FINAL
ASSESSMENT REPORT

Cove Wash Watershed Assessment Site
Navajo Nation, Cove Chapter, Arizona

Prepared for:

U.S. Environmental Protection Agency
Tribal Lands Cleanup Section, Region 9

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ABBREVIATIONS AND ACRONYMS

$\delta^{18}O$	$^{18}O/^{16}O$
$^{0}/_{00}$	per thousands
CO_3	carbonate
ADEQ	Arizona Department of Environmental Quality
amsl	above mean sea level
AUM	abandoned uranium mine
bgs	below ground surface
°C	degrees Celsius
°F	degrees Fahrenheit
CMEH	Carrizo Mountain Environmental & Herbarium
COC	constituent(s) of concern
COPC	constituent(s) of potential concern
cpm	counts per minute
DQO	data quality objectives
EPA	U. S. Environmental Protection Agency
GPS	global positioning system
HRS	Hazard Ranking System
µg/L	micrograms per liter
mg/kg	milligram per kilogram
mg/L	milligram per liter
MSO	Mexican spotted owl
MCAP	Mine Category Assessment Protocol
mV	millivolt
NNDFW	Navajo Nation Department of Fish & Wildlife
NNEPA	Navajo Nation Environmental Protection Agency
NNSWQS	Navajo Nation Surface Water Quality Standards
ORP	oxidation-reduction potential
pCi/L	picocuries per liter
QA	quality assurance
RSL	Regional Screening Level

ABBREVIATIONS AND ACRONYMS - CONTINUED

SAP	Sampling and Analysis Plan
SD	standard deviation
START	Superfund Technical Assessment and Response Team
TDS	total dissolved solids
USGS	U. S. Geological Survey
USFWS	U.S. Fish & Wildlife Service
VSMOW	Vienna Standard Mean Ocean Water
WESTON	Weston Solutions, Inc.

EXECUTIVE SUMMARY

The Cove Wash watershed assessment was conducted over four sampling events: a 2015 low flow sampling event, a 2016 spring snowmelt sampling event, a 2016 low flow sampling event, and a 2017 spring snowmelt sampling event. The watershed assessment included sampling of surface water and sediment to delineate the contamination and source(s) contributing to the contamination in drainages throughout the watershed. Ground surface gamma radiation surveys were conducted within Cove Wash watershed drainages in the vicinity of sampling locations to identify areas of high gamma activity during each sampling event. Groundwater wells, seeps, and springs were also sampled in order to assess potential impacts of historical uranium mining from abandoned uranium mines (AUMs) in the Cove Wash watershed.

General trends were observed for uranium concentrations in surface water based on the geologic units of the sample locations. The lowest uranium concentrations were found above the Morrison Formation, and the highest concentrations were found just below the Morrison Formation, with a decreasing concentration trend down section from the Morrison Formation. However, the surface water pathway is a dynamic system that may have contributions from sources other than waters originating from the individual geological layers discussed including surface water from upstream. Uranium also appears to be transported in the dissolved phase in surface waters throughout the watershed. The majority of uranium is not attached to sediments moving through the surface water pathway, a scenario which would be observed as a higher concentration of total uranium versus dissolved uranium, rather than the relatively higher dissolved concentrations seen in this assessment.

General chemistry and isotope analysis were conducted to assist in determining water sources within the watershed. Evaluation of stable isotopes indicates that the results deviate from the Meteoric Water Line, favoring the heavier oxygen and hydrogen isotopes; this is indicative of a harshly evaporative watershed. The overall chemistry of the Cove Wash watershed is dominated by a calcium-bicarbonate chemistry, with influence along alkali and/or sulfate vectors. Based on an evaluation of uranium isotopes in water samples throughout the watershed, specifically $^{234}U/^{238}U$ ratios, while samples collected from background locations had uranium exceedances, indicating that some non-anthropogenic contribution of uranium to the Cove Wash watershed is present, uranium deriving from the geologic layer in which abandoned uranium mines reside throughout the watershed are the primary contributors to uranium concentrations found downstream of AUMs, all the way to the furthest downstream sampling location within Cove Wash.

The data suggest that uranium concentrations may be highest in surface waters encountered during low flow season. Additional sampling events would be required to confirm this, as data were only collected during two low flow and two spring snowmelt sampling events. Surface flows encountered during snowmelt conditions showed high concentrations of total uranium in 82 to 91% of the samples collected, suggesting that dilution of contaminants from higher flow volumes is not sufficient to reduce concentrations to below screening levels. Background sampling location concentration ranges displayed some variability, sometimes exceeding the EPA Maximum Contaminant Level for drinking water of 30 micrograms per liter, suggesting that further investigation of naturally-occurring uranium in surface water and groundwater may be warranted.

Based on exceedances of screening level and background ranges for each sampling event, the following constituents of concern (COCs) in water are associated with AUMs within the Cove Wash watershed: total uranium, total aluminum, total adjusted gross alpha radiation, total arsenic, total barium, total beryllium, total lead, total mercury, total molybdenum, total combined radium, total selenium, total thallium, total vanadium, dissolved cadmium, and dissolved copper. The following COCs in sediment are associated with AUMs within the watershed: uranium, antimony, arsenic, barium, selenium, and thallium. The following COCs in sediment may be within background levels found in the general area: antimony, arsenic, barium, and selenium.

Based on sampling results from events conducted from 2015 to 2017, concentrations of uranium, aluminum, and arsenic in surface waters exceed one or more screening levels from the geologic layer in which AUMs reside all the way to the furthest downstream sampling location, near the boundary of the watershed. It is recommended that the possibility of collecting additional samples downstream of the Cove Wash watershed boundary be evaluated in order to determine the full extent of uranium and other COCs that exceed screening levels.

1. INTRODUCTION

In 2015, the U. S. Environmental Protection Agency (EPA) tasked Weston Solutions, Inc.'s (WESTON®) Superfund Technical Assessment and Response Team (START) to conduct a watershed assessment at the Cove Wash Watershed site (the Site) in the Cove Chapter of the Navajo Nation, Apache County, Arizona. The watershed assessment was conducted over four sampling events: a 2015 low flow sampling event, a 2016 spring snowmelt sampling event, a 2016 low flow sampling event, and a 2017 spring snowmelt sampling event.

The watershed assessment included sampling of surface water and sediment to delineate the contamination and source(s) contributing to the contamination in drainages throughout the watershed. Media investigated included surface water collected from stream channels, seeps, and springs, and groundwater collected from shallow wells. Sampling locations were chosen based on proximity to mined areas or in the assumed path of materials transported downslope from mines. Wherever possible, based on the presence of water during each sampling event, surface water samples were collected at confluences and above confluences. In the event that surface water was not present in a tributary, a sediment sample was collected at the furthest accessible reach upstream. Water parameters such as temperature and conductivity were measured at each surface water sampling point. Ground surface gamma radiation surveys were conducted within Cove Wash watershed drainages in the vicinity of sampling locations to identify areas of high gamma activity during each sampling event. Groundwater wells, seeps, and springs were sampled in order to assess potential impacts of historical uranium mining in the Cove Wash watershed.

The revised Sampling and Analysis Plan (SAP) (Appendix A) describes the project and data use objectives, data collection rationale, data quality assurance (QA) goals, and requirements for sampling and analysis activities. It also defines the sampling and data collection methods that were used for this project. The SAP is intended to accurately reflect the planned data-gathering activities for this task; however, site conditions, budget, and additional EPA direction that warranted modifications are described below and documented in Site records. Analytical data were validated as specified in Section 9.4 of the SAP. Data validation was performed by START according to the *EPA Region IX Superfund Data Evaluation/Validation Guidance R9QA/006.1*

(EPA, 2001a). The standard data quality review requirements of a Tier 2 validation of 100% of the data (as defined in *Requirements for Quality Assurance Project Plans* [EPA, 2001b]) satisfy the data quality requirements for this portion of the project.

1.1 STATEMENT OF THE SPECIFIC PROBLEM

A total of 42 abandoned uranium mines (AUMs) are located within the Cove Wash watershed. Twenty-four of the AUMs were historically operated by Kerr McGee, which became Tronox. The 2014 Tronox settlement provides a total of $5.15 billion, including over $4.4 billion to clean up many environmental contamination sites across the United States. This includes almost $1 billion to clean up more than 50 Navajo area uranium mines operated by Kerr-McGee. It is known as the Tronox settlement because the case arose from the Tronox Bankruptcy. In the bankruptcy, the United States, the Navajo Nation and other parties sued to recover funds from the Kerr-McGee and Anadarko Petroleum companies for environmental and other liabilities that Tronox could not pay. It is the largest environmental cleanup settlement in U.S. history. From the late 1940s to the 1980s, Kerr-McGee Corporation mined more than seven million tons of uranium ore on or near the Navajo Nation. Twenty-nine (29) of these mines are located in the Cove and Lukachukai Chapters. Other mines are located in the Teec Nos Pos, Coyote Canyon, Casamero Lake, and Baca/Prewitt Chapters. The Tronox settlement allocated approximately $89 million for the Quivira mines in the Coyote Canyon Chapter. No specific settlement amount has been allocated to the mines in Cove or any other area. There are approximately 30 additional AUMs in the Lukachukai and Carrizo Mountains that are not covered by the settlement because they were not operated by Kerr-McGee. The EPA is working to identify additional responsible parties to pay for cleanup of these mines.

Previous studies within the watershed have identified uranium and other constituents of potential concern (COPCs), including arsenic and molybdenum, within surface water, groundwater, and sediments (Lameman-Austin, 2012; NNEPA, 2014). Previous gamma screenings conducted in 2008 by WESTON identified elevated gamma radiation levels in the AUMs throughout the watershed and within surveyed drainages below. Additionally, unreclaimed mining waste has been identified within Cove Wash drainages during previous investigations. Due to the large number of AUMs present within the Cove Wash watershed, it is important to determine which AUMs are contributing to the elevated concentrations of COPCs.

The Cove Wash watershed is not a known drinking water source, but may have been historically used by residents before drinking water was provided by a municipal source 20 years ago. However, it is not entirely clear if residents are currently using surface water and/or groundwater wells for drinking water (Lameman-Austin, 2012; NNEPA, 2014). Additionally, the Cove Wash watershed is used extensively for drinking water for grazing livestock. Livestock are dependent on surface water and groundwater for drinking.

At least one sensitive species, the Mexican spotted owl (MSO), is present within the Cove Wash watershed. The MSO is listed as "threatened" by the U.S. Fish and Wildlife Service (USFWS) and "Endangered - G3" by the Navajo Nation Department of Fish and Wildlife (NNDFW). Three protected activity centers were established in the watershed based on surveys conducted from 2005 to 2007. EPA Region 9 received concurrence from USFWS on determinations in a previous biological assessment report in 2015 (USFWS, 2015): Consultation Number 02EAAZ00-2015-I-0452) for Cove Wash watershed assessment field activities and other field activities. During the initial 2015 low flow sampling event, MSO were observed onsite, and were observed again during 2016 field activities. Two years of MSO surveys were completed in June 2017. MSO surveys were conducted from June to August in 2016 and from March to August in 2017. Based on the presence of established protected activity centers, observations during field activities, and surveys conducted in 2016 and 2017, MSO populations have been documented within the watershed.

Potential wetland habitat has been identified onsite and wetland delineation field activities have been conducted. The results of the wetland delineation will be submitted in a separate report. Based on preliminary data, wetlands are present in drainages downstream of AUMs within the watershed.

2. SITE BACKGROUND

2.1 SITE LOCATION AND DESCRIPTION

The Site consists of the Cove Wash watershed, which includes 42 AUMs within the Lukachukai Mountains. The Cove Wash watershed is located within the Navajo Nation and extends at the highest elevations in the Lukachukai Mountains and downstream to Cove, Arizona. The watershed contains approximately 52 miles of tributaries and is defined by the U.S. Geological Survey (USGS) as Hydrologic Unit Code 140801050903. Annual precipitation averages 12 to 16 inches throughout the watershed. The site location is shown in Figure 1. AUMs located in the Cove Wash watershed are shown in Figure 2.

2.2 SITE HISTORY

Uranium outcrops were discovered within the Cove Wash watershed in the late 1940s. During that same time period, Dan Phillips obtained a 528-acre lease, and Koley Black obtained a 640-acre lease. Mr. Phillips and Mr. Black then assigned F.A. Sutton, Inc. a 75% interest in their leases. Uranium and vanadium ore shipments from the watershed began in 1950 (NNEPA, 2004). The mine sites were situated along mesas throughout the watershed. Uranium and vanadium mining ceased in the 1960s and the mine sites were abandoned. The Navajo Nation reclaimed some of the AUMs in the 1990s, but mine waste remains present throughout the watershed, much of which is difficult to access (Lameman-Austin, 2012).

2.3 PREVIOUS INVESTIGATIONS

In 1999, the EPA collected surface water and groundwater samples within the Cove Wash watershed and analyzed the samples for metals and radionuclides. Uranium and other metals exceeded EPA Maximum Contaminant Levels (MCLs) for drinking water in some samples collected during the investigation. Of the 21 water samples collected, 12 water samples contained COPCs in exceedance of EPA MCLs for at least one COPC, including arsenic, uranium, selenium, and vanadium (Lameman-Austin, 2012).

In 2008, WESTON conducted AUM screenings throughout the Lukachukai Mountains, including AUMs located within the Cove Wash watershed. The AUM screenings consisted of gamma radiation screenings in the vicinity of a majority of AUMs in the watershed. Gamma readings two to three times background were detected at multiple AUMs during the 2008 AUM screenings.

In 2011, Terri Lameman-Austin conducted a study of the uranium distribution throughout the Cove Wash watershed as part of a Master's Degree fulfillment requirement with the assistance of the USGS. A total of seven surface water, three groundwater, and 26 sediment, rock, and soil samples were collected and analyzed for metals, including uranium and other trace metals. Uranium concentrations exceeded the EPA MCL of 30 micrograms per liter (µg/L) in all surface water samples collected during the study. Arsenic was detected above the EPA MCL of 10 µg/L in one surface water sample collected within the Cove Wash watershed. Uranium was detected above the MCL in one well sample (Ellison Well).

As part of the 2011 study, surface water and groundwater samples were also analyzed for major cations and anions, alkalinity, and stable oxygen isotopes (^{16}O and ^{18}O) in order to determine the ratio of $^{18}O/^{16}O$ ($\delta^{18}O$). As ^{16}O has a lower vapor pressure than ^{18}O, the $\delta^{18}O$ results can be used to determine additional information about surface water sources, such as whether the surface water source is primarily precipitation. The study report recommended that future investigations analyze water samples for $\delta^{18}O$. The study report also noted that uranium isotope (^{234}U and ^{238}U) concentrations in water samples can be used to evaluate groundwater residence times.

The Navajo Nation Environmental Protection Agency (NNEPA) completed a Surface Water Quality Assessment Report (Integrated 305(b) Report (pending revision) and 303(d) Listing) in 2014 (NNEPA, 2014). The report summarized water quality sampling events conducted at two locations downgradient of historical mining activity in the Cove Wash watershed. Data used for the assessment were from a 2001 sampling event for one sampling location, and from 2011 and 2012 for the second sampling location. The NNEPA compared concentrations of COPCs at the two locations to Navajo Nation Surface Water Quality Standards (NNSWQS) adopted by the Navajo Nation in 2013. Sampling results for the surface water location in 2001 did not meet

NNSWQS standards for gross alpha radioactivity, chlorine, and selenium. Sampling results for the surface water samples in 2011 and 2012 did not meet NNSWQS standards for gross alpha radioactivity, aluminum, and dissolved oxygen. However, the gross alpha radiation results were not adjusted to remove uranium alpha activity, as required for comparison to the NNSWQS standards. The assessment recommended that the Cove Wash watershed be designated as impaired per the U.S. Clean Water Act Sections 305(b) and 303(d). The assessment also recommended that a total maximum daily load for gross alpha radioactivity be developed for the Cove Wash watershed.

2.4 ASSESSMENT INVESTIGATIONS

A total of four sampling events have been conducted as part of the watershed assessment: a 2015 low flow sampling event, a 2016 spring snowmelt sampling event, a 2016 low flow sampling event, and a 2017 spring snowmelt sampling event. Low flow sampling events were conducted in June after the sustained flows associated with snowmelt runoff, but prior to the high flows associated with monsoon rains. However, the 2015 low flow sampling event was conducted several days after a rain event that was not considered to have been characteristic of the typical monsoon season of late summer, due to its brief duration and relatively low intensity. Due to the difficulties of rescheduling mobilization of the field team on such short notice, the event continued as scheduled. Spring snowmelt events were held when snow was still present at AUMs and within parts of drainages, but had mostly melted and was providing increased surface flows into the drainages.

The first sampling event was conducted within the Cove Wash watershed in 2015. The 2015 low flow sampling event was conducted from June 16 to June 25, 2015. A spring snowmelt sampling event was conducted from March 21, 2016 to April 1, 2016. START initially collected water and sediment samples only from the lower elevation areas of the Site because the higher elevation areas were inaccessible due to snowpack. Based on these limitations, project personnel were temporarily demobilized on March 31 and April 1, 2016. START personnel were re-mobilized to the Site on April 26, 2016, and sampling of the upper elevation areas of the Cove Wash watershed recommenced on April 27, 2016; sampling concluded on May 3, 2016. WESTON mobilized project personnel for a low-flow sampling event on June 16, 2016, and sampling concluded on June 29, 2016.

WESTON mobilized seven START personnel to Farmington, New Mexico, from April 16 - 17, 2017. One local START member began participating in sampling activities on April 18, 2017. A field office was established in an Environmental Response Team (ERT) trailer located within the gated area of the Cove Chapter House on April 18, 2017. A NNEPA representative, Binod Chaudhary, accompanied sampling teams during two days of the sampling event. On April 21, 2017, Mr. Chaudhary accompanied the hiking team to three Cove Wash Middle 1A sampling locations. On April 24, 2017, Mr. Chaudhary accompanied the all-terrain vehicle team to background locations at the top of the mesas and locations downstream of the dam. Sampling concluded on April 26, 2017.

3. PRINCIPLE STUDY OBJECTIVES, SCREENING LEVELS, AND BACKGROUND SAMPLE DETERMINATION

Watershed assessment data quality objectives (DQOs), screening levels for comparison to sample results, and background locations were determined prior to field activities and outlined in a SAP. The SAP was revised prior to each sampling event (Weston, 2015; Weston, 2016a; Weston, 2016b; Weston, 2017). The EPA reviewed and approved each SAP prior to each sampling event.

3.1 PRINCIPLE STUDY OBJECTIVES

The EPA tasked START to complete the watershed assessment to support the environmental data collection activities needed to document implementation and completion of the removal assessment. The primary objectives for this assessment were to delineate AUM sources of contamination to the Cove Wash watershed and characterize contamination within the watershed. COPCs for the watershed assessment were determined based on previous investigations discussed in Section 2.3, as well as a review of constituents of concern often identified at AUMs. COPCs were metals, gross alpha radiation, radium 226, and radium 228. Based on the results of this watershed assessment, COCs were identified and summarized in the conclusion section of this report. In order to further characterize surface waters within the watershed, some analyses unrelated to COPCs, such as stable isotopes and alkalinity, were evaluated.

START collected surface water, groundwater, and sediment samples, as well as conducted gamma radiation scanning surveys, in order to further characterize water contamination and delineate the source(s) contributing to contamination in the watershed. Analytical data were collected as part of this watershed assessment in order to answer the following site-specific study questions:

1. What is the extent of COC concentrations in surface water, groundwater, and sediments throughout the Cove Wash watershed?
2. Are the concentrations of COCs in surface water and groundwater present at concentrations above the MCL for drinking water?
3. Are the concentrations of COCs in sediments present at concentrations above the EPA Regional Screening Levels (RSLs) for protection of groundwater?

4. Is waste rock present within Cove Wash watershed drainages contributing to elevated concentrations of COCs within the watershed? If present, identify boundaries of waste rock in drainages.
5. What are other potential sources of contamination contributing to elevated concentrations of COCs within the watershed?

As part of the questions above, specific objectives were developed to be answered by analytical data and data collected in the field:

1. Determine the potential threat to human health or the environment from COCs originating from AUM waste within the Cove Wash watershed drainages which exceed the proposed action level protective of human health.
2. Determine the lateral ground surface boundaries where elevated gamma radiation activity is present within the Cove Wash watershed drainages.
3. Identify waste rock boundaries within Cove Wash watershed drainages.
4. Determine current COC concentrations within groundwater from wells throughout the Cove Wash watershed.

3.2 ENVIRONMENTAL SCREENING LEVELS

The screening levels for surface water and groundwater are EPA MCLs for drinking water. Screening levels for sediments are EPA RSLs for the protection of groundwater.

In addition, NNEPA sets surface water quality standards, NNSWQS, for surface water throughout the Navajo Nation. The SAP did not outline specific NNSWQS as updated standards were in draft format and being considered by the Navajo Nation during the 2015 to 2017 field activities, but noted they would be utilized once approved. Updated standards were approved by the Navajo Nation on May 23, 2017, and "Navajo Nation Surface Water Quality Standards 2015" are now Navajo Nation law. These standards still require EPA approval, but are approved by the Navajo Nation for use.

The NNSWQS 2007 designated Cove Wash for the following uses: secondary human contact, fish consumption, aquatic & wildlife habitat, and livestock watering. The NNSWQS 2015 split Cove Wash into two surface water body designations: Cove Wash, ephemeral reaches and Cove Wash, perennial and intermittent reaches. Steve Austin at the NNEPA confirmed that the Cove Wash watershed assessment study area lies within perennial and intermittent reaches (S. Austin.

NNEPA. Personal communication. June 30, 2017). The NNSWQS 2015 designated uses for Cove Wash, perennial and intermittent reaches are: primary human contact, secondary human contact, agricultural water supply, fish consumption, aquatic and wildlife, and livestock watering.

3.3 BACKGROUND SAMPLE AND SURVEY LOCATIONS

Sample locations for the four sampling events are shown on Figure 3. Sample locations for specific sampling events are shown in chronological order on Figures 3a through 3d. Background samples for surface water and sediment media were chosen within watershed drainages based on availability of locations hydraulically upgradient of potential contamination from AUMs. This included locations in mesas at higher elevations than mines (CW-04, CW-21, CW-30, CW-31, CW-45, and CW-88), where available, as well as locations within watershed tributaries at lower elevations that are not hydraulically downgradient of AUMs (CW-08, CW-18, CW-59, CW-86, and CW-87). Background sample locations are called out in Figure 4. Background sample locations for specific sampling events are shown in chronological order on Figures 4a through 4d.

The background samples collected at elevations above AUMs were from seeps and springs, as well as from surface water. Some background locations were only sampled for sediment (CW-30, CW-31, and CW-45). In order to collect background samples with similar characteristics as the sample locations, surface water and sediment samples were collected within watershed drainages with one exception at a background location collected at developed springs, (Mesa IV Springs [location CW-21]), where spring and sediment samples were collected in anthropogenically (road, livestock use) influenced areas that were not located directly within drainages. Surface water and sediment background locations were collocated. Sampling locations CW-44 and CW-46, Pine Water Springs drainage and Pine Water Springs, were initially evaluated as background locations, but when sampled, it was observed that mine waste, possibly from Mesa I AUMs, may have been used as erosion control in the vicinity of the well. Gamma scanning results and stationary 1-minute gamma readings were above background. Therefore, although surface water results indicate that the spring is not impacted by uranium contamination, the surface water and sediment samples are not evaluated as background samples.

Airborne contamination to sediments was not considered when choosing background locations for sediments. In general, surface water samples were limited due to the location of AUMs in the upper parts of the drainages, which were often dry. Background locations at elevations above the AUMs were limited to springs and seeps as no running water was located as suitable background locations (CW-04, CW-18, and CW-21) with the exception of sample location CW-88. Surface waters flowing into Cove Wash from locations surrounding the mesas that did not receive runoff from AUMs were more often present during spring snowmelt sampling events (CW-59, CW-86, and CW-87).

4. SITE GEOLOGY AND HYDROLOGY

4.1 GEOLOGIC OVERVIEW

The Cove Watershed is located within the Lukachukai Mountains of the Canyon Lands section of the Colorado Plateau physiographic province in Arizona. The Colorado Plateau is an elevated, stable crustal block of relatively undeformed rocks. The plateau is surrounded by the Rocky Mountains thrusting up to the north and east, and the Basin and Range province (created by tensional forces) to the south and west. The Canyon Lands section consists of structural basins and uplifted regions, neither of which are associated with significant faulting.

The Lukachukai Mountains are part of the Defiance Uplift located in the Four Corners region of Arizona, and are located at the north end of the Chuska Mountains, south of the Carrizo Mountains, and west of the Shiprock pinnacle. Bare sandstone mesas and canyons are located to the east. Within the Lukachukai Mountains, the Cove Watershed slopes to the northeast, and elevations at the Site range from approximately 6,300 feet above mean sea level (amsl) to over 9,000 feet amsl on top of the mesas.

In 1967, the U.S. Atomic Energy Commission commissioned a geologic report on the Lukachukai Mountains titled *The Uranium Deposits of the Lukachukai Mountains, Arizona* by William L. Chenoweth. According to this report, “Elevation at the mines ranges from 7,200 to 7,700 feet. Finger-like mesas and deep, steep-walled canyons combine to form very rugged topography. Except for the higher mountain slopes above the heads of the canyons, rock exposures are excellent and fairly continuous, though in many places inaccessible. The rugged topography makes roadbuilding difficult and hazardous” (Chenoweth, 1967). A more thorough discussion of the structural, economic, and stratigraphic geology at the Site can be found in Strobell, 1956; Chenoweth, 1967; and Carrizo Mountain Environmental & Herbarium (CMEH), 2015. Stratigraphy at the Site as described by Chenoweth in 1967 and CMEH in 2015 is summarized in Table 1 below.

Table 1: Summary of Geologic Formations within the Cove Watershed			
Geologic Formation	**Age[a]**	**Lithology[b]**	**Description[c]**
Basalt Flow	Tertiary	Dark, massive basalt eroding into hexagonal columns at cliffs.	Basalt flows cap portions of the mesas of the Lukachukai mountains.
Chuska Sandstone	Eocene and Oligocene	Massively crossbedded, white to grayish white sandstone with thin basal conglomeratic sandstone.	The eolian Chuska Sandstone is exposed on the upper slopes of the mountains. A resistant silicified unit of the Chuska caps the main mountain ridge.
Morrison Formation (Non-Salt Wash members)	Jurassic	Variegated shale, sandstone, siltstone, and mudstone.	This fluvial formation also contains uranium ore in the Recaptured Member.
Salt Wash Member of the Morrison Formation	Jurassic	Light gray sandstone interbedded with greenish, reddish gray shale, siltstone, and thin conglomeritic lens.	The only commercial uranium ore bearing unit in the Lukachukai district. It crops-out continuously around the perimeter of the mountains, and most of the AUMs are located within this formation.
Summerville/Wanakah Formation	Jurassic	Sandstone, shale, limestone, gypsum, hard calcareous concretions and breccia.	The marginal marine, interbedded sandstones and siltstones of this formation overlie the Entrada Sandstone and are exposed around the perimeter of the mountains.
Entrada Sandstone	Jurassic	Upper unit thin bedded, reddish brown sandstone; lower unit massive bedded, reddish brown, sandstone and siltstone.	The marginal marine sandstones and siltstones are partly sub-aerial and partly sub-aqueous. The formation is exposed around the perimeter of the mountains and rests conformably on the Carmel where present; where the Carmel is absent, the Entrada rests unconformably on the Wingate Sandstone. Upper cliff-forming unit at Site.
Carmel Formation	Jurassic	Reddish orange brown to buff sandstone and siltstone with reddish green shale.	This formation consists of marginal marine siltstone and mudstones which thin southeastward and pinch out in the Lukachukai Mountains area. It overlaps the Kayenta and Navajo feather edges and rests conformably on the Wingate Sandstone.
Navajo Sandstone	Jurassic	Massive bedded, highly cross-bedded, light red to gray orange sandstone.	Eolian sandstone nearly coextensive with the Kayenta Formation is exposed as a wedge edge on a bench northwest of Mexica Cry Mesa. The sandstone thickens to the northwest.
Kayenta Formation	Triassic	Fine grained, reddish purple, pale reddish gray to reddish brown sandstone, siltstone and shale.	Fluvial formation exposed as a wedge edge on the northeast side of Mexican Cry Mesa. It pinches out as a result of non-deposition in the area and thickens to the north and west.

Table 1: Summary of Geologic Formations within the Cove Watershed			
Geologic Formation	Age[a]	Lithology[b]	Description[c]
Wingate Sandstone	Triassic	Massively bedded and cross-bedded reddish orange sandstone and siltstone.	Eolian sandstones and siltstones are exposed around the foot of the mountains in steep ledgy slopes and picturesque vertical cliffs hundreds of feet high. Lower cliff-forming unit at Site.
Chinle Formation	Triassic	Variegated shale, sandstone, siltstone, and limestone conglomerate.	Fluvial and lacustrine formation exposed in broad valleys around the mountains. The community of Cove is primarily situated on the Chinle Formation.

Notes:
AUM = abandoned uranium mine
[a] The Triassic period occurred between approximately 200 and 250 million years ago, the Jurrassic period occurred between approximately 145 and 200 million years ago, and Eocene and Oligocene Epochs occurred between approximately 23 and 56 million years ago. The Eocene and Oligocene Epochs are part of the Tertiary, which occurred between approximately 2.5 and 65 million years ago.
[b] Lithology adapted from CMEH, 2015.
[c] Descriptions adapted from Chenoweth, 1967.

4.1.1 Designation of Seeps, Springs, and Surface Water

All environmental water samples at the Site were collected from surface water sources, except for two shallow groundwater wells, believed to be less than 20 feet below ground surface (bgs) emplaced into the Chinle Formation (GW-01 and GW-03). Surface water was collected during both spring (snowmelt) and early summer (low flow) conditions as discussed in Section 3.4. As summarized in Table 2 below, surface water at some locations occurred perennially, and at other locations seasonally. In addition, some of this surface water was from overland flow, and some occurred as natural seeps and springs. These surface water sources are shown on Figure 3 with assigned sample locations.

Springs were observed on top of the mesas above the Morrison Formation, and were typically developed with a livestock trough. Seeps were observed throughout the canyons between the mesas. Seeps identified in the table below may not have produced overland flow, but were characterized by moisture, erosion, and deposition of evaporates on sedimentary rock in the immediate vicinity; patches of vegetation such as forbs, shrubs, mosses, or species associated with wetlands habitats; and evidence of regular use by livestock and wildlife. Most of the seeps identified occurred within or at the base of the Wingate sandstone Formation (Section 4.1).

Table 2: Sources of Water Samples Collected within the Cove Watershed				
Location ID	**Source Type**	**Presumed Source Geology[a]**	**Cove Watershed Location[b]**	**Notes**
GW-01	Groundwater Well	Chinle	Cove Wash North	Red Point Dug Well
GW-03	Groundwater Well	Chinle	Cove Wash	No longer operational as of 06/17/2015
CW-10	Spring	Chinle	Cove Main Wash	Cottonwood Spring
CW-21	Spring	Morrison Member	Background (Mesa IV)	Mesa IV Spring
CW-46	Spring	Chuska	Mesa I	Pine Water Spring
CW-04	Seep	Morrison Member	Background (Cove Wash North)	Perennial
CW-15	Seep	Base of Wingate	Cove Wash North	2016 low flow event only (Intermittent)
CW-18	Seep	Base of Wingate	Background (Cove Wash Middle 1)	Dry in 2016 low flow event (Intermittent)
CW-26	Seep	Base of Morrison	Cove Wash Middle 2	Perennial
CW-47	Seep	Entrada/Carmel	Cove Wash Middle 3	Dry in 2015 low flow event (Intermittent)
CW-51	Seep	Wingate	Cove Wash Middle 1	Dry in 2016 low flow event (Intermittent)
CW-53	Seep	Wingate	Cove Wash Middle 1	Perennial
CW-54	Seep	Wingate	Cove Wash Middle 1	Perennial
CW-56	Seep	Wingate	Cove Wash Middle 3	2016 only (Intermittent)
CW-64	Seep	Entrada/Carmel	Cove Wash North	Perennial
CW-70	Seep	Wingate	Cove Wash Middle 3	First sampled during 2016 low flow event
CW-75	Seep	Summerville	Cove Wash Middle 3	First sampled during 2016 low flow event
CW-01	Surface Water	Chinle	Cove Main Wash	Perennial
CW-02	Surface Water	Chinle	Cove Main Wash	Perennial
CW-03	Surface Water	Chinle	Cove Main Wash	2016 Spring event only (Intermittent)
CW-05	Surface Water	Base of Wingate	Cove Main Wash	Perennial
CW-07	Surface Water	Chinle	Cove Main Wash	Perennial
CW-09	Surface Water	Chinle	Cove Main Wash	2016 Spring event only (Intermittent)
CW-11	Surface Water	Base of Wingate	Cove Wash North	Perennial
CW-12	Surface Water	Base of Wingate	Cove Wash Middle 3	Perennial
CW-13	Surface Water	Base of Wingate	Cove Wash Middle 3	Perennial

Table 2: Sources of Water Samples Collected within the Cove Watershed				
Location ID	**Source Type**	**Presumed Source Geology[a]**	**Cove Watershed Location[b]**	**Notes**
CW-14	Surface Water	Base of Wingate	Cove Wash Middle 3	Perennial
CW-36	Surface Water	Base of Wingate	Cove Wash Middle 2	Perennial
CW-37	Surface Water	Base of Wingate	Cove Wash Middle 2	Perennial
CW-38	Surface Water	Base of Wingate	Cove Wash Middle 2	Perennial
CW-39	Surface Water	Base of Wingate	Cove Wash Middle 2	Perennial
CW-41	Surface Water	Base of Wingate	Cove Wash Middle 1	2016 Spring event only (Intermittent)
CW-48	Surface Water	Wingate	Cove Wash Middle 3	Dry in 2016 low flow event (Intermittent)
CW-50	Surface Water	Wingate	Cove Wash Middle 1	Perennial
CW-59	Surface Water	Chinle	Background (Cove Main Wash Tributary)	2016 & 2017 Spring event only (Intermittent)
CW-60	Surface Water	Chinle	Cove Main Wash	2016 Spring event only (Intermittent)
CW-62	Surface Water	Chinle	Cove Main Wash	2016 Spring event only (Intermittent)
CW-65	Surface Water	Entrada/Carmel	Cove Wash Middle 3	Perennial
CW-66	Surface Water	Entrada/Carmel	Cove Wash Middle 3	Perennial
CW-81	Surface Water	Chinle	Cove Wash North	First sampled during 2016 low flow event
CW-08	Surface Water	Chinle	Cove Wash North Tributary	First sampled during 2017 spring snowmelt
CW-82	Surface Water	Base of Wingate	Cove Middle 2	First sampled during 2017 spring snowmelt
CW-83	Surface Water	Base of Wingate	Cove Middle 2	First sampled during 2017 spring snowmelt
CW-84	Surface Water	Base of Wingate	Cove Middle 2	First sampled during 2017 spring snowmelt
CW-85	Surface Water	Base of Wingate	Cove Middle 2	First sampled during 2017 spring snowmelt
CW-86	Surface Water	Base of Wingate	Cove Middle 3	First sampled during 2017 spring snowmelt (Intermittent)
CW-87	Surface Water	Base of Wingate	Cove Middle 3	First sampled during 2017 spring snowmelt (Intermittent)

Table 2: Sources of Water Samples Collected within the Cove Watershed				
Location ID	**Source Type**	**Presumed Source Geology[a]**	**Cove Watershed Location[b]**	**Notes**
CW-88	Surface Water	Entrada/Carmel	Background (Cove Middle 3)	First sampled during 2017 spring snowmelt
CW-90	Surface Water	Base of Wingate	Cove Middle 3	First sampled during 2017 spring snowmelt event

Notes:
[a] See Section 4.1 for a discussion of Site geology
[b] See Figure 3 for watershed locations

4.1.2 Total Uranium Results by Geologic Unit

Surface water, seep and spring samples were collected from 49 locations on the following geologic units: Chuska Sandstone, Morrison Formation, Summerville Formation, Entrada Sandstone/Carmel Formation, Wingate Formation and the Chinle Formation. For purposes of this discussion only the general formation was identified and groundwater samples were omitted (CW-01G and CW-03G).

To identify the geologic units, in addition to field observations, the sample locations were overlaid onto a georeferenced geologic map of the area (USGS, 1968). Figure 5 includes the sample locations and the portion of the geologic map that covers the Site. Each sampling location was inspected and the surface exposure of the geologic unit corresponding to its location was identified. The water samples collected in each geologic unit represent the waters that contributed to the sample and likely flowed through or over other geologic units. Thus, a surface water sample collected in the Entrada/Carmel Formations may have influences from the geologic units above such as the Morrison, Summerville and Chuska, and/or other units that are not listed above.

Next, the concentrations of total uranium versus time were graphed and evaluated to assess the total concentration per formation, as well as calculating the minimum, maximum and mean of each formation. This evaluation was conducted to see if there was any trend information that could be inferred from the geologic unit where samples were collected. No other COPC were analyzed.

Total uranium appears to decrease downgradient further away from the Morrison Formation, with the highest concentrations in surface water samples collected on exposures of the Entrada/Carmel Formation. The lowest concentrations were in water samples collected on an exposure of the Chuska Formation (above the Morrison). Although the uranium ore was mined from the Morrison Formation, the concentrations of total uranium in samples collected on the Morrison were relatively low, possibly due to the fact that background seep locations at elevations above AUMs were collected within the Morrison Formation, with the highest concentrations collected from formations just below the Morrison Formation (Summerville and Entrada/Carmel).

The following table lists the ranges of concentrations detected in surface water from each formation and observations about the data. The data are presented from the top to bottom of the section (or youngest to oldest formations). Table 3 below contains the total uranium concentration information for surface water and the geologic unit the samples were collected from.

Table 3: Total Uranium Results by Geologic Unit

Formations Sampled	Total Uranium Concentrations				Relative Location and Age of Units
	Range (µg/L)	Mean (µg/L)	# Sample Locations	# Data Points	
Chuska	5.4-5.7	5.6	1	4	Youngest Formation (Top)
Morrison	1.5-220	72.6	3	12	
Summerville	540-790	665	1	2	↓
Entrada/Carmel	110-2000	606.4	7	15	
Wingate	4.4-700	131.2	26	68	Oldest Formation (Bottom)
Chinle	15-270	71.5	11	25	

Notes:
µg/L = micrograms per liter

Chuska Formation: The Chuska Formation is the youngest formation from which samples were collected. Only one surface water sample location, CW-46, was identified on this formation. All four samples from this location contained low concentrations of total uranium (around 5.6 µg/L).

Morrison Formation: The Morrison Formation is the uranium ore bearing formation. Three locations were identified on this formation. The total uranium concentrations were relatively low, ranging from 1.5 to 220 µg/L. Each location had a specific range of total uranium concentrations. CW-21 had the lowest general concentrations: between 3.2 µg/L to 3.7 µg/L; and CW-04 contained the mid-range uranium concentrations: generally between 25 µg/L to 37 µg/L, with one low concentration at sample location CW-04 from the June 2015 sampling event with a total uranium concentration of 1.5 µg/L. Finally, sample location CW-26 ranged from 170 to 220 µg/L.

Summerville Formation: Only one sample location, CW-75, was identified on the Summerville Formation, and was sampled only during the 2016 low flow and 2017 spring snowmelt sampling events. The concentrations of total uranium from these two samples were 540 µg/L and 790 µg/L, respectively. Although there are only two samples, the concentrations of uranium found at sample location CW-75 support the trend of higher concentrations of uranium collected below the Morrison with the near Morrison samples containing the highest concentrations.

Entrada/Carmel Formation: The Entrada Sandstone and Carmel Formation were combined as one Formation for the purposes of this discussion due to the thickness of the formations as well as the similar nature of the reddish brown soils. Seven sample locations were identified within the Entrada/Carmel Formation. The highest concentrations of uranium were collected from water on this formation. Concentrations of uranium from these locations can be grouped into two concentration ranges. Five of the locations' samples total uranium concentrations ranged from 110 µg/L to 600 µg/L, and two locations (CW-65 and CW-66) ranged from 950 µg/L to 2,000 µg/L.

Wingate Formation: More samples were collected from the Wingate Formation than any other formation, with samples collected from 26 locations. Like the Entrada/Carmel Formation, the samples can be divided into two uranium concentration ranges. Twenty-three of the locations' samples total uranium concentrations ranged from 4.4 µg/L to 250 µg/L, and three locations (CW-51, CW-54 and CW-56) ranged from 400 to 700 µg/L.

Chinle Formation: The Chinle Formation is the oldest and lowest formation from which samples were collected. Eleven sample locations were identified on the Chinle Formation. The total uranium concentrations from these locations were between 15 µg/L and 150 µg/L, with one sample location, CW-01 during the Summer 2016 sampling event, with a total uranium concentration of 270 µg/L.

As stated above, the general trend of concentrations of uranium in water collected within drainages based on the geologic unit the samples were collected from is lowest above the Morrison and highest just below the Morrison with a decreasing concentration trend downgradient from the Morrison. It is understood that the surface water pathway is a dynamic system and can have contributions from sources other than waters originating from the individual geological layers discussed.

4.1.3 Geochemical Evaluation

4.1.3.1 General Chemistry - Piper Plots

The general chemistry of the Cove Watershed can be analyzed using Piper diagrams, a data rendering that presents major dissolved cations (calcium, magnesium, sodium and potassium) and anions (carbonate, bicarbonate, chlorine and sulfate) in proportion to hardness. The data are presented in three graphs: two ternary diagrams, each representing the cation and anion fractions, and a quaternary plot presenting cation/anion trends. Major anions and cations are not generally COPCs for the watershed and are evaluated in an effort to further understand sources of water to the Cove Wash watershed.

START generated the Piper diagrams using laboratory data from the 2016 and 2017 sampling events, and the USGS's GW Chart program (Figures 6 through 8). Water samples were not submitted for dissolved cations and anions in 2015, per SAP requirements. The data were formatted in Excel, then copied into GW Chart for plotting. GW Chart normalizes the major cations and anions to total dissolved solids (TDS), which was calculated as the sum of anions and cations for these diagrams. For the majority of the samples, carbonate (CO3) was not detected above the method detection limit, typically 20 milligrams per liter (mg/L); in each of these cases, START used the method detection limit as a proxy for the carbonate value, as opposed to entering a zero value.

The general chemistry data for the 2017 spring snowmelt sampling event are presented in a series of Piper diagrams, broken out by watershed, on Figure 9. The overall chemistry of the Cove Watershed can be described as being dominated by a calcium to alkaline (Na + K) cation chemistry, and bicarbonate-sulfate anion chemistry. Surface water chemistries tend to cluster together in the upper reaches of the watershed, with some separation between seeps and the lithologies over which the water is flowing.

Cove Wash North

Cove Wash North shows the largest variation in chemistry, mostly because of data from a single point, CW-81, which may be due to the local influence of a northern tributary. The reach of Cove Wash North includes two seeps, one in the Morrison Formation, and one in the Entrada/Carmel Formation. Surface water is observed/sampled in the upper reaches flowing over Wingate Formation (CW-11) and subsequently flowing over the Chinle Formation, where it joins with the Cove Wash Middle at CW-06.

The general chemistry data for Cove Wash North suggest blending between calcium- (CW-04) and sodium-rich (CW-81) endmembers in this reach of the watershed. In addition, the anion chemistry indicates that there may be a slight increase in chlorine and sulfate with distance in the watershed, which may represent an evaporative trend.

Cove Wash Middle 1

The sample locations in Cove Wash Middle 1 are dominated by seeps, one of which (CW-21) is in the Morrison Formation, and the rest of which are in the Wingate Formation. One surface water sample (CW-39) also flows over the Wingate Formation.

The data cluster very tightly, favoring calcium and bicarbonate. Seep sample CW-21 from the Morrison Formation appears to be an endmember for this reach of the watershed, with water chemistry increasing slightly toward the magnesium-alkali and sulfate direction as water flows through Wingate lithologies.

Cove Wash Middle 2

The samples from Cove Wash Middle 2 consist mostly of surface water samples flowing over Wingate Formation, and a single seep sample from the Morrison Formation. Cove Wash Middle 2 represents the most robust surface flow regime observed during the spring 2017 sampling event.

The general chemistry data for the surface water samples from Cove Wash Middle 2 cluster very tightly in the same calcium bicarbonate field observed in the Middle 1 plot. Seep sample CW-26 plots in a higher sodium sulfate field, and is distinct from the rest of the samples in this reach of the wash. The calcium bicarbonate composition of the seep water at CW-21 appears to be the most likely candidate for an endmember for this reach of the wash, with another endmember being something close to the sodium sulfate composition of CW-26, as well as a possible third alkali bicarbonate (low-sulfate) endmember.

Cove Wash Middle 3

The sample locations for Cove Wash Middle 3 consist of seeps from the Morrison and Chuska Formations, as well as surface water samples flowing over Wingate, Entrada/Carmel, and Chinle Formations.

Seep sample CW-46 is similar to CW-21 in its calcium bicarbonate chemistry, while the seeps at CW-47 and CW-75 have higher sulfate and alkalis, respectively. The surface water data do not cluster as tightly in this reach of the Middle wash, but instead spread across a field toward two possible endmembers: one alkali bicarbonate endmember (similar to the one postulated for Cove Wash Middle 2), and the other an alkali sulfate endmember resembling CW-26.

Cove Wash South and Main Fork

The samples of the Cove Wash South reach and Main Fork consist of surface water, seep, and groundwater samples associated with Chinle Formation lithologies.

The chemistry of this reach of the wash is distinct and dominated by an alkali bicarbonate endmember, similar to that postulated for Cove Wash Middle 2 and 3.

Temporal Variations in General Chemistry

Three data sets are available, including 2016 spring snowmelt, 2016 low flow, and 2017 spring snowmelt sampling events. Water samples collected during the 2015 low flow sampling event were not analyzed for general chemistry analytes as discussed per SAP requirements. The two spring data sets are generally consistent with each other, with variations that may represent normal fluctuations in annual rainfall.

The 2016 low flow and 2017 spring snowmelt data sets lie also mostly within the same plot areas, with the exception of order-of-magnitude variations in Cl and/or SO4 at a few locations, notably CW-21, -26, -50, -53, -54, -64, and -65. The general trend is for an increase in Cl and/or SO4 during the high-flow sampling event, except in CW-21, where Cl increases, but SO4 decreases substantially. Cation chemistry is generally more stable across the data sets than the anion chemistry.

General Chemistry Conclusions

The overall chemistry of the Cove Wash watershed is dominated by a calcium-bicarbonate chemistry, with influence along alkali and/or sulfate vectors. From the spring 2017 data set (Figure 9), analysis suggests at least three endmember water types:

1) The upper wash endmember is a high-calcium, high-bicarbonate water relatively depleted in magnesium, alkalis, chlorine and sulfate. The sample that most closely represents this endmember is CW-21, collected from a seep at the head of Cove Wash Middle 1. The general chemistry of this sample is also similar to CW-04 and CW-47, which are also located in the Morrison Formation. The general chemistry of CW-21 is also similar to CW-46, located in the Chuska Formation. Most of the upper wash surface and seep data lie relatively close to this endmember, between two other potential endmembers.

2) The data suggest a sodium-sulfate endmember mingling with the calcium-bicarbonate endmember. The sample in the spring 2017 data set with the closest composition to the sodium-sulfate endmember is CW-26, a seep located at the head of Cove Wash Middle 2, in the Morrison Formation.

3) The data also suggest a sodium-bicarbonate endmember mingling in the watershed system. The trend is most easily observed in the lower watershed, but also appears to lie on a mixing line, affecting the upper portions of the watershed as well. The sample that most closely resembles this endmember is CW-02, a surface water sample in the lowest reach of the watershed.

There are noteworthy variations across the three temporal data sets (spring 2016, June 2016, spring 2017). There are two high-flow (spring) sampling events represented; the overall sample sets plot in similar areas on the Piper diagrams, with a large spread in variations among the plots of individual samples. The comparison between the low flow 2016 and spring 2017 data sets indicates a wider variation, with the spring data showing order-of-magnitude variations (mostly increases) in sulfate and chlorine anions, with less dramatic variations in cation chemistry. The net effect is that the influence of the alkali sulfate endmember does not appear in the low flow data set.

<u>Discussion</u>

Although there is a general trend from top to bottom, the variations with surface water chemistry are not easily correlated with respect to the distance in the localized portions of the watershed. For example, the flow direction for Cove Wash North is CW-04, CW-64, CW-11, CW-81, to CW-06; location CW-81 has the highest alkali-bicarbonate signature in this run, and CW-06, which is located below CW-81, plots back with the calcium-bicarbonate samples. There is a similar observation in Cove Wash Middle 3, where the surface water flowing in the upper portion of the run has a higher alkali-sulfate influence than the lower portion of the run. This suggests that there are local controls increasing alkali (+/-bicarbonate/sulfate) in the system, which is then diluted by calcium bicarbonate waters further downstream.

It is currently unclear what the source of the alkali endmembers is. Sources for these variations may include unique populations of water coming from varied sources, such as bedrock aquifers, as well as leachates from natural lithologies and/or mine tailings.

4.1.3.2 Stable Isotopes Evaluation

Stable isotope analyses for water in the Cove Watershed include oxygen ($\delta^{18}O$ H_2O) and deuterium (δD H_2O). Oxygen isotopes are measured as a ratio of oxygen-18 to oxygen-16, and deuterium is measured as a ratio of hydrogen-2 to hydrogen-1. Both isotopic ratios are normalized to Vienna Standard Mean Ocean Water (VSMOW), and the normalization is expressed in per thousandths ($^0/_{00}$). Stable isotopes are not COPCs and are evaluated in an effort to further understand sources of water to the Cove Wash watershed. The data are presented graphically on Figure 10.

With the exception of one anomalous result (CW-54 sampled June 2016; discussed below), the $\delta^{18}O$ H_2O ratios range from -7.33 to -14.02 $^0/_{00}$, and the δD H_2O range from -80.8 to -101.6 $^0/_{00}$ over the four sets of seasonal sampling data. The range of data varies by season:

Summer 2015: the $\delta^{18}O$ H_2O ratios range from -11.4 to -14.02 $^0/_{00}$, and the δD H_2O range from -88.0 to -101.5 $^0/_{00}$.

Spring 2016: the $\delta^{18}O$ H_2O ratios range from -12.38 to -13.77 $^0/_{00}$, and the δD H_2O range from -91.8 to -101.3 $^0/_{00}$.

Summer 2016: the $\delta^{18}O$ H_2O ratios range from -9.51 to -13.86 $^0/_{00}$, and the δD H_2O range from -80.8 to -101.6 $^0/_{00}$, not including the anomalous sample (CW-54) where the $\delta^{18}O$ H_2O ratio is measured at -1.69 $^0/_{00}$, and the δD H_2O is measured at -10.8 $^0/_{00}$.

Spring 2017: the $\delta^{18}O$ H_2O ratios range from -7.33 to -13.79 $^0/_{00}$, and the δD H_2O range from -77.3 to -100.3 $^0/_{00}$.

As stated above, stable isotopic results for the CW-54 sample collected during the 2016 low flow ($\delta^{18}O$ H_2O= -1.69; δD H_2O = -10.8) lie outside the range of the rest of the 2016 low flow data set ($\delta^{18}O$ H_2O = -7.3 to -13.8; δD H_2O = -77.3 to 101.6). The data are also different from previous and subsequent sampling events for this location. The CW-54 data point is removed from consideration at this time.

As shown on Figure 10, the stable isotope results for the Cove Wash are consistent from season to season, with the spring melt data occupying a narrower range for both isotopic systems than the dry season (summer) data for consecutive years. The results deviate from the Meteoric Water Line, favoring the heavier oxygen and hydrogen isotopes; this is indicative of a harshly evaporative watershed (Faure, 1986).

4.1.3.3 Uranium Isotopes Evaluation

Uranium isotope analyses include $^{233}U+^{234}U$, $^{235}U+^{236}U$, and ^{238}U. For the purposes of this analysis, the results are assumed to include only the natural isotopes, ^{234}U, ^{235}U, and ^{238}U. ^{235}U and ^{238}U do not have natural parent isotopes, and are therefore not created under normal (earth) pressure-temperature regimes. ^{234}U is an indirect decay product of ^{238}U with a half-life of around 250,000 years. Due to the chemistry of the decay chain and/or fractionation in certain geologic environments, some relative variations in natural uranium isotopes may be found in nature (Osmond and Cowart, 1976). These variations can be evaluated to potentially identify sources of uranium.

There is a linear relationship between total uranium and each of the uranium isotope activities; this is expected, as these are dependent variables. There is not a distinguishable relationship between any of the isotopic activities with any of the total metal and non-metal concentrations measured, including calcium, magnesium, sodium, potassium, iron, vanadium, bicarbonate, chlorine, fluorine, and sulfate.

Isotopic ratios of uranium are known to vary in water systems, in spite of their relatively small mass differences (Osmond and Cowart, 1976; Brennecka, 2012). The system $^{234}U/^{238}U$ has been shown to be especially variable in natural groundwater systems due to disequilibrium caused by a combination of uranium's bivalency in crustal eh-pH conditions, and the predisposition to chemical/fractional disequilibrium in the decay chain, making the $^{234}U/^{238}U$ ratio potentially useful for the study of waters from disparate geologic ages (Osmond and Cowart, 1976). Natural variations in the system $^{235}U/^{238}U$ also occur, but the small deviation requires a more precise method of measurement than alpha spectrometry, such as thermal mass spectrometry (Minteer, et al., 2007; Condon, et al., 2010). $^{235}U/^{238}U$ ratios using the alpha spectrometry data do not correlate with any other analytes in the data set, and, based on the line of reasoning above, are not discussed further.

The observed $^{234}U/^{238}U$ activity ratios in the Cove Watershed data vary from 0.92 to 2.57 in the spring 2017 sampling event. $^{234}U/^{238}U$ ratios in the lower, main reach of Cove Wash (SW-02, -01, -06, -07, and -05) range from 1.4 to 1.0. The highest $^{234}U/^{238}U$ ratios are observed in locations that are hydraulically upgradient of AUMs, or are from tributaries that do not receive surface water runoff from AUMs: GW-01, SW-04, SW-21 (Mesa Springs), SW-46 (Pine Water Springs), and SWs 86 and 87 from an unnamed tributary on Cove Wash Middle 3 reach.

Figure 11 shows a plot of $^{234}U/^{238}U$ ratios versus the inverse concentrations of total uranium for the spring 2017 data set. There is a good, hyperbolic relationship between the two dependent variables, and it indicates that high uranium concentrations are associated with $^{234}U/^{238}U$ ratios around 1, while low uranium concentrations are associated with higher $^{234}U/^{238}U$ ratios (around 2 to 2.5).

Substituting an inverse concentration for the element concentration (1/Utot) can be a test of mixing between a concentration and a dependent isotopic ratio (Figure 11). Comparison of $^{234}U/^{238}U$ ratios to 1/Utot shows a ternary spread, indicating at least three endmembers in the system $^{234}U/^{238}U$ – total uranium: 1) a high-uranium, low $^{234}U/^{238}U$ ratio endmember (or range of endmembers: SW-26, SW-51, SW-65); 2) a relatively low-uranium, high $^{234}U/^{238}U$ ratio endmember (SW-04); and 3) a low-uranium, high $^{234}U/^{238}U$ ratio endmember (SW-21). The results suggest that high uranium values (>~35 ppm) in the watershed are attributable to commingling with the high-uranium, low $^{234}U/^{238}U$ ratio endmember. In general, the high-uranium, low $^{234}U/^{238}U$ ratio endmember appears to be associated with seeps associated with the AUMs, while background samples are associated with the lower-uranium, high $^{234}U/^{238}U$ ratio endmembers. As shown on Figure 11, high-uranium, low $^{234}U/^{238}U$ ratio endmember influence is detected at AUM elevations within Cove Wash drainages to the furthest downstream sample collected in Cove Wash (CW-02).

The seasonal variation in $^{234}U/^{238}U$ ratios include 0.99 to 2.9 (June 2016), 0.91 to 2.4 (spring 2016), and 0.93 to 2.75 (June 2015). Appendix B shows $^{234}U/^{238}U$ ratios for samples collected in the four seasonal sampling events (spring snowmelt and low flow), as well as a percentage difference between the consecutive sampling events. Seasonal variations in the lower main run of Cove Wash (SW-07 to SW-02) are within 5% and do not exhibit an obvious seasonal fluctuation. Upstream locations, especially springs (GW-01, SW-21, SW-46), show variations in the range of 30 to 60% in $^{234}U/^{238}U$ ratios, which may represent seasonal variations in water contribution.

4.1.4 Geologic Overview Conclusions

The overall chemistry of the Cove Wash watershed is dominated by a calcium-bicarbonate chemistry, with influence along alkali and/or sulfate vectors. Surface water chemistries tend to cluster together in the upper reaches of the watershed, with some separation between seeps and the lithologies over which the water is flowing. While spring snowmelt data sets are comparable, the influence of an alkali sulfate endmember does not appear in the low-flow data set for which cation and anion sample results are available. This may mean an alkali sulfate water source contributing to the surface water pathway is not present during low flow conditions in the summer. The evaluation of the water chemistry shows that the surface water pathway in Cove Wash drainages receives inputs from multiple water sources beginning at upper reaches of the drainages to the furthest samples' reach of the Cove Wash. The predominance of a calcium-bicarbonate chemistry is not expected to impact mobilization of COPCs.

A review of the water chemistry results evaluated here may provide useful information when considering future remediation designs for COCs at AUMs or within the watershed, as seasonal variation in water chemistry may buffer or inhibit chemical reactions inherent to some remedial methods. Based on evaluation of sample locations within individual drainages, the data suggest that there are local controls increasing alkali (+/-bicarbonate/sulfate) in the system, which is then diluted by calcium bicarbonate waters further downstream. It is currently unclear what the source of the alkali endmembers is. Sources for these variations may include unique populations of water coming from varied sources, such as bedrock aquifers, as well as leachates from natural lithologies and/or mine tailings.

Evaluation of stable isotopes indicates that the results deviate from the Meteoric Water Line, favoring the heavier oxygen and hydrogen isotopes; this is indicative of a harshly evaporative watershed (Faure, 1986). As shown on Figure 10, the range of results were fairly consistent for data collected over the four sampling events, with no obvious seasonal trends present in the data set. The variation among the stable isotopes results within background samples is as great as the overall population, and there does not appear to be a relationship with total uranium.

Evaluation of uranium isotopes shows that in general, the high-uranium, low $^{234}U/^{238}U$ ratio endmember appears to be associated with seeps associated with the AUMs, while background samples are associated with the lower-uranium, high $^{234}U/^{238}U$ ratio endmembers. As shown on Figure 11, water samples collected within the Cove Wash drainages (Cove Wash Middle 1, Cove Wash Middle 2, Cove Wash Middle 3, and Cove Wash North), at or downstream of drainages receiving runoff from AUMs, contained uranium with low $^{234}U/^{238}U$ ratios in comparison with background locations, with the exception of background location CW-88. Therefore, while sample results from samples collected from background locations with uranium exceedances (discussed in Section 5) indicates that some non-anthropogenic contribution of uranium to the Cove Wash watershed is present, uranium deriving from the geologic layer in which AUMs reside throughout the watershed are the primary contributors to uranium concentrations found downstream of AUMs all the way to the furthest sampling location within Cove Wash.

5. SAMPLING RESULTS

5.1 SAMPLE RESULTS AND DISCUSSION

Surface water, surface sediment, and subsurface sediment samples were collected from drainages in Cove Wash to delineate the sources contributing to contamination from abandoned uranium mines throughout the watershed. Surface water and sediment samples were also collected from identified seeps and springs in the drainage, and a groundwater sample was collected from an area well presumably used to water livestock. These samples were submitted to subcontracted laboratories for analysis for a variety of parameters.

Surface water and groundwater samples were analyzed for uranium isotopes, radium 226, radium 228, gross alpha radiation, alkalinity, major ions, metals, and stable isotopes. Surface and groundwater samples were submitted for both total and dissolved analysis for uranium isotopes, radium 226, radium 228, gross alpha radiation, and metals. Following the 2015 low flow sampling event, alkalinity and major ions were added to the analyte list, and the metals analyte list for water and sediments was revised to include additional metals based on input from the USGS in order to assist with determining potential sources of water and uranium into the Cove Wash drainages and downstream wells. The full metal suite was revised to aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chromium (total), cobalt, copper, iron, lead, lithium, manganese, magnesium, mercury, molybdenum, nickel, potassium, phosphorous, selenium, silver, sodium, strontium, thallium, total uranium, vanadium, and zinc. All sampling events occurring in 2016 and 2017 included the revised analytical list.

Surface water and groundwater samples were submitted for dissolved analysis only for alkalinity and major ions. Surface and groundwater samples were submitted without filtering for stable isotopes. Sediment samples were analyzed for uranium isotopes, radium 226, radium 228, and metals.

Analytical methods were selected in order to characterize the samples for COPCs (metals, gross alpha radiation, radium 226, and radium 228). Uranium isotopes activities were characterized in each water sample in order to calculate total adjusted gross alpha radiation for comparison to screening levels, as well as to evaluate activity ratios as discussed in Section 4.1.3.3. The stable isotopes, major ions, and alkalinity were evaluated in order to evaluate water sources to the Cove Wash watershed as discussed in Sections 4.1.3.1 and 4.1.3.2.

In addition to collecting water and sediment samples at the Site, START recorded in situ surface water parameters such as pH, temperature, conductivity, turbidity, and an estimate of flow.

5.1.1 Evaluation of Sample Results

Per DQOs outlined within the SAP, water sample results for COPCs were compared to screening levels in order to determine the potential threat to human health or the environment. Additionally, as discussed in Section 3.3, water samples were collected at available background locations in order to determine a range of background concentrations for COPCs during each sampling event. The background ranges are evaluated in order to establish whether COPCs are present at concentrations significantly above background as outlined in the Hazard Ranking System (HRS). Section 2.3 and Table 2-3 of the HRS for the Observed Release (40 CFR Appendix A to Part 300) states that non-radiation COPCs are compared to three times the background value during each sampling event, and Section 7.1.1 of the HRS (40 CFR Appendix A to Part 300) states that radiation COPCs (in picocuries per liter [pCi/L] and gamma scanning surveys in cpm) are compared to two times the mean background value. The HRS assesses the relative threat associated with actual or potential releases of hazardous substances to the environment, and has been adopted by the EPA to assist in setting priorities for further Site evaluation and potential remedial action. COPCs that exceed screening levels and are significantly above background concentrations are considered COCs.

The SAP (Appendix A) outlines the procedure for collecting background samples within the watershed. The number and type of samples planned and collected for the watershed assessment study is not considered robust enough to develop a single statistical background value for use in comparison, and therefore the highest background value for each COPC per sampling event is used per the HRS. However, for information purposes, the mean and SD for each COPC discussed in Section 5 is provided for background samples as well as non-background samples provided in Sections 5.4.2 through 5.4.10. One half of the method detection limit was used as the concentration for the samples with non-detect results.

5.2 WATER RESULTS

5.2.1 Water Sample Exceedances of Screening Levels

The Site was investigated for concentrations of total and dissolved metals, total and dissolved radionuclides, and gross alpha radioactivity during four separate sampling events beginning in 2015 and ending in 2017. Media investigated included surface water collected from stream channels, seeps, and springs, and groundwater collected from shallow wells. Sampling locations were chosen based on proximity to mined areas or in the assumed path of materials transported downslope from mines. Wherever possible, based on the presence of water during each sampling event, surface water samples were collected at confluences and above confluences. In the event that surface water was not present in a tributary, a sediment sample was collected at the furthest accessible reach upstream. Sediment results are discussed in Section 5.4.

Background samples were also investigated for concentrations of total and dissolved metals, total and dissolved radionuclides, and gross alpha radioactivity. Background sample locations are shown on Figure 4. Background sample locations were chosen based on similar geologic types to other sample locations within the investigation area, but were situated outside of the areas influenced by mining activities. Background samples were collected from stream channels and wells. Duplicates were also collected, and all field samples were analyzed following the approved SAP.

All sample results were compared to numeric thresholds established by EPA and the NNEPA for water quality protection or drinking water safety. Additionally, the 2015 NNSWQS currently in EPA review were also used for comparison to sample results. Exceedances of EPA numeric thresholds, and NNSWQS 2015 numeric standards are presented below. Rather than using these values as regulatory limits, here these numeric thresholds are presented as screening levels for further evaluation.

Metal analytes included aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chromium (total), cobalt, copper, iron, lead, lithium, manganese, magnesium, mercury, molybdenum, nickel, potassium, phosphorous, selenium, silver, sodium, strontium, thallium, total uranium, vanadium, and zinc. Radionuclides included uranium and radium, including isotopes. A smaller suite of metals was analyzed during the initial 2015 low flow sampling event (antimony, arsenic, barium, beryllium, cadmium, chromium (total), cobalt, copper, lead, molybdenum, nickel, selenium, silver, sodium, thallium, uranium, vanadium, and zinc). Additional metals were included for the next three sampling events. Adjusted gross alpha radiation was calculated from the results of laboratory analysis of gross alpha activity and uranium isotope activities. Concentrations in excess of numeric standards or numeric criteria were detected during multiple sample events, and are summarized in the tables below. Concentrations of analytes below numeric thresholds are not summarized here, but complete sampling results are available in Appendix C.

Results of the four sampling events are organized below by the year sampled and associated representative hydrologic event: 2015 low flow, 2016 low flow, 2016 snowmelt, and 2017 snowmelt. In the tables, sampling statistics (e.g., number of samples collected, detected concentration ranges, and data qualifiers) are presented for analyte exceedances found during the investigation. Results are summarized below in separate tables for each sampling event grouped by similar analyte type, and present exceedances of relevant water quality standards and water quality criteria. Every exceedance of a numeric threshold was totaled for each analyte.

2015 Low Flow Sampling Screening Level Exceedances

A total of 27 samples were collected. One or more exceedances in total arsenic, total barium, total lead, total molybdenum, total selenium, total thallium, total uranium, total vanadium, dissolved cadmium, and dissolved zinc were found. The numeric threshold for total adjusted gross alpha radiation and total combined radium 226 and radium 228 were also exceeded. Tables 4 through 6 represent the chemical and radionuclide analytical data for the surface water samples collected as part of the 2015 low flow sampling event.

.Table 4: Summary of Total Metals in Surface Water and Groundwater Exceedances for 2015 Low Flow Sampling Event								
Sample Information	**Arsenic**	**Lead**	**Selenium**	**Thallium**	**Uranium**	**Barium**	**Molybdenum**	**Vanadium**
Number of Samples (including three field duplicates)	27	27	27	27	27	27	27	27
Detected Background Results Range (µg/L)	5.4 U - 18	2.2 U – 7.4	4.6 U – 4.7 J	6.2 U – 8.3 J	1.5 – 4.4	210 – 310	2.9 U	3.9 J - 22
Detected Result Range (µg/L)	6.6 J - 89	2.5 J - 32	5.3 - 770	6.5 J - 11	5.4 - 500	9.8 J – 1300	4.9 J - 780	1.5 J - 4600
Number of Detects (excluding duplicates)	18	4	5	7	24	24	15	24
Numeric Threshold (µg/L)	10 (MCL) 30 (PrHC) 80 (FC)	15 (MCL) 15 (PrHC) 15 (ScHC)	2 (A&Wc) 20 (AgWS) 33 (A&Wa) 50 (MCL) 50 (LW) 670 (FC)	1 (FC) 2 (MCL)	30 (MCL)	500 (AgWS)	50 (AgWS)	100 (LW) 1000 (AgWS)
Number of Exceedances (excluding duplicates)	8-MCL 1-PrHC 1-FC	1-MCL 1-PrHC 1-ScHC	5-A&Wc 1-AgWS 1-A&Wa 1-MCL 1-LW 1-FC	6-FC 6-MCL	17 - MCL	1-AgWS	1-AgWS	1-LW 1-AgWS

Notes:
A&Wa = 2015 Navajo Nation Surface Water Quality Standards – Aquatic and Wildlife - Acute
A&Wc = 2015 Navajo Nation Surface Water Quality Standards - Aquatic and Wildlife – Chronic
AgWS = 2015 Navajo Nation Surface Water Quality Standards - agricultural water supply (currently under EPA review)
FC = 2015 Navajo Nation Surface Water Quality Standards - fish consumption
J = Compound detected, but result value is approximate.
LW = 2015 Navajo Nation Surface Water Quality Standards - Livestock Watering
MCL = EPA Maximum Contaminant Level - Drinking Water
µg/L = micrograms per liter
ScHC = 2015 Navajo Nation Surface Water Quality Standards - secondary human contact
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

Table 5: Summary of Dissolved Metals Exceedances in Surface Water and Groundwater for 2015 Low Flow Event		
Sample Information	**Copper***	**Cadmium***
Number of Samples (including three duplicates)	27	27
Detected Background Results Range (µg/L)	2.2 U	0.76 U
Detected Result Range (µg/L)	2.6 J - 140	0.84-1.5 J
Number of Detects (including duplicates)	3	6
Numeric Threshold (µg/L)	5.9 – 50 (A&Wa) 4.3 – 29 (A&Wc)	0.13-0.64 (A&Wc)
Number of Exceedances (including duplicates)	1 – A&Wa 1 – A&Wc	6 – A&Wc

Notes:
* = The value is hardness dependent. Hardness was evaluated for these samples, and hardness was calculated for individual exceedances.
A&Wc = 2015 Navajo Nation Surface Water Quality Standards - Aquatic and Wildlife - Chronic
J = Compound detected, but result value is approximate. Hardness values were calculated.
µg/L = micrograms per liter

Table 6: Summary of Radionuclide Exceedances in Surface Water and Groundwater for 2015 Low Flow Sampling Event		
Sample Information	**Adjusted Gross Alpha, Total**	**Radium, Total**
Number of Samples (including three field duplicates)	27	27
Detected Background Results Range (pCi/L)	-3.43 – 21.22	0.21 – 2.1 J
Detected Result Range (pCi/L)	-126.5 – 4.37	0.22 – 25
Number of Detects (excluding duplicates)	3*	24
Numeric Threshold (pCi/L)	15 (MCL) 15 (AgWS) 15 (LW)	5 (MCL), 5 (LW), 5 (AgWS)
Number of Exceedances (excluding duplicates)	1	4 – MCL, LW, and AgWS

Notes:
* = Positive adjusted gross alpha radiation values are reported as detects
AgWS = 2015 Navajo Nation Surface Water Quality Standards - agricultural water supply (currently under EPA review)
J = Compound detected, but result value is approximate.
LW = 2015 Navajo Nation Surface Water Quality Standards - livestock watering (currently under EPA review)
MCL = EPA Maximum Contaminant Level - Drinking Water
pCi/L = picocuries per liter

2016 Snowmelt Sampling Screening Level Exceedances

A total of 41 samples were collected. One or more exceedances in total aluminum, total arsenic, total barium, total beryllium, total combined radium 226 and radium 228, total lead, total molybdenum, total selenium, total thallium, total uranium, and total vanadium were found. Tables 7 and 8 represent the chemical and radionuclide analytical data for the surface water samples collected as part of the 2016 snowmelt sampling event.

Table 7: Summary of Total Metals Exceedances in Surface Water and Groundwater for 2016 Snowmelt Sampling Event										
Sample Information	**Aluminum**	**Arsenic**	**Beryllium**	**Lead**	**Selenium**	**Thallium**	**Uranium**	**Barium**	**Molybdenum**	**Vanadium**
Number of Samples (including four field duplicates)	41	41	41	41	41	41	41	41	41	41
Detected Background Results Range (µg/L)	3.2 U – 13,000	3.9 U – 9.9 J	0.48 U – 0.52 J	2.2 U – 5.2	4.5 U – 8.5	5.4 U	3.2 - 37	270 - 320	0.39 J – 3.3	3.3 J - 96
Detected Result Range (µg/L)	36 J – 140,000	4.6 J - 70	5.9 – 6.7	4.1 – 76	4.7 J - 590	5.7 J	5.7 - 1600	25 J – 4,700	0.49 J - 670	2.9 J – 3,000
Number of Detects (exluding duplicates)	28	16	3	4	15	1	37	37	36	37
Numeric Threshold (µg/L)	87 (A&Wc) 750 (A&Wa)	10 (MCL) 30 (PrHC)	4 (MCL)	15 (ScHC) 15 (MCL) 15 (PrHC)	2 (A&Wc) 20 (AgWS) 33 (A&Wa) 50 (MCL) 50 (LW)	1 (FC) 2 (MCL)	30 (MCL)	500 (AgWS) 2,000 (MCL)	50 (AgWS)	100 (LW) 1,000 (AgWS)
Number of Exceedances (excluding duplicates)	24 – A&Wc 5 – A&Wa	6 - MCL 1 - PrHC	29- MCL	2 – ScHC 2 – MCL 2 - PrHC	15 – A&Wc 5 – AgWS 4 – A&Wa 4 – MCL 4 - LW	1 – FC 1 - MCL	29	2 – AgWS 2 - MCL	2 - AgWS	4 (LW 4 (AgWS)

Notes:
A&Wa = 2015 Navajo Nation Surface Water Quality Standards - Aquatic and Wildlife – Acute
A&Wc = 2015 Navajo Nation Surface Water Quality Standards - Aquatic and Wildlife - Chronic
AgWS = 2015 Navajo Nation Surface Water Quality Standards - agricultural water supply (currently under EPA review)
FC = 2015 Navajo Nation Surface Water Quality Standards - fish consumption
J = Compound detected, but result value is approximate
LW = 2015 Navajo Nation Surface Water Quality Standards - Livestock Watering
MCL = EPA Maximum Contaminant Level - Drinking Water
µg/L = micrograms per liter
PrHC = 2015 Navajo Nation Surface Water Quality Standards - primary human contact (currently under EPA review)
ScHC = 2015 Navajo Nation Surface Water Quality Standards - secondary human contact
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit

Table 8: Summary of Radionuclide Exceedances in Surface Water and Groundwater for 2016 Snowmelt Sampling Event		
Sample Information	**Adjusted Gross Alpha, Total***	**Radium, Total**
Number of Samples (including four field duplicates)	41	41
Detected Background Results Range (pCi/L)	-13.06 – 1.56	0.24 J – 0.76 J
Detected Result Range (pCi/L)	-583.3 – -1.352	0.3 J – 11.2
Number of Detects (excluding duplicates)	1	32
Numeric Threshold (pCi/L)	15 (MCL) 15 (AgWS) 15 (LW)	5 (MCL) 5 (LW) 5 (AgWS)
Number of Exceedances (excluding duplicates)	0	5 – MCL 5 – LW 5 – AgWS

Notes:
* = Positive adjusted gross alpha radiation values are reported as detects
AgWS = 2015 Navajo Nation Surface Water Quality Standards - agricultural water supply (currently under EPA review)
pCi/L = picocuries per liter
J = Compound detected, but result value is approximate
LW = 2015 Navajo Nation Surface Water Quality Standards - livestock watering (currently under EPA review)
MCL = EPA Maximum Contaminant Level - Drinking Water

2016 Low Flow Sampling Screening Level Exceedances

A total of 33 samples were collected. One or more exceedances in total uranium, total aluminum, total arsenic, total barium, total lead, total molybdenum, total selenium, total vanadium, and dissolved cadmium were found. The numeric threshold for total adjusted gross alpha radiation and combined radium 226 and radium 228 were also exceeded. Tables 9, 10, and 11 represent the chemical and radionuclide analytical data for the surface water samples collected as part of the 2016 low flow sampling event.

Table 9: Summary of Total Metals Exceedances in Surface Water and Groundwater for 2016 Low Flow Sampling Event								
Sample Information	**Aluminum**	**Arsenic**	**Lead**	**Selenium**	**Uranium**	**Barium**	**Molybdenum**	**Vanadium**
Number of Samples (including three field duplicate)	33	33	33	33	33	33	33	33
Detected Background Results Range (µg/L)	32 U – 490 J	3.9 U – 5.6 J	22 U	4.5 U	3 – 34	11 J – 310	0.38 U – 1.5	3 J – 3.4
Detected Result Range (µg/L)	38 J – 22,000	4.4 J - 98	3.5 - 18	6.6 - 570	6.6 – 2,000	120 – 1,100	0.0.64 J - 590	1.4 J - 4600
Number of Detects (excluding duplicates)	21	19	3	8	30	33	24	30
Numeric Threshold (µg/L)	87 (A&Wc) 750 (A&Wa)	10 (MCL) 30 (PrHC)	15 (ScHC) 15 (MCL) 15 (PrHC)	2 (A&Wc) 20 (AgWS) 33 (A&Wa) 50 (MCL) 50 (LW)	30 (MCL)	500 (AgWS)	50 (AgWS)	100 (LW) 1000 (AgWS)
Number of Exceedances (excluding duplicates)	20 – A&Wc 9 – A&Wa	8 – MCL 1 - PrHC	2 – ScHC 2 – MCL 2 - PrHC	8 – A&Wc 4 – AgWS 4 – A&Wa 3 – MCL 3 - LW	24 - MCL	1 - AgWS	3 - AgWS	2 - LW 1 - AgWS

Notes:
A&Wa = 2015 Navajo Nation Surface Water Quality Standards - Aquatic and Wildlife - Acute
A&Wc = 2015 Navajo Nation Surface Water Quality Standards - Aquatic and Wildlife - Chronic
AgWS = 2015 Navajo Nation Surface Water Quality Standards - agricultural water supply (currently under EPA review)
FC = 2015 Navajo Nation Surface Water Quality Standards - fish consumption
J = Compound detected, but result value is approximate
LW = 2015 Navajo Nation Surface Water Quality Standards - Livestock Watering
MCL = EPA Maximum Contaminant Level - Drinking Water
µg/L = micrograms per liter
PrHC = 2015 Navajo Nation Surface Water Quality Standards - primary human contact (currently under EPA review)
ScHC = 2015 Navajo Nation Surface Water Quality Standards - secondary human contact
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit

Table 10: Summary of Dissolved Metals Exceedances in Surface Water and Groundwater for 2016 Low Flow Sampling Event	
Sample Information	**Cadmium***
Number of Samples (including three field duplicates)	33
Detected Background Results Range (µg/L)	0.77 U
Detected Result Range (µg/L)	0.77 U – 0.94 J
Number of Detects (excluding duplicates)	1
Numeric Threshold** (µg/L)	0.17 (A&Wc)
Number of Exceedances (excluding duplicates)	1 – A&Wc

Notes:
* = The value is hardness dependent. Hardness was evaluated for these samples, and hardness was calculated for individual exceedances.
A&Wc = 2015 Navajo Nation Surface Water Quality Standards - Aquatic and Wildlife - Chronic
J = Compound detected, but result value is approximate. Hardness values were calculated.
µg/L = micrograms per liter
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit

Table 11: Summary of Radionuclide Exceedances in Surface Water and Groundwater for 2016 Low Flow Sampling Event		
Sample Information	**Adjusted Gross Alpha, Total***	**Radium, Total**
Number of Samples (including three field duplicates)	33	33
Detected Background Results Range (pCi/L)	-21.53 – 0.2 J	0.35 J
Detected Result Range (pCi/L)	-565.6 – 23.74	0.31 J – 12.9
Number of Detects (excluding duplicates)	10	27
Numeric Threshold (pCi/L)	15 (MCL) 15 (AgWS) 15 (LW)	5 (MCL) 5 (LW) 5 (AgWS),
Number of Exceedances (excluding duplicates)	1 (MCL) 1 (AgWS) 15 (LW)	4 – MCL 4 – LW 4 - AgWS

Notes:
* = Positive adjusted gross alpha radiation values are reported as detects
AgWS = 2015 Navajo Nation Surface Water Quality Standards - agricultural water supply (currently under EPA review)
DWS = Navajo Nation Surface Water Quality Standards - Domestic Water Supply (currently under EPA review)
J = Compound detected, but result value is approximate
LW = 2015 Navajo Nation Surface Water Quality Standards - livestock watering (currently under EPA review)
MCL = EPA Maximum Contaminant Level - Drinking Water
pCi/L = picocuries per liter

2017 Snowmelt Sampling Screening Level Exceedances

A total of 45 samples were collected. One or more exceedances in total aluminum, total arsenic, total barium, total combined radium 226 and radium 228, total iron, total lead, total mercury, total molybdenum, total selenium, total thallium, total uranium, total vanadium, dissolved aluminum, dissolved copper, were found. Tables 12, 13, and 14 represent the chemical and radionuclide analytical data for the surface water samples collected as part of the 2017 Snowmelt Sampling Event.

Table 12: Summary of Total Metals Exceedances in Surface Water and Groundwater for 2017 Snowmelt Sampling Event										
Sample Information	**Aluminum**	**Arsenic**	**Barium**	**Lead**	**Mercury**	**Molybdenum**	**Selenium**	**Thallium**	**Uranium**	**Vanadium**
Number of Samples (including 5 field duplicates)	45	45	45	45	45	45	45	45	45	45
Detected Background Results Range (µg/L)	60 U – 18,000	3 U – 15	30 U - 350	0.9 U – 4.5	0.06 U	0.3 U – 6.9	1.5 U – 15	3 U – 3.6 J	3.2 - 180	3 U – 130
Detected Result Range (µg/L)	67 J – 20,000	4.1 J - 120	130 - 530	1 J - 26	0.064 J	0.57 J – 270	1.6 J - 980	3.2 J - 11	8.1 – 1,200	4 J – 11,000
Number of Detects (excluding duplicates)	22	28	39	11	1	38	25	8	40	39
Numeric Threshold (µg/L)	87 (A&Wc) 750 (A&Wa)	10 (MCL) 30 (PrHC) 80 (FC)	500 (AgWS)	15 (ScHC) 15 (MCL) 15 (PrHC)	0.012 (A&Wc)	50 (AgWS)	2 (A&Wc) 20 (AgWS*) 33 (A&Wa) 50 (LW) 50 (MCL) 670 (FC)	1 (FC) 2 (MCL)	30 (MCL)	100 (LW) 1,000 (AgWS)
Number of Exceedances (excluding duplicates)	20 – A&Wc 12 - A&Wa	7 – MCL 1 - PrHC 1 - FC	1 - AgWS	1 – ScHC 1 – MCL 1 - PrHC	1 - A&Wc	3 – AgWS	19 – A&Wc 4 – AgWS 4 – A&Wa 4 – LW 4 – MCL 1 - FC	8 – FC 8- MCL	33 - MCL	4 – LW 1 - AgWS

Notes:
A&Wa = 2015 Navajo Nation Surface Water Quality Standards - Aquatic and Wildlife - Acute
A&Wc = 2015 Navajo Nation Surface Water Quality Standards - Aquatic and Wildlife - Chronic
AgWS = 2015 Navajo Nation Surface Water Quality Standards - agricultural water supply (currently under EPA review)
FC = 2015 Navajo Nation Surface Water Quality Standards - fish consumption
J = Compound detected, but result value is approximate
LW = 2015 Navajo Nation Surface Water Quality Standards - Livestock Watering
MCL = EPA Maximum Contaminant Level - Drinking Water
µg/L = micrograms per liter
PrHC = 2015 Navajo Nation Surface Water Quality Standards - primary human contact (currently under EPA review)
ScHC = 2015 Navajo Nation Surface Water Quality Standards - secondary human contact
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit

Table 13: Summary of Dissolved Metals Exceedances in Surface Water and Groundwater for 2017 Snowmelt Sampling Event	
Sample Information	**Copper***
Number of Samples (including duplicate)	45
Detected Background Results Range (µg/L)	3 U - 30
Detected Result Range (µg/L)	3.3 J – 6.6 J
Number of Detects (including duplicates)	3
Numeric Threshold (µg/L)	5.9 – 50 (A&Wa) 4.3 – 29 (A&Wc)
Number of Exceedances (including duplicates)**	1 – A&Wa 1 – A&Wc

Notes:
*= The value is hardness dependent. Hardness was evaluated for these samples, and hardness was calculated for individual exceedances.
A&Wa = 2015 Navajo Nation Surface Water Quality Standards - Aquatic and Wildlife - Acute
A&Wc = 2015 Navajo Nation Surface Water Quality Standards - Aquatic and Wildlife - Chronic
J = Compound detected, but result value is approximate
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit
µg/L = micrograms per liter

Table 14: Summary of Radionuclide Exceedances in Surface Water and Groundwater for 2017 Snowmelt Sampling Event		
Sample Information	**Adjusted Gross Alpha, Total***	**Radium, Total**
Number of Samples (including duplicate)	45	45
Detected Background Results Range (pCi/L)	--578.2 – 0.2	0.25 J – 0.52 J
Detected Result Range (pCi/L)	-496.3– 23.6	0.25 J – 16.5
Number of Detects (exncluding duplicates)	5	36
Numeric Threshold (pCi/L)	15 (MCL) 15 (AgWS) 15 (LW)	5 (MCL) 5 (LW*) 5 (AgWS*)
Number of Exceedances (excluding duplicates)	1	7 – MCL 7 – LW 7 – AgWS

Notes:
* = Positive adjusted gross alpha radiation values are reported as detects
AgWS = 2015 Navajo Nation Surface Water Quality Standards - agricultural water supply (currently under EPA review)
J = Compound detected, but result value is approximate
LW = 2015 Navajo Nation Surface Water Quality Standards - livestock watering (currently under EPA review)
MCL = EPA Maximum Contaminant Level - Drinking Water
pCi/L = picocuries per liter

5.2.2 Groundwater Sampling Results

Groundwater wells were located in preparing for the 2015 low flow sampling event, and two wells were visited during the 2015 low flow sampling event. It was determined that some wells discussed in the 2015 SAP were no longer in operation based on speaking with local residents and Cove Day School representatives. Terri Lameman-Austin, EPA Remedial Project Manager Chip Poalinelli, and Diné College Interns participated in well sampling activities.

Well construction information is not available for the groundwater wells sampled. Groundwater was sampled by purging wells for 1 to 2 minutes and collecting the groundwater sample before the well went dry. Water level readings could not be collected as the wells are surrounded by a stone masonry box.

Sampling locations for CW-01G and CW-03G are shown on Figure 3. Two functional wells were visited during the 2015 low flow sampling event: the Red Point Dug Well (CW-01G), which is located along a wash near background sample CW-08, and Ellison Well (CW-03G). In 2015, the Ellison Well broke internally during sampling by a Diné College intern. Only a partial sample volume was obtained, and as a result only dissolved metals, including uranium, were analyzed in that sample. The Ellison Well was visited during other sampling events and remained non-functioning. The remaining functional well (Red Point Dug Well) was sampled in all subsequent sampling.

Sample location CW-46, Pine Water Springs, is considered a spring due to the relatively high water volumes found at this site. A permanent livestock watering trough has been constructed at this location. Other wildlife tracks were observed at the trough including bear and deer during sampling activities. The spring has a spigot and a well box. From 2016 to 2017, the spigot was not functioning, and water could not be run for up to 1 to 2 minutes, which was done in 2015. The well box was accessed and has a combination lock that is maintained by the Navajo Tribal Utility Authority. In the event that the combination lock code is not available, the trough continues to receive flow from the well box and spring water source, despite the spigot's functioning state, although debris is present in the trough from animal use. All other springs and wells are accessible without locks. Cottonwood Springs, sample location CW-10, has been permanently capped to prevent its use for drinking water, but water seeps out of the capped well box, and samples were collected from that seep area. Cattle tracks were visible around the seep each time Cottonwood Springs was sampled from 2015 to 2017. The Red Point Dug Well is located at a camp that was not inhabited during any of the sampling events.

Figure 15 shows water results for all water samples, including groundwater wells. The Red Point Dug Well (CW-GW-01) contained total uranium at concentrations ranging from 6.8 µg/L to 17.3 µg/L. The Ellison Well (CW-GW-02), when sampled once in 2015, contained dissolved uranium at a concentration of 33 µg/L. The Ellison Well location was not analyzed for total uranium, but it can be estimated that the well exceeds the EPA MCL of 30 µg/L.

5.2.3 Evaluation of Screening Level Exceedances in Water Samples

COPCs found at concentrations exceeding the screening levels are discussed individually in this section. Each COPC is also compared to background concentrations in order to determine if screening level exceedances are naturally present within the Cove Wash watershed, or if AUM influence may be causing screening level exceedances. The following COPCs found at concentrations exceeding screening levels are determined to be COCs based on the determination that they are significantly above background concentrations: total uranium, total aluminum, total adjusted gross alpha radiation, total arsenic, total barium, total beryllium, total lead, total mercury, total molybdenum, total combined radium, total selenium, total thallium, total vanadium, dissolved cadmium, and dissolved copper.

5.2.3.1 Total Uranium Results

5.2.3.1.1 Comparison of Total Uranium in Water Samples to Background Locations

Background locations and associated total uranium concentrations are shown on Figure 14. A total of 10 background locations contained adequate volumes of water to sample during at least one of the sampling events. Several background samples (CW-86, CW-87, and CW-88) were added during the 2017 spring snowmelt event, because water was observed for the first time at those locations. Location CW-03, shown on Figure 3, was evaluated as a background location because it is located in a tributary that is upstream of the drainages leading from the AUMs. However, due to its proximity and elevation in relation to the Cove Transfer Station, it is not considered as a background location.

Total uranium concentrations of background water samples ranged from 1.5 to 180 ug/L over the four sampling events. Surface water background samples located in tributaries to the Cove Wash that are not impacted by waters draining from AUMs (CW-59, CW-86, and CW-87) contained uranium below screening levels at concentrations ranging from 6 µg/L to 15 µg/L over the one to two sampling events that surface water was present. The Mesa IV spring (CW-21), which is located at an elevation above AUMs in the vicinity, has contained total uranium at concentrations ranging from 3.0 to 3.7 µg/L during all four sampling events, which are below screening levels. A seep located at an elevation below Mesa V mines (CW-18) has contained total uranium concentrations ranging from 4.4 to 8 µg/L, which are below screening levels.

However, two background locations do contain total uranium concentrations above the EPA MCL of 30 µg/L: CW-04 and CW-88. Location CW-04, which is located upgradient of AUMs running along Mesas V and VI, has contained total uranium above 30 µg/L (at concentrations of 34.5 µg/L to 49 µg/L) when sampled during three sampling events. Location CW-88, which was determined to have water only during the 2017 spring snowmelt event, contained total uranium at a concentration of 180 µg/L. Sample location CW-88 was only able to be sampled during the 2017 Spring Snowmelt sampling event. This sample location receives runoff from an isolated valley on Mesa I, which is elevated above the Middle 3A stream channel, and apparently outside of the influence of any nearby AUMs on Mesa I. For evaluation purposes in this report, it will be included as a background sample, as there is no historical information or field observances that imply AUM influence of surface water in that location. The presence of uranium above the EPA MCL in background locations suggests that some uranium contamination within the watershed may originate from non-anthropogenic sources.

5.2.3.1.2 Evaluation of Total Uranium Concentrations in Drainages

This section discusses total uranium results for the four main drainages that receive runoff from AUMs within the Cove Wash Watershed: Cove Wash Middle 1, Cove Wash Middle 2, Cove Wash Middle 3, and Cove Wash North. The total uranium results are compared to screening levels and background concentrations determined over four sampling events. Figure 15 shows total uranium concentrations for all water sample locations over all four sampling events from 2015 to 2017.

Total uranium exceeded screening levels in some water samples collected during all four sampling events. Table 15 shows a comparison of results over four sampling events. A compilation of all total arsenic results for the four sampling events is shown in Appendix D-1.

Table 15: Total Uranium Results – All Sampling Events				
Sampling Event	**2015 Low Flow**	**2016 Spring Snowmelt**	**2016 Low Flow**	**2017 Spring Snowmelt**
Number of Samples (including duplicate)	27	41	33	45
Detected Background Results Range (µg/L of Total Uranium)	1.5 – 4.4	3.2 – 37	3 – 34	3.2 - 180
Detected Result Range (µg/L of Total Uranium)	3.5 – 500	5.7 – 1,600	6.6 – 2,000	3.2 – 1,200
Number of Detects (excluding field duplicates)	24	37	30	40
Screening Level – EPA Maximum Contaminant Level – Drinking Water (µg/L)	30 (MCL)	30 (MCL)	30 (MCL)	30 (MCL)
Number of Exceedances (excluding field duplicates)	19	29	28	29
Percent of Samples Exceeding Screening Level (excluding field duplicates)	90%	78%	85%	91%
Percent of Samples Containing Uranium at Concentrations Significantly Above Background	100%	52%	54%	17%
Background Sample Mean	3.2	16	19	35
Background Sample Standard Deviation	1.5	15	22	64
Sample Mean	130	230	270	220
Sample Standard Deviation	120	360	460	290

Notes:
MCL = EPA Maximum Contaminant Level - Drinking Water
µg /L = micrograms per liter

Cove Wash Middle 1

As shown on Figure 2, the Cove Wash Middle 1 drainage receives runoff from multiple AUMs on Mesa V, as well as three AUMs on Mesa IV (Cov068, Mesa IV West Mine, and Mesa IV, Mine No. 2). Total uranium concentrations in water samples collected throughout the drainage exceed the EPA MCL. Domestic animal use, such as herds of sheep in the drainage, has been observed during sampling events.

The main channel, Cove Wash Middle 1, is accessible by foot above an irrigation diversion dam (Appendix K, Photos 3 to 6) (CW-05). Thereafter, accessibility continues upstream until sample location CW-53a. During the 2015 low flow sampling event, the drainage was accessible by foot to a slightly more upstream location, CW-53. However, due to sedimentation within the drainage, sample location CW-53a has been the furthest upstream sample collected by foot for the last three sampling events. Sample locations CW-32 (a dry tributary) and CW-55, which are upstream of location CW-53a, are sampled by accessing the drainage from the top of the mesa. The tributaries into Cove Wash Middle 1 are dry at confluences, and the samples collected from those tributaries (CW-18, CW-51, CW-53, CW-54, and CW-55) are from seeps or discontinuous flow in the stream channel.

Figure 16 shows a close-up of total uranium results in water throughout the Cove Wash Middle 1 drainage. CW-21, called Mesa IV Springs in previous assessments, is a background sampling location for this study. CW-21 is a developed spring located at an elevation above the AUMs, and above the Middle 1 drainage. During 2015 low flow, seeps located downstream or within AUM boundaries in the Middle 1 drainage were found to contain total uranium at concentrations significantly above background concentrations. During the 2016 spring snowmelt sampling event, the seeps CW-54 and CW-51 contained total uranium at concentrations significantly above background. During the 2016 low flow sampling event, seep locations CW-53a and CW-51 contained total uranium at concentrations significantly above background. During the 2017 spring snowmelt sampling event, only seep location CW-54 contained total uranium at a concentration significantly above background.

Total uranium concentrations at surface water sample location CW-50, located within the main Cove Wash Middle 1 drainage at an elevation below all AUMs and seeps within the drainage, ranged from 180 µg/L to 250 µg/L over all sampling events. The highest concentration over all events (250 ug/L) came from sample location CW-50 during 2016 spring snowmelt..

Cove Wash Middle 2

As shown on Figure 2, the Cove Wash Middle 2 drainage receives runoff from multiple Mesa II, III, and IV AUMs. Total uranium concentrations in water samples collected throughout the drainage exceed the EPA MCL. Domestic animal use, specifically, cattle tracks indicating that grazing may occur in the drainage, has been observed throughout the drainage during sampling events. Feral cattle are known to utilize water from springs at higher elevations along the mesas.

The Cove Wash Middle 2 channel, and its main tributary, Cove Wash Middle 2A, are accessible by foot from the dam (CW-05) upstream until sample locations CW-84 and CW-85. The Wingate geological layer, which contains shear rock formations within the drainages, blocks additional access above those sample locations. Sample locations CW-26, CW-27, and CW-29 are sampled by accessing the drainage from the top of the mesa.

Figure 17 shows a close-up of total uranium results in water throughout the Cove Wash Middle 2 drainage. CW-21, also called Mesa IV Springs, is a background sampling location for this study. CW-21 is a developed spring located at an elevation above the AUMs, and above the Middle 2 drainage. The tributaries into Cove Wash Middle 2 are dry at confluences, and the samples collected in those tributaries (CW-26, CW-83, CW-84, and CW-85) are located at seeps, or in stream reaches with discontinuous flow. During sampling events, Cove Wash Middle 2 had intermittent flows, typically during snowmelt, or in response to precipitation during monsoon or winter storms. Sample location CW-26, Mesa II ½ Mine 4 adit drainage, was located at a perennial water source, specifically, seepage from an enclosed adit containing total uranium at concentrations of 170 µg/L to 220 µg/L over all sampling events. Total uranium was detected at a concentration significantly above background within seep sample location CW-26 during 2015 low flow, 2016 spring snowmelt, and 2016 low flow sampling events, but not during the 2017 spring snowmelt sampling event.

As shown on Figure 17, samples collected in Cove Wash Middle 2A above the confluence of Cove Wash Middle 2B, CW-82, CW-83, and CW-85 contained total uranium at concentrations that are not significantly above background, ranging from 36 µg/L to 65 µg/L. A sample collected downstream of Mesa II AUMs in Cove Wash Middle 2B (CW-84) contained total uranium at a concentration of 250 µg/L which was not significantly above background for the 2017 spring snowmelt sampling event. As these locations were only sampled once during the 2017 spring snowmelt sampling event, additional information may be required to determine if the sampling event results are representative of typical concentrations of uranium in that drainage.

Total uranium concentrations collected within surface water within the main Cove Wash Middle 2 drainage at an elevation below the confluence of Cove Wash Middle 2A and Cove Wash Middle 2B and downstream of all AUMs within the drainage (historical locations CW-36, CW-37, and CW-38) ranged from 100 µg/L to 210 µg/L over all sampling events. Sample locations CW-36 and CW-38 contained total uranium at concentrations significantly above background during the 2015 low flow, 2016 spring snowmelt, and 2016 low flow sampling events, but not during the 2017 spring snowmelt sampling event. Sample locations in the reach in between CW-26 and CW-38 contained total uranium at concentrations significantly above background during only the 2015 low flow and 2016 snowmelt sampling events. Concentrations of total uranium in water samples collected at location CW-37 were slightly lower than concentrations of total uranium detected in samples from locations CW-36 and CW-38.

Confluence of Cove Wash Middle 1 and Cove Wash Middle 2

Below the confluence of Cove Wash Middle 1 and Cove Wash Middle 2 drainages at CW-39, total uranium concentrations ranged from 140 to 223 µg/L over all sampling events.

Cove Wash Middle 3

As shown on Figure 2, the Cove Wash Middle 3 drainage receives runoff from Mesa I and Mesa II AUMs, including the Mesa I Mines 10 to 15 and Cove Mesa 2 Mine. With the exception of sample location CW-14 located in Cove Wash Middle 3E, total uranium concentrations in water samples collected throughout the drainage exceed the EPA MCL. Domestic animal use, such as sheep and cattle grazing, has been observed throughout the Cove Wash Middle 3 stream valley during sampling events. Cows utilize surface water wherever it is available, and have been observed regularly at sample locations CW-65 and CW-66.

Sample locations are shown on Figure 3. Surface water in Cove Wash Middle 3A has had continuous flow from upstream points CW-56a and CW-14 to the dam at CW-05 during every sampling event. It is not possible to access the drainage much further by foot or vehicle upstream of those two uppermost sample locations. Sample locations located upstream of the confluence of Cove Wash Middle 3A and Cove Wash Middle 3E (CW-19, CW-20, CW-20a, CW-65, CW-66, CW-73, CW-74, and CW-75) were accessed by roads leading to the top of the mesas. The Cove Wash Middle 3G and Cove Wash Middle 3F drainages receive runoff from Mesa I AUMs. Sample locations CW-13, CW-14, and CW-56a were not accessible during the 2017 spring snowmelt sampling event due to a rock fall which prevented access to the drainage in between sample locations CW-90 and CW-66. A surface water sample was collected at the base of the rock fall where sediment had gathered at CW-90.

Upstream of CW-56a and CW-14, the Cove Wash Middle 3 tributary streams have intermittent flows, typically during snowmelt, or in response to precipitation during monsoon or winter storms. However, seeps are found in Cove Wash Middle 3A, 3F and 3G, and were sampled during low flow sampling events.

Figure 18 shows a close-up of total uranium results in water throughout the Cove Wash Middle 3 drainage. As noted above, background sample CW-88 was collected for the first time during the 2017 spring snowmelt event and contained total uranium at a concentration of 180 µg/L. No upstream AUM influence could be determined at the sample location. However, the surface water sample location is located below elevation of AUM Mesa I ¼ Mine, which did not have any water during the last two sampling events it was visited. A seep downgradient of AUM Mesa I ¼ Mine was sampled (CW-75) and contained total uranium at concentrations of 540 to 790 µg/L, which were significantly above the background concentrations determined throughout the sampling events at springs and surface waters, as well as the background location CW-88 sampled during the 2017 spring snowmelt sampling event.

Samples collected above the confluence of Cove Wash Middle 3A and Cove Wash Middle 3B (CW-66) and directly downstream of the confluence (CW-65) contained the highest total uranium concentrations found within the watershed, ranging from 950 µg/L to 2,000 µg/L, which were significantly above background for all sampling events. Sample location CW-65 lies within Cove Wash Middle 3 drainage downstream of the Cove Mesa II No. 1 and No. 2 AUMs. While sample location CW-66 lies just upstream of the confluence Cove Wash Middle 3A and Cove Wash Middle 3B, it remains unclear if sample location CW-66 is influenced by the Cove Mesa II No. 1 and No. 2 AUMs. Water has been observed coming out of the sidewall of the drainage in the vicinity of sample locations CW-65 and CW-66, and the Cove Wash Middle 3A drainage goes dry directly upstream of CW-66 or CW-73, depending on the sampling event. Therefore, the surface water pathway may be affected by underground surface water that is not visible at the surface from Cove Mesa II No. 1 and No.2 Mines in the vicinity of both CW-65 and CW-66 sample locations. The stream reach between location CW-65 and CW-56a has been observed to be mostly dry and inaccessible. Directly below sample CW-65 is a cliff that has been observed to be dry throughout all sampling events. Sample location CW-56a has consistently contained elevated concentrations of total uranium ranging from 411 µg/L to 470 µg/L. Sample location CW-56a contained total uranium at concentrations significantly above background during the 2016 spring snowmelt and 2016 low flow sampling events.

As shown on Figure 18, sample CW-13 total uranium decreases to concentrations significantly below that detected at CW-56a. Further upstream at CW-14, total uranium concentrations were detected below the MCL for all samples, suggesting a source area with minimal influence from AUMs. This may be due to dilution by surface waters from Cove Wash Middle 3E that contain lower concentrations of total uranium. Total uranium was detected in surface water samples collected from locations CW-13 and CW-14 at concentrations significantly above background during the 2015 low flow sampling event, but concentrations were not significantly above background in surface water samples collected during the 2016 spring snowmelt and 2016 low flow sampling events.

A seep sampling location downslope from AUM Mesa I Mine 15 (CW-47) contained total uranium at concentrations significantly above background during three sampling events where water was present, with concentrations ranging from 510 µg/L to 616 µg/L. Downstream of the AUM, but above the confluence of Cove Wash Middle 3F and Cove Wash Middle 3G at CW-48, the concentrations of total uranium have varied significantly from 7.5 and 32 µg/L during the snowmelt sampling events to 210 µg/L during the 2015 low flow sampling event, suggesting that dilution by increased seasonal flows may be a factor in total uranium concentrations. Total uranium was detected at a concentration significantly above background at surface water sample location CW-48 during the 2015 low flow sampling event only.

Samples at CW-12, below the confluence of Cove Wash Middle 3A and Cove Wash Middle 3G, have contained total uranium at concentrations ranging from 38 µg/L to 70 µg/L over all four sampling events. This may indicate that increased surface water flow from non-AUM impacted areas has a dilution effect on water sources originating from higher elevations. Total uranium was detected at a concentration significantly above background at surface water sample location CW-12 during the 2015 low flow sampling event only.

Confluence of Cove Wash Middle 1, Cove Wash Middle 2, and Cove Wash Middle 3

Samples collected fully downstream of all Cove Middle drainages (CW-05 and CW-07) contained total uranium at concentrations from 74 µg/L to 120 µg/L over all sampling events. Samples collected at the CW-05 and CW-07 locations were detected at concentrations significantly above background during the 2015 low flow sampling event. The surface water sample collected at sample location CW-05 contained total uranium at a concentration significantly above background during the 2016 low flow sampling event. Samples collected in surface waters within Cove Middle Wash at location CW-05 and CW-07 were not significantly above background levels for the 2016 spring snowmelt and 2017 spring snowmelt sampling events.

Cove North

As shown on Figure 2, the Cove Wash North drainage receives runoff from Mesa V and Mesa VI AUMs. Total uranium concentrations in water samples collected throughout the drainage exceed the EPA MCL, including three out of four samples collected from the background location in this drainage. Domestic animal use has not been observed throughout the drainage during sampling events. Deer tracks have been observed at sampling points below location CW-15.

Surface water flows intermittently throughout the Cove Wash North drainage. Upstream of sample location CW-15, shown on Figure 3, only seeps are found within the drainage. The Cove

Wash North drainage is accessible by foot and all-terrain vehicle from the Indian Route 335 from location CW-06 to CW-15. Sample location CW-15 is located at the base of a cliff that cannot be accessed by foot or by vehicle. Samples upstream of location CW-15 can be accessed by driving up to the top of Mesa IV and walking on an old mining road. The background location CW-04 must be accessed by descending from an unmaintained road by foot.

Figure 19 shows a close-up of total uranium results in water throughout the Cove Wash North drainage. As noted in Section 4.1.2, background sample CW-04 contained total uranium at concentrations ranging from 1.5 µg/L to 37 µg/L. No upstream AUM influence could be determined at the CW-04 background sample location. Concentrations of total uranium increase in seeps and surface waters downstream of AUMs located within the Cove Wash North drainage. Only the seep located at sample location CW-64 consistently contained total uranium at concentrations significantly above the background location during the 2016 spring snowmelt and 2016 low flow sampling events.

The sample collected downstream of all AUMs (CW-11) contained total uranium at concentrations ranging from 38 µg/L to 220 µg/L. Total uranium was detected at a concentration significantly above background at surface water sample location CW-11 during the 2015 low flow sampling event only. At the request of Don Ellison, a sample was collected further downstream within the drainage above the confluence on the Cove Wash North and Cove Middle drainages (CW-81). The location had surface flow during two sampling events and contained total uranium at concentrations of 16 µg/L and 37 µg/L, which were not significantly above background. The confluence of Cove Wash North and Cove Wash Middle drainages (CW-06) only contained surface water during the last sampling event. Sample location CW-06 contained total uranium at a concentration of 150 µg/L, which was significantly above background.

Confluence of Cove Wash North, Cove Wash Middle, and Cove Wash South Drainages

As shown on Figure 19, sample location CW-01 is located downstream of the confluence of the Cove Wash North, Cove Wash Middle, and Cove Wash South drainages. Total uranium concentrations at sample location CW-01 have ranged from 110 µg/L to 270 µg/L, and concentrations significantly above background were detected during the 2015 low flow and 2016 spring snowmelt sampling events. Samples collected at a confluence with a background drainage (CW-59) were collected during the 2016 spring low flow sampling event when surface water was present. Samples (CW-02) were collected as far downstream of Cove Wash as possible, based upon the presence of surface water, and contained total uranium at concentrations from 57 µg/L to 63 µg/L over all sampling events. Total uranium was detected at a concentration significantly above background at surface water sample location CW-02 during the 2015 low flow sampling event only.

5.2.3.1.3 Seasonal Differences in Total Uranium Concentrations

Total uranium concentrations in surface water and groundwater samples were evaluated for potential seasonal differences. In hydrologic terms, snowmelt and low flow conditions are distinguished by differences in the availability and volumes of surface water found in seeps, springs, and stream channels. Differences in surface water volumes may be observed as differences in contaminant concentrations. As described in Section 2.4, during these sampling events snowmelt occurred in Cove from March to May, and low flow was generally in middle to late June, just prior to monsoon season. As summarized in Table 15 in Section 5.1.4.1, sample data populations were compared for number of exceedances, percentage of samples exceeding the screening level, and detected concentration ranges. Appendix E-1 shows concentrations of uranium for each sampling location over all four sampling events as a bar graph.

Comparing the number of screening level exceedances observed between low flow sampling and snowmelt sampling, the data show 19 and 28 exceedances during low flow sampling events, and 29 exceedances during both snowmelt sampling events. The data show that seasonal snowmelt conditions contained the highest total number of exceedances in the locations sampled. However, snowmelt sampling events had a greater total number of samples compared to low flow events, due to increased availability of surface flows throughout the investigation area. During low flow sampling events, 90% and 85% of water samples exceeded the screening level of 30 µg/L respectively. In the two snowmelt sampling events in 2016 and 2017, 78% and 91% of water samples exceeded the screening level of 30 µg/L respectively. Based on a comparison of the percentage of exceedances per sampling event, total uranium concentrations observed during low flow sampling events showed the highest percentage of exceedances, despite lower flow volumes and lower number of total samples.

The range of total uranium concentrations detected under different flow conditions found both the lowest and highest maximum concentrations, at 500 µg/L and 2,000 µg/L, during low flow sampling events. However, the 2016 and 2017 snowmelt sampling events had two to three times the maximum concentration seen during the 2015 low flow sampling, at 1,600 µg/L and 1,200 µg/L respectively. This is partly due to increased access gained over each sampling event. The highest sampling locations were not accessed during the 2015 low flow sampling event due to time limitations in the field. As more information about the drainages and potential access became available, sampling locations were added. The 2016 low flow event had the highest minimum concentration detected at 6.6 µg/L, while the 2017 snowmelt sampling event had the lowest minimum concentration, at 3.2 µg/L. The variability in detection of uranium over all sampling locations does not suggest a strong relationship between seasonal flows and concentrations.

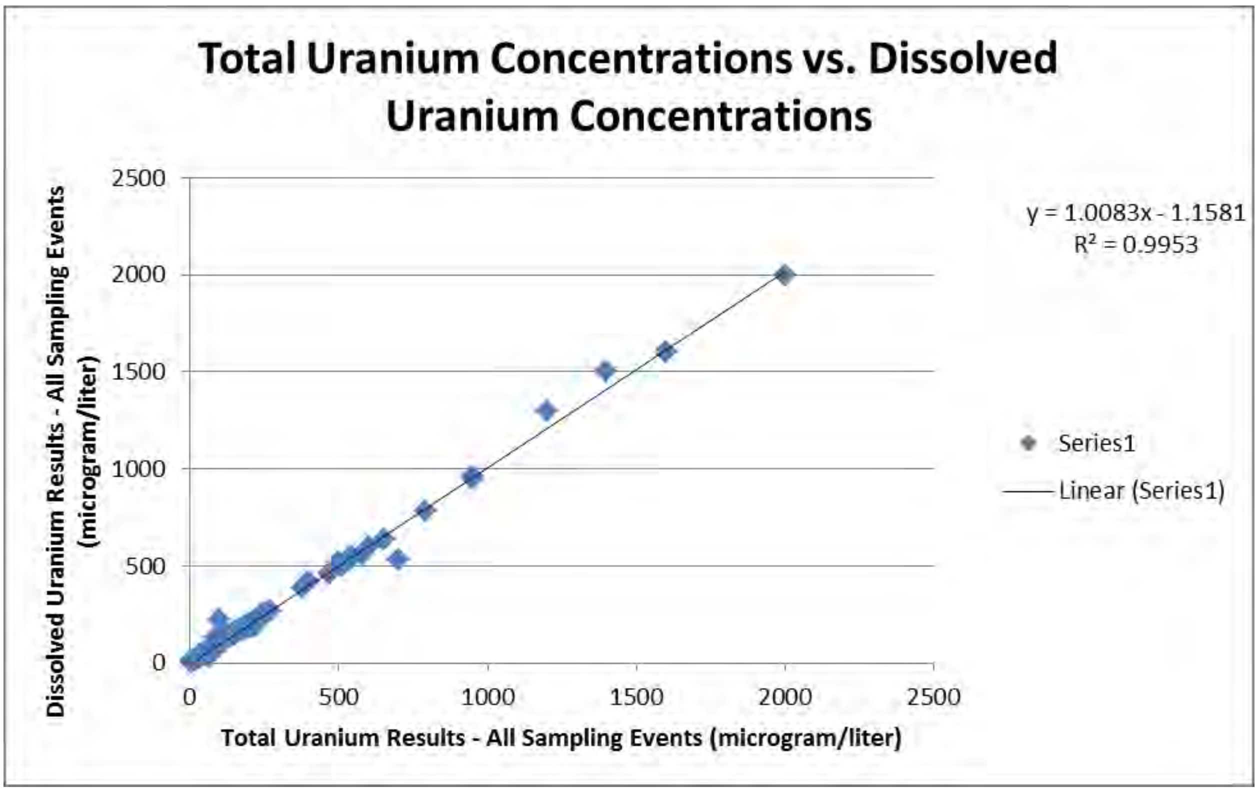
Interestingly, there are differences in total uranium concentrations observed in background sampling locations under different flow conditions. The lowest minimum concentrations were found during low flow sampling events, while the maximum concentration observed was during the 2016 snowmelt sampling event, exceeding the screening level at 37 µg/L. This same background location (CW-04) also exceeded the screening level during the 2016 low flow sampling event. Although the limited amount of background sampling data do not support definitive conclusions, these data do suggest that a more thorough investigation of naturally-occurring concentrations of uranium may be warranted. The standard deviations for total uranium in background samples approach or exceed the mean value (Table 15 for the last three sampling events, mostly due to the increased uranium concentrations found in samples CW-04 during the last three sampling events, and the high concentration found at sample location CW-88 during the 2017 low flow sampling event.

Four other sample locations shown on Figure 3 (CW-01, CW-53a, CW-54, and CW-81) had relatively large differences in total uranium results over the four sampling events. Sample location CW-53a, contained total uranium at concentrations of 130 µg/L and 190 µg/L during the 2016 and 2017 spring snowmelt sampling events, respectively. During the 2016 low flow sampling event, water collected at sample location CW-53a contained total uranium at a concentration of 230 µg/L. Sample location CW-01 contained the lowest concentrations of total uranium detected at the location during the 2016 and 2017 spring snowmelt events, at estimated concentration of 110 µg/L and a concentration of 120 µg/L, respectively. The concentration of total uranium detected during 2015 and 2016 low flow sampling events was 130 µg/L and 270 µg/L, respectively. While the sample results were in keeping with the general trend of higher detected concentrations during low flow sampling events, the overall range of sample concentrations is larger than found in other samples further upstream.

However, sample location CW-54 contained total uranium at a concentration of 380 µg/L and 80 µg/L during the 2015 and 2016 low flow sampling events, but higher concentrations of total uranium during the 2016 and 2017 spring snowmelt sampling events of 580 µg/L and 654 µg/L, respectively. Sample location CW-81 only had two seasons' worth of data, the 2016 low flow and 2017 spring snowmelt sampling events, but the low flow sampling event concentration of 16 µg/L was less than half of the spring snowmelt concentration of 37 µg/L. Overall, the general trend of higher uranium concentrations detected during the low flow sampling events was not seen universally at all sampling locations. In summary, the data suggest that total uranium concentrations are highest in surface waters encountered during low flow season. Additional sampling events would be required to confirm this, since samples were only collected during two low flow and two spring snowmelt sampling events. Surface flows encountered during snowmelt conditions showed high concentrations of total uranium in greater than 78% to 91% of the samples collected, so dilution of contaminants from higher flow volumes is not sufficient to reduce concentrations to below screening levels. Use of the concentration ranges of the existing sample data do not appear to be helpful in evaluating seasonal variations in total uranium concentrations due to variability discussed above. Background sampling location concentration ranges displayed some variability, sometimes exceeding the screening level, suggesting that further investigation of naturally-occurring uranium in surface water and groundwater may be warranted.

5.2.3.1.4 Comparison of Total and Dissolved Uranium Concentrations

The majority of uranium in all water samples collected from the watershed whether seep, spring, surface water, or groundwater, is transported in the dissolved phase. As shown in the scatterplot below, which compares total uranium to dissolved uranium results over all four sampling events, the relation of total uranium to dissolved uranium is linear with a coefficient of determination of 0.99. The ratio of total uranium to dissolved uranium is almost 1:1. Therefore, uranium is transported in the dissolved phase in surface waters throughout the watershed. This implies that the majority of uranium is not attached to sediments moving through the surface water pathway, which would lead to a larger concentration of total uranium versus dissolved uranium, since dissolved uranium analysis filters out particulates larger than 0.45 micrometers before preserving the sample for analysis.



5.2.3.2 Total Aluminum Results

As discussed in Section 5.2.1, total aluminum exceeded screening levels for NNSWQS in some water samples collected during all four sampling events. Table 16 shows a comparison of results over four sampling events. Aluminum was not analyzed in water samples during the 2015 low flow sampling event. A compilation of all total aluminum results for the four sampling events is shown in Appendix D-2. As shown on Figure 20, total aluminum was detected in samples collected throughout the watershed at concentrations exceeding NNSWQS – Aquatic and Wildlife – Chronic. Background concentrations detected over all sampling events ranged from 480 µg/L to 18,000 µg/L. Water samples collected from background sample location CW-59, the furthest downstream background location, contained total aluminum at concentrations of 13,000 µg/L and 6,200 µg/L during spring snowmelt sampling events when water was present at the location.

Sample locations CW-03 and CW-09 within the Cove Wash North drainage and Cove Wash South drainage contained total aluminum at concentrations significantly exceeding background during the 2016 spring snowmelt sampling event. Cottonwood Springs (sample location CW-10) and sample location CW-26, the seep extending from an adit at Mesa II ½ Mine No. 4, contained total aluminum at concentrations significantly above background during the 2016 low flow sampling event. Sample location CW-26 contained total aluminum at a concentration significantly above background during the 2017 spring snowmelt sampling event.

Screening level exceedances were detected at seeps near AUMs and downstream of those seeps. Specifically, samples collected throughout the Cove Wash Middle 3 and Cove Wash North drainages exceeded screening levels. Samples collected within the Cove Wash Middle 1 and Cove Wash Middle 2 drainages contained total aluminum above screening levels, but water samples collected at the confluence of those two drainages prior to flowing into the dammed area and further downstream did not exceed screening levels for total aluminum.

Overall, total aluminum was detected within surface waters, including seeps and springs on or near AUMs, at concentrations exceeding the NNSWQS for aquatic wildlife and habitat throughout the watershed as well as in background samples. Water samples collected within drainages at or below the elevation of AUMs contained total aluminum at concentrations significantly above background at sample locations CW-03, CW-09, CW-10 and CW-26 during various sampling events. Therefore, total aluminum is a COC.

Table 16: Summary of Total Aluminum in Surface Water and Groundwater			
Sampling Event	**2016 Spring Snowmelt**	**2016 Low Flow**	**2017 Spring Snowmelt**
Number of Samples (including field duplicates)	41 (including 4 field duplicates)	33 (including 3 field duplicates)	45 (including 5 field duplicates)
Detected Background Results Range (µg/L)	3.2 U – 13,000	32 U – 490 J	60 U – 18,000
Detected Result Range (µg/L)	36 J – 140,000	38 J – 22,000	67 J – 20,000
Number of Detects (excluding duplicates)	28	21	22
Numeric Threshold (µg/L)	87 (A&Wc) 750 (A&Wa)	87 (A&Wc) 750 (A&Wa)	87 (A&Wc) 750 (A&Wa)
Number of Exceedances (excluding duplicates)	26 – A&Wc 7 – A&Wa	19 – A&Wc 8 – A&Wa	20 – A&Wc 12 - A&Wa
Background Sample Mean	3,400	420	3,100
Background Sample Standard Deviation	6,400	370	6,400
Sample Mean	8,200	1,700	2,400
Sample Standard Deviation	30,000	4,800	5,600

Notes:
A&Wa = 2015 Navajo Nation Surface Water Quality Standards – Aquatic and Wildlife - Acute
A&Wc = 2015 Navajo Nation Surface Water Quality Standards - Aquatic and Wildlife – Chronic
J = Compound detected, but result value is approximate.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
µg /L = micrograms per liter

5.2.3.3 Total Adjusted Gross Alpha Radiation

As noted in the results summaries above and in the Appendix B results tables, the calculated total adjusted gross alpha radiation is a negative value for the majority of water results, regardless of water type. Table 17 shows a comparison of results over four sampling events. A compilation of all total adjusted gross alpha results for the four sampling events is shown in Appendix D-3. Only two water samples collected during sampling events exceeded screening levels. During the 2015 low flow sampling event, the background sample location CW-04, shown on Figure 3, exceeded the EPA MCL, NNSWQS for agricultural water supply, and NNSWQS for livestock and wildlife watering of 15 µg/L. During the 2016 low flow sampling event, sample location CW-05, shown on Figure 3, exceeded the EPA MCL, NNSWQS for agricultural water supply, and NNSWQS for livestock and wildlife watering of 15 µg/L. As noted in Section 5.1, radiological activities are compared to two times the mean of the background results. Based on the general negative value of background sample mean calculated as shown in Table 17, the background mean value is not used to evaluate whether total adjusted gross alpha is found at concentrations significantly above background.

Table 17: Summary of Total Adjusted Gross Alpha Radiation in Surface Water and Groundwater				
Sampling Event	**2015 Low Flow**	**2016 Spring Snowmelt**	**2016 Low Flow**	**2017 Spring Snowmelt**
Number of Samples (including field duplicates)	27 (including 3 field duplicates)	41 (including 4 field duplicates)	33 (including 3 field duplicates)	45 (including 5 field duplicates)
Detected Background Results Range (µg/L)	-3.43 – 21.22	-13.06 – 1.569	-21.53 – 0.8	--578.2 – 1.1
Detected Result Range* (µg/L)	-126.5 – 4.37	-583.3 – -2.23	-565.6 – 23.74	-496.3– 23.6
Number of Detects (excluding duplicates)	3	1	12	5
Numeric Threshold (µg/L)	15 (MCL) 15 (AgWS) 15 (LW)	15 (MCL) 15 (AgWS) 15 (LW)	15 (MCL) 15 (AgWS) 15 (LW)v	15 (MCL) 15 (AgWS) 15 (LW)
Number of Exceedances (excluding duplicates)	1 – MCL 1 – AgWS 1-LW	0	2 – MCL 2 – AgWS 2-LW	1
Background Sample Mean	5.9	-3.4	-11	-104.80
Background Sample Standard Deviation	13.3	6.6	15.4	215.46
Sample Mean	-27.7	---71.9	-63	-86
Sample Standard Deviation	31.1	127	140	130

Notes:
* = Positive adjusted gross alpha radiation values are reported as detects
AgWS = 2015 Navajo Nation Surface Water Quality Standards - agricultural water supply (currently under EPA review)
LW = 2015 Navajo Nation Surface Water Quality Standards - livestock watering (currently under EPA review)
MCL = EPA Maximum Contaminant Level - Drinking Water
µg /L = micrograms per liter

The adjusted gross alpha radiation is determined by subtracting the total uranium isotope activity results from total adjusted gross alpha radiation activity results. It was determined that the majority of the water sample results for total adjusted gross alpha activity were negative upon receipt of 2015 low flow analytical data. The laboratory was contacted to discuss the analytical results and the project manager noted that negative value results for adjusted gross alpha are not uncommon in uranium dominated systems, where the radium 226 and radium 228 activities are very low (L. Steere, personal communication, October 15, 2015).

The gross alpha radiation method (SM7110C) is not as accurate as the uranium isotope method (ASTM D3972). The method for determination of uranium isotopes uses a tracer isotope during analysis, while the gross alpha radiation analysis method does not. Overall, the total adjusted gross alpha radiation and radium 226/radium 228 results indicate that alpha activity in water samples is primarily from uranium alpha emission.

5.2.3.4 Total Arsenic Results

Total arsenic exceeded screening levels in some water samples collected during all four sampling events. Table 18 shows a comparison of results over four sampling events. The total number of screening level exceedances did not vary between sampling events, but the locations of samples containing total arsenic exceeding the MCL varied for each sampling event with some exceptions. The NNSWQS for primary human contact and fish consumption were exceeded during all four sampling events at sample location CW-26, which is a seep originating from a sealed adit at the AUM Mesa II ½ Mine 4.

As shown on Figure 21, the sample locations furthest downstream, CW-01 and CW02, consistently contained total arsenic above or just below the EPA MCL during all sampling events. Some background samples, whether at higher locations such as CW-04, or lower elevations like CW-59, contained total arsenic at similar concentrations as other samples exceeding the EPA MCL during specific sampling events. Sample location CW-26 at AUM Mesa II ½ Mine 4 consistently contained total arsenic at concentrations significantly above background during all sampling events. Sample locations CW-02, the furthest sample collected downstream, and CW-66, located within Cove Was Middle 3A, contained arsenic at concentrations significantly above background during the 2016 low flow sampling event. Therefore, total arsenic is a COC. Other sample locations contained arsenic exceeding the EPA MCL, but not at concentrations significantly above background. A compilation of all total arsenic results for the four sampling events is shown in Appendix D-4.

Table 18: Summary of Total Arsenic in Surface Water and Groundwater				
Sampling Event	**2015 Low Flow**	**2016 Spring Snowmelt**	**2016 Low Flow**	**2017 Spring Snowmelt**
Number of Samples (including field duplicates)	27 (including 3 field duplicates)	41 (including 4 field duplicates)	33 (including 3 field duplicates)	45 (including 5 field duplicates)
Detected Background Results Range (µg/L)	5.4 U - 18	3.9 U – 9.9 J	3.9 U – 5.6 J	3 U – 15
Detected Result Range (µg/L)	6.6 J - 89	4.6 J – 70	4.4 J - 98	4.1 J - 120
Number of Detects (excluding duplicates)	18	17	19	28
Numeric Threshold (µg/L)	10 (MCL) 30 (PrHC) 80 (FC)	10 (MCL) 30 (PrHC)	10 (MCL) 30 (PrHC)	10 (MCL) 30 (PrHC) 80 (FC)
Number of Exceedances (excluding duplicates)	8-MCL 1-PrHC 1-FC	6 – MCL 1 – PrHC	8 – MCL 1 - PrHC	7 – MCL 1 - PrHC 1 - FC
Background Sample Mean	7.8	3.5	3.8	5.9
Background Sample Standard Deviation	8.8	4.4	2.6	4.4.6
Sample Mean	12	78.1	10	9.4
Sample Standard Deviation	17	12	18	20

MCL = EPA Maximum Contaminant Level - Drinking Water
PrHC = 2015 Navajo Nation Surface Water Quality Standards - primary human contact (currently under EPA review)
FC = 2015 Navajo Nation Surface Water Quality Standards - fish consumption
µg/L = micrograms per liter
J = Compound detected, but result value is approximate.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

5.2.3.5 Total Barium Results

Total barium exceeded screening levels in some water samples collected during all four sampling events. Table 19 shows a comparison of results over four sampling events. A compilation of all total barium results for the four sampling events is shown in Appendix D-5. With the exception of exceedances noted below for the 2015 and 2016 sampling events, barium was detected within background ranges (up to three times background) in all water samples. Samples collected from location CW-10, shown on Figure 3, contained total barium at concentrations exceeding the NNSWQS for agricultural water supply. Sample location CW-10 is located at the capped Cottonwood Springs spring near residences in Cove, Arizona. Although capped, the former well continues to seep water and cow tracks were observed during sampling events. Sample location

CW-10 contained total barium at concentrations significantly above background during the 2015 low flow and 2016 low flow sampling events. Sample locations CW-03 and CW-09 contained total barium at concentrations significantly above background during the 2016 spring snowmelt sampling event.

During the 2016 spring snowmelt sampling event, two locations within Cove Wash North, near its confluence with Cove Wash, exceeded the NNSWQS and EPA MCL for total barium. Surface water was not present during other sampling events at those locations, so only one data set for water samples is available for evaluation at those locations. Overall, exceedances were not detected in the vicinity of AUMs or within drainages directly receiving runoff from those drainages, with the exception of sample location CW-73 during the 2017 spring snowmelt sampling event, which was within background concentrations. Therefore, there is not a clear line of evidence from AUM sample locations to the exceedances of total barium further downstream in Cove Wash and Cottonwood Springs. However, based on sample results of total barium at concentrations significantly above background, total barium is a COC.

Table 19: Summary of Total Barium in Surface Water and Groundwater				
Sampling Event	**2015 Low Flow**	**2016 Spring Snowmelt**	**2016 Low Flow**	**2017 Spring Snowmelt**
Number of Samples (including field duplicates)	27 (including 3 field duplicates)	41 (including 4 field duplicates)	33 (including 3 field duplicates)	45 (including 5 field duplicates)
Detected Background Results Range (µg/L)	210 – 310	25 J - 320	11 J – 310	30 U - 350
Detected Result Range (µg/L)	9.8 J – 1300	98 J – 4,700	120 – 1,100	130 - 530
Number of Detects (excluding duplicates)	24	37	33	39
Numeric Threshold (µg/L)	500 (AgWS)	500 (AgWS) 2,000 (MCL)	500 (AgWS)	500 (AgWS)
Number of Exceedances (excluding duplicates)	1 - AgWS	2 – AgWS 2 - MCL	1 - AgWS	1 - AgWS
Background Sample Mean	280	290	305	280
Background Sample Standard Deviation	58	25	7.1	60
Sample Mean	305	400	280	260
Sample Standard Deviation	238	820	180	98

Notes:
AgWS = 2015 Navajo Nation Surface Water Quality Standards - agricultural water supply (currently under EPA review)
MCL = EPA Maximum Contaminant Level - Drinking Water
J = Compound detected, but result value is approximate.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
µg /L = micrograms per liter

5.2.3.6 Total Beryllium Results

Total beryllium exceeded the EPA MCL screening level in two samples collected during the 2016 spring snowmelt sampling event. Total beryllium was detected at concentrations of 6.7 ug/L and 5.9 ug/L at sample locations CW-03 and CW-09, respectively. Sample locations are shown on Figure 3. Both sample locations are located within Cove Wash North well below AUMs. The samples contained total beryllium at concentrations significantly above background during the 2016 spring snowmelt sampling event. Cottonwood Springs (sample location CW-10) also contained total beryllium at a concentration significantly above background during the 2016 spring snowmelt sampling event. However, samples collected at seeps and within surface water within Cove Wash North near the drainage did not contain total beryllium at comparable concentrations, and were non-detect. Therefore, it is not clear that AUMs are the cause of elevated total beryllium concentrations detected in surface waters within Cove Wash North drainage. However, based on sample results of total beryllium at concentrations significantly above background, total beryllium is a COC. Table 20 shows a comparison of results over four sampling events. A compilation of all total beryllium results for the four sampling events is shown in Appendix D-6.

Table 20: Summary of Total Beryllium in Surface Water and Groundwater				
Sampling Event	**2015 Low Flow**	**2016 Spring Snowmelt**	**2016 Low Flow**	**2017 Spring Snowmelt**
Number of Samples (including field duplicates)	27 (including 3 field duplicates)	41 (including 4 field duplicates)	33 (including 3 field duplicates)	45 (including 5 field duplicates)
Detected Background Results Range (µg/L)	0.51 U – 1.2 J	0.48 U – 0.52 J	0.48 U	1.5 U
Detected Result Range (µg/L)	1.4 J – 2.2 J	5.9 – 6.7	0.48 U – 1.4 J	1.5 U to 15 U
Number of Detects (excluding duplicates)	4	3	1	0
Numeric Threshold (µg/L)	4 (MCL)	4 (MCL)	4 (MCL)	4 (MCL)
Number of Exceedances (excluding duplicates)	0	2 - MCL	0	0
Background Sample Mean	0.57	0.19	0.48 U--	1.5 U --
Background Sample Standard Deviation	0.55	0.25	0	0--
Sample Mean	0.45	0.58	0.35	0.90
Sample Standard Deviation	0.52	1.4	0.46	1.2

Notes:
MCL = EPA Maximum Contaminant Level - Drinking Water
J = Compound detected, but result value is approximate.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
µg /L = micrograms per liter

5.2.3.7 Total Lead Results

Water samples exceeded total lead screening levels at one to two sample locations during all sampling events. Table 21 shows an overview of exceedances over all sampling events. All water results for total lead are provided in Appendix D-7. With the exception of two exceedances of total lead detected during the 2016 low flow sampling event, all exceedances of the EPA MCL, NNSWQS primary human contact, and NNSWQS secondary human contact, which are all 15 µg/L, were significantly above background ranges detected of non-detect to 7.4 µg/L. Total lead was detected above all three screening levels and significantly above background at water collected from Cottonwood Springs (CW-10), located near residences in Cove, Arizona, during the 2015 low flow and 2016 low flow sampling events at concentrations of 32 µg/L and 18 µg/L, respectively. Sample locations are shown on Figure 3. During the 2016 spring snowmelt sampling event, total lead was detected above screening levels and significantly above background at sample locations CW-03 and CW-09 at concentrations of 76 µg/L and 44 µg/L, respectively. Sample location CW-26 at AUM Mesa II ½ Mine 4 contained total lead at concentrations significantly above background and screening levels during the 2016 low flow sampling event and 2017 spring snowmelt sampling event at concentrations of 17 µg/L and 26 µg/L, respectively. Sample location CW-65, located within the Cove Wash Middle 3 drainage contained total lead concentration significantly above background during the 2016 low flow sampling event, at 3.5 µg/L. Although the seeps CW-26 and CW-65 contained total lead above screening levels, surface water samples collected downstream within Cove Wash Middle 2 and Cove Middle 3 as well as further downstream near the dam have not contained detectable concentrations of total lead. Therefore, it is not clear that elevated concentrations of total lead within Cottonwood Springs and within the Cove Wash North drainage are results of AUM influence within the watershed. However, based on the presence of total lead within at least one sample at concentrations significantly above background, total lead is a COC.

Table 21: Summary of Total Lead in Surface Water and Groundwater				
Sampling Event	**2015 Low Flow**	**2016 Spring Snowmelt**	**2016 Low Flow**	**2017 Spring Snowmelt**
Number of Samples (including field duplicates)	27 (including 3 field duplicates)	41 (including 4 field duplicates)	33 (including 3 field duplicates)	45 (including 5 field duplicates)
Detected Background Results Range (µg/L)	2.2 U – 7.4	2.2 U – 5.2	2.2 U	0.9 U – 4.5
Detected Result Range (µg/L)	2.5 J - 32	4.1 – 76	3.5 - 018	1 J - 26
Number of Detects (excluding duplicates)	4	4	3	11
Numeric Threshold (µg/L)	15 (MCL) 15 (PrHC) 15 (ScHC)	15 (ScHC) 15 (MCL) 15 (PrHC*)	15 (ScHC) 15 (MCL) 15 (PrHC)	15 (ScHC) 15 (MCL) 15 (PrHC)
Number of Exceedances (excluding duplicates)	1-MCL 1-PrHC 1-ScHC	2-MCL 2-PrHC 2-ScHC	2-MCL 2-PrHC 2-ScHC	1-MCL 1-PrHC 1-ScHC
Background Sample Mean	3.2	2.1	—2.9 U	1.6
Background Sample Standard Deviation	3.6	2.1	0	1.8
Sample Mean	2.6	4.5	2.4	2.8
Sample Standard Deviation	6.4	14	4.3	5.8

Notes:
MCL = EPA Maximum Contaminant Level - Drinking Water
PrHC = 2015 Navajo Nation Surface Water Quality Standards - primary human contact (currently under EPA review)
ScHC = 2015 Navajo Nation Surface Water Quality Standards - secondary human contactMCL = EPA Maximum Contaminant Level - Drinking Water
J = Compound detected, but result value is approximate.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
µg /L = micrograms per liter

5.2.3.8 Total Mercury Results

At an estimated concentration of 0.064 µg/L, total mercury exceeded the NNSWQS – Aquatic and Wildlife – Chronic in one sample, CW-26, which was collected at a seep from a sealed adit at AUM Mesa II ½ Mine 4. Table 22 shows an overview of exceedances over all sampling events. With the exception of the detection at CW-26, which was detected at a concentration significantly above background, mercury was non-detect in all water samples collected during the assessment. Therefore, while only present at sample location CW-26 during one sampling event, total mercury is a COC. All water results for total mercury are provided in Appendix D-8.

Table 22: Summary of Total Mercury in Surface Water and Groundwater

Sampling Event	2015 Low Flow	2016 Spring Snowmelt	2016 Low Flow	2017 Spring Snowmelt
Number of Samples (including field duplicates)	27 (including 3 field duplicates)	41 (including 4 field duplicates)	33 (including 3 field duplicates)	45 (including 5 field duplicates)
Detected Background Results Range (µg/L)	0.06 U	0.06 U	0.06 UJ	0.06 U – 0.06 UJ
Detected Result Range (µg/L)	0.06 U	0.06 U	0.06 UJ	0.064 J
Number of Detects (excluding duplicates)	0	0	0	1
Numeric Threshold (µg/L)	0.012 (A&Wc)	0.012 (A&Wc)	0.012 (A&Wc)	0.012 (A&Wc)
Number of Exceedances (excluding duplicates)	0	0	0	1 - A&Wc
Background Sample Mean	0.06 U	0.06 U	0.06 U	0.06 U
Background Sample Standard Deviation	0	0	0	0
Sample Mean	0.06 U	0.06 U	0.06 U	0.031 J
Sample Standard Deviation	0	0	0	0.0059

A&Wa = 2015 Navajo Nation Surface Water Quality Standards – Aquatic and Wildlife - Acute
A&Wc = 2015 Navajo Nation Surface Water Quality Standards - Aquatic and Wildlife – Chronic
J = Compound detected, but result value is approximate.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
µg /L = micrograms per liter

5.2.3.9 Total Molybdenum Results

Total molybdenum exceeded the NNSWQS for agricultural water supply of 50 µg/L within water samples at five sample locations. Table 23 shows the overview of exceedances over all sampling events. All water results for total molybdenum are provided in Appendix D-9. Figure 3 shows the sample locations: CW-26 and CW-51 within the Cove Wash Middle 2 drainage, as well as CW-56a, CW65, and CW-66 within the Cove Wash Middle 3 drainage. Within the Cove

Wash Middle 2 drainage, the samples collected at location CW-26, from a seep at a sealed adit at AUM Mesa II ½ Mine 4, contained molybdenum at the highest concentrations detected, ranging from 270 µg/L to 780 µg/L over all sampling events. Water collected from a seep at sample location CW-51 contained total molybdenum at a concentration of 65 µg/L during the 2016 spring snowmelt sampling event. Within the Cove Wash Middle 3 drainage, sample locations CW-65 and CW-66 contained the highest concentrations of total molybdenum, ranging from 170 µg/L to 420 µg/L over the three sampling events they were sampled during from the 2016 spring snowmelt to the 2017 spring snowmelt event. Samples collected at the dam (CW-05) near the irrigation ditch did not exceed the NNSWQS for agricultural water supply.

Background concentrations of total molybdenum ranged from non-detect to 1.8 µg/L. Some water samples collected throughout all four drainages from seeps and surface water samples were significantly above background during one or more sampling event. Two samples collected from the dam location CW-05 contained total molybdenum at concentrations significantly above background during the 2015 low flow, 2016 low flow, and the 2017 spring snowmelt sampling events. Water samples collected at the furthest downstream points (CW-01 and CW-02) were consistently significantly above background at concentrations ranging from non-detect to 12 µg/L. Based on the concentrations detected in samples at concentrations significantly above background, total molybdenum is a COC. Total molybdenum was detected at concentrations significantly above background throughout the watershed, but not above NNSWQS for agricultural water supply of 50 µg/L, in parts of the Cove Wash Middle and Cove Wash North drainages that are diverted for agricultural water supply.

Table 23: Summary of Total Molybdenum in Surface Water and Groundwater				
Sampling Event	**2015 Low Flow**	**2016 Spring Snowmelt**	**2016 Low Flow**	**2017 Spring Snowmelt**
Number of Samples (including field duplicates)	27 (including 3 field duplicates)	41 (including 4 field duplicates)	33 (including 3 field duplicates)	45 (including 5 field duplicates)
Detected Background Results Range (µg/L)	2.9 U	0.39 J – 3.3	0.38 U – 1.5	0.3 U – 1.6
Detected Result Range (µg/L)	4.9 J - 780	0.49 J - 670	0.64 J - 590	0.57 J – 270
Number of Detects (excluding duplicates)	15	36	28	38
Numeric Threshold (µg/L)	50 (AgWS)	50 (AgWS)	50 (AgWS)	50 (AgWS)
Number of Exceedances (excluding duplicates)	1-AgWS	2 - AgWS	4 - AgWS	3 – AgWS
Background Sample Mean	2.9 U	1.6	0.80	1.8
Background Sample Standard Deviation	--	1.3	0.86	2.3
Sample Mean	44	43	52	27
Sample Standard Deviation	160	120	140	61

Notes:
AgWS = 2015 Navajo Nation Surface Water Quality Standards - agricultural water supply (currently under EPA review)
MCL = EPA Maximum Contaminant Level - Drinking Water
J = Compound detected, but result value is approximate.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
µg /L = micrograms per liter

5.2.3.10 Total Combined Radium 226/228 Results

Total combined radium 226/228 results exceeded the EPA MCL and NNSWQS for livestock watering and agricultural supply of 5 pCi/L in some water samples collected during all four sampling events. Table 24 shows a comparison of results over four sampling events. A compilation of all total combined radium 226/228 results for the four sampling events is shown in Appendix D-10. Total combined radium 226/228 results are shown on Figure 22. As shown on Figure 18, exceedances of the EPA MCL and NNSWQS occur in Cove Wash Middle 1 (sample locations CW-50, CW-53, CW-53a, and CW-54) at concentrations ranging from 5.7 to 24.7 pCi/L and in Cove Wash Middle 2 drainages (sample locations CW-26 and CW-84) at concentrations ranging from 1.6 to 13.9 pCi/L. These locations are not currently used for drinking water.

The background samples, shown on Figure 22, contained combined radium 226/228 at a range of 0.28 pCi/L to 2.11 pCi/L over four sampling events. Some water samples, collected throughout all four drainages from seeps and surface water, were significantly above background during one or more sampling event. Therefore, total combined radium is a COC.

Samples containing total combined radium 226/228 at concentrations significantly above background and exceeding the EPA MCL and NNSWQS were collected within areas where current livestock and drinking water use are not documented. Water downstream of AUMs near the dam (CW-05) and irrigation diversion has not exceeded screening levels in samples collected during any sampling event. Sample location CW-05 did contain total combined radium at a concentration significantly above background during the 2016 low flow and 2017 spring snowmelt sampling events. As noted in other sections, particularly within the vicinity of sample location CW-26, feral cows and wild animals have been observed in the area, and the seep at CW-26 may be used as a water source. Sheep camps are located in the upper reaches of the mesas. They have been unused during Site visits conducted from 2015 to 2017.

Table 24: Summary of Total Combined Radium 226/228 in Surface Water and Groundwater				
Sampling Event	**2015 Low Flow**	**2016 Spring Snowmelt**	**2016 Low Flow**	**2017 Spring Snowmelt**
Number of Samples (including field duplicates)	27 (including 3 field duplicates)	41 (including 4 field duplicates)	33 (including 3 field duplicates)	45 (including 5 field duplicates)
Detected Background Results Range (µg/L)	0.21 – 2.1 J	0.24 J – 0.76 J	0.35 J	0.25 J – 0.69 J
Detected Result Range (µg/L)	0.22 – 25	0.3 J – 11.2	0.33 J – 12.9	0.28 J – 16.5
Number of Detects (excluding duplicates)	22	34	27	36
Numeric Threshold (µg/L)	5 (MCL) 5 (LW) 5 (AgWS)	5 (MCL) 5 (LW) 5 (AgWS)	5 (MCL) 5 (LW) 5 (AgWS)	5 (MCL) 5 (LW) 5 (AgWS)
Number of Exceedances (excluding duplicates)	4 – MCL 4 – LW 4 - AgWS	5 – MCL 5 – LW 5 - AgWS	4 – MCL 4 – LW 4 - AgWS	7 – MCL 7 – LW 7 – AgWS
Background Sample Mean	0.87	0.38	0.28	0.37
Background Sample Standard Deviation	1.1	0.26	—0.099	0.16
Sample Mean	3.9	2.6	2.7	3.6
Sample Standard Deviation	5.3	2.6	3.3	4.2

Notes:
AgWS = 2015 Navajo Nation Surface Water Quality Standards - agricultural water supply (currently under EPA review)
LW = 2015 Navajo Nation Surface Water Quality Standards - livestock watering (currently under EPA review)
MCL = EPA Maximum Contaminant Level - Drinking Water
J = Compound detected, but result value is approximate.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
µg /L = micrograms per liter

5.2.3.11 Total Selenium Results

Total selenium results exceeded the EPA MCL (50 µg/L) and multiple NNSWQS: Aquatic and Wildlife – Chronic (2 µg/L), agricultural water supply (20 µg/L), Aquatic and Wildlife – Acute (33 µg/L), livestock watering (50 µg/L), and fish consumption (670 µg/L) in some water samples collected during sampling events. Table 25 shows a comparison of results over four sampling events. Background sample locations collected at seeps and surface water at the top of the mesas (CW-04, CW-21, and CW-88) exceeded the NNSWQS for Aquatic and Wildlife - Chronic. Total selenium was detected in background samples at concentrations ranging from non-detect to 15 μg/L. Table 25 shows a comparison of results over four sampling events. A compilation of all total selenium results for the four sampling events is shown in Appendix D-11. Total selenium results are shown in Figure 23.

Table 25: Summary of Total Selenium in Surface Water and Groundwater				
Sampling Event	**2015 Low Flow**	**2016 Spring Snowmelt**	**2016 Low Flow**	**2017 Spring Snowmelt**
Number of Samples (including field duplicates)	27 (including 3 field duplicates)	41 (including 4 field duplicates)	33 (including 3 field duplicates)	45 (including 5 field duplicates)
Detected Background Results Range (µg/L)	4.6 U – 4.7 J	4.5 U – 8.5	4.5 U	1.5 U – 15
Detected Result Range (µg/L)	5.3 - 770	4.7 J - 590	6.6 - 570	1.6 J - 980
Number of Detects (excluding duplicates)	5	15	8	25
Numeric Threshold (µg/L)	2 (A&Wc) 20 (AgWS) 33 (A&Wa) 50 (MCL) 50 (LW) 670 (FC)	2 (A&Wc) 20 (AgWS) 33 (A&Wa) 50 (MCL) 50 (LW)	2 (A&Wc) 20 (AgWS) 33 (A&Wa) 50 (MCL) 50 (LW)	2 (A&Wc) 20 (AgWS*) 33 (A&Wa) 50 (LW) 50 (MCL) 670 (FC)
Number of Exceedances (excluding duplicates)	5-A&Wc 1-AgWS 1-A&Wa 1-MCL 1-LW 1-FC	15 – A&Wc 5 – AgWS 4 – A&Wa 4 – MCL 4 - LW	8 – A&Wc 4 – AgWS 4 – A&Wa 3 – MCL 3 - LW	19 – A&Wc 4 – AgWS 4 – A&Wa 4 – LW 4 – MCL 1 - FC
Background Sample Mean	3.1	1.7	4.5 U	3.8
Background Sample Standard Deviation	14	1.1	0	5.2
Sample Mean	37	31	32	42
Sample Standard Deviation	160	100	110	170

Notes:
A&Wa = 2015 Navajo Nation Surface Water Quality Standards – Aquatic and Wildlife - Acute
A&Wc = 2015 Navajo Nation Surface Water Quality Standards - Aquatic and Wildlife – Chronic
AgWS = 2015 Navajo Nation Surface Water Quality Standards - agricultural water supply (currently under EPA review)
MCL = EPA Maximum Contaminant Level - Drinking Water
LW = 2015 Navajo Nation Surface Water Quality Standards - livestock watering (currently under EPA review)
FC = 2015 Navajo Nation Surface Water Quality Standards - fish consumption
J = Compound detected, but result value is approximate.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
µg /L = micrograms per liter

Total selenium was detected in background samples at concentrations ranging from non-detect to 15 µg/L. Four sample locations contained total selenium at concentrations significantly above background concentrations during one or more sampling events in the Cove Wash Middle 2 and Cove Wash Middle 3 drainages, Cove Wash North, as well as at Cottonwood Springs: CW-10, CW-11, CW-26, CW-47, CW-65, and CW-66. Within Cove Wash Middle 2 drainages, sample location CW-26, a seep at the Mesa II ½ Mine 4 AUM, contained total selenium at concentrations ranging from 570 µg/L to 980 µg/L. Therefore, total selenium is a COC.

Sample locations CW-65 and CW-66 contained total selenium at concentrations ranging from 43 µg/L to 130 µg/L. As noted in the total uranium evaluation Section 5.2.3.1.3, sample location CW-65 lies within Cove Wash Middle 3 drainage downstream of the Cove Mesa II No. 1 and No. 2 AUMs. It remains unclear if sample location CW-66 is influenced by the Cove Mesa II No. 1 and No. 2 AUMs. Water has been observed coming out of the sidewall of the drainage in the vicinity of sample locations CW-65 and CW-66, and the Cove Wash Middle 3A drainage goes dry directly upstream of CW-66 or CW-73, depending on the sampling event. Therefore, the surface water pathway may be affected by underground surface water that is not visible at the surface from Cove Mesa II No. 1 and No.2 Mines in the vicinity of both CW-65 and CW-66 sample locations. Sample location CW-47, a seep that lies downstream of Mesa I Mines 10, 13, and 15 within Cove Wash Middle 3F, contained total selenium at concentrations ranging from 120 µg/L to 130 µg/L.

Total selenium exceeded the NNSWQS for Aquatic and Wildlife – Chronic of 2 µg/L in several background samples and sporadically throughout all four drainages, with the exception of part of Cove Wash Middle 2 and Cove Wash Middle 3F and 3G. Total selenium was also detected at Cottonwood Springs at concentrations ranging from 11 to 15 µg/L. Total selenium was detected above the NNSWQS for Aquatic and Wildlife – Chronic as far downstream as sample location CW-01. Surface water collected from sample location CW-02 did not exceed the NNSWQS during any sampling event.

Total selenium exceeded the NNSWQS for agricultural water supply of 20 µg/L at locations CW-26, CW-47, CW-54, CW-65, and CW-66. None of the sample locations are currently utilized for agricultural water supply, and a sample collected near the known irrigation canal, CW-05, did not contain total selenium above the NNSWQS for agricultural water supply during any sampling event. The Cove Wash North, near agricultural fields, did not contain total selenium at concentrations above the NNSWQS for agricultural water supply.

Total selenium exceeded the NNSWQS for Aquatic and Wildlife - Acute for 33 µg/L in water samples at four sample locations discussed above: CW-26, CW-47, CW-65, and CW-66. As noted above, the locations are seeps or surface water that is likely used by wildlife, and in some cases has been observed in use by feral cows.

Total selenium exceeded the EPA MCL and NNSWQS for livestock watering of 50 µg/L at four sample locations discussed above: CW-26, CW-47, CW-65, and CW-66. As noted above, the locations are in the vicinity of sheep camps that have not been observed in use during field activities from June 2015 to April 2017.

Total selenium exceeded the NNSWQS for fish consumption of 670 µg/L at sample location CW-26 during the 2015 low flow and 2017 spring snowmelt sampling events. Sample location CW-26 is located at the top of Mesa II. There are no recorded fish within the Cove Wash, and sample locations further downstream that may contribute water to areas within the San Juan River watershed that have fish did not contain total selenium at concentrations that exceed the NNSWQS for fish consumption.

5.2.3.12 Total Thallium Results

Total thallium results exceeded the EPA MCL (2 µg/L) and the NNSWQS for fish consumption (1 µg/L). Background samples collected at two seeps at the top of the mesas (CW-04, CW-21) exceeded the EPA MCL and NNSWQS for fish consumption during one sampling event: the 2015 low flow sampling event for sample location CW-21, and the 2017 spring snowmelt sampling event for sample location CW-04. Total thallium was detected in background samples at concentrations ranging from non-detect to an estimated concentration of 8.3 µg/L. Table 26 shows a comparison of results over four sampling events. A compilation of all total thallium results for the four sampling events is shown in Appendix D-12. Total thallium results are shown on Figure 24.

Water samples collected throughout the Cove Wash watershed were not significantly above background concentrations with the exception of sample location CW-66 during the 2016 spring snowmelt sampling event, and sample location CW-05 during the 2017 spring snowmelt sampling event. Therefore, total thallium is a COC.

With the exception of Cove Wash North, samples collected at seeps and within surface waters exceeded the EPA MCL and NSWQS for fish consumption sporadically in the Cove Wash Middle drainages, but did not exceed the screening levels within Cove Wash North with the exception of background sample CW-04. Surface water collected from the furthest sample location downstream within Cove Wash watershed, CW-02/CW-57 (duplicate location) contained total thallium at concentrations above the EPA MCL and NNSWQS for fish consumption during the 2016 and 2017 spring snowmelt sampling events.

Table 26: Summary of Total Thallium in Surface Water and Groundwater				
Sampling Event	**2015 Low Flow**	**2016 Spring Snowmelt**	**2016 Low Flow**	**2017 Spring Snowmelt**
Number of Samples (including field duplicates)	27 (including 3 field duplicates)	41 (including 4 field duplicates)	33 (including 3 field duplicates)	45 (including 5 field duplicates)
Detected Background Results Range (µg/L)	6.2 U – 8.3 J	5.4 U	5.4 U	3 U – 3.6 J
Detected Result Range (µg/L)	6.5 J - 11	5.7 J	5.4 U – 54 U	3.2 J – 11
Number of Detects (excluding duplicates)	6	1	0	8
Numeric Threshold (µg/L)	1 (FC) 2 (MCL)	1 (FC) 2 (MCL)	1 (FC) 2 (MCL)	1 (FC) 2 (MCL)
Number of Exceedances (excluding duplicates)	6-FC 6-MCL	1 – FC 1 - MCL	0	8 – FC 8 - MCL
Background Sample Mean	4.8	5.4 U	5.4 U	1.8
Background Sample Standard Deviation	3.0	0	0	0.79
Sample Mean	4.5	2.8	5.4 U	2.6
Sample Standard Deviation	2.6	0.63	0	2.9

Notes:
A&Wa = 2015 Navajo Nation Surface Water Quality Standards – Aquatic and Wildlife - Acute
A&Wc = 2015 Navajo Nation Surface Water Quality Standards - Aquatic and Wildlife – Chronic
AgWS = 2015 Navajo Nation Surface Water Quality Standards - agricultural water supply (currently under EPA review)
MCL = EPA Maximum Contaminant Level - Drinking Water
LW = 2015 Navajo Nation Surface Water Quality Standards - livestock watering (currently under EPA review)
FC = 2015 Navajo Nation Surface Water Quality Standards - fish consumption
J = Compound detected, but result value is approximate.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
µg /L = micrograms per liter

5.2.3.13 Total Vanadium Results

Total vanadium results exceeded the NNSWQS for livestock watering (100 µg/L) and agricultural water supply (1000 µg/L). One background sample collected just above the confluence with Cove Wash at CW-01 exceeded the NNSWQS for livestock watering during one sampling event: the 2017 spring snowmelt sampling event at a concentration of 130 µg/L. Total vanadium was detected in background samples at concentrations ranging from non-detect to an estimated concentration of 8.3 µg/L. Table 27 shows a comparison of results over four sampling events. A compilation of all total thallium results for the four sampling events is shown in Appendix D-13. Total vanadium results are shown in Figure 25.

Samples contained total vanadium at concentrations significantly above background at one or more sample locations within the Cove Wash Middle 1 drainage (CW-51 and CW-54), Cove Wash Middle 2 drainage (CW-26), Cove Wash North drainage (CW-09), Cove Wash South drainage (CW-03), and within Red Dug Point Well (CW-GW-01) and Cottonwood Springs (CW-10) during one or more sampling events. Therefore, total vanadium is a COC. Sample CW-26, which is collected from Mesa II ½ Mine 4 adit drainage, contained total vanadium at the highest concentrations detected throughout the watershed ranging from 3,000 µg/L to 11,000 µg/L.

Samples collected below Mesa V Mine and Mesa IV ½ Mine water samples (CW-51 and CW-54) consistently contained total vanadium from 140 ug/L to 240 ug/L. Overall, the seeps near these mines contained dissolved vanadium above the livestock standard, waters that are routinely used by domestic livestock or for agricultural water contain total vanadium below the livestock standard. However, at the Mesa II ½ drainage, feral cows and wildlife likely use the spring and are seen in the vicinity. A compilation of all total vanadium results for the four sampling events is shown in Appendix D-14.

Table 27: Summary of Total Vanadium in Surface Water and Groundwater				
Sampling Event	**2015 Low Flow**	**2016 Spring Snowmelt**	**2016 Low Flow**	**2017 Spring Snowmelt**
Number of Samples (including field duplicates)	27 (including 3 field duplicates)	41 (including 4 field duplicates)	33 (including 3 field duplicates)	45 (including 5 field duplicates)
Detected Background Results Range (µg/L)	3.9 J - 22	3.3 J - 13	2.7 J – 4.3 J	3 U – 130
Detected Result Range (µg/L)	1.5 J - 4600	2.9 J – 3,000	1.4 J - 5300	4.2 J – 11,000
Number of Detects (excluding duplicates)	24	41	30	39
Numeric Threshold (µg/L)	100 (LW) 1000 (AgWS)	100 (LW) 1,000 (AgWS)	100 (LW) 1000 (AgWS)	100 (LW) 1,000 (AgWS)
Number of Exceedances (excluding duplicates)	1-LW 1-AgWS	4 (LW 4 (AgWS)	2 - LW 1 - AgWS	4 – LW 1 - AgWS
Background Sample Mean	10	29	3.2	30
Background Sample Standard Deviation	10	45	0.28	45
Sample Mean	230	130	210	370
Sample Standard Deviation	950	500	1000	1900

Notes:
AgWS = 2015 Navajo Nation Surface Water Quality Standards - agricultural water supply (currently under EPA review)
LW = 2015 Navajo Nation Surface Water Quality Standards - livestock watering (currently under EPA review)
J = Compound detected, but result value is approximate.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
µg /L = micrograms per liter

5.2.3.14 Dissolved Cadmium Results

Dissolved cadmium was detected at concentrations above the NNSWQS for Aquatic and Wildlife – Chronic, and at concentrations significantly above background, during the 2015 low flow sampling event (sample locations CW-GW-03, CW-01, CW-11, CW-50, CW-51, and CW-53a) and the 2016 low flow sampling event (sample location CW-02). Sample locations are shown on Figure 3. Table 28 shows a comparison of results over four sampling events. A compilation of all dissolved cadmium results for the four sampling events is shown in Appendix D-14.

Background concentrations during all sampling events were non-detect. The detections and NNSWQS for Aquatic and Wildlife – Chronic screening level were below the reporting limits for cadmium and other detections may have been missed due to being below the reporting limit. A required reporting limit was not set in the SAP (Appendix A) and NNSWQS for Aquatic and Wildlife were not specifically discussed as part of DQOs. However, the data that were collected can be evaluated with the understanding that the NNSWQS for dissolved cadmium is below the reporting limit for some water samples. Dissolved cadmium was detected at concentrations above background (non-detect). Therefore, dissolved cadmium is a COC.

Table 28: Summary of Dissolved Cadmium in Surface Water and Groundwater

Sampling Event	2015 Low Flow	2016 Spring Snowmelt	2016 Low Flow	2017 Spring Snowmelt
Number of Samples (including field duplicates)	27 (including 3 field duplicates)	41 (including 4 field duplicates)	33 (including 3 field duplicates)	45 (including 5 field duplicates)
Detected Background Results Range (µg/L)	0.76 U	0. 77 U	0.77 U	1.5 U
Detected Result Range (µg/L)	0.84 J – 1.3 J	0.77 U	0.94 J	1.5 U
Number of Detects (excluding duplicates)	6	0	1	0
Numeric Threshold (µg/L)	0.13-0.64 (A&Wc)	0.07-0.64 (A&Wc)	0.17 (A&Wc)	0.13-0.64 (A&Wc)
Number of Exceedances (excluding duplicates)	6 – A&Wc	0	1 – A&Wc	0
Background Sample Mean	0.76 U	0. 77 U	0.77 U	1.5 U
Background Sample Standard Deviation	0	0	0	0
Sample Mean	0.56	0. 77 U	0.40	0.69
Sample Standard Deviation	0.33	0	0.10	0.11

Notes:
A&Wc = 2015 Navajo Nation Surface Water Quality Standards - Aquatic and Wildlife – Chronic
J = Compound detected, but result value is approximate.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
µg /L = micrograms per liter

5.2.3.15 Dissolved Copper Results

Dissolved copper was detected at concentrations above the NNSWQS for Aquatic and Wildlife – Chronic and for Aquatic and Wildlife - Acute during the 2015 low flow sampling event (sample locations CW-GW-03, CW-46) and the 2017 low flow sampling event (sample location CW-46). Sample locations are shown on Figure 3. Table 28 shows a comparison of results over four sampling events. A compilation of all dissolved copper results for the four sampling events is shown in Appendix D-15.

Background concentrations during all sampling events ranged from non-detect to an estimated concentration of 2.3 µg/L. Sample location CW-GW-01 (Red Point Dug Well) and CW-46 (Pine Water Springs) contained dissolved copper at concentrations significantly above background during the 2015 low flow, 2016 spring snowmelt, and 2017 spring snowmelt sampling events. Sample location CW-GW-03 (Ellison Well) contained dissolved copper at a concentration significantly above background during the 2015 low flow sampling event. Sample location CW-46 (Pine Water Springs) contained copper at a concentration significantly above background during the 2016 low flow sampling event. Sample locations in Cove Wash Middle 1 (CW-54) and Cove Wash North (CW-64) contained dissolved copper at concentrations significantly above background during the 2016 low flow sampling event. Sample location CW-10 (Cottonwood Springs) contained dissolved copper at a concentration significantly above background during the 2017 spring snowmelt sampling event. Therefore, dissolved copper is a COC.

All detected concentrations with exceedances of NNSWQS for Aquatic and Wildlife - Chronic were found in groundwater wells or at a spring location where sampling occurred at the well-box or trough. Therefore, the dissolved copper exceedances within wells and springs may be due to contact with anthropogenic materials such as plumbing for the constructed water delivery systems.

Table 29: Summary of Dissolved Copper in Surface Water and Groundwater				
Sampling Event	**2015 Low Flow**	**2016 Spring Snowmelt**	**2016 Low Flow**	**2017 Spring Snowmelt**
Number of Samples (including field duplicates)	27 (including 3 field duplicates)	41 (including 4 field duplicates)	33 (including 3 field duplicates)	45 (including 5 field duplicates)
Detected Background Results Range (µg/L)	2.2 U	1.9 U – 2.3 J	1.9 U	3 U
Detected Result Range (µg/L)	2.6 J - 140	2 J – 29	2.4 J – 5.9 J	4.1 J – 30
Number of Detects (excluding duplicates)	3	8	3	4
Numeric Threshold (µg/L)	4.3-29* (A&Wc) 5.9-50* (A&Wa)	1.9-29* (A&Wc)	5.8-29* (A&Wc)	14.8 (A&Wc) 23.4 (A&Wa)
Number of Exceedances (excluding duplicates)	2 – A&Wc 2 – A&Wa	0	0	1 – A&Wc 1 – A&Wa
Background Sample Mean	1.10	1.8	3 U	3 U
Background Sample Standard Deviation	0	0.71	--0	0
Sample Mean	10	2.1	1.2	2.5
Sample Standard Deviation	32	5.0	1.0	5.0

Notes:
* = The value is hardness dependent
A&Wa = 2015 Navajo Nation Surface Water Quality Standards – Aquatic and Wildlife - Acute
A&Wc = 2015 Navajo Nation Surface Water Quality Standards - Aquatic and Wildlife – Chronic
J = Compound detected, but result value is approximate.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
µg /L = micrograms per liter

5.3 WATER QUALITY MEASUREMENTS

Water quality measurements were collected in the field each sampling event and are provided in Appendix F. The following water quality parameters were measured at each water sample location: pH, temperature, conductivity, and oxidation-reduction potential (ORP), dissolved oxygen, and turbidity (with exception of the 2015 low flow sampling event as discussed in Section 8). Velocity was estimated at water sample locations where flow was sufficient.

The pH measurements collected over all four sampling events ranged from 6.5 to 9.8. Measured pH values above 9.2 were only noted during 2016 and 2017 spring snowmelt events in the Cove Wash North drainage. Background sample pH values ranged from 6.5 to 8.9. Measured pH in surface waters, springs, and seeps throughout the Cove Wash Middle 1, 2, and 3 and downstream of all drainages affected by AUMs varied by location and seasonally from 6.5 to 9.1.

ORP varied at individual sample locations over the four sampling events. ORP is a measurement of the oxidative-reductive potential (Eh) and can be used to determine if reducing or oxidizing environments are present within the water sampled. Measured ORP ranges over all sample locations varied per sampling event. The 2015 low flow ORP values ranged from -80.2 millivolt (mV) to 172.4 mV. 2016 spring snowmelt ORP values ranged from 1.66 mV to 1,683 mV. 2016 low flow ORP values ranged from -141.5 mV to 264.4 mV. 2017 spring snowmelt ORP values ranged from -114.8 to 341.2 mV. Overall, spring snowmelt ORP values had the largest range when compared to the other sampling event ORP measurements. Generally, ORP and pH values have the most effect on the phase of metals when compared to other field measured water quality parameters. Eh/pH diagrams for metals that outline specific aqueous phases of metals are dependent on specific conditions, such as the metal concentration, temperature, and other chemical factors, but general trends for ORP measurements and pH can be discussed. The lower the mV value for ORP, the more reducing environment. For uranium, a reducing environment would encourage precipitation of uranium oxides present in the aqueous phase. The ORP values measured in the field during the four sampling events are mostly positive, meaning that the environment is considered oxidizing. The pH values measured in the field are close to neutral or basic, which generally does not encourage reduction, or precipitation, of uranium into the solid phase at ORP values measured in the field. Other metals determined to be COCs are similarly affected by Eh and pH factors.

Temperature ranges varied depending on the season. Spring snowmelt temperatures varied from 2.7 degrees Celsius (°C) to 18.07 °C (34.2 degrees Fahrenheit (°F) to 64.5 °F) during the 2016 spring snowmelt sampling events, and 1.58 °C to 19.85 °C (34.8 °F to 67.7 °F) during the 2017 spring snowmelt sampling event. Low flow temperatures varied from 14.79 °C to 28.26 °C (58.6 °F to 82.9 °F) during the 2015 low flow sampling event, and 2.45 °C to 26.41 (36.4 °F to 79.5

°F) during the 2016 low flow sampling event. Temperatures generally increased as sample location elevation decreased for all sampling events.

Velocity was measured when possible in surface waters. A biodegradable object buoyant enough to float was placed instream and timed while flowing down an estimated 10-foot section of drainage. Seeps and springs did not contain enough flow to measure velocity over all sampling events. Sample locations where flow was not measurable are noted as "NM." Some surface water locations also did not contain enough flow, or had water levels that were too shallow to allow for flow measurements. This was more often the case during low flow sampling events. Velocity ranged from 0.5 to 1 foot per second during the low flow sampling events to 0.04 to 3.6 feet per second during the 2016 spring snowmelt sampling event. In 2017, the depth and width of the section of stream being measured was estimated. Volumetric flow rates were assigned for 2017 water sample locations where flow was high enough to estimate. Volumetric flow rates ranged from 0.02 cubic feet per second to 1.09 cubic feet per second.

5.4 SEDIMENT RESULTS

The Site was investigated for concentrations of metals, uranium and radium isotopes, and gross alpha radioactivity in sediment and subsurface sediment during four separate sampling events beginning in 2015 and ending in 2017. Media investigated included sediment and subsurface soil deposited outside of stream channels. Sampling locations were chosen based on proximity to surface water sampling locations and in the assumed path of materials transported downslope from mines.

Subsurface samples were collected to further characterize mine waste that has migrated into the watershed. The depths of subsurface sediment samples were determined in the field and ranged from 6 to 18 inches. Sediment results discussed in Appendix F denote subsurface samples in the "Sample Type" column and the specific depth of individual subsurface samples is shown as the 10th and 11th digits of the sample location in Appendices F and G.

Background sediment samples were also investigated for concentrations of metals and uranium and radium isotopes in sediment and subsurface sediments. Background sample locations were chosen based on similar geologic types to other sample locations within the investigation area, but were situated outside of the areas influenced by mining activities. Background samples were collected from stream channel depositions. Field duplicates were also collected, and all field samples were analyzed following the approved SAP and Quality Assurance Project Plan.

Sample results for metals were also compared to typical background concentrations published in a report prepared for the Arizona Department of Environmental Quality (ADEQ) (Earth Tech, 1991). Background concentrations published in this report are based on 47 United States Geological Services samples and 62 ADEQ samples collected from various Arizona locations. The Site lies along the Arizona/New Mexico border.

5.4.1 Surface and Subsurface Sediment Sampling

All sample results were compared to numeric thresholds established by EPA for soil protective of groundwater. Exceedances of EPA RSLs are presented below. Rather than using these values as regulatory limits, here these numeric thresholds are presented as screening levels for further evaluation.

Metal analytes included aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chromium (total), cobalt, copper, iron, lead, lithium, manganese, magnesium, mercury, molybdenum, nickel, potassium, phosphorous, selenium, silver, sodium, strontium, thallium, total uranium, vanadium, and zinc. Radionuclides included uranium and radium, including isotopes. A smaller suite of metals was analyzed for during the initial 2015 low flow sampling event (antimony, arsenic, barium, beryllium, cadmium, chromium (total), cobalt, copper, lead, molybdenum, nickel, selenium, silver, sodium, thallium, uranium, vanadium, and zinc). Concentrations in excess of numeric standards or numeric criteria were detected during multiple sample events, and are summarized in the tables below. Concentrations of analytes below numeric thresholds are not summarized here, but complete sampling results are available in Appendix G.

Results of the four sampling events are organized below by the year sampled and associated representative hydrologic event: 2015 low flow, 2016 low flow, 2016 snowmelt, and 2017 snowmelt. In the tables, sampling statistics, such as number of samples collected, detected concentration ranges, and data qualifiers are presented for analyte exceedances found during the investigation. Results are summarized below in separate tables for each sampling event, grouped by similar analyte type, and present exceedances of relevant screening levels. Every exceedance of a numeric threshold was totaled for each analyte.

Results of 2015 Low Flow Sampling Event

A total of 46 sediment samples (including two duplicate samples) and five subsurface soil samples were collected. Tables 30 and 31 represent the chemical and radionuclide analytical data for the sediment and subsurface samples collected as part of the 2015 low flow sampling event and show exceedances of EPA RSLs for sediments collected during the 2015 low flow sampling event.

Numeric thresholds for radium 226, radium 228, and Combined radium 226/228 were also identified.

Table 30: Summary of Surface Sediment Results for 2015 Low Flow Sampling Event											
Sample Information	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cadmium**	**Lead**	**Selenium**	**Uranium**	**Radium 226**	**Radium 228**	**Combined Radium 226/228**
Number of Samples (including two field duplicates)	46	46	46	46	46	46	46	46	46	46	46
Detected Background Results Range (mg/kg)	0.65 U - 2.8 J	0.48 U - 45	29 – 510	0.1 J - 3.8	0.071 U - 0.38 J	2.2 - 32	0.43 U - 5.2	0.28 - 8.1	0.46 U - 2.55 J	0.33 U - 1.15 J	0.92 U - 3.7 J
Detected Result Range (mg/kg)	0.84 J	0.75 J - 5.2	59 – 1900	0.16 J - 1.3	0.066 J - 0.18	2.2 - 11	0.32 J - 2.8	0.34 - 85	0.49 - 35.1	0.61 - 2.42	0.49 - 35.1
Number of Detects (excluding duplicates)	1	43	44	43	10	44	19	44	45	5	50
Screening Level (mg/kg)	0.27	0.29	82	3.2	0.38	14	0.26	14	N/A	N/A	N/A
Number of Exceedances (including duplicates)	2	40	34	1	1	1	19	5	N/A	N/A	N/A

Table 31: Summary of Subsurface Sediment Results for 2015 Low Flow Sampling Event											
Sample Information	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cadmium**	**Lead**	**Selenium**	**Uranium**	**Radium 226**	**Radium 228**	**Combined Radium 226/228**
Number of Samples	5	5	5	5	5	5	5	5	5	5	5
Detected Background Results Range (mg/kg)	0.77 U	2.7	110	0.42 J	0.083 U	4.2	0.57	0.56	0.92	0.5 U	0.92
Detected Result Range (mg/kg)	N/A	0.56 J – 6.7	71 - 300	0.16 J - 0.51 J	N/A	2.6 - 7.5	0.98	0.82 - 4.9	0.87 - 3.65	0.9 J	1.69 - 3.65
Number of Detects (excluding duplicates)	0	5	5	0	0	5	2	5	5	1	5
Screening Level (mg/kg)	0.27	0.29	82	3.2	0.38	14	0.26	14	N/A	N/A	N/A
Number of Exceedances (excluding duplicates)	0	4	4	0	0	0	2	0	N/A	N/A	N/A

Notes:
J = Compound detected, but result value is approximate
mg/kg = milligram per kilogram
N/A = Not Applicable
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit

Results of 2016 Snowmelt Sampling Event

A total of 58 sediment samples (including five duplicate samples) and four subsurface soil samples (including one duplicate sample) were collected. One or more RSL exceedances in antimony, arsenic, barium, selenium, and uranium were found in sediment soils. All of the same exceedances for sediment samples were also found in subsurface samples with the exception of uranium. Tables 32 and 33 represent the chemical and radionuclide analytical data for the sediment and subsurface samples collected as part of the 2016 snowmelt sampling event and show exceedances of EPA RSLs for sediments collected during the 2016 snowmelt sampling event.

Table 32: Summary of Surface Sediment Results for 2016 Spring Snowmelt Sampling Event								
Sample Information	**Antimony**	**Arsenic**	**Barium**	**Selenium**	**Uranium**	**Radium 226**	**Radium 228**	**Combined Radium 226/228**
Number of Samples (including five field duplicates)	58	58	58	58	58	58	58	58
Detected Background Results Range (mg/kg)	0.5 U - 0.8 U	0.52 J - 2.1	28 - 350	0.46 U - 0.74	0.23 - 1.5	0.38 U - 1.17	0.5 U – 1.04	0.5 U – 2.21
Detected Result Range (mg/kg)	0.66 J - 0.92 J	0.53 J - 5.3	33 - 660	0.63 - 13	0.35 - 65 J	0.45 J - 22.1	0.57 J - 1.25 J	0.45 J - 22.1
Number of Detects (excluding duplicates)	3	55	55	10	55	51	14	51
Screening Level (mg/kg)	0.27	0.29	82	0.26	14	N/A	N/A	N/A
Number of Exceedances (excluding duplicates)	5	55	30	10	3	N/A	N/A	N/A

Table 33: Summary of Subsurface Sediment Results for 2016 Spring Snowmelt Sampling Event								
Sample Information	**Antimony**	**Arsenic**	**Barium**	**Selenium**	**Uranium**	**Radium 226**	**Radium 228**	**Combined Radium 226/228**
Number of Samples	4	4	4	4	4	4	4	4
Detected Background Results Range (mg/kg)	0.57 U	1.2 J	83	0.53 U	0.56	1 J	1.14 J	2.14 J
Detected Result Range (mg/kg)	0.62 J	1.1 - 8.6	65 - 140	7	1.2 - 6	1.04 J – 5.52 J	0.95 J – 1.14 J	1.99 J – 6.62 J
Number of Detects (excluding duplicates)	1	3	3	1	3	3	3	3
Screening Level (mg/kg)	0.27	0.29	82	0.26	14	N/A	N/A	N/A
Number of Exceedances (excluding duplicates)	1	3	2	1	0	N/A	N/A	N/A

Notes:
J = Compound detected, but result value is approximate
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit
mg/kg = milligram per kilogram
N/A = Not Applicable

Results of 2016 Low Flow Sampling Event

A total of 61 sediment samples (including five duplicate samples) and six subsurface soil samples (including one duplicate sample) were collected. One or more RSL exceedances in arsenic, barium, selenium, thallium, and uranium were found in sediment soils. Tables 34 and 35 represent the chemical and radionuclide analytical data for the sediment and subsurface samples collected as part of the 2016 low flow sampling event.

Table 34: Summary of Surface Sediment Results for 2016 Low Flow Sampling Event								
Sample Information	**Arsenic**	**Barium**	**Selenium**	**Thallium**	**Uranium**	**Radium 226**	**Radium 228**	**Combined Radium 226/228**
Number of Samples (including five field duplicates)	61	61	61	61	61	61	61	61
Detected Background Results Range (mg/kg)	0.88 J - 2.3	31 - 120	0.45 J – 0.67 J	0.32 U - 0.52 U	0.24 - 0.86	0.46 UJ - 1.66 J	1.06 J - 1.48 J	0.64 J - 3.14 J
Detected Result Range (mg/kg)	0.81 J - 5.4	27 - 710	0.4 J - 20	0	0.3 - 100	0.47 J - 16.3	0.48 J - 1.37	0.47 J - 16.3
Number of Detects (excluding duplicates)	57	38	24	0	57	56	16	56
Screening Level (mg/kg)	0.29	82	0.26	0.14	14	N/A	N/A	N/A
Number of Exceedances (excluding duplicates)	57	38	24	0	5	N/A	N/A	N/A

Table 35: Summary of Subsurface Sediment Results for 2016 Low Flow Sampling Event								
Sample Information	**Arsenic**	**Barium**	**Selenium**	**Thallium**	**Uranium**	**Radium 226**	**Radium 228**	**Combined Radium 226/228**
Number of Samples (including one field duplicate)	6	6	6	6	6	6	6	6
Detected Background Results Range (mg/kg)	1.8	81	0.33 U	0.36 U	0.65	0.88 J	0. 75 U J	0.88 J
Detected Result Range (mg/kg)	1.3 - 3.3	100 - 170	046 J - 1.1 J	0.88 J	1.5 - 5.6	1.28 - 11.6	N/A	1.28 - 11.6
Number of Detects (excluding duplicates)	5	5	1	1	6	6	0	6
Screening Level (mg/kg)	0.29	82	0.26	0.14	14	N/A	N/A	N/A
Number of Exceedances (excluding duplicates)	5	5	1	1	0	N/A	N/A	N/A

Notes:
J = Compound detected, but result value is approximate
mg/kg = milligram per kilogram
N/A = Not Applicable
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit

Results of 2017 Snowmelt Sampling Event

A total of 68 sediment samples (including seven field duplicate samples) and five subsurface soil samples were collected. One or more RSL exceedances in antimony, arsenic, barium, selenium, thallium, and uranium were found in sediment soils. All of the same exceedances for sediment samples were also found in subsurface samples with the exception of uranium. Tables 36 and 37 represent the chemical and radionuclide analytical data for the sediment and subsurface samples collected as part of the 2017 snowmelt sampling event.

Table 36: Summary of Surface Sediment Results for 2017 Spring Snowmelt Sampling Event									
Sample Information	**Antimony**	**Arsenic**	**Barium**	**Selenium**	**Thallium**	**Uranium**	**Radium 226**	**Radium 228**	**Combined Radium 226/228**
Number of Samples (including seven field duplicates)	67	67	67	67	67	68	68	68	68
Detected Background Results Range (mg/kg)	0.6 U – 0.83 U	0.71 J - 2.9	21 - 250	0.21 J - 0.43 J	0.35 U – 0.48 U	0.21 - 0.77	0.43 U J - 0.89	0.55 J - 0.84 U	0.43 J - 1.7 J
Detected Result Range (mg/kg)	0.74 J	0.48 J - 5.1	26 - 320	0.19 - 6.1	0.53 J - 0.71 J	0.23 - 24	0.42 J - 16.7	0.2 - 1.39 J	0.43 J - 16.7
Number of Detects (excluding duplicates)	1	59	61	20	3	61	60	16	60
Screening Level (mg/kg)	0.27	0.29	82	0.26	0.14	14	N/A	N/A	N/A
Number of Exceedances (excluding duplicates)	1	58	26	17	3	4	N/A	N/A	N/A

Table 37: Summary of Subsurface Sediment Results for 2017 Spring Snowmelt Sampling Event									
Sample Information	**Antimony**	**Arsenic**	**Barium**	**Selenium**	**Thallium**	**Uranium**	**Radium 226**	**Radium 228**	**Combined Radium 226/228**
Number of Samples (including one field duplicate)	5	5	5	5	67	5	5	5	5
Detected Background Results Range (mg/kg)	0.69 U	1.7	87	0.2 J	0.4 U	0.46	0.71 J	0.58 UJ	0.71 J
Detected Result Range (mg/kg)	0.6U – 0.73 U	0.47 J - 4.1	65 - 95	0.26 J - 2.1	0.35 U – 0.42 U J	0.86 - 9.2	0.44 J – 5.86	0.63 J -1.23	0.44 J – 5.86
Number of Detects (including duplicates)	0	4	4	2	0	4	4	2	4
Screening Level (mg/kg)	0.27	0.29	82	0.26	0.14	14	N/A	N/A	N/A
Number of Exceedances (including duplicates)	0	4	1	0	0	0	N/A	N/A	N/A

Notes:
J = Compound detected, but result value is approximate
mg/kg = milligram per kilogram
N/A = Not Applicable
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit

5.4.1.1 Comparison of Uranium Concentrations in Sediment to Background Concentrations

In order to compare sediment sample uranium results to background concentrations, the background range for uranium was evaluated for each sampling event and samples collected during each sampling event were only compared to background concentrations for that specific event. Figure 26 shows background sediment sample concentrations of uranium.

2015 low flow samples contained uranium in sediments at significantly elevated concentrations (i.e., three times background concentrations or greater) within Cove Wash Middle 3 drainage at locations CW-13 and CW-14. As discussed in Section 6.3.3, these locations are adjacent to the Mesa I 14 Mine waste pile. 2016 low flow samples contained uranium in sediments at concentrations significantly above background throughout watershed drainages in Cove Wash Middle 1, Cove Wash Middle 2, and Cove Wash Middle 3. Samples collected downstream of the confluence of those three drainages (CW-05) contained uranium at concentrations not significantly above background. All sediment samples collected in the Cove Wash North and Cove Wash South drainages contained uranium at concentrations not significantly above background.

2016 spring snowmelt and 2016 low flow samples contained uranium in sediments at concentrations significantly above background throughout watershed drainages in Cove Wash Middle 1, Cove Wash Middle 2, and Cove Wash Middle 3. Samples collected downstream at the confluence of those three drainages (CW-05 and CW-07) were significantly above background, but all sample locations further downstream were not significantly above background. Cove Wash North drainages contained uranium in sediments at concentrations significantly above background. All sediment samples collected in Cove Wash South drainages contained uranium at concentrations not significantly above background.

2017 spring snowmelt samples contained uranium in sediments at concentrations significantly above background throughout watershed drainages in Cove Wash Middle 1, Cove Wash Middle 2, and Cove Wash Middle 3. Samples collected further downstream at the confluence of those three drainages (CW-05) were below background. All sediment samples collected in the

Cove Wash North and Cove Wash South drainages contained uranium at concentrations not significantly above background.

5.4.1.2 Uranium Exceedances of the Regional Screening Level

As shown on Figure 27, uranium concentrations in sediment samples were below RSL protective of groundwater, 14 mg/kg, with the exception of three areas within Cove Wash Middle 1, Cove Wash Middle 2, and Cove Wash Middle 3. Table 38 shows a comparison of results over four sampling events. A compilation of all uranium results for the four sampling events is shown in Appendix G-1.

Table 38: Summary of Uranium in Sediments – Surface Samples

Sampling Event	2015 Low Flow	2016 Spring Snowmelt	2016 Low Flow	2017 Spring Snowmelt
Number of Samples (including field duplicates)	46 (including 2 field duplicates)	58 (including 5 field duplicates)	61 (including 5 field duplicates)	67 (including 5 field duplicates)
Detected Background Results Range (mg/kg)	0.28 - 8.1	0.23 - 1.5	0.24 - 0.86	0.21 - 0.77
Detected Result Range (mg/kg)	0.34 - 85	0.35 - 65 J	0.3 – 100	0.23 – 24
Number of Detects (excluding duplicates)	39	55	57	61
Screening Level – EPA Regional Screening Level for Protection of Groundwater (mg/kg)	14	14	14	14
Number of Exceedances (including duplicates)	5	3	5	4
Background Sample Mean	1.6	0.60	0.60	0.45
Background Sample Standard Deviation	2.9	0.43	0.41	0.24
Sample Mean	7.4	4.9	5.9	3.3
Sample Standard Deviation	15	10	15	4.7

Notes:
J = Compound detected, but result value is approximate
mg/kg = milligram per kilogram

Within Cove Wash Middle 1, samples collected downstream of Mesa IV and Mesa V mines generally only exceeded the EPA RSL for uranium when collected during the 2016 spring snowmelt sampling event, with the exception of sediment samples collected from location CW-54, which exceeded the EPA RSL when collected during the 2015 low flow and 2016 low flow sampling events, and location CW-52, which exceeded the EPA RSL during the 2017 snowmelt sampling event. Only drainages leading off of two clusters of Mesa V mines, the Mesa IV ½ Mine, Simpson 181, Mesa IV Mine, and North Portal, Frank No. 1 as well as the cluster of Mesa V Adit, Mesa V Mine, and Mesa V Incline AUMs contained uranium exceeding EPA RSLs during the 2016 spring snowmelt sampling event. The sample location located within Cove Wash Middle 1 downstream of all AUMs (CW-50) contained the highest concentration of uranium in sediments at an estimated concentration of 65 mg/kg during the 2016 spring snowmelt.

One sample location (CW-27) in the upper reaches of the Cove Wash Middle 2B drainage contained uranium in a sediment sample collected during the 2016 spring snowmelt and low flow sampling events. Sample location CW-26, slightly upstream of sample location CW-27, contained uranium in a sediment sample collected during the 2016 low flow sampling event at a concentration exceeding the EPA RSL. Sediment samples collected downstream of the drainage in Cove Wash Middle 2B as well as within the primary Cove Wash Middle 2 drainage, which is downstream of Mesa II, Mesa III, and Mesa IV mines did not contain uranium at concentrations above the EPA RSL, with the exception of a sediment sample collected location CW-37 during the 2015 low flow sampling event.

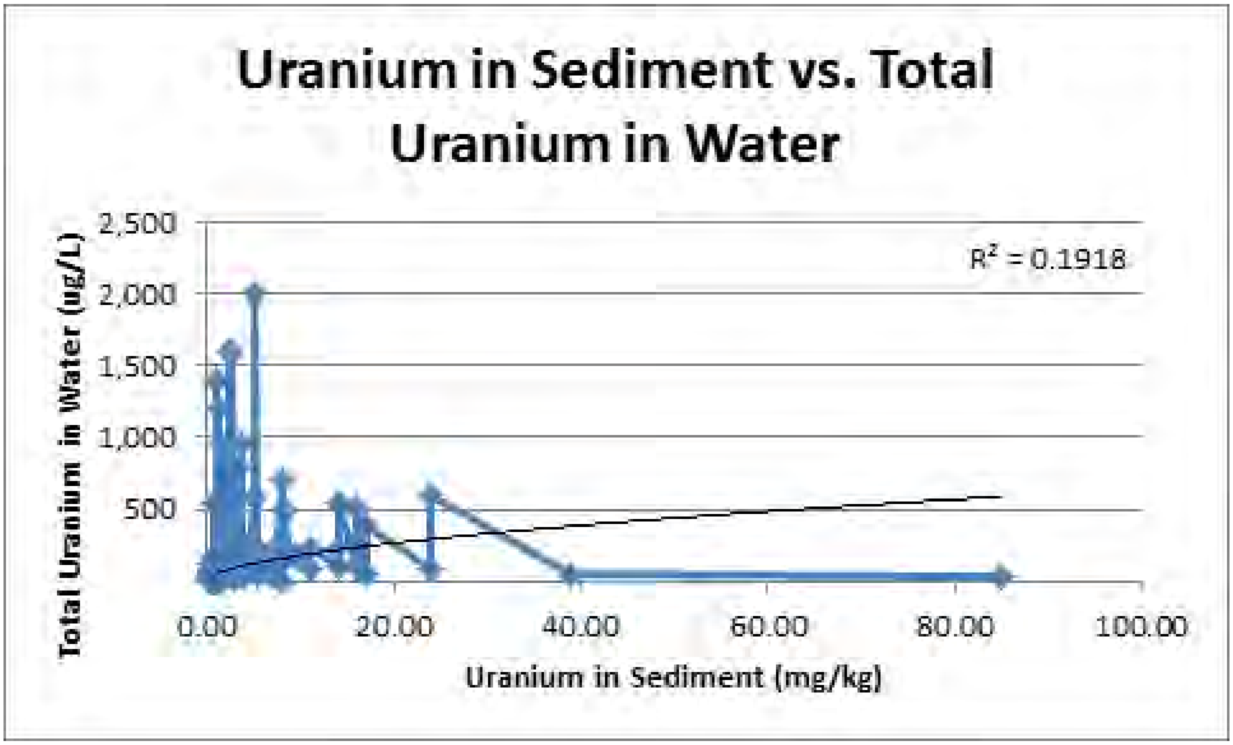
Sampling locations within Cove Wash Middle 3 drainage containing uranium above the EPA RSL (CW-13, CW-14, CW-47, and CW-90) were clustered around the Mesa I AUMs. Sample locations CW-13 and CW-14, which are adjacent to Mesa I 12 and 14 AUMs only contained uranium above the EPA RSL during the 2015 low flow sampling event. Sample location CW-14 is located within the Cove Middle E drainage, where a mine waste pile form Mesa I Mine 14 AUM spills into the drainage. CW-13 is located downstream of CW-14 at the confluence of Cove Wash Middle 3A and Cove Wash Middle 3E. Based on 2015 low flow sampling event results for uranium, the waste pile on Mesa I Mine 14 AUM located in Cove Wash Middle 3E likely contributed to the uranium exceedances in sample locations CW-13 and CW-14. However, due to terrain issues, an additional sample could not be collected upstream, so AUMs Mesa I ½ Mine and Mesa I ¼ Mine may have contributed to the increase in uranium concentrations in sediment in 2015. Sample locations CW-13 and CW-14 were not accessible during the 2017 spring snowmelt sampling event due to a rock fall which prevented access to the drainage between sample locations CW-90 and CW-66. A sediment sample was collected at the base of the rock fall where sediment had gathered at CW-90, which contained uranium above the EPA RSL at a concentration of 17 mg/kg.

Sample CW-47, which is located in Cove Wash Middle 3F drainage on Mesa I AUM Mesa I Mine 15 contained uranium exceeding the EPA RSL during all sampling events with the exception of the 2016 spring snowmelt event. Sample location CW-47 is also located within a waste pile that falls into Cove Wash Middle 3E drainage.

Overall, while sediment samples in specific areas near AUMs contained uranium at concentrations exceeding the EPA RSL when collected during varying sampling events, sampling locations further downstream at confluences within each drainage had no uranium exceedances of the EPA RSL throughout all four sampling events. Sediment samples with exceedances were collected at locations near or directly downstream from the Mesa I, Mesa 1 ¾, and Mesa V AUMs. The uranium exceedances in the sediments in those locations indicate that additional investigation of sediments in those areas and prioritization of investigations at waste piles, such as analysis of waste rock, at the AUMs may be warranted. The varying results over four sampling events for each drainage illustrate the dynamic nature of the watershed, which experiences higher flows during snowmelt and monsoon events, and may indicate that material transported from AUMs and into drainages is removed at varying rates within each drainage, depending on local factors, such as precipitation intensity and duration, flow volumes, streamflow velocities, degree of weathering, and other physical and chemical factors.

5.4.2 Comparison of Uranium Concentrations in Sediment to Uranium Concentrations in Water

Uranium concentrations in sediments were compared to total uranium concentrations in surface waters at collocated locations over four sampling events. A scatterplot showing total uranium in surface water, seeps, and springs vs. uranium in sediment is shown below. As can be seen in the plot, there is no discernable relationship between concentrations of total uranium and concentrations of uranium in sediment collected at collocated sample locations. The lack of relationship between water concentrations and sediment is in keeping with the determination that uranium is almost entirely present within the dissolved phase in surface water in the watershed.



5.4.3 Arsenic Concentrations in Sediments

Arsenic concentrations in sediments are shown on Figure 28. Sediment samples collected at all sample locations over all sampling events contained arsenic at concentrations exceeding the EPA RSL of 0.29 mg/kg. Table 39 shows a comparison of surface sample results for arsenic over four sampling events. Table 40 shows a comparison of subsurface sample results for arsenic over four sampling events. A compilation of all arsenic results for the four sampling events is shown in Appendix G-3. Surface and subsurface sediment samples contained arsenic at concentrations significantly above background at one or more sample locations during the 2016 spring snowmelt, 2016 low flow, and 2017 spring snowmelt sampling events. Therefore, arsenic is a COC.

Sample results for metals were compared to typical background concentrations published in a report prepared for the ADEQ (Earth Tech, 1991). Background concentrations published in this report are based on 47 USGS samples and 62 ADEQ samples collected from various Arizona locations. The Site lies along the Arizona/New Mexico border. Arsenic was detected in the samples at concentrations ranging from 0.48 mg/kg to 45 mg/kg. Background samples collected during watershed assessment field activities from 2015 to 2017 ranged from non-detect to 45 mg/kg. The arsenic concentrations collected from site-specific background locations and sample locations are within the range of background concentrations for Arizona soils of less than 0.2 mg/kg to 97 mg/kg (Earth Tech, 1991). Subsurface sample results are not available from the ADEQ report. However, samples collected by the USGS as part of the ADEQ study were collected at approximately 8 inches bgs, and samples collected by the ADEQ as part of the study were collected at depths of 4 inches to 108 inches bgs.

Table 39: Summary of Arsenic in Sediments – Surface Samples

Sampling Event	2015 Low Flow	2016 Spring Snowmelt	2016 Low Flow	2017 Spring Snowmelt
Number of Samples (including field duplicates)	46 (including 2 field duplicates)	58 (including 5 field duplicates)	61 (including 5 field duplicates)	67 (including 5 field duplicates)
Detected Background Results Range (mg/kg)	0.48 U - 45	0.52 J - 2.1	0.88 J - 2.3	0.71 J - 2.9
Detected Result Range (mg/kg)	0.75 J - 5.2	0.53 J - 5.3 J	0.81 J - 5.4	0.48 J - 5.1
Number of Detects (excluding duplicates)	43	55	57	59
Screening Level – EPA Regional Screening Level for Protection of Groundwater (mg/kg)	0.29	0.29	0.29	0.29
Number of Exceedances (including duplicates)	40	55	57	58
Background Sample Mean	7.5	1.1	1.8	1.5
Background Sample Standard Deviation	17	0.47	0.82	0.66
Sample Mean	2.2	1.8	2.1	1.7
Sample Standard Deviation	0.99	1.0	1.1	0.94

Notes:
J = Compound detected, but result value is approximate
mg/kg = milligram per kilogram
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit

Table 40: Summary of Arsenic in Sediments – Subsurface Samples				
Sampling Event	**2015 Low Flow**	**2016 Spring Snowmelt**	**2016 Low Flow**	**2017 Spring Snowmelt**
Number of Samples (including field duplicates)	5	4	6 (including 1 field duplicate)	5 (including 1 field duplicate)
Detected Background Results Range (mg/kg)	2.7	1.2 J	1.8	1.7 J
Detected Result Range (mg/kg)	0.56 J - 6.7	1.1 - 8.6	1.3 - 3.3	0.47 J - 4.1
Number of Detects (excluding duplicates)	5	3	5	4
Screening Level – EPA Regional Screening Level for Protection of Groundwater (mg/kg)	0.29	0.29	0.29	0.29
Number of Exceedances (excluding duplicates)	4	3	5	4
Background Sample Mean	2.7	1.2	1.8	1.7
Background Sample Standard Deviation	--	--	--	--
Sample Mean	2.5	3.7	2.2	1.6
Sample Standard Deviation	2.8	4.2	0.83	1.3

Notes:
J = Compound detected, but result value is approximate
mg/kg = milligram per kilogram

5.4.4 Antimony Concentrations in Sediments

As shown on Figure 29, antimony concentrations in sediment samples exceeded the EPA RSL of 0.27 mg.kg for protection of groundwater in one background location (CW-04) and in several locations throughout the watershed. Table 41 shows a comparison of surface sediment results over four sampling events. A compilation of all antimony results for the four sampling events is shown in Appendix G-2. The method detection limit exceeded the EPA RSL for antimony for a majority of sample results, although the method detection limit was less than 1 mg/kg for all sampling events. A reporting limit was not established for antimony in sediments in the SAP. All antimony concentrations were within range of background concentration detected during the 2015 low flow and 2016 low flow sampling events. Sample results from locations CW-09, CW-17, CW-29, and CW-50 were significantly above background during the 2016 spring snowmelt sampling event at estimated detections of 0.62 mg/kg to 0.92 mg/kg. Sample location CW-09 contained antimony at concentration significantly above background at an estimated concentration of 0.74 mg/kg. Therefore, antimony is a COC for sediments.

Table 42 shows a comparison of subsurface sediment results over four sampling events. One subsurface sample collected at location CW-19 at 12 inches bgs contained antimony exceeding the EPA RSL of 0.27 mg/kg, and significantly above background at an estimated concentration of 0.68 mg/kg.

Sample results for metals were compared to typical background concentrations published in a report prepared for the Arizona Department of Environmental Quality (Earth Tech, 1991). Background concentrations published in this report are based on 47 USGS samples and 62 ADEQ samples collected from various Arizona locations. The Site lies along the Arizona/New Mexico border. Antimony was detected in the samples at concentrations ranging from non-detect to an estimated concentration of 0.92 mg/kg. Background samples collected during watershed assessment field activities from 2015 to 2017 ranged from non-detect to an estimated concentration of 2.8 mg/kg. The antimony concentrations collected from site-specific background locations and sample locations are within the range of background concentrations for Arizona soils of less than non-detect to 500 mg/kg (Earth Tech, 1991). Subsurface sample results are not available from the ADEQ report. However, samples collected by the USGS as part of the ADEQ study were collected at approximately 8 inches bgs, and samples collected by the ADEQ as part of the study were collected at depths of 4 inches to 108 inches bgs.

Table 41: Summary of Antimony in Sediments – Surface Samples				
Sampling Event	**2015 Low Flow**	**2016 Spring Snowmelt**	**2016 Low Flow**	**2017 Spring Snowmelt**
Number of Samples (including field duplicates)	46 (including 2 field duplicates)	58 (including 5 field duplicates)	61 (including 5 field duplicates)	67 (including 5 field duplicates)
Detected Background Results Range (mg/kg)	0.65 U - 2.8 J	0.5 U - 0.8 U	0.72 U -1.2 U	0.6 U – 0.83 U
Detected Result Range (mg/kg)	0.84 J	0.66 J - 0.92 J	0.71 U – 1.2 U	0.74 J
Number of Detects (excluding duplicates)	43	3	0	1
Screening Level – EPA Regional Screening Level for Protection of Groundwater (mg/kg)	0.27	0.27	0.27	0.27
Number of Exceedances (including duplicates)	1	4	0	1
Background Sample Mean	0.72	--	--	--
Background Sample Standard Deviation	0.92	0	0	0
Sample Mean	0.40	--	--	--
Sample Standard Deviation	0.087	0	0	0

Notes:
J = Compound detected, but result value is approximate
mg/kg = milligram per kilogram
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit

Table 42: Summary of Antimony in Sediments – Subsurface Samples				
Sampling Event	**2015 Low Flow**	**2016 Spring Snowmelt**	**2016 Low Flow**	**2017 Spring Snowmelt**
Number of Samples (including field duplicates)	5	4	6 (including 1 field duplicate)	5 (including 1 field duplicate)
Detected Background Results Range (mg/kg)	0.77 U	0.57 U	0.81 U	0.69 U
Detected Result Range (mg/kg)	0.72 U – 0.77 U	0.62 J	0.92 U	0.6U – 0.73 U
Number of Detects (excluding duplicates)	0	1	0	0
Screening Level – EPA Regional Screening Level for Protection of Groundwater (mg/kg)	0.27	0.27	0.27	0.27
Number of Exceedances (including duplicates)	1	1	0	0
Background Sample Mean	0.77 U	0.57 U	0.81 U	0.69 U
Background Sample Standard Deviation	--	--	--	--
Sample Mean	0.77 U	0.62 J	0.92 U	--
Sample Standard Deviation	--	0.19	--	--

Notes:
J = Compound detected, but result value is approximate
mg/kg = milligram per kilogram
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit

5.4.5 Barium Concentrations in Sediments

Barium concentrations in sediments are shown on Figure 30. Sediment samples collected at a majority of locations within Cove Wash drainages over all sampling events contained barium at concentrations exceeding the EPA RSL of 82 mg/kg. Table 43 shows a comparison of surface sample results for barium over four sampling events. Table 44 shows a comparison of subsurface sample results for barium over four sampling events. A compilation of all barium results for the four sampling events is shown in Appendix G-4.

Sample results for metals were compared to typical background concentrations published in a report prepared for the ADEQ (Earth Tech, 1991). Background concentrations published in this report are based on 47 USGS samples and 62 ADEQ samples collected from various Arizona locations. The Site lies along the Arizona/New Mexico border. Barium was detected in the samples at concentrations ranging from 26 mg/kg to 1,900 mg/kg. Background samples collected during watershed assessment field activities from 2015 to 2017 ranged from 21 mg/kg to 510 mg/kg. The barium concentrations collected from site-specific background locations and sample locations are within the range of background concentrations for Arizona soils of 70 mg/kg to 5,000 mg/kg (Earth Tech, 1991). Subsurface sample results are not available from the ADEQ report. However, samples collected by the USGS as part of the ADEQ study were collected at approximately 8 inches bgs, and samples collected by the ADEQ as part of the study were collected at depths of 4 inches to 108 inches bgs.

One sediment sample collected at sample location CW-03 during the 2015 low flow sampling event was significantly above site-specific background concentrations at a concentration of 1,900 mg/kg. Two sediment samples (CW-02 and CW-09) contained barium at concentrations significantly above background during the 2016 spring snowmelt sampling event. Two sediment samples (CW-09 and CW-81) contained barium at concentrations significantly above background during the 2016 low flow sampling event. Subsurface sample results for barium were not significantly above background concentrations in samples collected within the watershed. Therefore, barium is a COC for sediments.

Overall, background and sample locations with potential AUM impacts contain barium at concentrations above the EPA RSL for protection of groundwater. A compilation of all barium results for the four sampling events is shown in Appendix G-4.

Table 43: Summary of Barium in Sediments – Surface Samples

Sampling Event	2015 Low Flow	2016 Spring Snowmelt	2016 Low Flow	2017 Spring Snowmelt
Number of Samples (including field duplicates)	46 (including 2 field duplicates)	58 (including 5 field duplicates)	61 (including 5 field duplicates)	67 (including 5 field duplicates)
Detected Background Results Range (mg/kg)	29 - 510	28 - 350	31 - 120	21 - 250
Detected Result Range (mg/kg)	59 - 1900	33 - 660	27 - 710	26 - 320
Number of Detects (excluding duplicates)	44	55	38	61
Screening Level – EPA Regional Screening Level for Protection of Groundwater (mg/kg)	82	82	82	82
Number of Exceedances (including duplicates)	34	30	38	26
Background Sample Mean	150	105	97	92
Background Sample Standard Deviation	167	103	91	62
Sample Mean	210	123	140	100
Sample Standard Deviation	310	110	130	68

Notes:
mg/kg = milligram per kilogram

Table 44: Summary of Barium in Sediments – Subsurface Samples				
Sampling Event	**2015 Low Flow**	**2016 Spring Snowmelt**	**2016 Low Flow**	**2017 Spring Snowmelt**
Number of Samples (including field duplicates)	5	4	6 (including 1 field duplicate)	5 (including 1 field duplicate)
Detected Background Results Range (mg/kg)	110	83	81	87
Detected Result Range (mg/kg)	71 - 300	65 – 140	100 - 170	65 - 95
Number of Detects (excluding duplicates)	5	3	5	4
Screening Level – EPA Regional Screening Level for Protection of Groundwater (mg/kg)	82	82	82	82
Number of Exceedances (excluding duplicates)	4	2	5	1
Background Sample Mean	110	83	81	87
Background Sample Standard Deviation	--	--	--	--
Sample Mean	175	94	130	70
Sample Standard Deviation	95	40	30	6.4

Notes:
mg/kg = milligram per kilogram

5.4.6 Beryllium Concentrations in Sediments

Beryllium exceeded the EPA RSL of 3.2 mg/kg for protection of groundwater at one background location (CW-04), shown on Figure 3 at a concentration of 3.8 mg/kg. Table 45 shows a comparison of surface sample results for beryllium over four sampling events. All other background sample locations and sample locations that were potentially impacted by AUMs contained beryllium at concentrations below the EPA RSL for protection of groundwater. Beryllium is not considered a COC. A compilation of all beryllium results for the four sampling events is shown in Appendix G-5.

Table 45: Summary of Beryllium in Sediments – Surface Samples				
Sampling Event	**2015 Low Flow**	**2016 Spring Snowmelt**	**2016 Low Flow**	**2017 Spring Snowmelt**
Number of Samples (including field duplicates)	46 (including 2 field duplicates)	58 (including 5 field duplicates)	61 (including 5 field duplicates)	67 (including 5 field duplicates)
Detected Background Results Range (mg/kg)	0.1 J - 3.8	0.093 J – 0.52 J	0.13 J – 0.44 J	0.17 J – 0.39 J
Detected Result Range (mg/kg)	0.16 J - 1.3	0.057 J - 0.54 J	0.097 J – 0.51 J	0.19 – 1.3
Number of Detects (excluding duplicates)	43	47	39	29
Screening Level – EPA Regional Screening Level for Protection of Groundwater (mg/kg)	3.2	3.2	3.2	3.2
Number of Exceedances (excluding duplicates)	1	0	0	0
Background Sample Mean	0.75	0.22	0.22	0.18
Background Sample Standard Deviation	1.3	0.13	0.15	0.094
Sample Mean	0.34	0.22	0.18	0.23
Sample Standard Deviation	0.20	0.12	0.12	0.22

Notes:
J = Compound detected, but result value is approximate
mg/kg = milligram per kilogram

5.4.7 Cadmium Concentrations in Sediments

Cadmium exceeded the EPA RSL of 0.38 mg/kg for protection of groundwater at one background location (CW-04), shown on Figure 3 at an estimated concentration of 0.38 mg/kg. As the result is estimated due to the reporting limit, the potential exceedance is noted here. Table 46 shows a comparison of surface samples results for cadmium over four sampling events. All other background sample locations and sample locations that were potentially impacted by AUMs contained cadmium at concentrations below the EPA RSL for protection of groundwater.

Cadmium is not considered a COC. A compilation of all cadmium results for the four sampling events is shown in Appendix G-6.

Table 46: Summary of Cadmium in Sediments – Surface Samples				
Sampling Event	**2015 Low Flow**	**2016 Spring Snowmelt**	**2016 Low Flow**	**2017 Spring Snowmelt**
Number of Samples (including field duplicates)	46 (including 2 field duplicates)	58 (including 5 field duplicates)	61 (including 5 field duplicates)	67 (including 5 field duplicates)
Detected Background Results Range (mg/kg)	0.071 U - 0.38 J	0.079 U – 0.13 U	0.043 U – 0.15 J	0.15 U – 0.21 U
Detected Result Range (mg/kg)	0.066 J - 0.18	0.11 J - 0.13 J	0.044J – 0.13 J	0.15 U – 0.22 U
Number of Detects (excluding duplicates)	10	3	30	0
Screening Level – EPA Regional Screening Level for Protection of Groundwater (mg/kg)	0.38	0.38	0.38	0.38
Number of Exceedances (excluding duplicates)	1	0	0	0
Background Sample Mean	0.089	__	0.050	__
Background Sample Standard Deviation	0.13	0	0.048	01
Sample Mean	0.062	0.053	0.059	__
Sample Standard Deviation	0.040	0.017	0.036	01

Notes:
J = Compound detected, but result value is approximate
mg/kg = milligram per kilogram
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit

5.4.8 Lead Concentrations in Sediments

Lead exceeded the EPA RSL of 14 mg/kg for protection of groundwater at one background location (CW-04), shown on Figure 3 at a concentration of 32 mg/kg. Table 47 shows a comparison of surface sample results for lead over four sampling events. All other background sample locations and sample locations that were potentially impacted by AUMs contained lead at concentrations below the EPA RSL for protection of groundwater. Lead is not considered a COC. A compilation of all lead results for the four sampling events is shown in Appendix G-7.

Table 47: Summary of Lead in Sediments – Surface Samples

Sampling Event	2015 Low Flow	2016 Spring Snowmelt	2016 Low Flow	2017 Spring Snowmelt
Number of Samples (including field duplicates)	46 (including 2 field duplicates)	58 (including 5 field duplicates)	61 (including 5 field duplicates)	67 (including 5 field duplicates)
Detected Background Results Range (mg/kg)	2.2 - 32	3 - 7	2.7 – 6.8	1.8 – 6.3
Detected Result Range (mg/kg)	2.2 - 11	2.1 – 9.2	5.4 – 7.3	1.4 - 11
Number of Detects (excluding duplicates)	44	48	52	53
Screening Level – EPA Regional Screening Level for Protection of Groundwater (mg/kg)	14	14	14	14
Number of Exceedances (excluding duplicates)	1	0	0	0
Background Sample Mean	8.0	4.5	4.1	4.0
Background Sample Standard Deviation	11	1.4	14	1.4
Sample Mean	5.1	4.4	4.6	4.5
Sample Standard Deviation	1.8	1.9	2.0	2.0

Notes:
mg/kg = milligram per kilogram

5.4.9 Selenium Concentrations in Sediments

Selenium concentrations in sediments are shown on Figure 31. Sediment samples collected at a majority of locations within Cove Wash drainages over all sampling events contained selenium at concentrations exceeding the EPA RSL of 0.26 mg/kg. Table 48 shows a comparison of surface sample results for selenium over four sampling events. Table 49 shows a comparison of subsurface sample results for selenium over four sampling events. A compilation of all selenium results for the four sampling events is shown in Appendix G-8.

A method detection limit for selenium in sediments was specified as 0.158 mg/kg in order to detect selenium at concentrations above the EPA RSL of 0.26 mg/kg for protection of groundwater. The method detection limit was exceeded in most sample results. Concentrations of selenium were detected in sediments throughout the Cove Wash watershed, although some results may be below the reported method detection limits, but above the EPA RSL for protection of groundwater. Background concentrations of selenium in background samples collected at the Site ranged from non-detect to 5.2 mg/kg. Some surface sediment samples and one subsurface sample collected throughout all four drainages from seeps and surface water samples were significantly above background during one or more sampling event. Therefore, selenium is a COC.

Sample results for metals were compared to typical background concentrations published in a report prepared for the ADEQ (Earth Tech, 1991). Background concentrations published in this report are based on 47 USGS samples and 62 ADEQ samples collected from various Arizona locations. The Site lies along the Arizona/New Mexico border. Background samples collected during watershed assessment field activities from 2015 to 2017 ranged from non-detect to 5.2 mg/kg. The selenium concentrations collected from site-specific background and sample locations are within the range of background concentrations for Arizona soils of non-detect to 4.3 mg/kg (Earth Tech, 1991). However, the range of sample results for selenium is somewhat higher, 0.15 mg/kg to 20 mg/kg.

Table 48: Summary of Selenium in Sediments – Surface Samples				
Sampling Event	**2015 Low Flow**	**2016 Spring Snowmelt**	**2016 Low Flow**	**2017 Spring Snowmelt**
Number of Samples (including field duplicates)	46 (including 2 field duplicates)	58 (including 5 field duplicates)	61 (including 5 field duplicates)	67 (including 5 field duplicates)
Detected Background Results Range (mg/kg)	0.43 U - 5.2	0.46 U - 0.74	0.45 J – 0.67 J	0.21 J - 0.43 J
Detected Result Range (mg/kg)	0.32 J - 2.8	0.63 - 13	0.4 J – 20	0.19 - 6.1
Number of Detects (excluding duplicates)	19	10	24	20
Screening Level – EPA Regional Screening Level for Protection of Groundwater (mg/kg)	0.26	0.26	0.26	0.26
Number of Exceedances (excluding duplicates)	19	10	24	17
Background Sample Mean	1.0	0.29	0.48	0.14
Background Sample Standard Deviation	1.8	0.048	0.30	0.12
Sample Mean	0.60	0.83	1.5	0.39
Sample Standard Deviation	0.56	2.1	3.7	0.90

Notes:
J = Compound detected, but result value is approximate
mg/kg = milligram per kilogram
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit

Table 49: Summary of Selenium in Sediments – Subsurface Samples				
Sampling Event	**2015 Low Flow**	**2016 Spring Snowmelt**	**2016 Low Flow**	**2017 Spring Snowmelt**
Number of Samples (including field duplicates)	5	4	6 (including 1 field duplicate)	5 (including 1 field duplicate)
Detected Background Results Range (mg/kg)	0.57	0.53 U	0.33 U	0.2 J
Detected Result Range (mg/kg)	0.98	7	046 J - 1.1 J	0.26 J - 2.1
Number of Detects (excluding duplicates)	2	1	1	2
Screening Level – EPA Regional Screening Level for Protection of Groundwater (mg/kg)	0.26	0.26	0.26	0.26
Number of Exceedances (excluding duplicates)	2	1	1	0
Background Sample Mean	0.57	0.53 U	0.33 U	0.2 J
Background Sample Standard Deviation	--	--	--	--
Sample Mean	0.42	2.5	0.24	0.14
Sample Standard Deviation	0.37	3.9	0.15	0.10

Notes:
J = Compound detected, but result value is approximate
mg/kg = milligram per kilogram
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit

5.4.10 Thallium Concentrations in Sediments

Sediment samples collected at three surface sample locations and one subsurface sample location within Cove Wash drainages over all sampling events contained thallium at concentrations exceeding the EPA RSL for protection of 0.14 mg/kg. Surface samples collected during the 2017 low flow sampling event contained thallium above the EPA RSL for protection groundwater and significantly above background at sample locations CW-SS-02, CW-SS-11, and CW-SS-12 at estimated concentrations ranging from 0.53 mg/kg to 0.71 mg/kg. Therefore, thallium is a COC in sediments. Sample locations are shown in Figure 3d. One subsurface sample collected during the 2016 low flow sampling event exceeded the EPA RSL for protection of groundwater and was significantly above background at sample location CW-19 shown in Figure 3c at an estimated concentration of 0.88 mg/kg. Table 52 shows a comparison of surface samples results for thallium over four sampling events. Table 53 shows a comparison of subsurface samples results for thallium over four sampling events. A compilation of all thallium results for the four sampling events is shown in Appendix G-9.

Thallium was non-detect in all samples collected from background locations. However, the method detection limit was exceeded in most sample results. A required method detection limit was not set in the SAP (Appendix A). Some exceedances of the thallium EPA RSL for the protection of groundwater may not be reflected in sample results due to the method detection limits achieved for thallium in sediments.

Table 50: Summary of Thallium in Sediments – Surface Samples				
Sampling Event	**2015 Low Flow**	**2016 Spring Snowmelt**	**2016 Low Flow**	**2017 Spring Snowmelt**
Number of Samples (including field duplicates)	46 (including 2 field duplicates)	58 (including 5 field duplicates)	61 (including 5 field duplicates)	67 (including 5 field duplicates)
Detected Background Results Range (mg/kg)	0.66 U – 3.3 U	0.34 U – 0.4 U	0.32 U - 0.52 U	0.35 U – 0.48 U
Detected Result Range (mg/kg)	0.48 U - 0.96 U	0.34 U - 0.5 U	0.31 U – 0.53 U	0.53 J - 0.71 J
Number of Detects (excluding duplicates)	0	0	0	3
Screening Level – EPA Regional Screening Level for Protection of Groundwater (mg/kg)	0.14	0.14	0.14	0.14
Number of Exceedances (excluding duplicates)	0	0	0	3
Background Sample Mean	--	--	--	--
Background Sample Standard Deviation	0	0	0	0
Sample Mean	--	--	--	0.23
Sample Standard Deviation	0	0	0	0.10

Notes:
J = Compound detected, but result value is approximate
mg/kg = milligram per kilogram
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit

Table 51: Summary of Thallium in Sediments – Subsurface Samples				
Sampling Event	**2015 Low Flow**	**2016 Spring Snowmelt**	**2016 Low Flow**	**2017 Spring Snowmelt**
Number of Samples (including field duplicates)	5	4	6 (including 1 field duplicate)	5 (including 1 field duplicate)
Detected Background Results Range (mg/kg)	0.78 U	0.38 U	0.36 U	0.4 U
Detected Result Range (mg/kg)	0.71 U -00.78 U	0.38U – 0.39 U	0.88 J	0.35 U – 0.42 U J
Number of Detects (excluding duplicates)	0	0	1	0
Screening Level – EPA Regional Screening Level for Protection of Groundwater (mg/kg)	0.14	0.14	0.14	0.14
Number of Exceedances (including duplicates)	0	0	1	0
Background Sample Mean	0.78 U	0.39 U	0.36 U	0.4 U
Background Sample Standard Deviation	--	--	--	--
Sample Mean	--	--	0.18	0.19
Sample Standard Deviation	0	0	0.011	0.018

Notes:
J = Compound detected, but result value is approximate
mg/kg = milligram per kilogram
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit

6. GAMMA RADIATION SCANNING RESULTS

6.1 GAMMA SCANNING

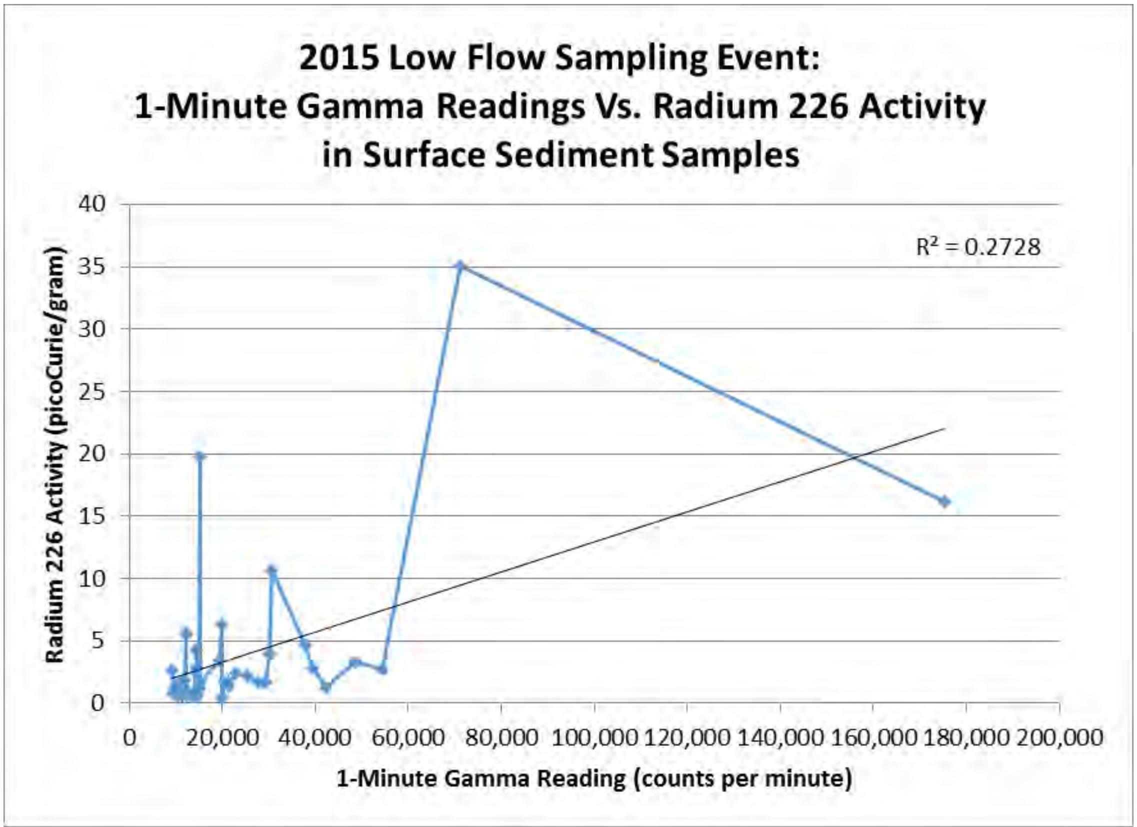
Gamma scanning can be employed to acquire large amounts of very sensitive data regarding the radiation levels at a site for comparison from one area to another, and to provide data that may quickly direct us to certain areas where more in-depth studies may be pertinent. It is important to note that gross gamma readings do not discriminate between gamma rays from one isotope versus another, so the source isotope that may cause any elevated reading cannot be determined from a gross gamma measurement. Physical conditions that can affect gamma radiation measurements include: surface geometry changes, variations in mineralogy, "shine" from nearby areas of high gamma readings such as waste rock, variations in day-to-day cosmic radiation levels, and even the variability of levels recorded by changes between detectors of the same type as well as between detectors of different configurations.

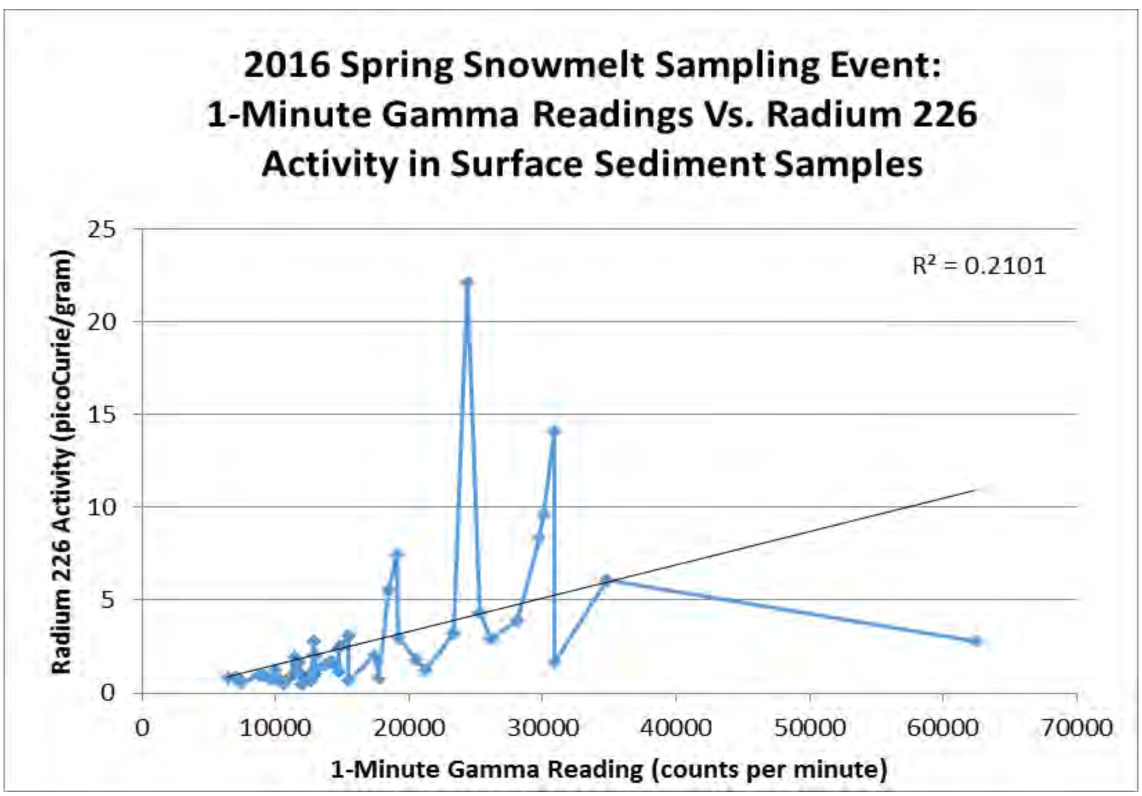
Gamma radiation was measured at reference locations, areas with mine waste in Cove Wash watershed drainages, and throughout drainages near sampling locations that were accessible by foot. The survey equipment for measuring gamma radiation consisted of a paired Ludlum Model 2241 meter and Model 44-10 (2-inch by 2-inch sodium iodide) detector in conjunction with a Trimble GeoXT 6000 GPS. The Trimble was used for geospatial information collection and analysis. The paired Ludlum and Trimble units had daily operational checks conducted both before and after field activities. Performance of the radiation survey equipment was verified throughout the field activities through operational checks and background checks as necessary. Whenever possible, the same paired gamma activity survey system was used for all surveys conducted at the Site. This was not always possible from sampling event to sampling event. In general, two paired Ludlum and Trimble units were used during each sampling event where there were two teams sampling, with a few exceptions where only one sampling team was active. The detector was carried at approximately six inches above ground surface, with some exceptions as noted in Section 6.1.2 below.

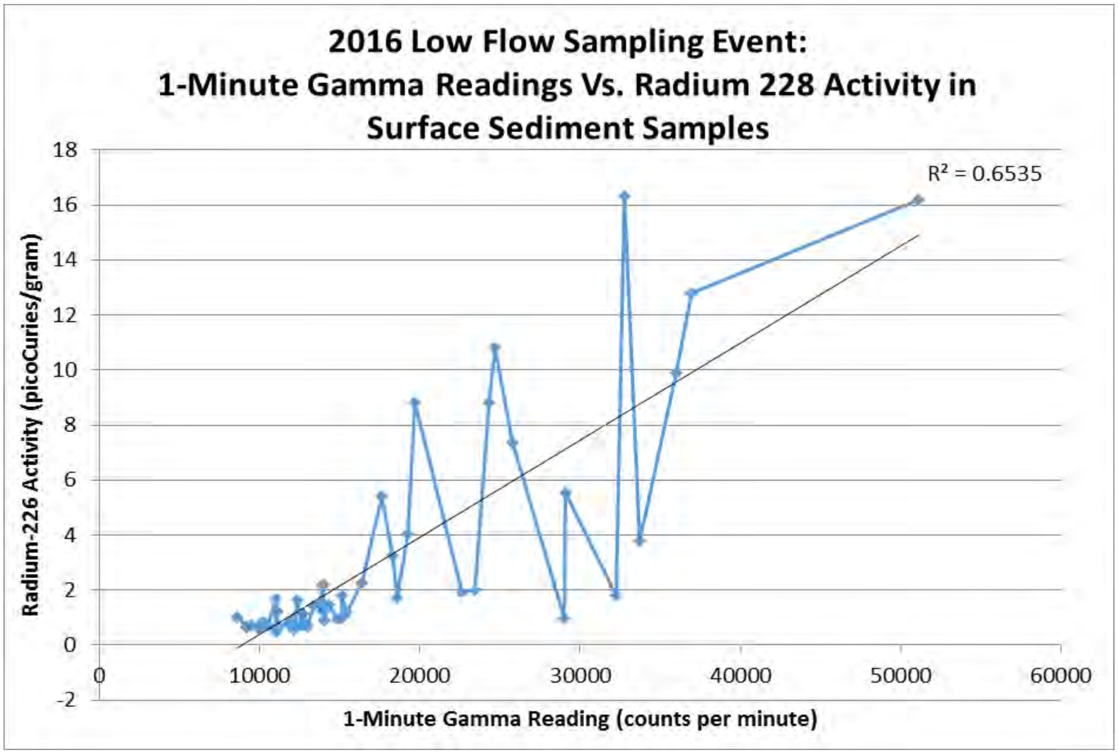
6.1.1 Stationary Gamma Measurements

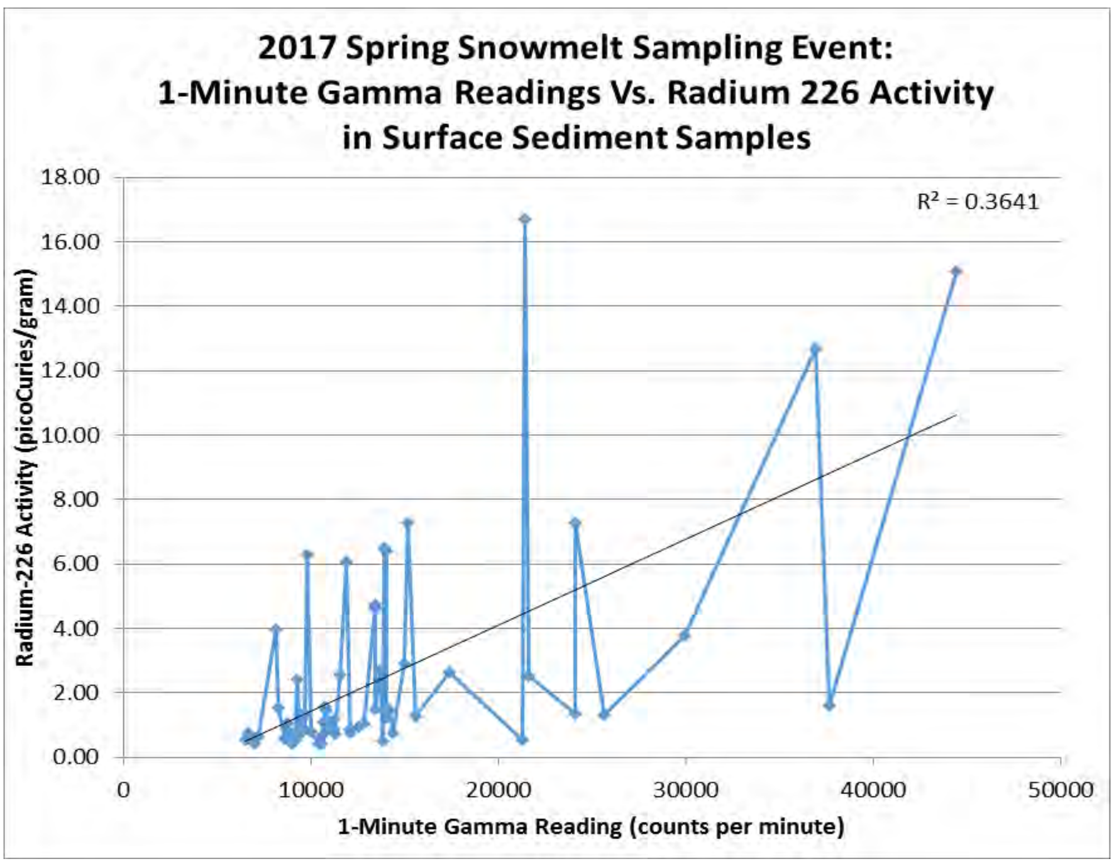
Stationary 1-minute gamma measurements were collected at selected locations across the Site, identified by the gamma-scanning data. The stationary 1-minute gamma measurements are provided in Appendix J. The stationary measurements are more accurate than scanning measurements because they are integrated over 1-minute intervals versus 1-second intervals for the gamma scanning measurements. Stationary measurements were be made with the same type of instrumentation, and at the same height (six inches) above ground surface as the gamma-scanning measurements.

The SAP for sampling events established that co-located static 1-minute gamma radiation counts at surface soil sampling locations would be used to establish the relationship between gamma radiation measurements in cpm and radium 226 activity in sediments. The 1-minute gamma radiation counts and radium 226 activity results for sediments (Appendix G) were evaluated for each individual sampling event and no correlation was found. The scatterplots below shows 1-minute gamma readings versus radium 226 data that were collected during each sampling event from 2015 to 2017. Sample results with estimated values of radium 226 were included in the scatterplot and evaluation. As shown below, there is not a clear relationship between 1-minute gamma readings and radium 226 activity results in sediment collected at collocated sample locations. The coefficients of determination ranged from 0.021 to 0.65 for individual sampling events. Combined radium 226 and radium 228 activity results were also compared to 1-minute gamma readings and no discernable relationship was established.

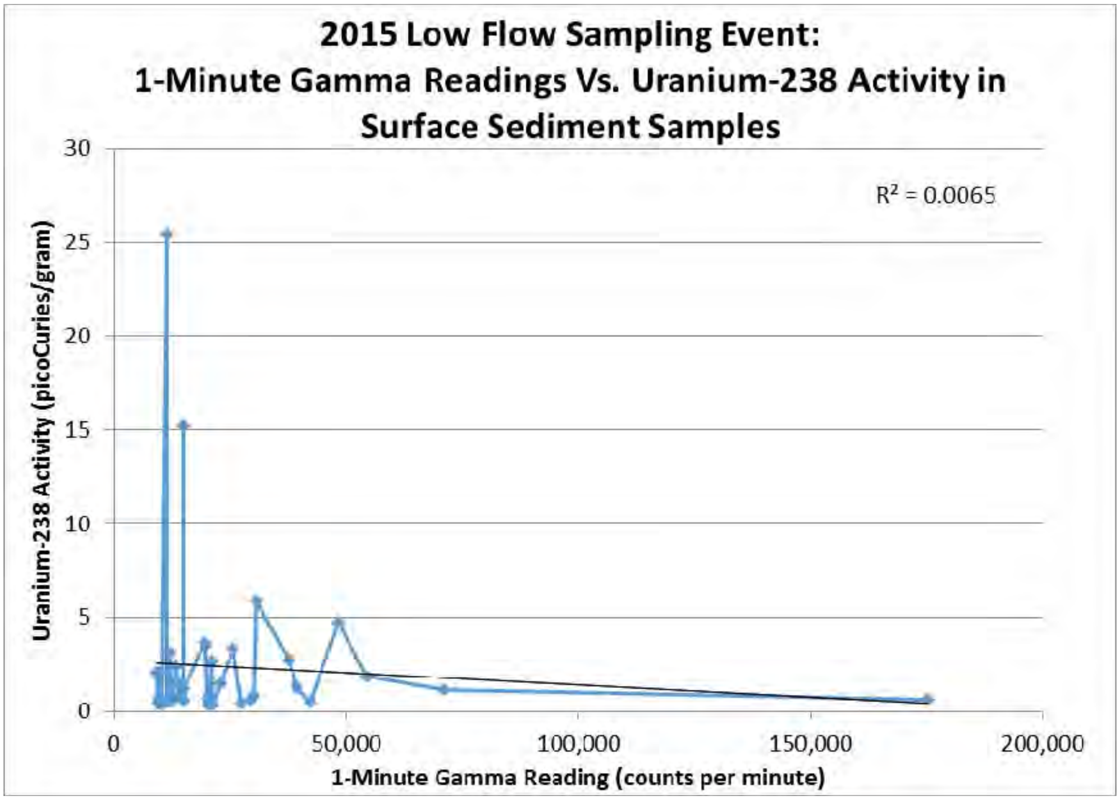

2015 Low Flow Sampling Event:
1-Minute Gamma Readings Vs. Radium 226 Activity in Surface Sediment Samples
R² = 0.2728
Radium 226 Activity (picoCurie/gram)
0
5
10
15
20
25
30
35
40
0
20,000
40,000
60,000
80,000
100,000
120,000
140,000
160,000
180,000
200,000
1-Minute Gamma Reading (counts per minute)

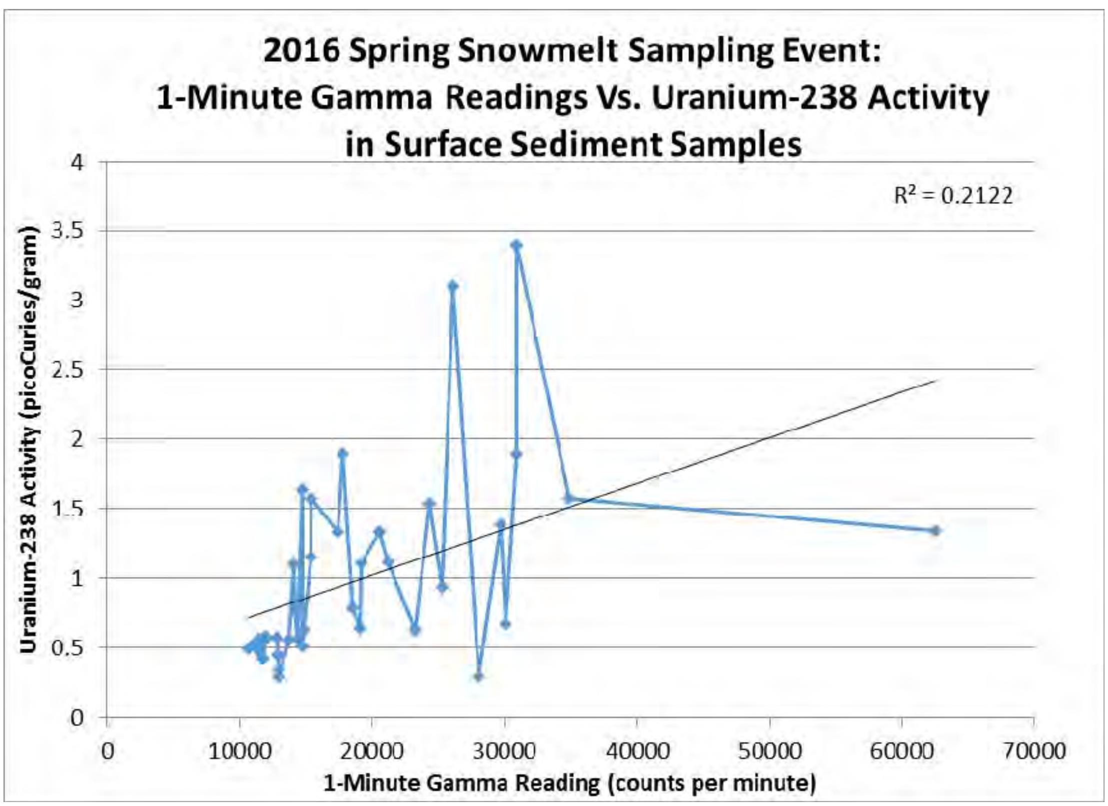

2016 Spring Snowmelt Sampling Event:
1-Minute Gamma Readings Vs. Radium 226 Activity in Surface Sediment Samples
R² = 0.2101
Radium 226 Activity (picoCurie/gram)
0
5
10
15
20
25
0
10000
20000
30000
40000
50000
60000
70000
1-Minute Gamma Reading (counts per minute)

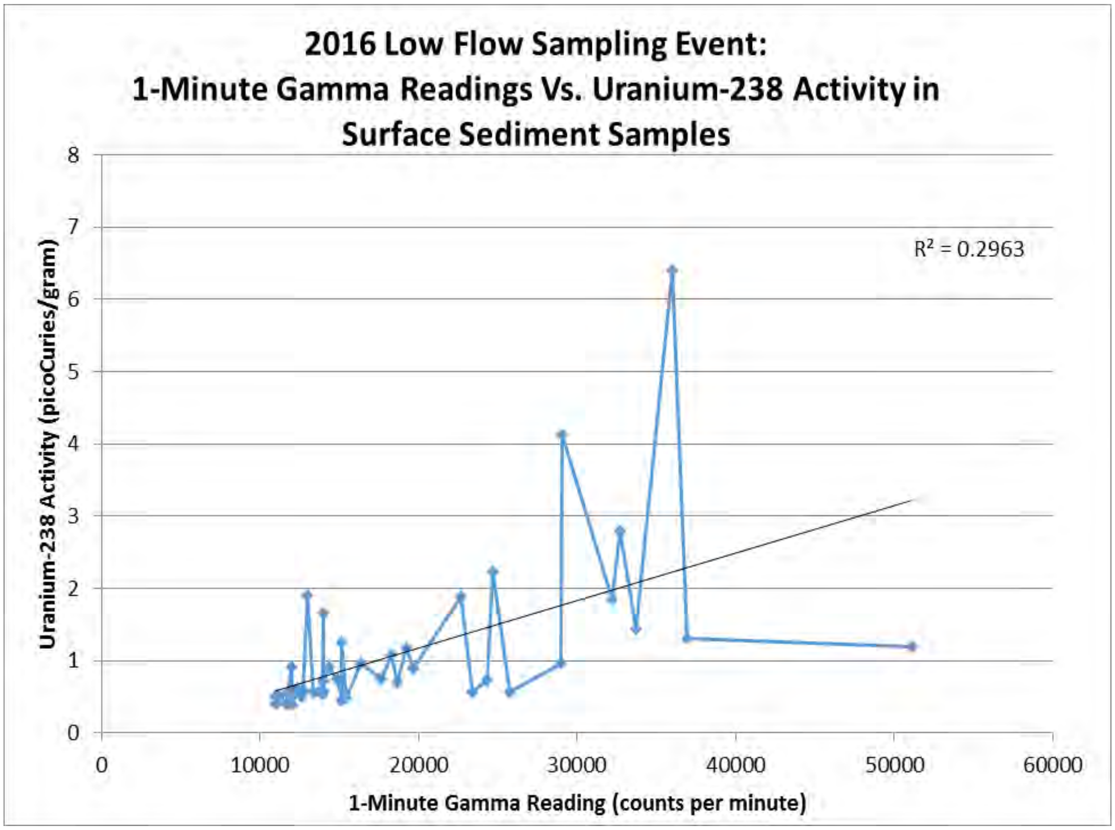

2016 Low Flow Sampling Event:
1-Minute Gamma Readings Vs. Radium 228 Activity in
Surface Sediment Samples
R² = 0.6535
Radium-226 Activity (picoCuries/gram)
1-Minute Gamma Reading (counts per minute)

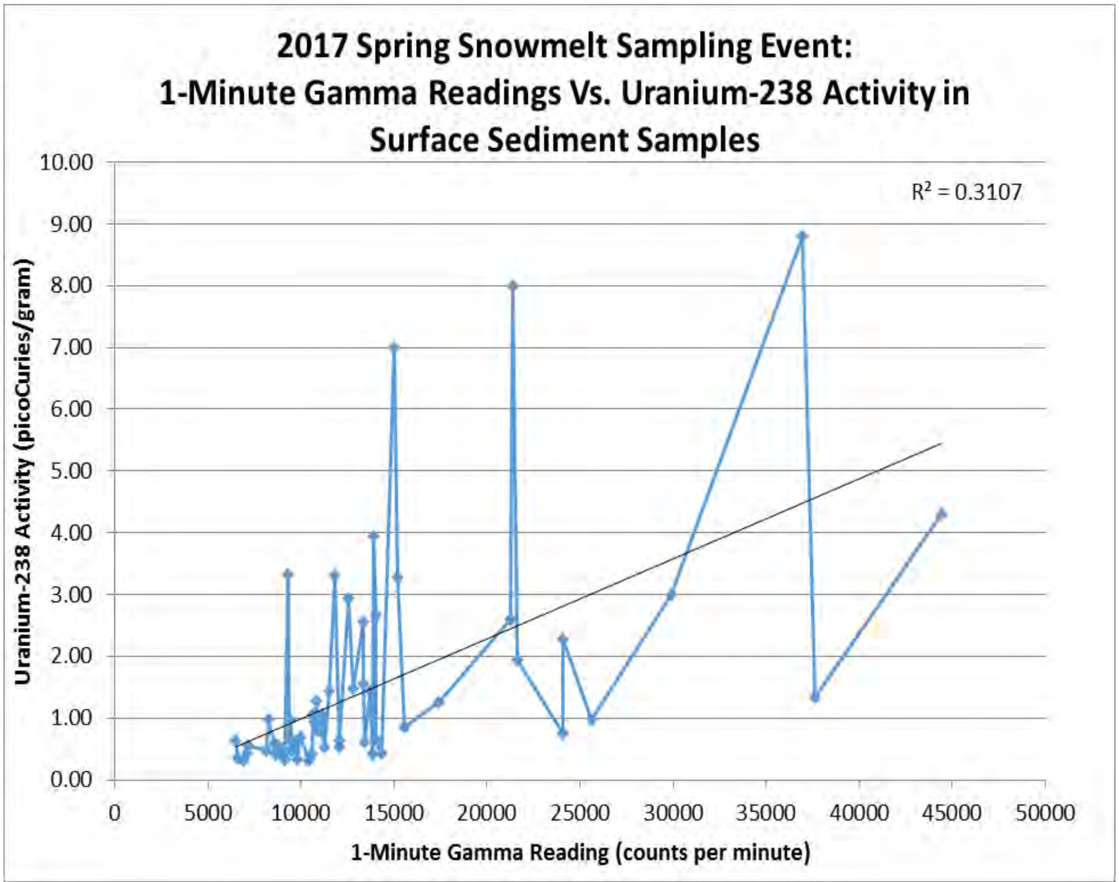

2017 Spring Snowmelt Sampling Event:
1-Minute Gamma Readings Vs. Radium 226 Activity
in Surface Sediment Samples
R² = 0.3641
Radium-226 Activity (picoCuries/gram)
1-Minute Gamma Reading (counts per minute)

The uranium-238 activity results (Appendix G), were also compared to 1-minute gamma readings over the sampling events from 2015 to 2017. The scatterplots below shows 1-minute gamma readings versus uranium-238 data that were collected during each sampling event from 2015 to 2017. Sample results with estimated values of uranium 238 were included in the scatterplot and evaluation. As shown below, there is not a clear relationship between 1-minute gamma readings and uranium-238 activity results in sediment collected at collocated sample locations. The coefficients of determination ranged from 0.0065 to 0.31 for individual sampling events. The lack of established correlation between alpha activity and 1-minute gamma readings may indicate that uranium and radium results in sediment are not representative of gamma radiation being measured within drainages, possibly due to gamma radiation measurements being affected by waste rock within drainages. Waste rock located within discrete areas of the drainages that are not part of the sediment matrix may elevate gamma readings. Sediment samples were collected from zero to 3 inches bgs, and the sediment matrix may be heterogeneous enough that the activity measured in the total sample does not correlate with gamma readings collected 6 inches above ground surface. Additionally, relatively high moisture content of sediments encountered in some drainages was unavoidable and may have affected 1-minute gamma reading results.


2015 Low Flow Sampling Event:
1-Minute Gamma Readings Vs. Uranium-238 Activity in Surface Sediment Samples
R^2 = 0.0065
Uranium-238 Activity (picoCuries/gram)
30
25
20
15
10
5
0
0
50,000
100,000
150,000
200,000
1-Minute Gamma Reading (counts per minute)


2016 Spring Snowmelt Sampling Event:
1-Minute Gamma Readings Vs. Uranium-238 Activity in Surface Sediment Samples
R^2 = 0.2122
Uranium-238 Activity (picoCuries/gram)
4
3.5
3
2.5
2
1.5
1
0.5
0
0
10000
20000
30000
40000
50000
60000
70000
1-Minute Gamma Reading (counts per minute)


2016 Low Flow Sampling Event:
1-Minute Gamma Readings Vs. Uranium-238 Activity in
Surface Sediment Samples
Uranium-238 Activity (picoCuries/gram)
1-Minute Gamma Reading (counts per minute)
R² = 0.2963
0
1
2
3
4
5
6
7
8
0
10000
20000
30000
40000
50000
60000



Generally speaking, there are two contradictory effects relative to gross gamma readings over soils (as a rough estimator of Ra-226 concentrations) when the moisture content in the soil changes significantly. As moisture content increases, the gamma rays from isotopes in the soil are shielded slightly more than when the pore spaces in the soil are filled with air instead of water – reducing the gamma readings when the soil is wet. At the same time, the water in the soil fills the pore spaces that radon gas (produced from the decay of the Ra-226) would use to migrate away from the soil particles to reach the soil surface and be released into the environmental air. As the radon levels build up in the soil and decay to short-lived particulates that emit more gamma rays, the gamma radiation levels climb slightly, which increases the gamma readings when the soil is wet. It is difficult to quantify which effect is greater – it can depend on how large the soil grain sizes are (how big the pore spaces are between the grain), how wet the soils are, how long they have been wet, and when the readings are taken. In general, the impact from elevated soil moisture is to reduce the gamma levels recorded above the ground surface. The presence of added water in the soil effectively serves to increase density by filling the available air space in the soil with water, and the greater density of the water compared to air adds to the shielding of the gamma rays.

Therefore, due to the moisture in drainages, potential heterogeneity in sediments sampled, which varied from sample location to sample location, and potential effects of the terrain, the gamma scan survey results cannot be correlated to radium 226 or uranium isotope activity results throughout the watershed.

6.1.2 Gamma Scanning

Gamma scanning was employed to locate the spots with the maximum gamma activity in watershed drainages. Gamma scanning does not provide a quantitative assessment of Site conditions, but is an excellent tool to assess the relative gamma activity of the area. The scanning procedure allows rapid assessment of a large area, sensitive detection of gamma radiation levels in excess of the background value, reasonably accurate delineation of areas where gamma radiation levels are elevated, and identification of small areas with the highest gamma count rates that have the highest potential for an observed release.

As discussed above, gamma scanning was conducted using a GPS assisted portable ratemeter and detector. The detector was hand-held approximately six inches above the soil surface. Due to rough terrain in drainages, the detector had to be held higher than six inches above ground surface in order to climb rocks, etc. This was minimized and results collected when the detector was raised in order to traverse terrain are reported without comment.

The instrument was set with an open window to allow detection of the broad spectrum of gamma energies associated with the naturally occurring radionuclides. Gamma activity measurements were recorded at 1-second intervals by the GPS with corresponding positional data. GPS signal was limited in some areas, particularly drainages, due to loss of satellite signal. This means that gamma scanning data cannot be used to determine the entire length of drainages inspected during each sampling event.

The field-of-view for this detector system is a circle of approximately 3-feet in diameter. Gamma activity was recorded by the GPS in units of gamma cpm. The data are collected in 1-second intervals and the ratemeter calculates the gamma counts as cpm. Any slight variation in the collected count rate is magnified by this automated conversion and individual readings will be more variable than those from the 1-minute gamma measurements. Individual gamma scan measurements will include occasional statistical outliers that do not indicate elevated gamma activity. Because of this statistical variation, these gamma-scanning data are not used for comparison to the observed release criteria for gamma measurements. These data are used to qualitatively evaluate the Site.

Additionally, gamma readings conducted with scintillation detectors such as the standard NaI instruments used for gamma scanning surveys are likely to include a small amount of variability from one instrument to another instrument of similar make, model, calibration, and set-up. Two NaI crystals of identical size and shape likely do not produce identical readings in a given gamma radiation field because of variations in the detectors' crystal structure, color, age, and electronic circuitry in the meter. In addition, NaI detectors' responses to gamma radiation are energy dependent. Two sampling teams conducted gamma scanning during each sampling event, and the scintillation detectors used varied between sampling events in some cases. Therefore, the gamma scanning survey results cannot be directly compared to each other. However, as discussed below, the gamma scan survey results remained similar from sampling event to sampling event at the background location near the Cove Chapter House and within drainages, and can be used to understand qualitative differences in ranges of gamma radiation throughout the watershed.

A gamma radiation survey unit measuring 50-feet by 50-feet was established in selected reference locations that are not impacted by mining activities. A reference location was established on the Cove Chapter House grounds, which is at the base elevation of the mesas, below the elevation of the AUMs and outside of any drainages. This location was surveyed during each sampling event. However, only partial gamma scanning data for the 2015 low flow event, and none of the 2016 sampling event data were recoverable due to file corruption in the data collection device. Figure 30 shows the reference data collected at the Cove Chapter House from 2015 to 2017. In 2017, a reference gamma radiation area was surveyed at a sheep camp at background sample location CW-31, which is above mining influence at the top of a mesa. Figure 31 shows the reference data collected at location CW-31. Measurements from a reference area that are considered representative of conditions at a comparable uncontaminated site may be used as a baseline for comparison with data collected at the site or at suspected contaminated areas. In general, gamma radiation levels in excess of those reference readings are suspected to be caused by the presence of isotopes in excess of background.

Gamma radiation in surface soil was measured using a global positioning system (GPS)-assisted portable ratemeter and detector. The reference survey consisted of transects spaced 5-feet apart, providing 99-100% characterization of the Site. The transect width is based on the field-of-view of the detector, which is about 3-feet in diameter, and the surveyor walked at a pace of 3 feet per second. In the event that the surveyor exceeded the speed of 3-feet per second, the data collected during the exceedance were not used for evaluation and are not shown in gamma scanning figures in this report. The mean and standard deviation (SD) of the gamma radiation measurements in the background surface soil were calculated for comparison of gamma radiation results throughout the watershed drainages. The reference area calculated mean and SD fell within acceptable ranges in comparison to established background gamma radiation ranges throughout the southwestern United States. Tables 52 and 53 show reference results for each sampling event and combined statistics for the reference scans conducted at the Chapter House from 2015 to 2017. Based upon the reference gamma scanning readings, the mean gamma scanning reference value of 10,000 counts per minute (cpm) is utilized for evaluation of gamma scan results.

Table 52: Chapter House Reference

Event	Number of recorded measurements	Min	Max	Mean	Median	SD
2015 Low Flow	229	8932	12,134	10,281	10,263	596.6
2016 Snowmelt	872	7735	16,970	10,794	10,573	1,303.6
2017 Snowmelt	2,893	8450	12,118	9,897	9,872	530.8
Combined	***3,994***	***7735***	***16,970***	***10,115***	***9,977***	***855.6***

Table 53: Mesa IV Reference						
Event	**Number of recorded measurements**	**Min**	**Max**	**Mean**	**Median**	**SD**
2017 Snowmelt	276	8,339	12,432	10,033	10,004	654.9

Notes:
All measurements in counts per minute

Figure 32 contains plots showing the maximum gamma scanning results over all four sampling events. For assessment purposes, results that are two times above the established mean background gamma scanning results (10,000 cpm as discussed in Section 3.3) are considered significantly above background for comparison purposes, but not in order to document an observed release, as discussed above. As shown on Figure 32, at least part of all drainages surveyed were two times above background, or significantly above background during at least one sampling event. Gamma scan results collected during the 2016 spring snowmelt and 2016 low flow sampling events show that areas walked at elevations above AUMs (Figures 34 and 35) are within background range. A majority of the gamma scanning results significantly above background were within 20,000 cpm to 100,000 cpm. Exceedances between 100,000 cpm and 250,000 cpm were mostly clustered in areas of known waste piles or in tributaries directly receiving runoff from waste piles. Gamma scanning results exceeding 250,000 cpm shown on Figure 32 appear to be localized and may be the results of scanning individual waste rock or rock containing uranium ore. In particular, Cove Wash Middle 3G was noted to contain individual rocks that appeared to be washed down from Mesa I Mines. When surveyed, those rocks resulted in brief elevated readings, but did not indicate the presence of waste piles.

Figures 33 through 36 show gamma scanning results for each sampling event: the 2015 low flow sampling event (Figure 33), the 2016 spring snowmelt sampling event (Figure 34), the 2016 low flow sampling event (Figure 35), and the 2017 spring snowmelt sampling event (Figure 36). The maximum gamma scanning results are shown on each figure, and qualitative results for each main drainage are discussed below.

Cove Wash Middle 1

Little variation in gamma scanning results is noted within the Cove Middle Wash 1 drainage. Overall, the entire drainage contains gamma activity significantly above background. The exceptions are the 2017 spring snowmelt results (Figure 36), which show lowered gamma activity in part of the drainage at lowered elevations. The 2017 spring snowmelt data also show lower gamma scanning results at locations within the Cove Wash Middle 1A drainage directly downstream of the cluster of AUMs - Mesa V Adit, Mesa V Mine, and Mesa V Incline.

Cove Wash Middle 2

Gamma scanning results for Cove Wash Middle 2 also contained little variation between sampling events, with the exception of the 2017 spring snowmelt sampling event, which showed results that were not significantly above background within the drainage downstream of Mesa IV AUMs. Gamma scanning readings that were significantly above background continued upstream past Mesa IV AUMs until terrain did not allow additional surveying to occur.

Cove Wash Middle 3

Gamma results for Cove Wash Middle 3 varied more seasonally, with the 2015 and 2016 low flow sampling events results showing higher gamma activity than the 2016 and 2017 spring snowmelt sampling events. Overall, 2017 spring snowmelt results were geographically limited within the drainage, due to a rock fall restricting access to only downstream sampling locations as well as reduced satellite coverage during sampling dates, which impacted GPS data collection and the ability to compare scanning results to earlier sampling events.

Cove Wash North

Satellite coverage within the Cove Wash North drainage varied throughout the four sampling events, limiting comparison of gamma scanning results. As noted above, the waste pile at Mesa VI Mine consistently showed the highest gamma scanning results in the drainage. Below the AUMs, gamma scanning results significantly above background were sporadic and were not consistently located throughout the drainage over all four sampling events. The background exceedances may be due to individual rocks with higher uranium concentrations that move throughout the drainage during high flow events.

6.2 WASTE PILES

As shown on Figure 37, waste piles were identified throughout the watershed at AUMs and within watershed drainages downstream of AUMs. The waste piles were identified as part of the Mine Category Assessment Protocol (MCAP), which utilized multiple lines of evidence to determine the presence and mobility of the waste piles (Weston, 2016c), including gamma scanning, field observations, aerial photography, and historical records. Gamma scanning readings and field observations collected during the first three sampling events of the Cove Wash watershed were utilized as part of the MCAP determination of waste pile locations. Gamma scanning results collected during the watershed assessment show elevated gamma radiation results above background concentrations on the waste piles, where they fall into drainages and in some cases at elevations below the waste piles, as discussed for each Cove Wash drainage below. Additional gamma scanning data specific to waste piles located outside of drainages, where physically accessible, are available in the final MCAP report (Weston, 2016c).

Cove Wash Middle 1

Figure 37 shows that waste piles are located within AUM boundaries at a majority of tributaries of Cove Wash Middle 1. No waste piles were located within the main drainage, but the highly mobile waste pile shown in red, upstream from sample location CW-51, may drain into the drainage. The waste pile is visible from roads off of the mesa and is clearly moving into the adjacent drainage. A waste pile located near sample location CW-55 at Mesa V East Portal, Frank No. 1 Mine, is not accessible by foot in Cove Wash Middle 1C, as it spills off of the cliff. The drainage cannot be accessed from the main Cove Wash Middle 1 due to the blockage in the vicinity of sample location CW-53a.

Cove Wash Middle 2

Waste piles are also located on AUMs at Cove Wash Middle 2 headwaters. A waste pile is located near sample locations CW-26 and CW-27 within Cove Wash Middle 2B. Figure 38 shows gamma scanning results for all four sampling events in drainages and walking paths where waste piles are partially present near Mesa II ½ Mine and Mesa II ½ Mine 4 AUMs. As shown in the figure, gamma scanning results ranged from greater than 20,000 cpm to less than 100,000 cpm at the waste piles associated with the AUMs as well as partially downstream of the piles. The drainage was inaccessible by foot further downstream.

Cove Wash Middle 3

Waste piles have been identified at AUMs as well as directly within Cove Wash Middle 3 drainages, including near sample locations CW-13, CW-14, CW-19, CW-20, and CW-47. Figure 38 shows gamma scanning results for all four sampling events in drainages and walking paths where waste piles are partially present near the Mesa II Mines No. 1 & 2, P-21, Mesa II, Mine No. 1, P-150, and Mesa 1/34, Mine No. 2, P150, Mesa 1 ¾ Invlide AUMs. Figure 39 shows gamma scanning results near waste piles extending into drainages near the Mesa I Mines 10 to 15. There were no highly mobile waste piles located within the drainage with the exception of an area near sample location CW-19, at the Mesa II Mine No. 1&2, P-21 AUM. Sample location CW-90, located in the Cove Wash Middle 3A, is located at a rock fall that occurred during monsoon rains in July or August 2016. The rock fall now blocks sediments from moving further downstream, and may be capturing contaminated sediments. A sample of sediments built up behind the rock fall collected in April 2017 contained uranium at concentrations above EPA RSLs, and significantly above background concentrations. During the April 2017 field event, it was observed that the water level and what appeared to be sediments within water have raised at least several feet since the original rock fall was observed in August 2016. The rock fall at sample location CW-90 may contain sediments with elevated COCs.

Cove Wash North

The Cove Wash North drainage contains waste piles directly in the drainage at sample location CW-16 at the Mesa VI Mine and NA-0319 AUMs, which is where the drainage can be accessed from a former mine road. Downstream of sample location CW-15, a waste pile associated with the Frank Jr. Mine partially lies along the southern edge of the drainage along the sloped area downgradient of an AUM. Figure 40 shows gamma scanning results for all four sampling events in drainages and walking paths where waste piles are partially present. During field observations, the waste pile appeared to be a fine material deposited along the slope directly adjacent to the streambank.

7. DEVIATIONS FROM THE SAP

Overall, standard operating protocols and site-specific sampling requirements outlined within the SAP were followed during sampling events with exceptions outlined below. The deviations from the SAP discussed below are not expected to prevent the data from being used to meet DQOs discussed in Section 3.1.

7.1 WASTE PILES

Gamma scanning was performed in Cove Wash drainages containing visible waste rock from upstream AUMs. The SAP specified that a field team member would walk the area around the points where the highest 1-minute measurements were collected, attempting to locate the spot of maximum gamma count rate. When performing this scan, 100% of the hot spot was to be surveyed. The goal of the 100% scan of hot spots was to identify waste rock throughout drainages. During sampling events, terrain in drainages, particularly steep sidebanks, made full characterization of hot spots impossible (Appendix K, Photo 19).

As discussed in Section 7.2, waste piles that remain within drainages generally form steep slopes beginning above drainages and fall within drainages (Appendix K, Photo 2). It also appears that due to the dynamism of the watershed, high-velocity flows generated by snowmelt and/or monsoon transport sediments downstream seasonally, suspending and depositing sediments in lower portions of the watershed. According to community members, the dam located at the confluences of Cove Wash Middle 1, Cove Wash Middle 2, and Cove Wash Middle 3 is regularly eroded during monsoon rains and other high flow events, and requires annual maintenance in order to restore its use for irrigation diversion. Therefore, field team members were not able to scan 100% of hot spots as specified in the SAP.

However, as discussed above, gamma scanning and field observations collected during Cove Wash Watershed Assessment field activities were utilized as part of the MCAP that included all AUMs within the Cove Wash watershed. The assessment determined waste pile locations and estimated areas, or volumes when possible. Additional information concerning the depth of waste piles is required for an accurate estimate of waste pile volumes, which is outside the scope of this assessment.

7.2 FIELD OBSERVATIONS

Field observation requirements were outlined in the SAP for each individual sampling event (Weston, 2015; Weston, 2016a; Weston, 2016b; Weston, 2017). Water quality measurement requirements were outlined in Section 5.1.1 of each SAP. Water quality results are provided in Appendix F.

The 2015 low flow SAP (Weston, 2015) noted the following requirements for water quality measurements:

"Field measurements will be collected at each surface water sampling location including pH, temperature, conductivity, oxidation-reduction potential, and turbidity. Flow measurements will be collected at each surface water sampling location where flow is fast enough to measure. Flow will be measured using a Marsh McBirney Flo-Mate 2000. Visual observation of each surface water sample will be recorded."

Turbidity was not measured during the 2015 low flow sampling event. Water quality meters were shipped to the Site without turbidity meters, and sampling was conducted without obtaining turbidity meters. Turbidity measurements were obtained during all subsequent sampling events with the exception of transcription errors for turbidity measurements for several locations during the 2016 and 2017 field sampling events.

Due to the amount of sampling equipment and water and sediment sample volumes collected by each sampling team, a Marsh McBirney Flo-Mate 2000 was not used to measure stream velocity, which is a requirement for estimating flow volumes. Instead, a biodegradable object buoyant enough to float was placed instream and timed while floating down an estimated 10-foot section of stream channel in order to measure stream velocity. During subsequent SAP revisions, the requirement to use a Marsh McBirney Flo-Mate 2000 was removed, and field measurements were changed to require that flow would be measured when possible. The velocity was determined regularly throughout the sampling events with some transcription errors, but a majority of sites, including seeps, springs, and many surface water pathways, had flow too low to measure using a buoyant object.

7.3 METHOD DETECTION LIMITS

A method detection limit for selenium in sediments was specified as 0.158 mg/kg in order to detect selenium at concentrations above the EPA RSL of 0.26 mg/kg for protection of groundwater. The method detection limit was exceeded in most sample results. Concentrations of selenium were detected in sediments throughout the Cove Wash watershed, and some results may be below the reported method detection limits, but above the EPA RSL for protection of groundwater. Additional discussion of selenium results in sediments is provided in Section 5.4.9.

7.4 MONSOON SAMPLING EVENT

The 2015 low flow, 2016 spring snowmelt, and 2016 low flow SAPs reference a monsoon season sampling event that was to be scheduled. During 2016 monsoon season, it was determined that high flow activities only lasted a few days to a week and drainages were unsafe to traverse during that time. Dirt roads used to access sampling locations from the top of mesas are not accessible during monsoon rains. Due to the difficulty scheduling a monsoon sampling event that could allow for sampling of monsoon flow as well as safety concerns, a second spring snowmelt sampling event was conducted in 2017 instead.

8. CONCLUSIONS

8.1 PRINCIPAL STUDY QUESTIONS

The EPA tasked START to complete the watershed assessment to support the environmental data collection activities needed to document implementation and completion of the removal assessment. The primary objectives for this assessment were to delineate AUM sources of contamination to the Cove Wash watershed and characterize contamination within the watershed.

The analytical data were collected as part of this watershed assessment in order to answer the following site-specific study questions. START collected surface water, groundwater, and sediment samples, as well as conducted gamma radiation surveys, in order to further characterize wash water contamination and delineate the source(s) contributing to the contamination in the watershed:

1. *What are the extent of COC concentrations in surface water, groundwater, and sediments throughout the Cove Wash watershed?*

Within surface waters and groundwater, COCs within the watershed are total uranium, total aluminum, total adjusted gross alpha radiation, total arsenic, total barium, total beryllium, total lead, total mercury, total molybdenum, total combined radium, total selenium, total thallium, total vanadium, dissolved cadmium, and dissolved copper. These COCs have been detected in surface water samples above screening levels and significantly above background in at least one sample over the four sampling events conducted as part of the watershed assessment. Specific exceedances are outlined in Section 5.2.1 and Appendix D. The screening levels for water samples used to evaluate COC exceedances are the EPA MCL and 2015 NNSWQS.

2. *Are the concentrations of COCs in surface water and groundwater present at concentrations above the MCL for drinking water?*

Surface waters, seeps, and springs in samples downgradient of AUMs, one seep upgradient of AUMs within Cove Wash North drainage, and one surface water sample that does not appear to have any AUM upstream influence, contain uranium at concentrations above the EPA MCL throughout the watershed and remain above the EPA MCL at the final downstream sampling location within the Cove Wash. Other COCs exceed the EPA MCL in specific sampling locations (Section 5.2.1) including adjusted gross alpha radiation, combined radium 226/228, arsenic, barium, beryllium, lead, selenium, and thallium.

3. *Are the concentrations of COCs in sediments present at concentrations above the EPA RSLs for protection of groundwater?*

The following COCs are associated with sediments AUMs within the watershed above EPA RSLs for protection of groundwater: uranium, antimony, arsenic, barium, selenium, and thallium. Uranium exceedances of the EPA RSL are located within Cove Wash Middle 1, Cove Wash Middle 2, and Cove Wash Middle 3 drainages. Arsenic was detected at concentrations above the EPA RSL, and in some cases at concentrations significantly above background concentrations for specific sampling events. However, arsenic was detected in sediments at concentrations within the range of background levels documented in Arizona.

4. *Is waste rock present within Cove Wash watershed drainages contributing to elevated concentrations of COCs within the watershed? If present, identify boundaries of waste rock in drainages.*

Gamma radiation is elevated within drainages where waste rock is present, but a correlation between gamma radiation and COC concentration was not established as part of this assessment. Therefore, it was not determined if waste rock present within drainages is contributing to elevated concentrations of COCs within the watershed. As noted above, uranium moves primarily within the dissolved phase in surface waters. Uranium in sediments was only found at elevated concentrations in select parts of Cove Wash Middle 1, Cove Wash Middle 2, and Cove Wash Middle 3 (Figure 27).

Waste piles were identified in drainages as part of this watershed assessment, as well as during the MCAP assessment conducted in 2016. In addition to larger waste rock piles identified during the assessments, it was noted that elevated gamma readings were recorded when scanning directly over specific rocks within drainages. The rocks showing elevated gamma readings were transitory in nature and had similar characteristics to waste rock piles upstream. This was particularly noticeable in the Cove Wash Middle 3G drainage.

5. *What are potential sources of contamination contributing to elevated concentrations of COCs within the watershed?*

Potential sources include AUMs within the four main drainages of the Cove Wash watershed that drain from AUM impacted headwaters. Surface waters collected from all drainages contained uranium above the EPA MCL. A livestock standard is not established for uranium. Background samples collected during the watershed assessment indicate that while some uranium may originate from natural sources, uranium concentrations increase significantly at elevations below AUMs.

As part of the questions above, specific objectives were developed to be answered by analytical data and data collected in the field:

1. *Determine the potential threat to human health or the environment from constituents of concern (COCs) originating from AUM waste within the Cove Wash watershed drainages which exceed the proposed action level protective of human health.*

Present uranium and other COCs exceed human and ecological risk-based screening levels designed to identify chemical-specific concentrations that may warrant further investigation or cleanup on the basis of a probability of one in a million to one in ten thousand excess cancer or noncancerous incidence in a population. Human health exposure pathways considered include drinking water, consumption of livestock that utilize the water, use of water for agriculture and secondary human contact.

2. *Determine the lateral ground surface boundaries where elevated gamma radiation activity is present within the Cove Wash watershed drainages.*

Gamma radiation scanning over the four sampling events indicates that gamma radiation is significantly above background in drainages upstream of the dam within all Cove Wash Middle drainages. Gamma scanning radiation results were significantly above background in segments of the Cove Wash North drainage, within one mile of AUMs. Gamma scanning results collected at elevations above AUMs were not significantly above background during all sampling events.

3. Identify waste rock boundaries within Cove Wash watershed drainages.

Waste pile boundaries were identified and discussed in Section 6.2. Overall, it was determined that flow within the drainages moves sediments and potentially waste rock during high water flow periods. Waste piles located directly within drainages were identified in Cove Wash Middle 3, Cove Wash North, and the headwaters of Cove Wash Middle 1 and Cove Wash Middle 2.

4. Determine current COC concentrations within groundwater from wells throughout the Cove Wash watershed.

Groundwater wells located within the watershed that were able to be sampled include the Red Point Dug Well and the Ellison Well. COCs were not elevated in the Red Point Dug Well over all sampling events. The Ellison Well was able to be sampled during the first sampling event in 2015, and contained uranium, arsenic, and thallium at concentrations above the EPA MCL in the dissolved phase.

Based on sampling results from events conducted from 2015 to 2017, contamination from uranium, aluminum, and arsenic are found in surface waters above one or more screening levels all the way to the furthest downstream sampling location, which is near the boundary of the watershed. It is recommended that the possibility of collecting additional samples downstream of the Cove Wash watershed boundary be evaluated in order to determine the full extent of uranium and other COCs that exceed screening levels.

8.2 GENERAL CONCLUSIONS

The Cove Wash watershed assessment was conducted over four sampling events: a 2015 low flow sampling event, a 2016 spring snowmelt sampling event, a 2016 low flow sampling event, and a 2017 spring snowmelt sampling event. The watershed assessment included sampling of surface water and sediment samples to delineate the source(s) contributing to the contamination in drainages throughout the watershed. Ground surface gamma radiation surveys were conducted within Cove Wash watershed drainages in the vicinity of sampling locations to identify areas of high gamma activity during each sampling event. Groundwater wells, seeps, and springs were sampled in order to assess potential impacts of historical uranium mining from AUMs in the Cove Wash watershed.

General trends were observed for uranium concentrations in surface water, based on the geologic unit of the sample locations. The lowest uranium concentrations were found above the Morrison Formation, and the highest concentrations were found just below the Morrison layer, with a decreasing concentration trend down section from the Morrison. However, the surface water pathway is a dynamic system that may have contributions from sources other than waters originating from the individual geological layers discussed. Uranium also appears to be transported in the dissolved phase in surface waters throughout the watershed. The majority of uranium is not attached to sediments moving through the surface water pathway, a scenario which would be observed as a higher concentration of total uranium versus dissolved uranium, rather than the relatively higher dissolved concentrations seen in this assessment.

General chemistry and isotope analysis were conducted to assist in determining water sources within the watershed. Evaluation of stable isotopes indicates that the results deviate from the Meteoric Water Line, favoring the heavier oxygen and hydrogen isotopes; this is indicative of a harshly evaporative watershed. The overall chemistry of the Cove Wash watershed is dominated by a calcium-bicarbonate chemistry, with influence along alkali and/or sulfate vectors. Based on an evaluation of uranium isotopes in water samples throughout the watershed (specifically $^{234}U/^{238}U$ ratios), while samples collected from background locations had uranium exceedances, indicating that some non-anthropogenic contribution of uranium to the Cove Wash watershed is present, uranium deriving from the geologic layer in which AUMs reside throughout the watershed are the primary contributors to uranium concentrations found downstream of AUMs all the way to the furthest sampling location within Cove Wash.

The data suggest that uranium concentrations may be highest in surface waters encountered during low flow season. Additional sampling events would be required to confirm this, as data were only collected during two low flow and two spring snowmelt sampling events. Surface flows encountered during snowmelt conditions showed high concentrations of total uranium in greater than 82 to 91% of the samples collected, suggesting that dilution of contaminants from higher flow volumes is not sufficient to reduce concentrations to below screening levels. Background sampling location concentration ranges displayed some variability, sometimes exceeding the screening level, suggesting that further investigation of naturally-occurring uranium in surface water and groundwater may be warranted.

Based on exceedances of screening level and background ranges for each sampling event, the following COCs in water are associated with AUMs within the Cove Wash watershed: total uranium, total aluminum, total adjusted gross alpha radiation, total arsenic, total barium, total beryllium, total lead, total mercury, total molybdenum, total combined radium, total selenium, total thallium, total vanadium, dissolved cadmium, and dissolved copper. The following COCs are associated with sediments AUMs within the watershed: uranium, antimony, arsenic, barium, selenium, and thallium. The following COCs in sediment may be within background levels found in the general area: antimony, arsenic, barium, and selenium.

Based on sampling results from events conducted from 2015 to 2017, concentrations of uranium, aluminum, and arsenic in surface waters exceed one or more screening levels from the geologic layer in which AUMs reside all the way to the furthest downstream sampling location, near the boundary of the watershed. It is recommended that the possibility of collecting additional samples downstream of the Cove Wash watershed boundary be evaluated in order to determine the full extent of uranium and other COCs that exceed screening levels.

9. RECOMMENDATIONS

Based on the conclusions in Section 8, the following recommendations are made for additional studies within the Cove Wash watershed:

Removal Site Evaluations conducted at individual mines should take into account waste rock identified as spilling into drainages and determine depths of waste rock piles along sidewalls of drainages. Waste volumes are located on slopes, making an estimation of volume by physically scanning the piles ineffective. The vertical depths will need to be determined, and gamma scanning may not be conducted by hand in some areas where unstable piles make it physically impossible or unsafe to walk over the waste piles. Sediment samples with exceedances of uranium were collected at locations near or directly downstream from the Mesa I, Mesa I ¾, and Mesa V AUMs. The uranium exceedances in the sediments in those locations indicate that additional investigation of sediments in those areas and prioritization of investigations at waste piles, such as analysis of waste rock, at the AUMs may be warranted.

Based on sampling results from events conducted from 2015 to 2017, contamination from uranium, aluminum, and arsenic are found in surface waters above one or more screening levels all the way to the furthest downstream sampling location, which is near the boundary of the watershed. It is recommended that the possibility of collecting additional samples downstream of the Cove Wash watershed boundary be evaluated in order to determine the full extent of uranium and other COCs that exceed screening levels.

As noted in Section 5.1, background samples were collected where available, and some background locations contained uranium at concentrations above the screening level. At this time, additional background locations at elevations above AUMs have not been identified, and may not be present. In the event that the background concentration requires further determination, groundwater studies may be required. Additionally, sample location CW-88 should be further investigated to determine if it is in fact a background location, or an unknown AUM influence is present at that location.

Proposed remediation evaluations should take into account that uranium is found throughout the watershed in a predominantly dissolved state in waters when determining remediation options for evaluation.

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FIGURES

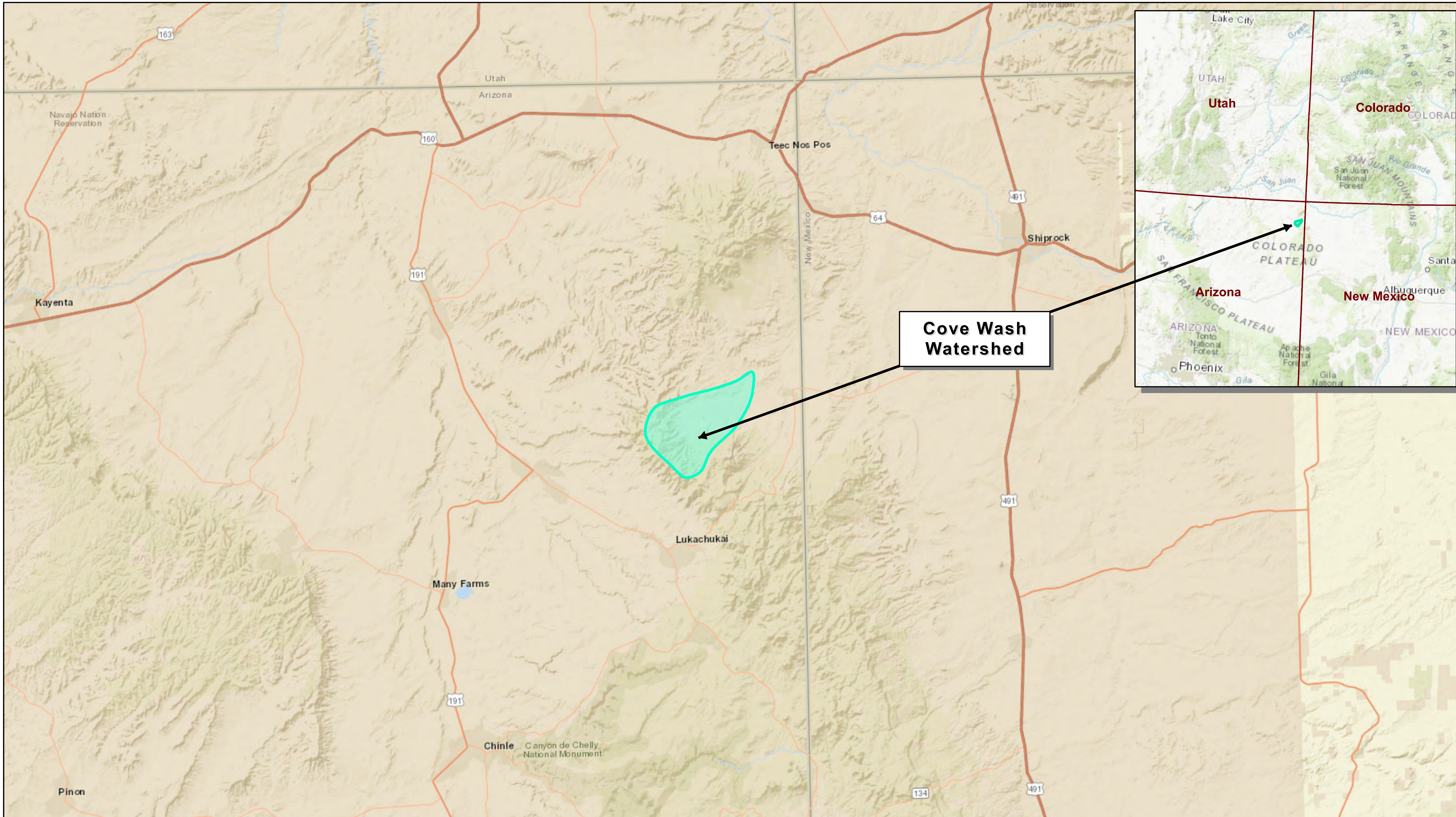

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FIGURE 1
SITE LOCATION
Cove Wash Watershed Assessment
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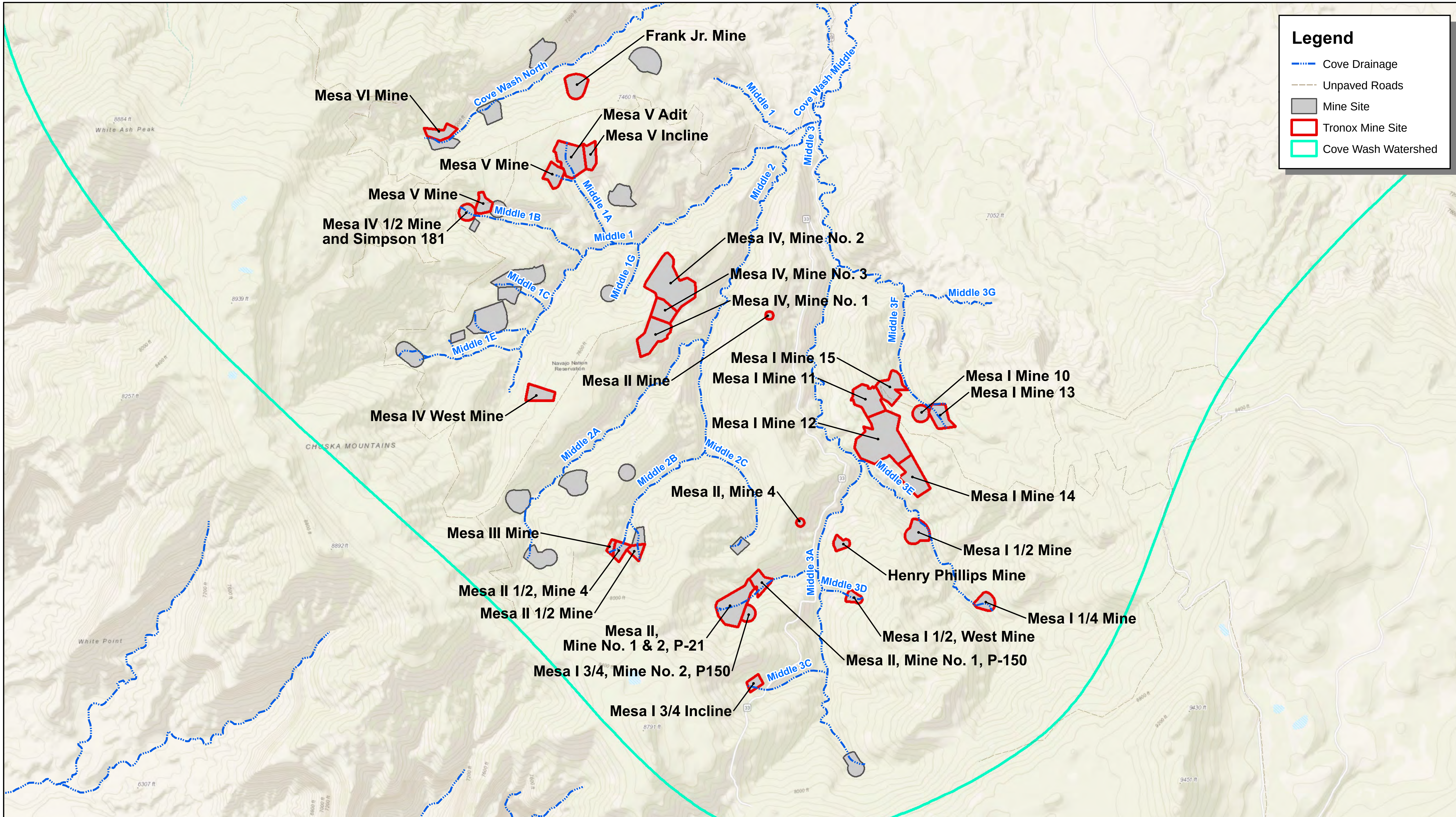

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FIGURE 2
ABANDONED URANIUM MINES
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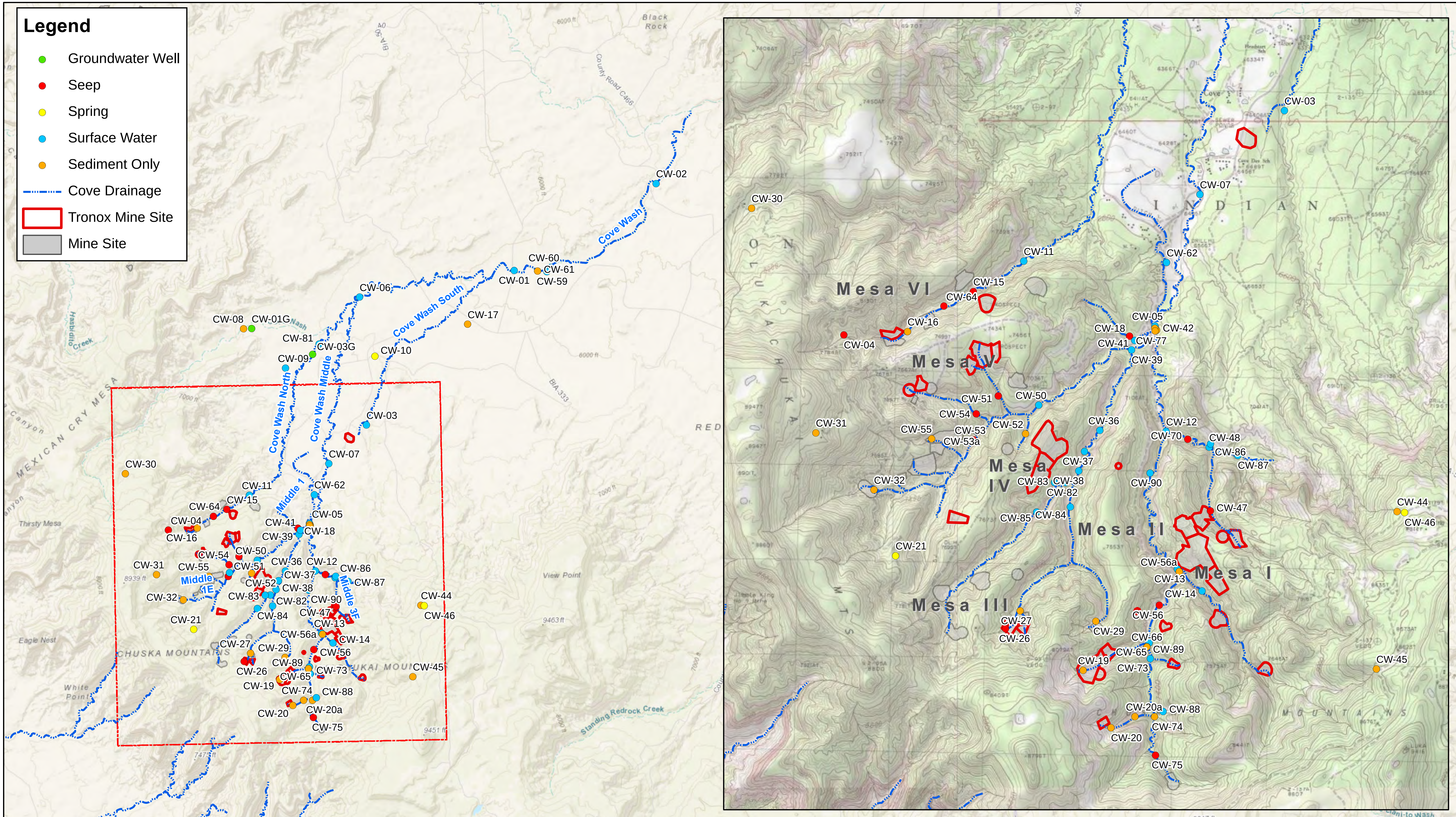

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FIGURE 3
SAMPLE LOCATIONS - ALL SAMPLING EVENTS 2015 - 2017
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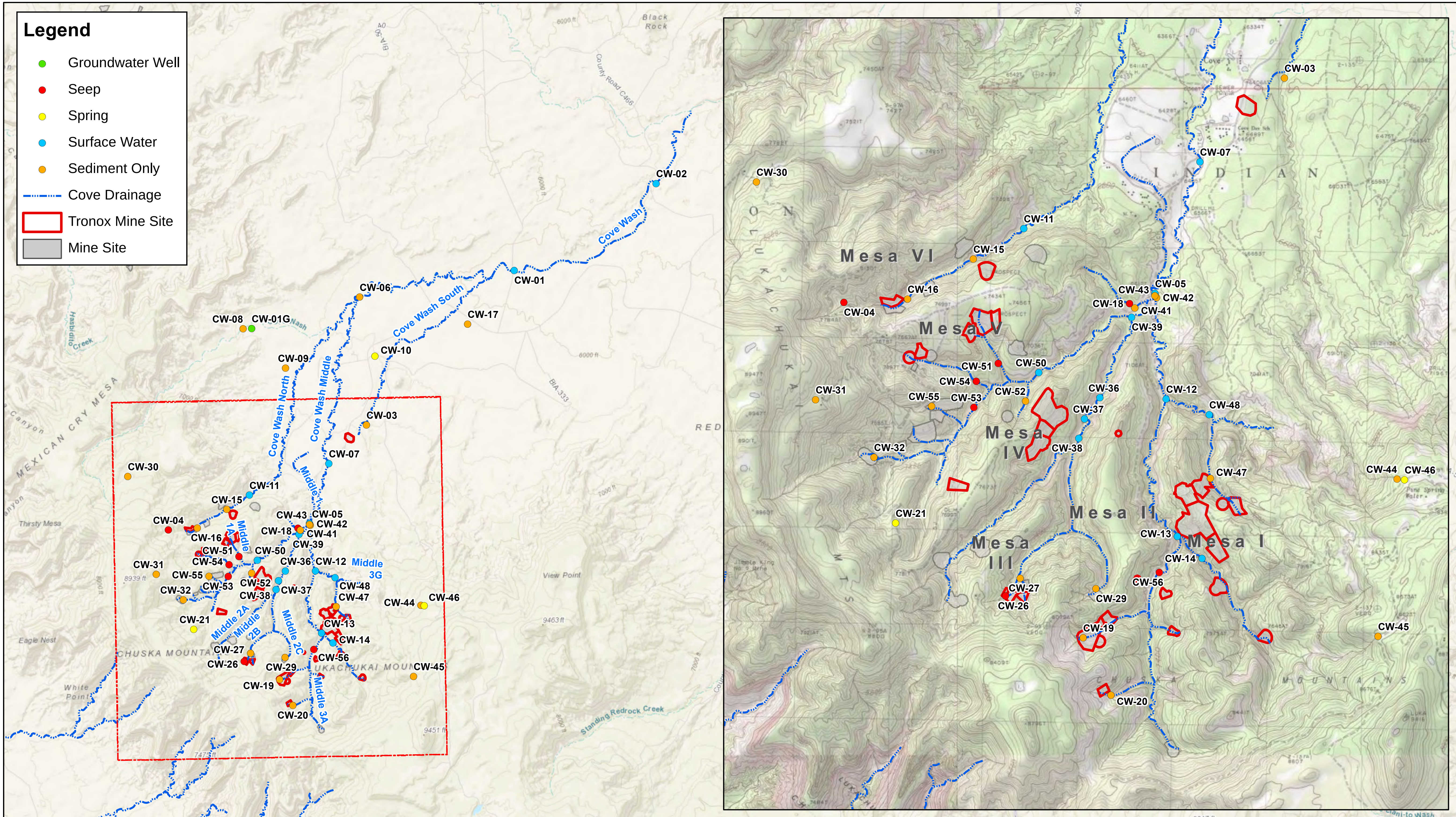

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FIGURE 3a
SAMPLE LOCATIONS - 2015 LOW FLOW SAMPLING EVENT
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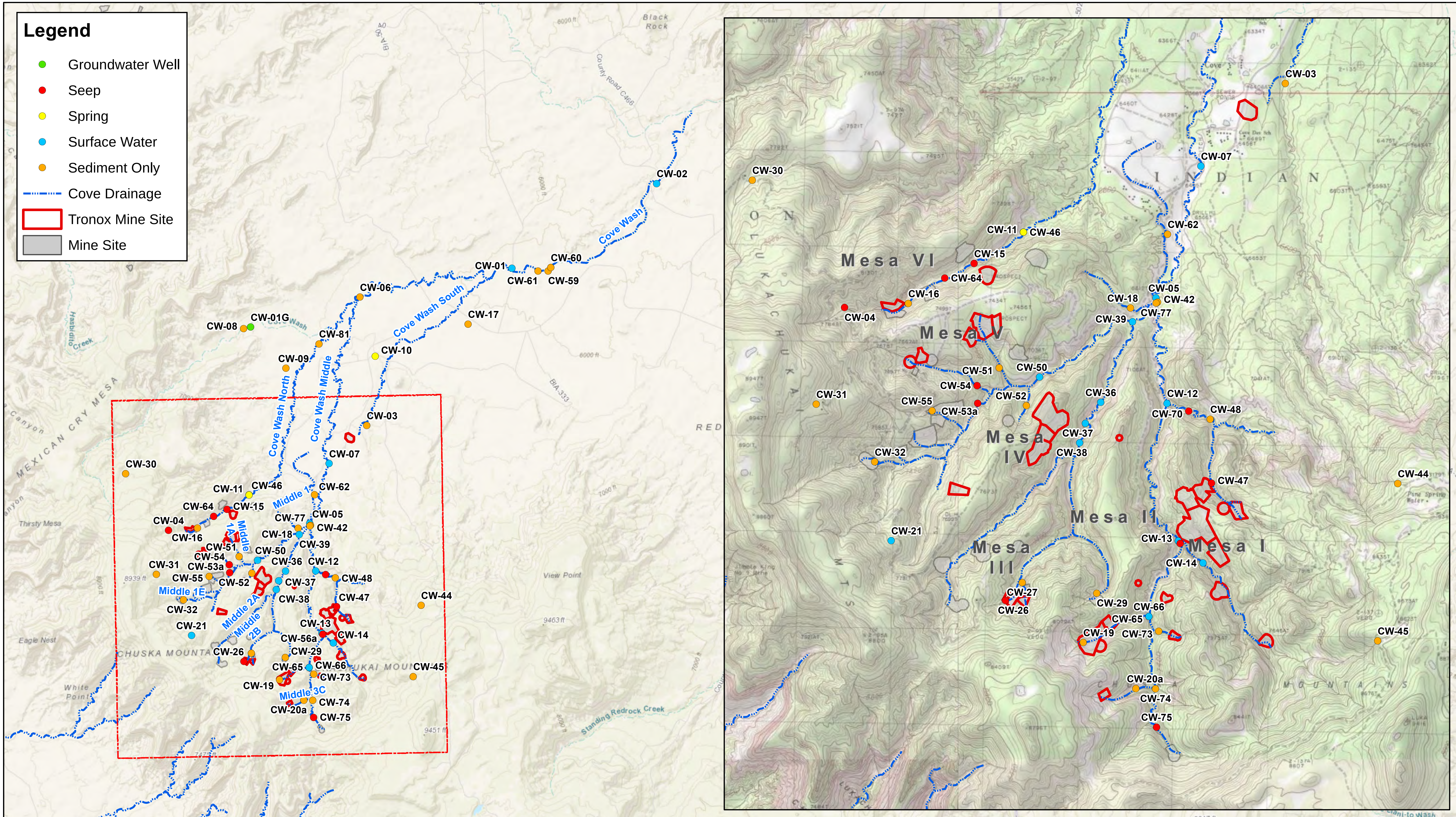

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FIGURE 3b
SAMPLE LOCATIONS - 2016 SPRING SNOWMELT SAMPLING EVENT
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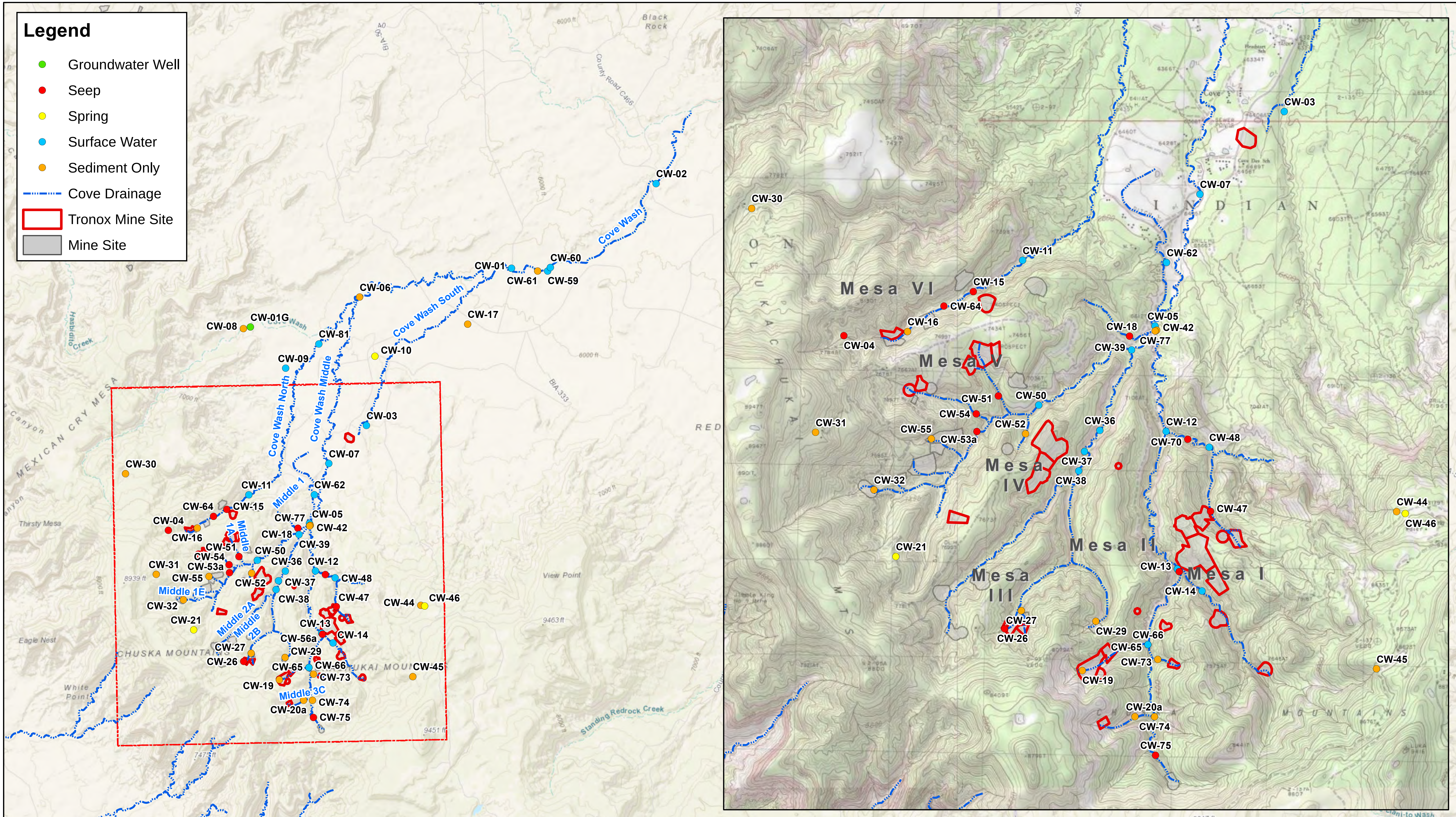

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FIGURE 3c
SAMPLE LOCATIONS - 2016 LOW FLOW SAMPLING EVENT
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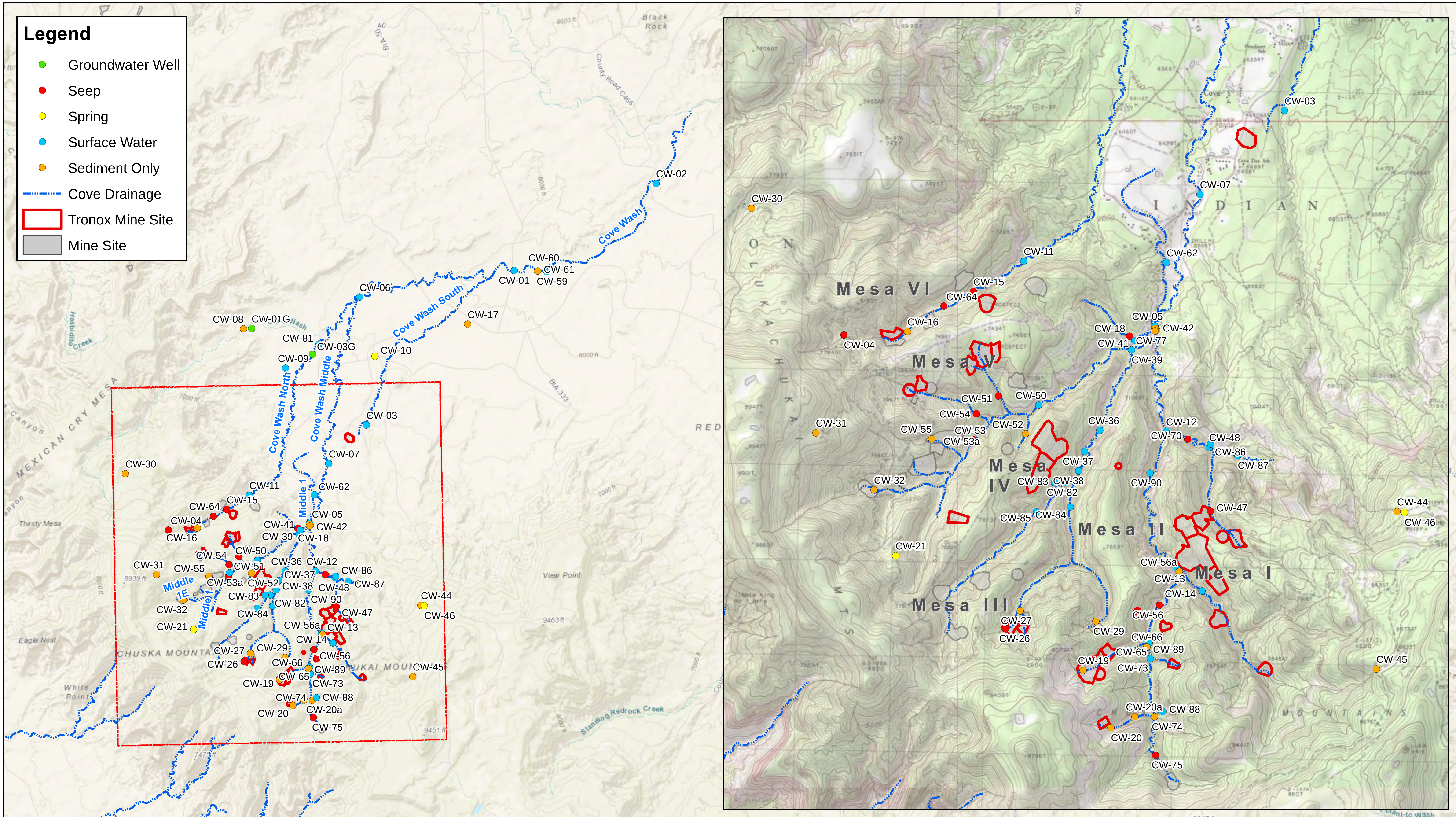

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FIGURE 3d
SAMPLE LOCATIONS - 2017 SPRING SNOWMELT SAMPLING EVENT
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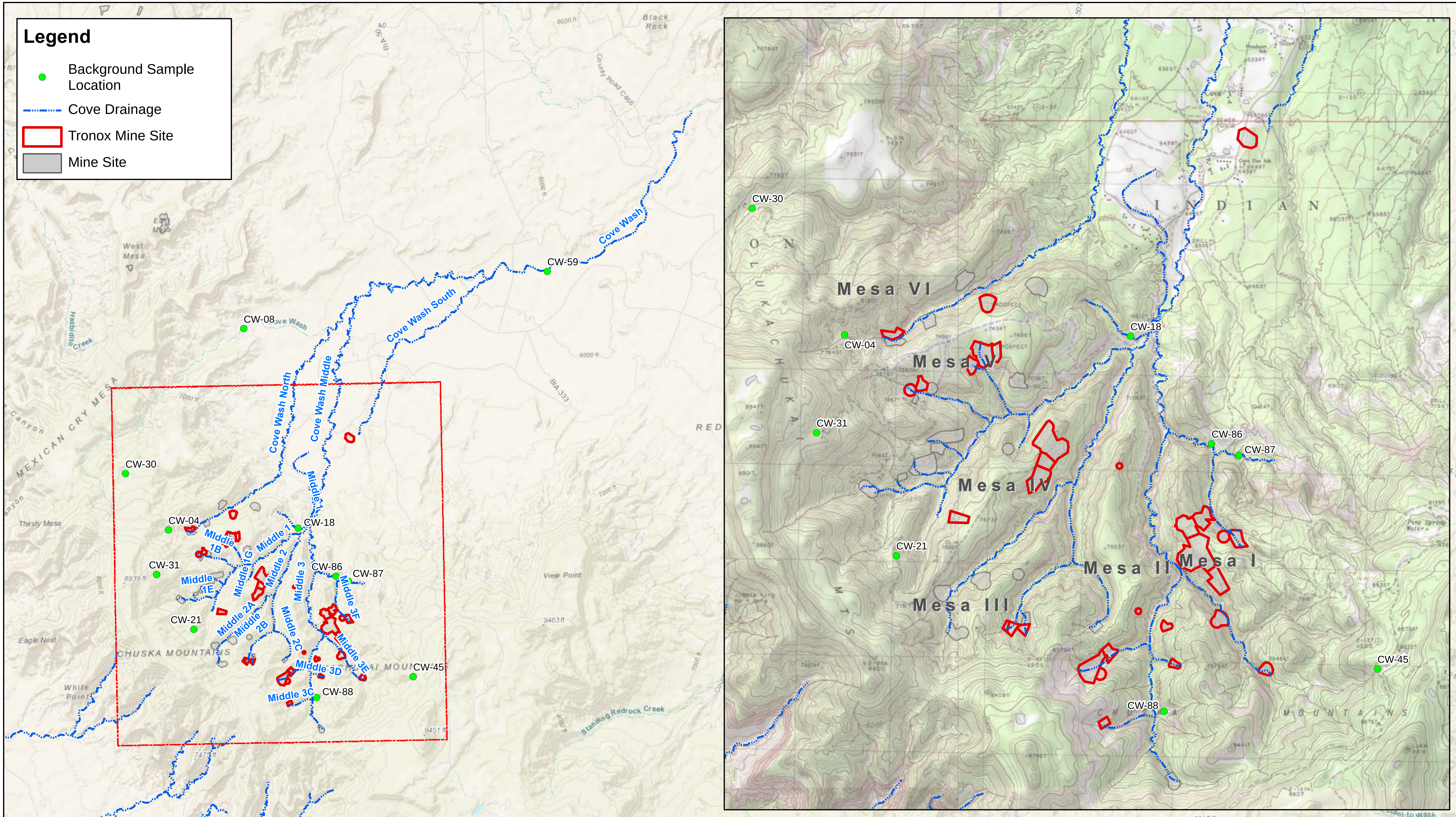

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FIGURE 4
BACKGROUND SAMPLE LOCATIONS - ALL SAMPLING EVENTS 2015 - 2017
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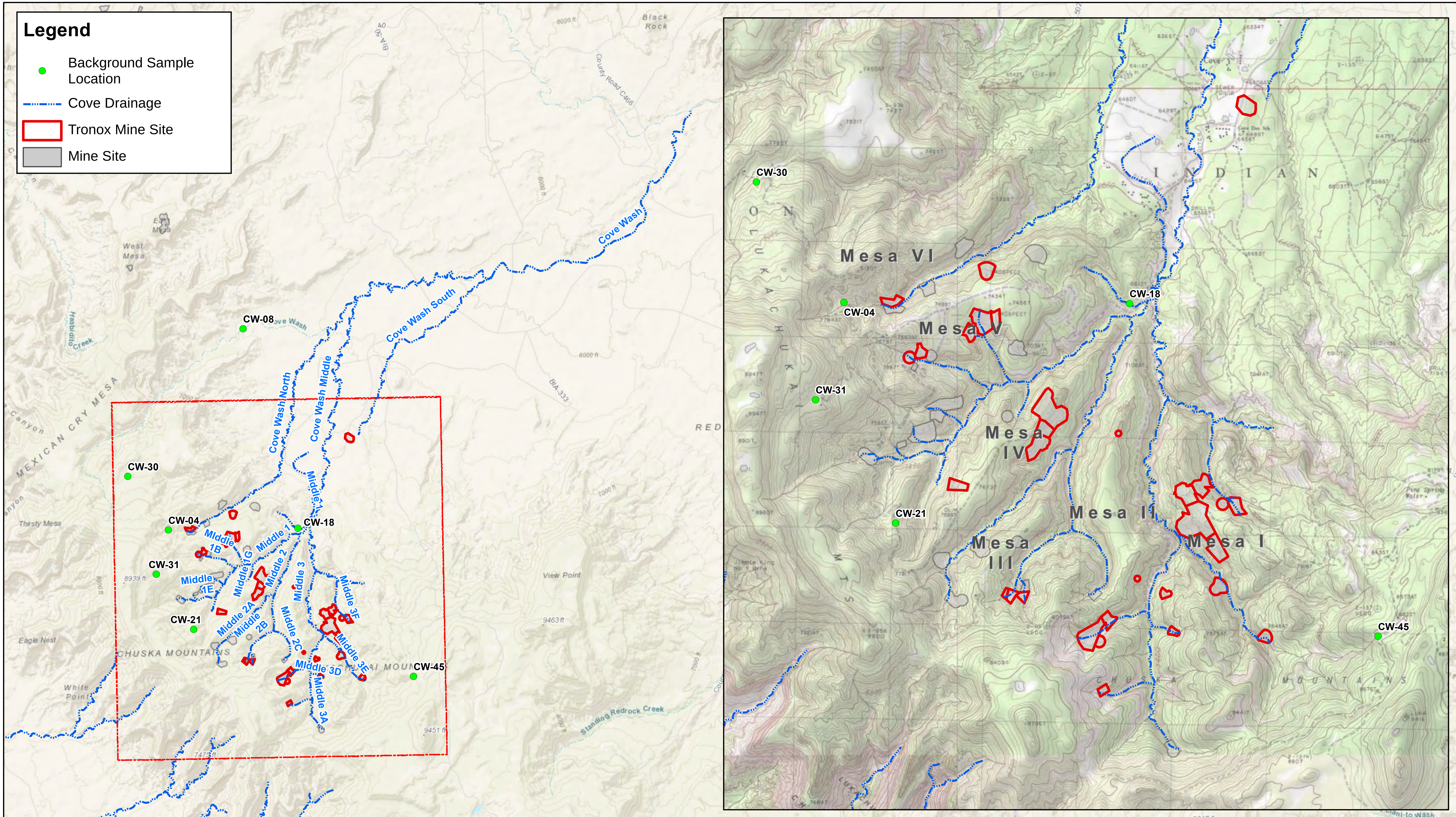

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FIGURE 4a
BACKGROUND SAMPLE LOCATIONS - 2015 LOW FLOW SAMPLING EVENT
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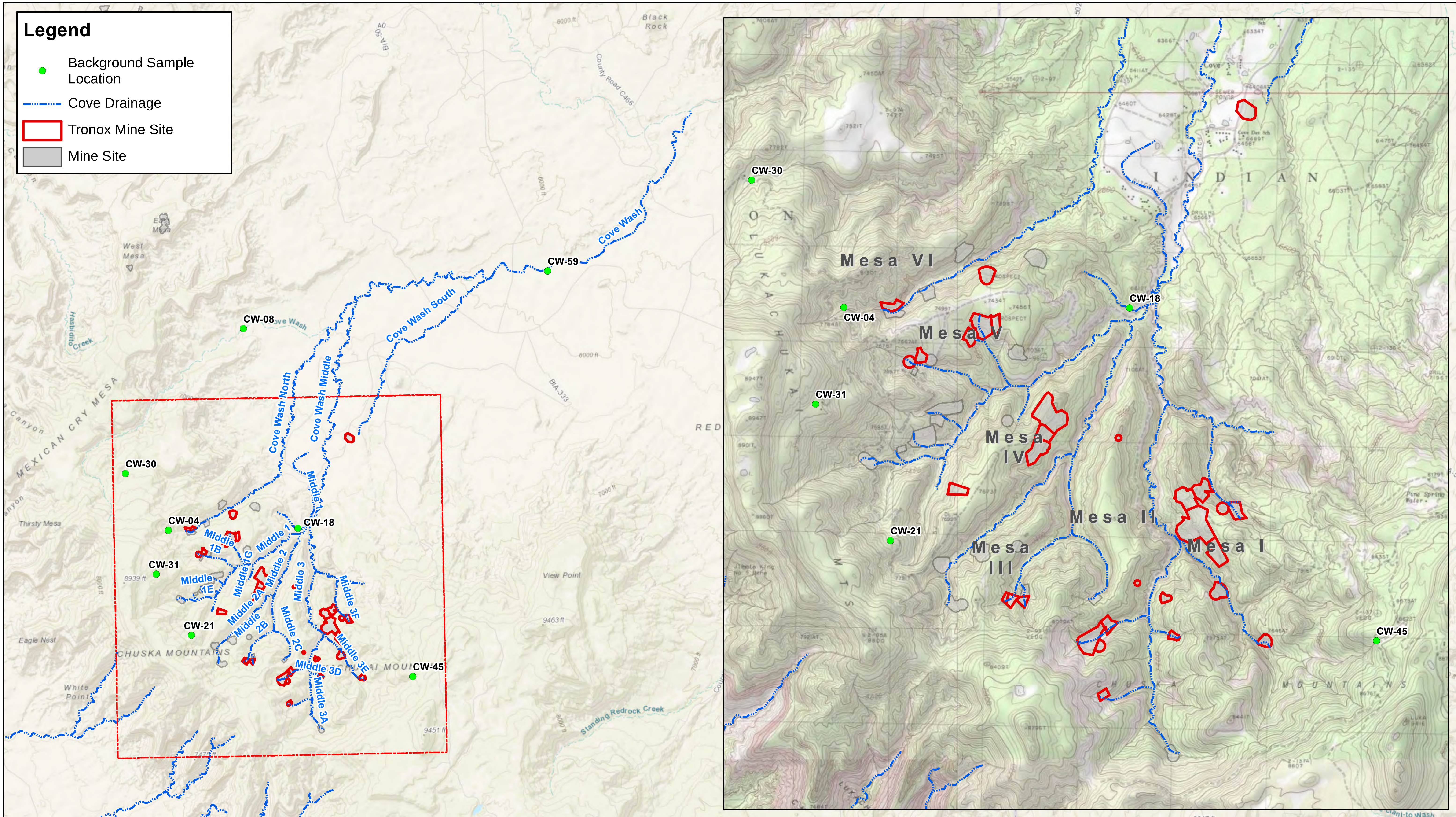

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FIGURE 4b

BACKGROUND SAMPLE LOCATIONS - 2016 SPRING SNOWMELT SAMPLING EVENT

Cove Wash Watershed Assessment

Cove Chapter, Navajo Nation, AZ

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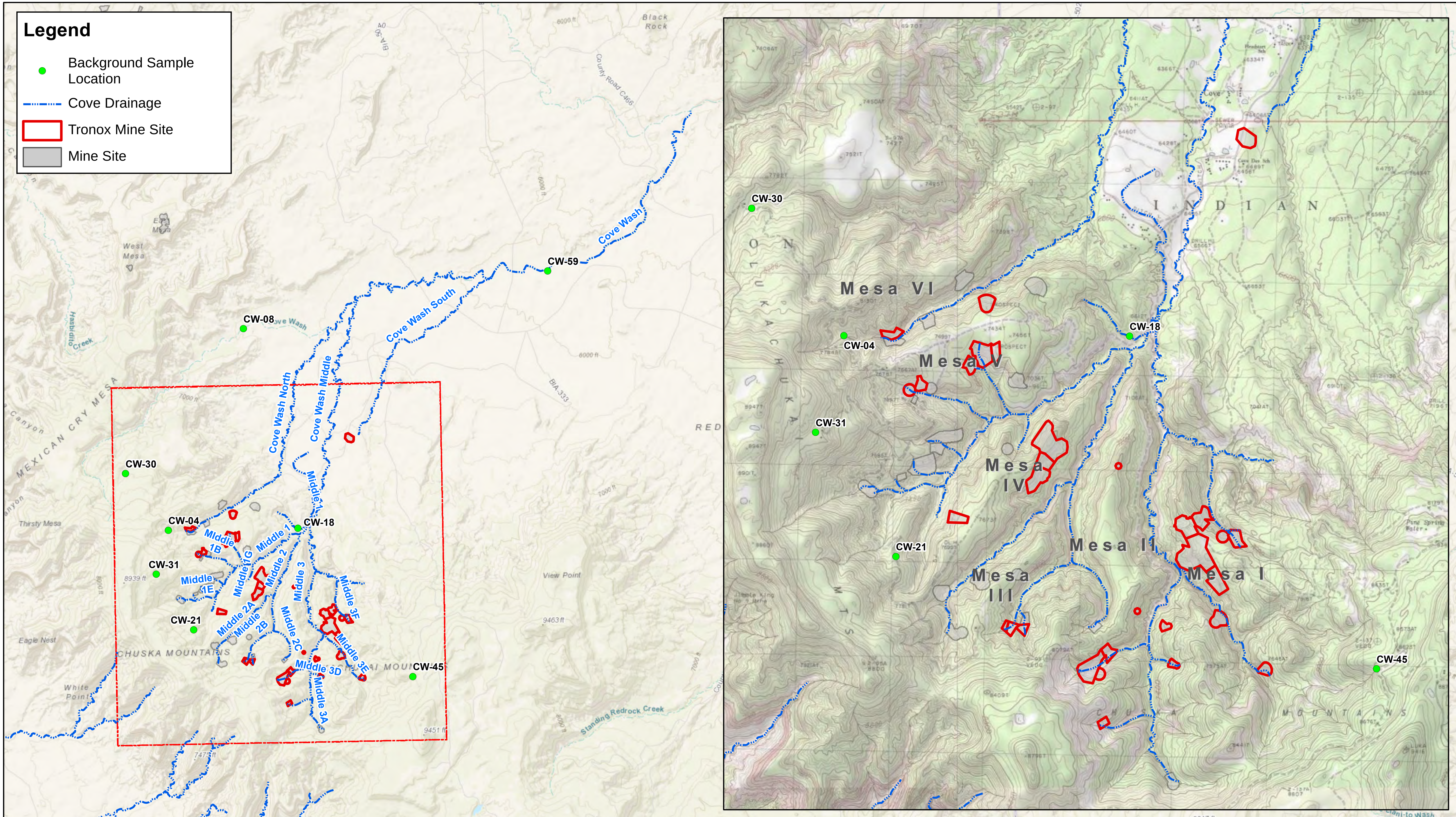

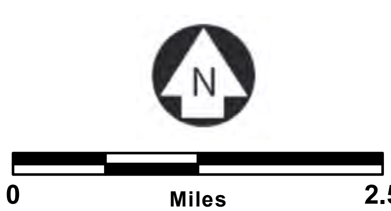

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FIGURE 4c
BACKGROUND SAMPLE LOCATIONS - 2016 LOW FLOW SAMPLING EVENT
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Cove Chapter, Navajo Nation, AZ

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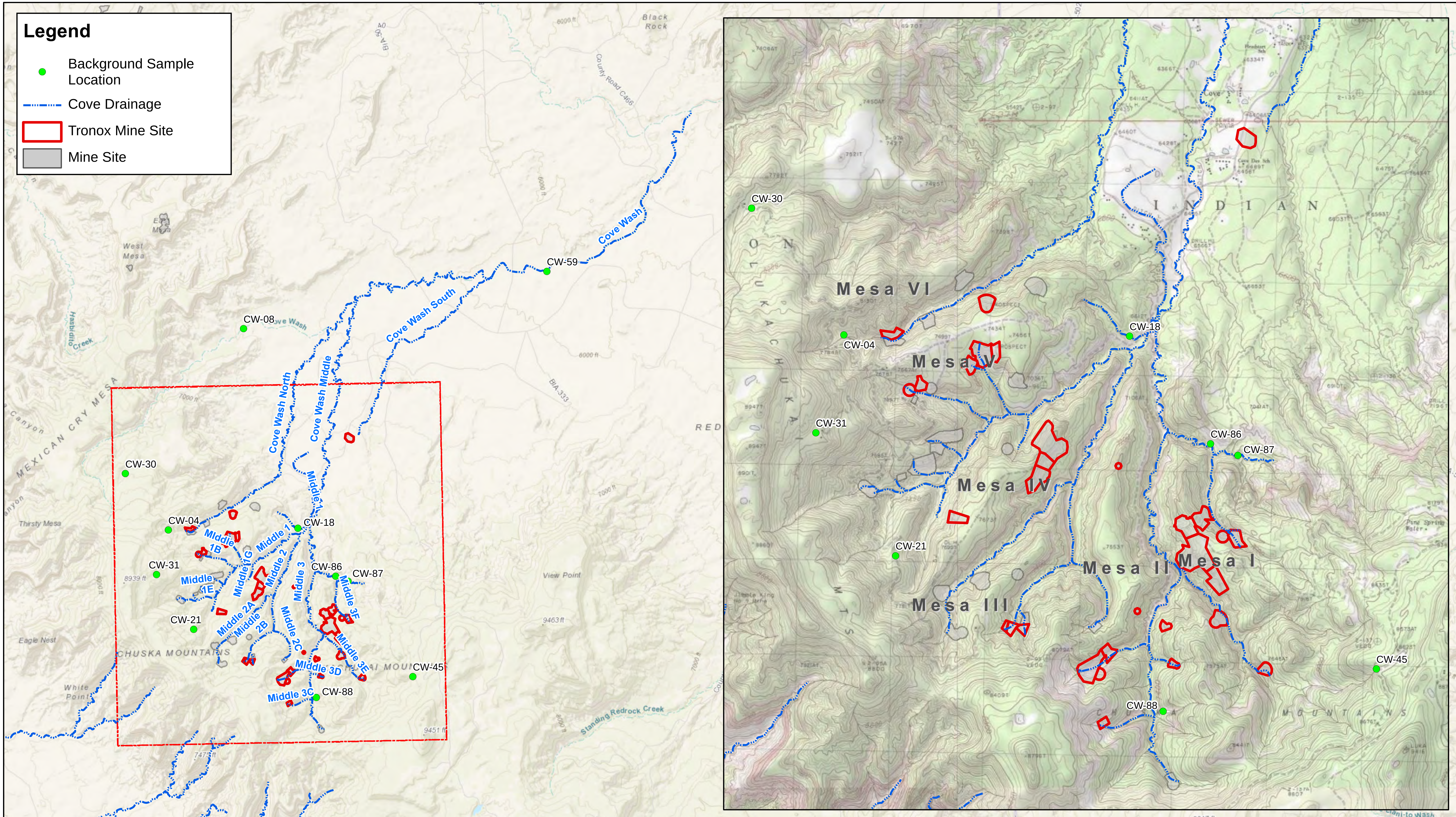

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FIGURE 4d
BACKGROUND SAMPLE LOCATIONS - 2017 SPRING SNOWMELT SAMPLING EVENT
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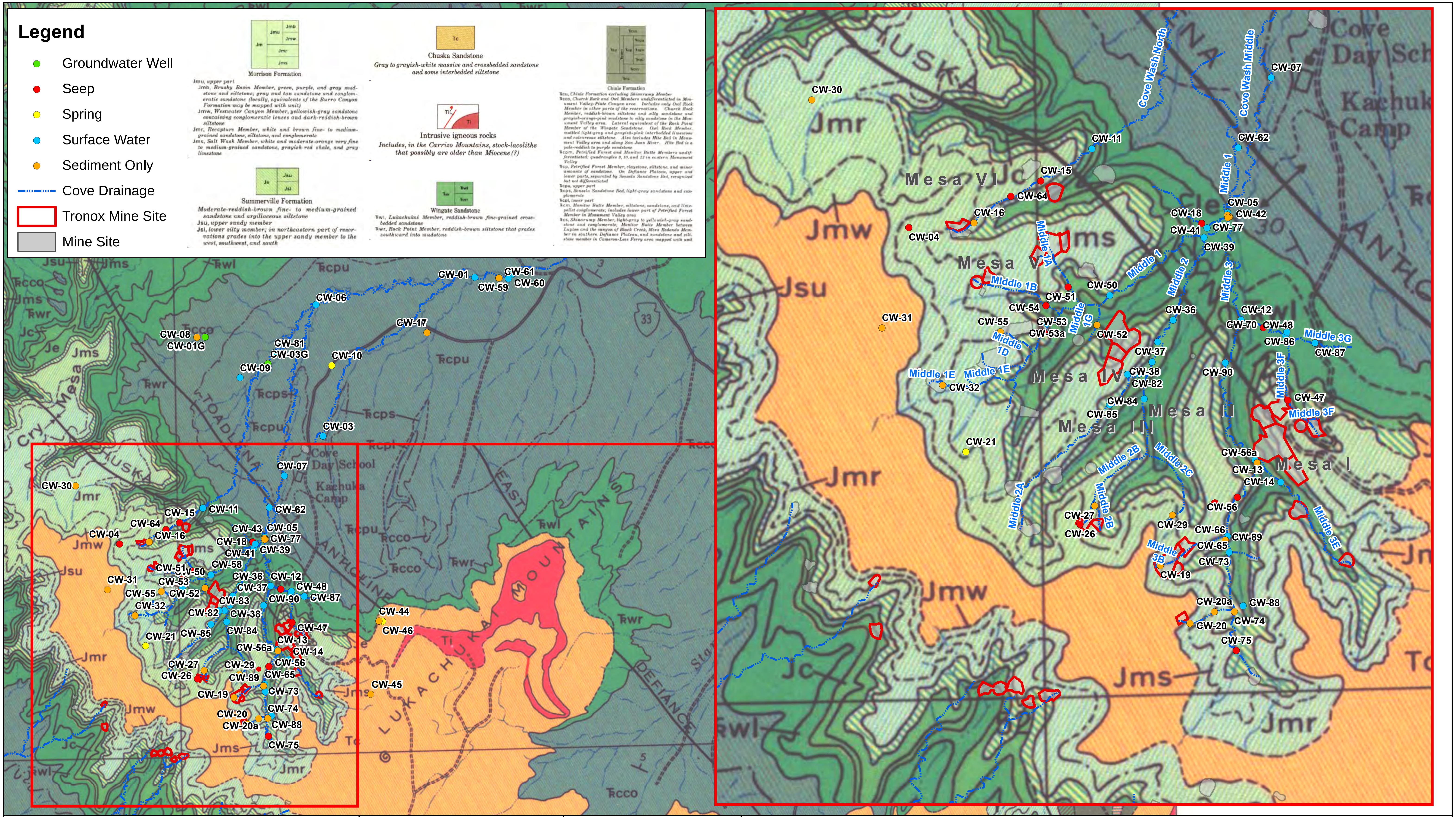

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FIGURE 5
GEOLOGICAL MAP WITH SAMPLE LOCATIONS
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

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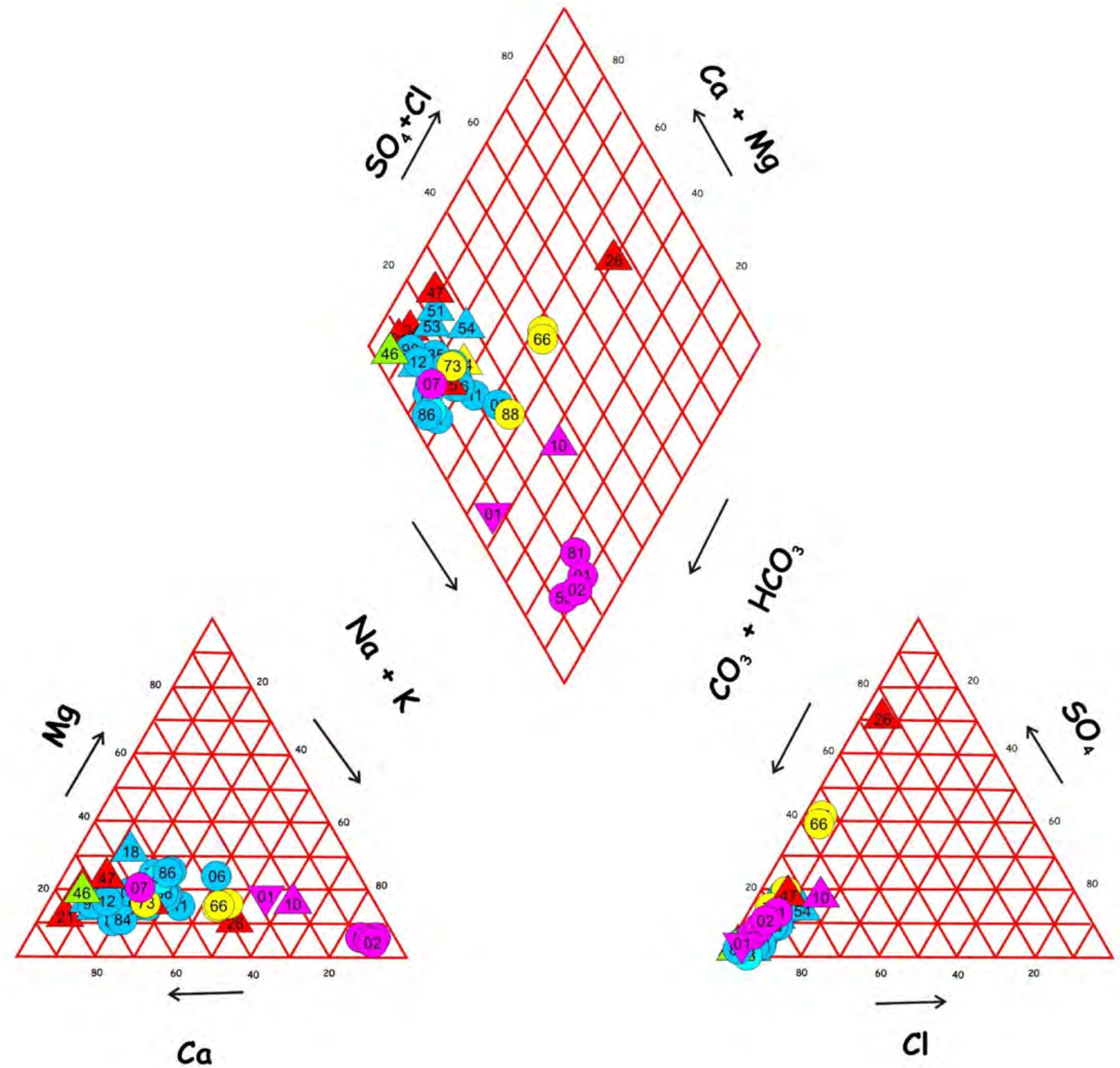

18 Seeps and Springs - Wingate Fm	84 Surface Water - Wingate Fm
46 Seeps and Springs - Chuska Fm	07 Surface Water - Chinle Fm
26 Seeps and Springs - Morrison Fm	48 Surface Water - Entrada/Carmel Fm
10 Seeps and Springs - Chinle Fm	
64 Seeps and Springs - Entrada/Carmel Fm	
01 Groundwater Chinle Fm	

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FIGURE 6
COVE WASH 2017 SPRING SNOWMELT SAMPLING EVENT PIPER DIAGRAM
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

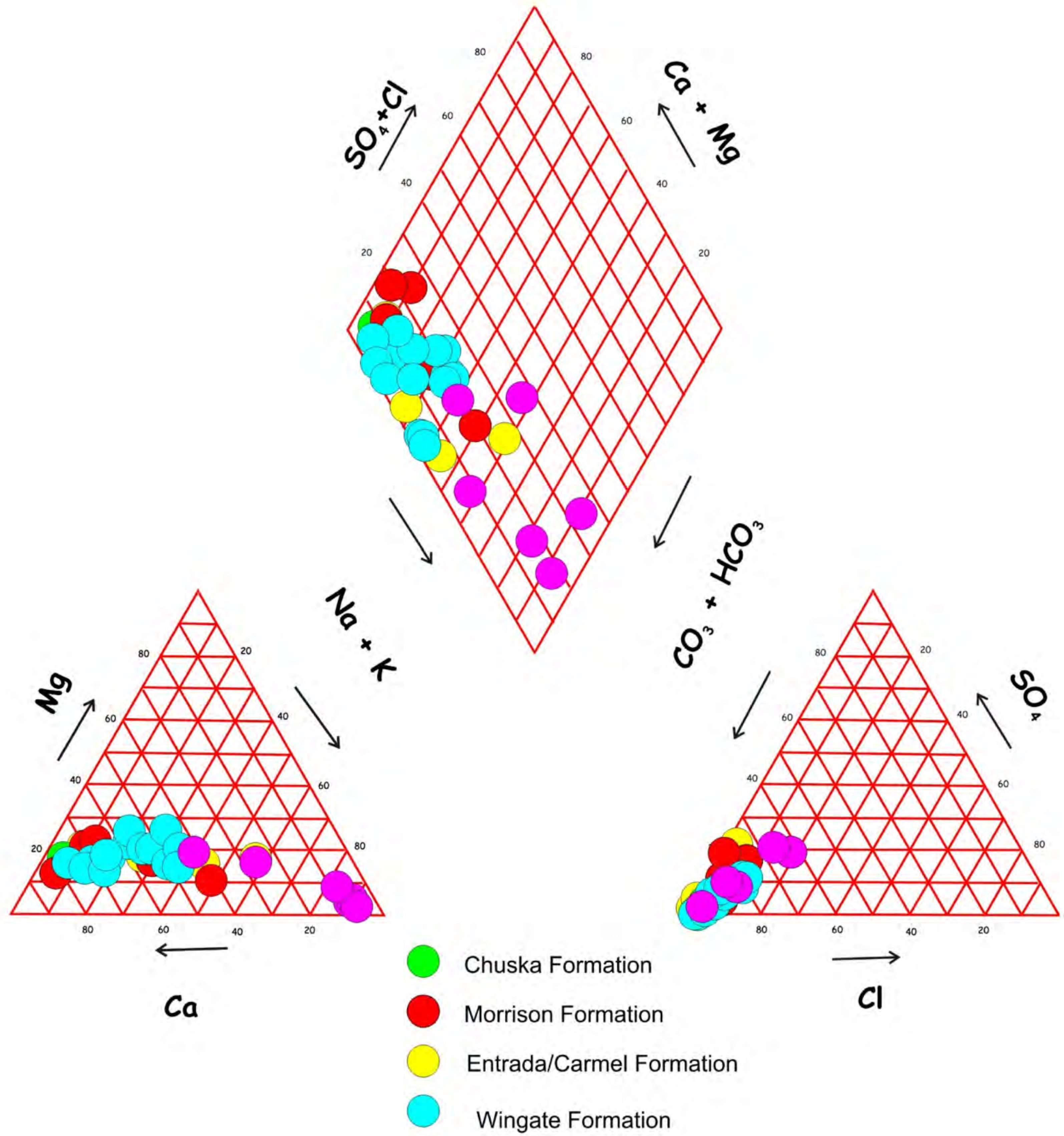

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FIGURE 7
COVE WASH 2016 LOW FLOW SAMPLING EVENT PIPER DIAGRAM
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

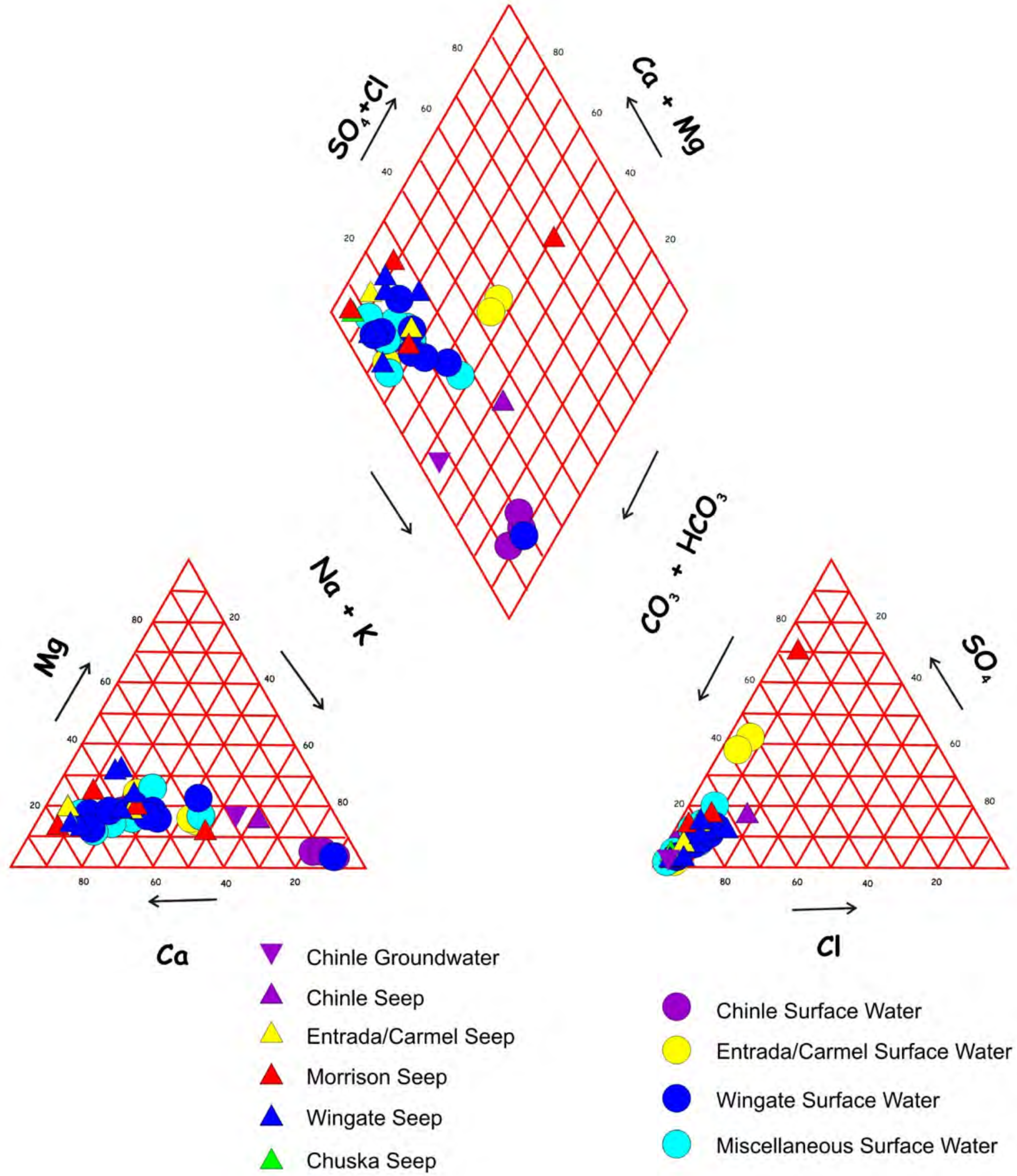

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FIGURE 8
COVE WASH SPRING SNOWMELT 2016 SAMPLING EVENT PIPER DIAGRAM
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

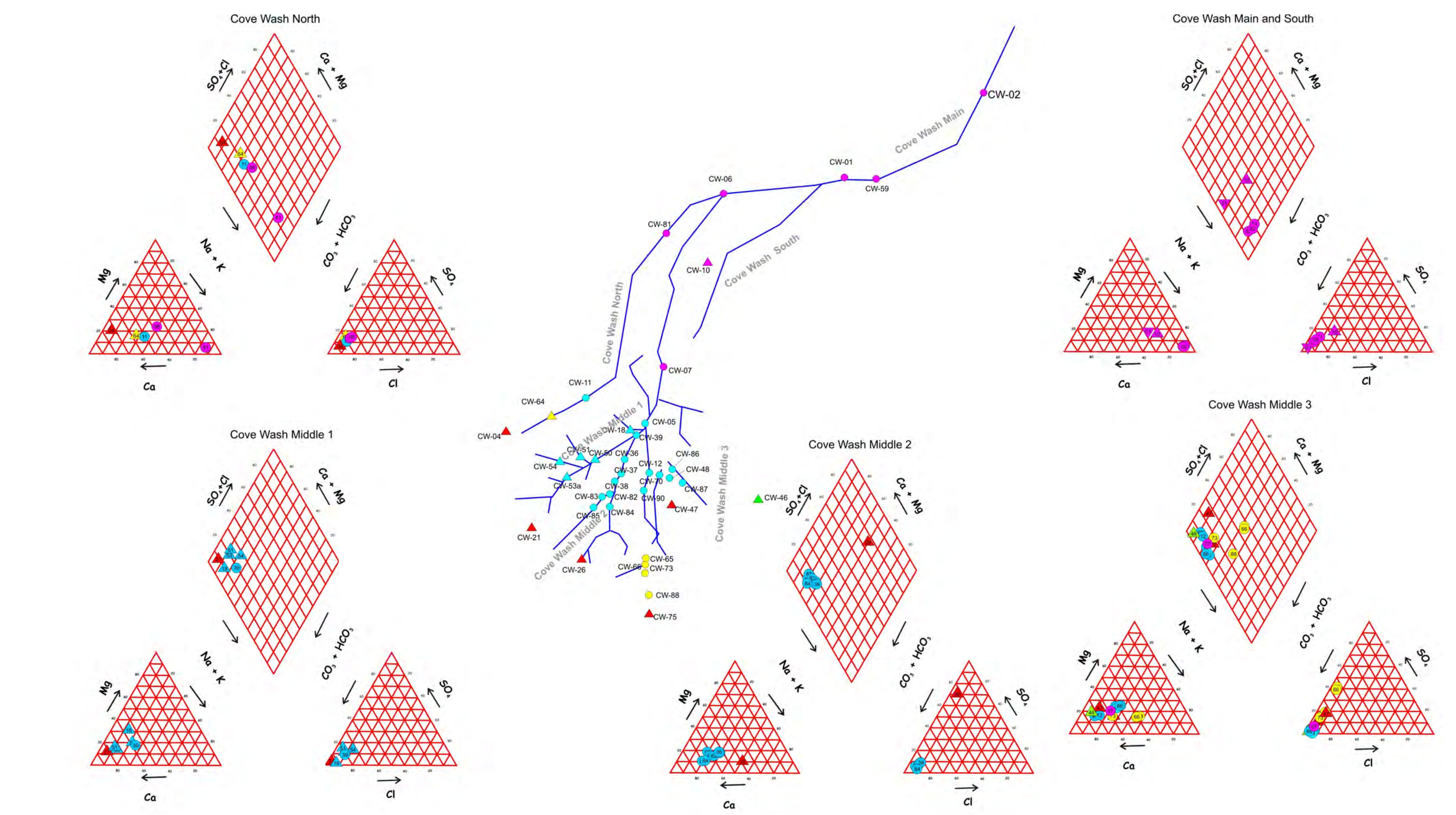

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FIGURE 9
2017 SPRING SNOWMELT SAMPLING PIPER DIAGRAMS BY WATERSHED
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

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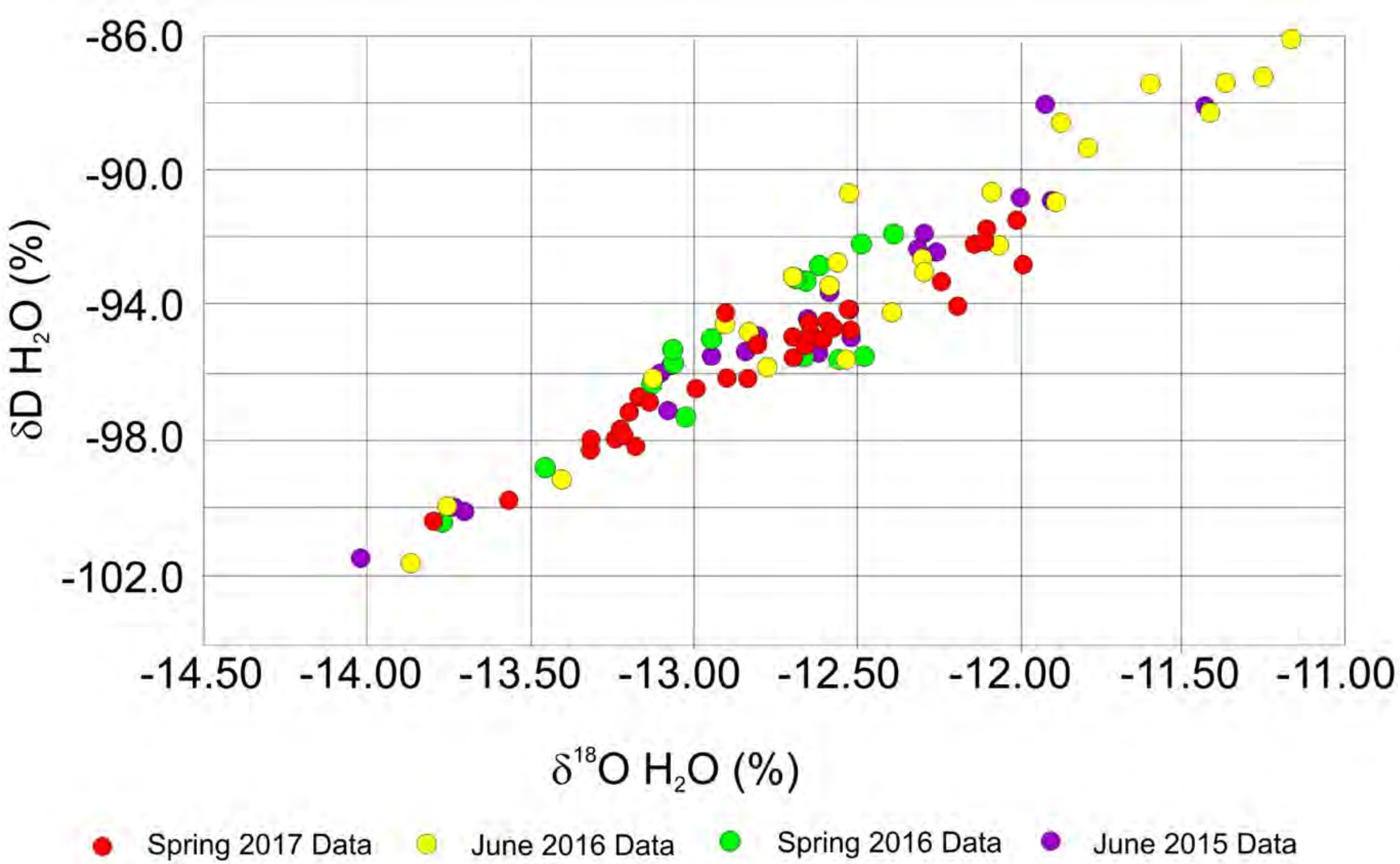

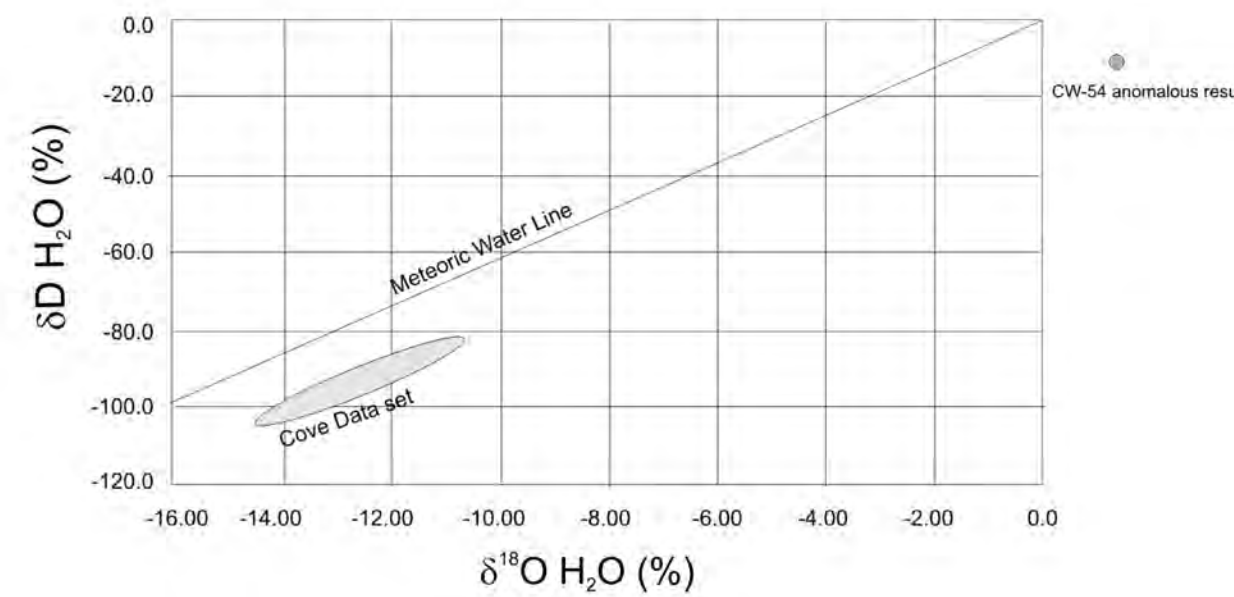

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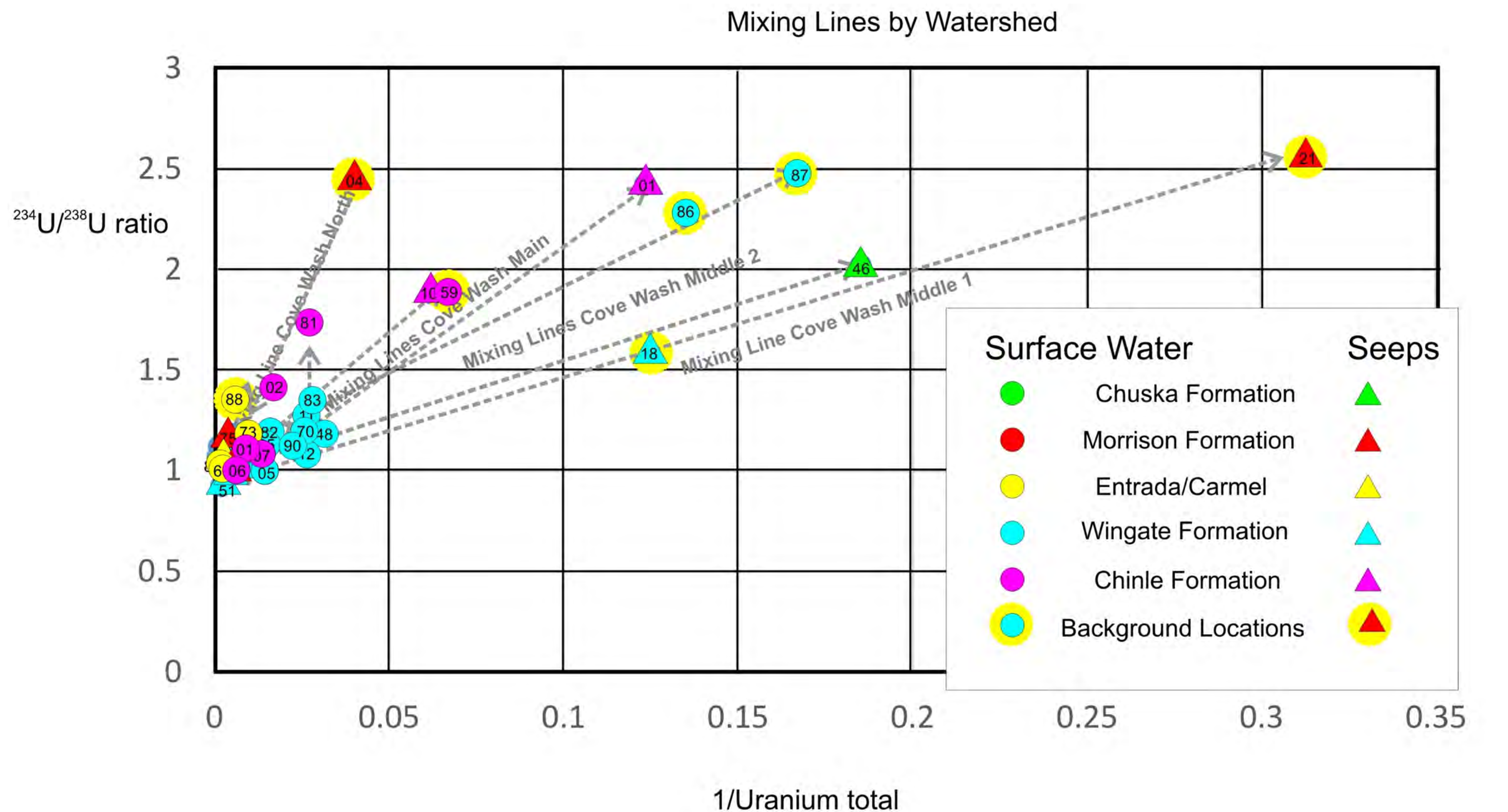
FIGURE 10
STABLE ISOTOPE DATA
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ



NOTE: 1/Total Uranium Concentration (L/µg).

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FIGURE 11
URANIUM ISOTOPE MIXING LINES BY WATERSHED
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

Contract: EP-S5-13-02; **TDD:** 0025/1302-T25-R9-16-03-0001

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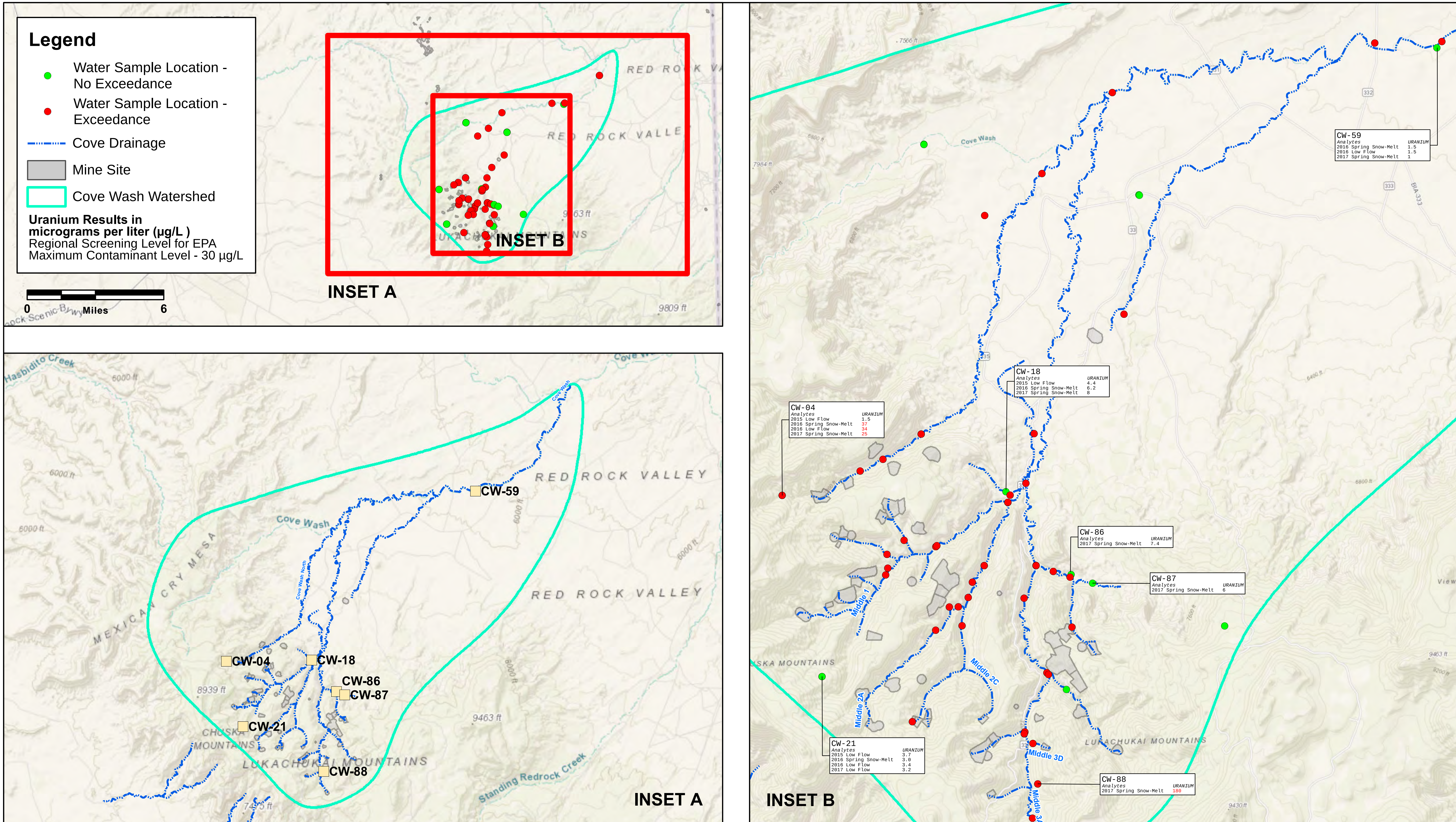

N

0 Miles 1.2

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FIGURE 12
BACKGROUND SAMPLE LOCATIONS - TOTAL URANIUM RESULTS
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

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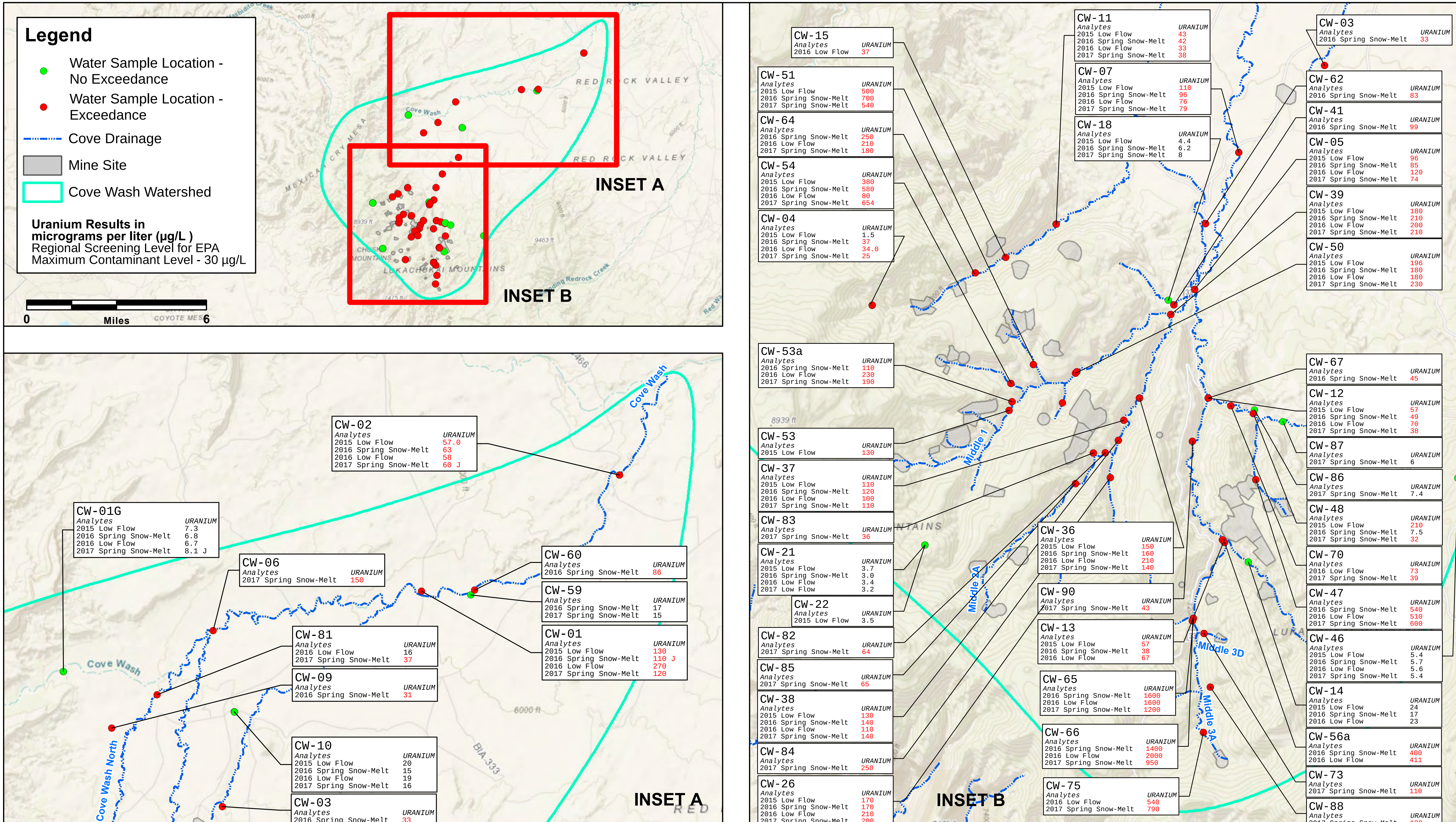

0 Miles 1.2

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FIGURE 13
WATER SAMPLES - TOTAL URANIUM RESULTS
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Cove Chapter, Navajo Nation, AZ

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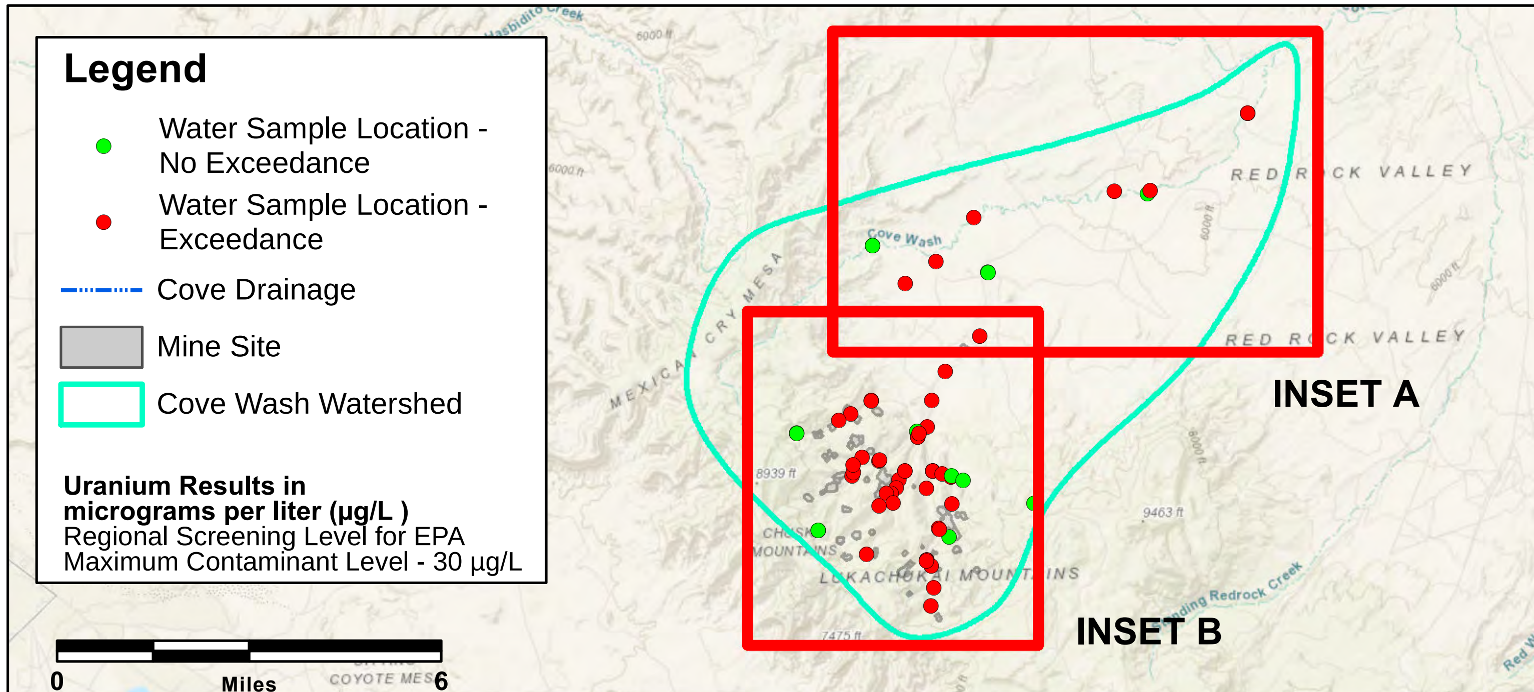

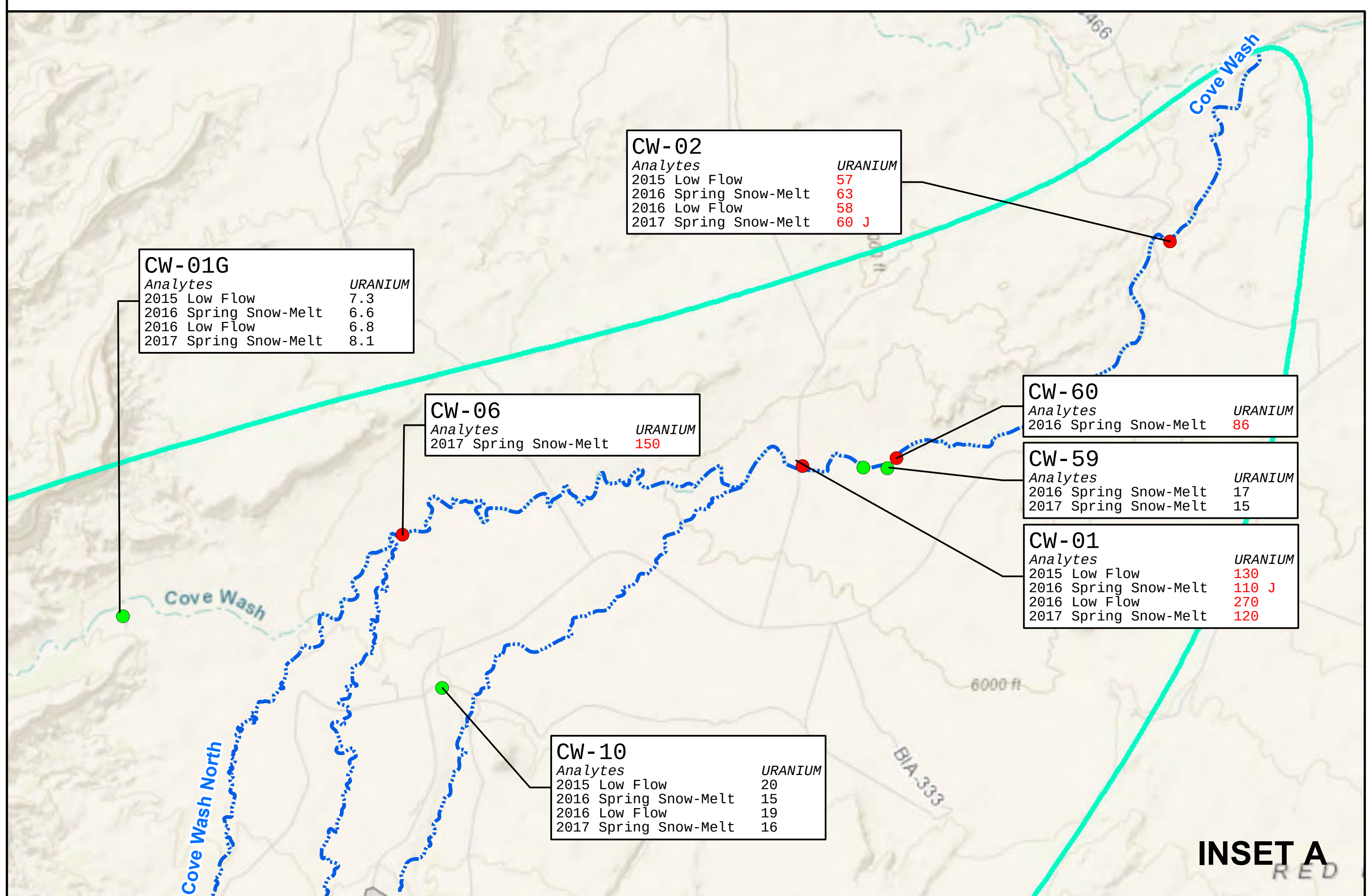

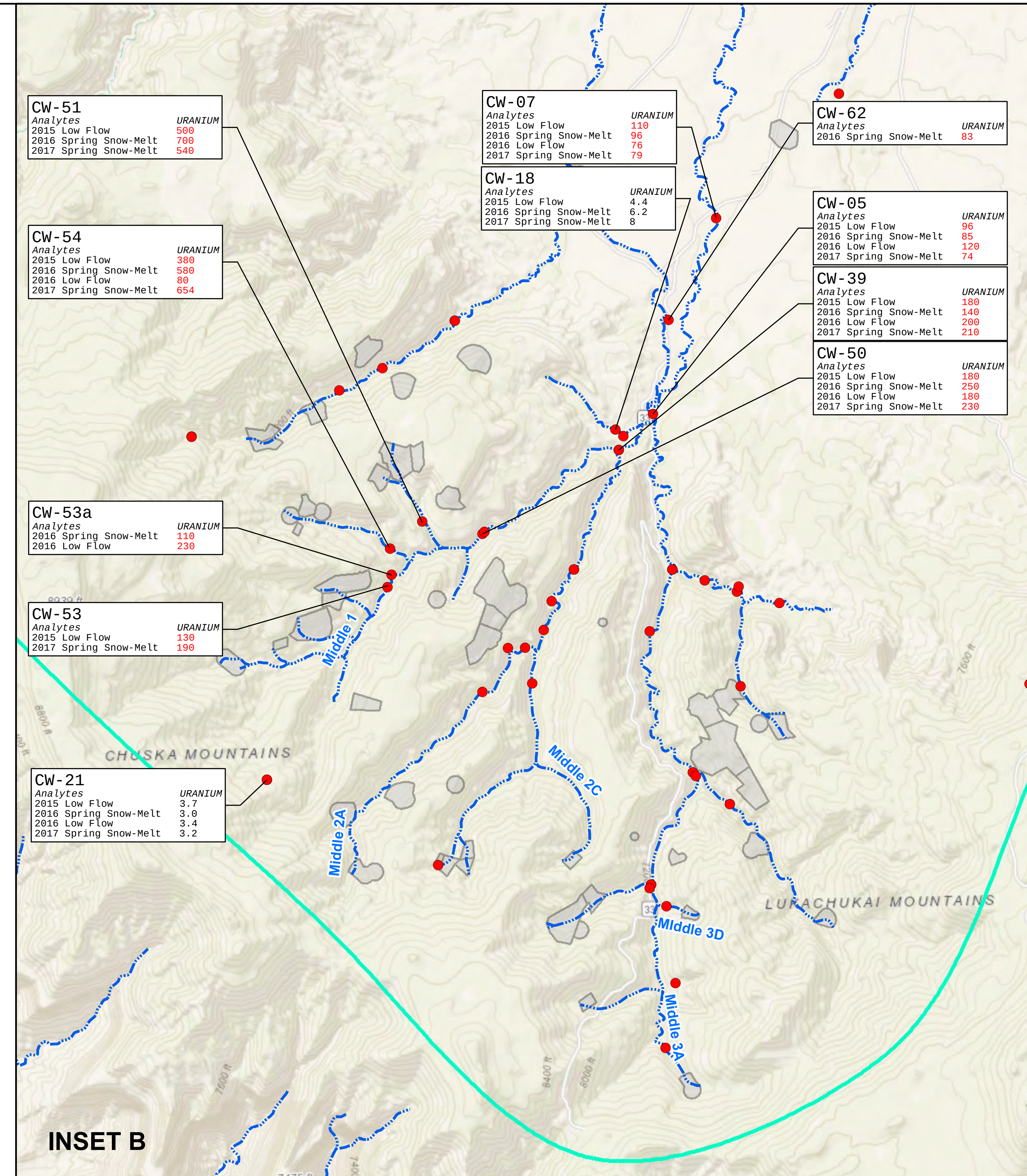

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FIGURE 14
COVE WASH MIDDLE 1 - TOTAL URANIUM RESULTS
Cove Wash Watershed Assessment
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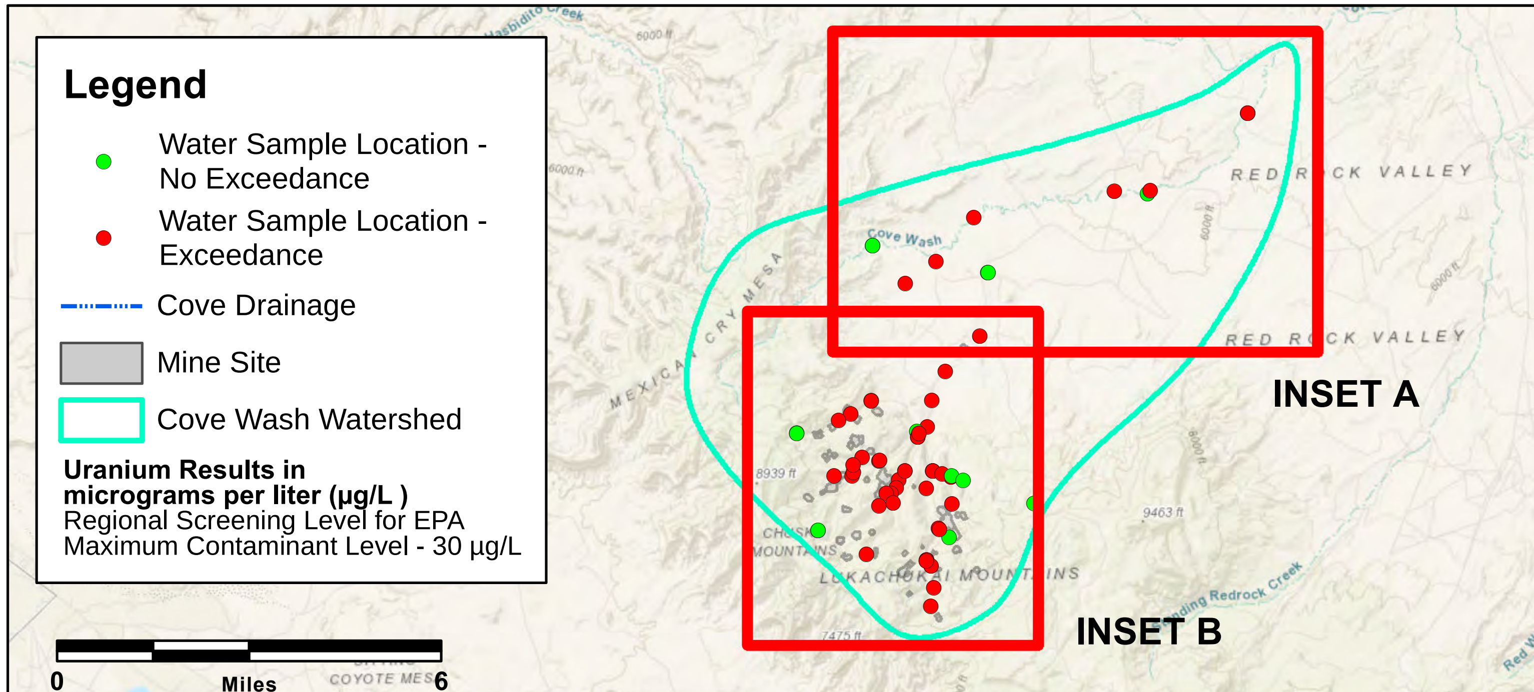

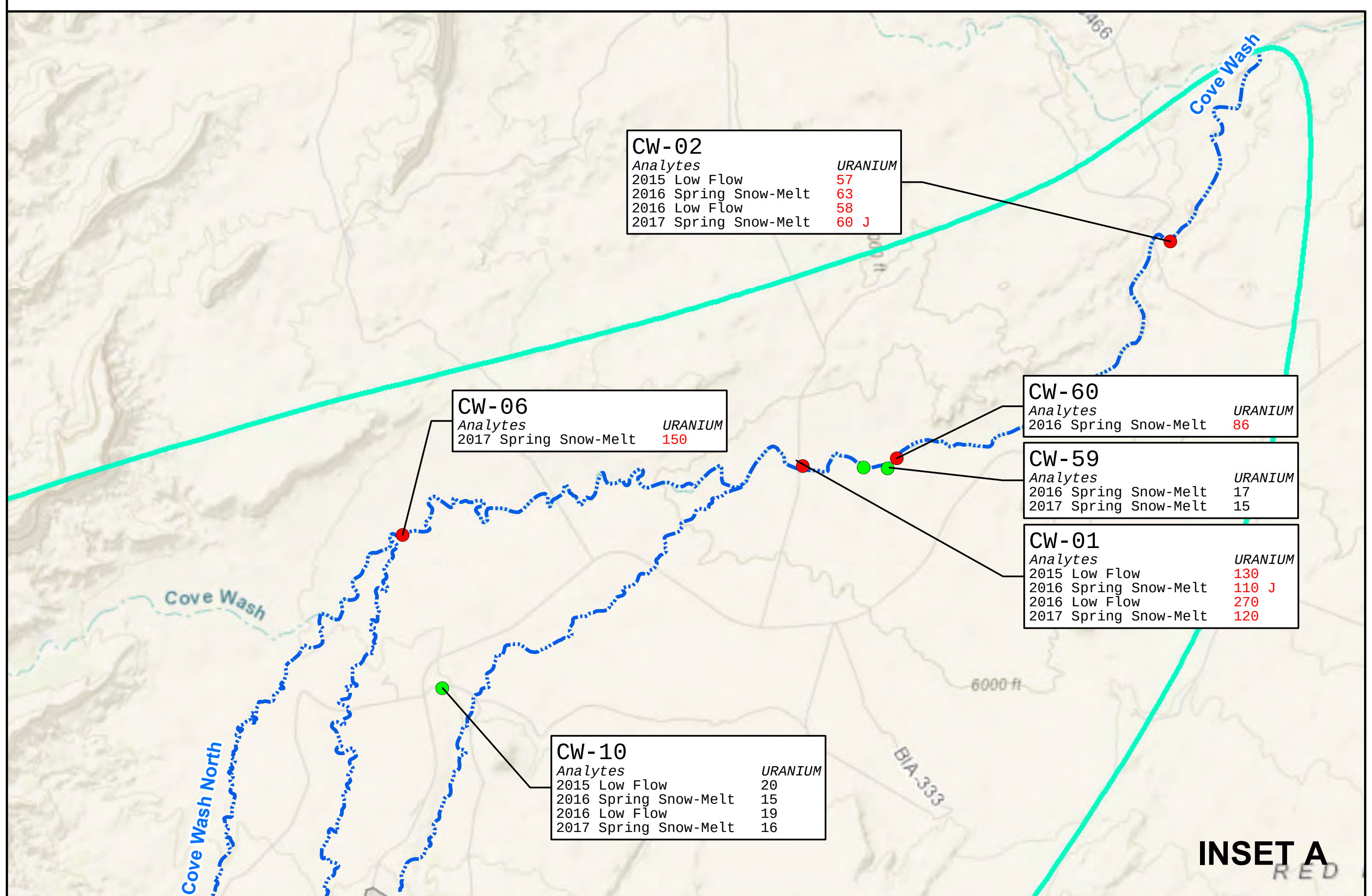

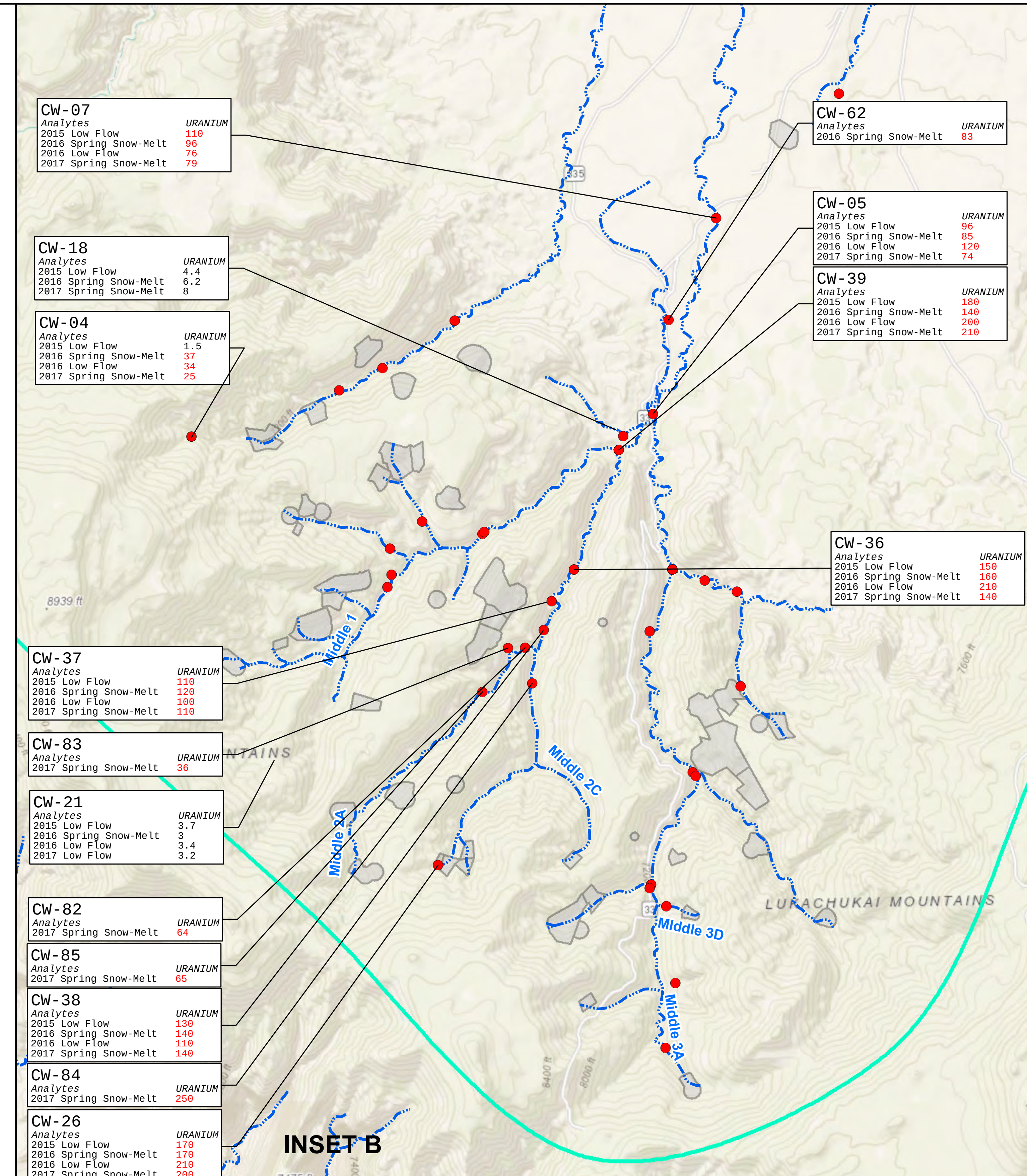

N
0 Miles 1.2

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FIGURE 15
COVE WASH MIDDLE 2 - TOTAL URANIUM RESULTS
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

Contract: EP-S5-13-02; **TDD:** 0025/1302-T25-R9-16-03-0001

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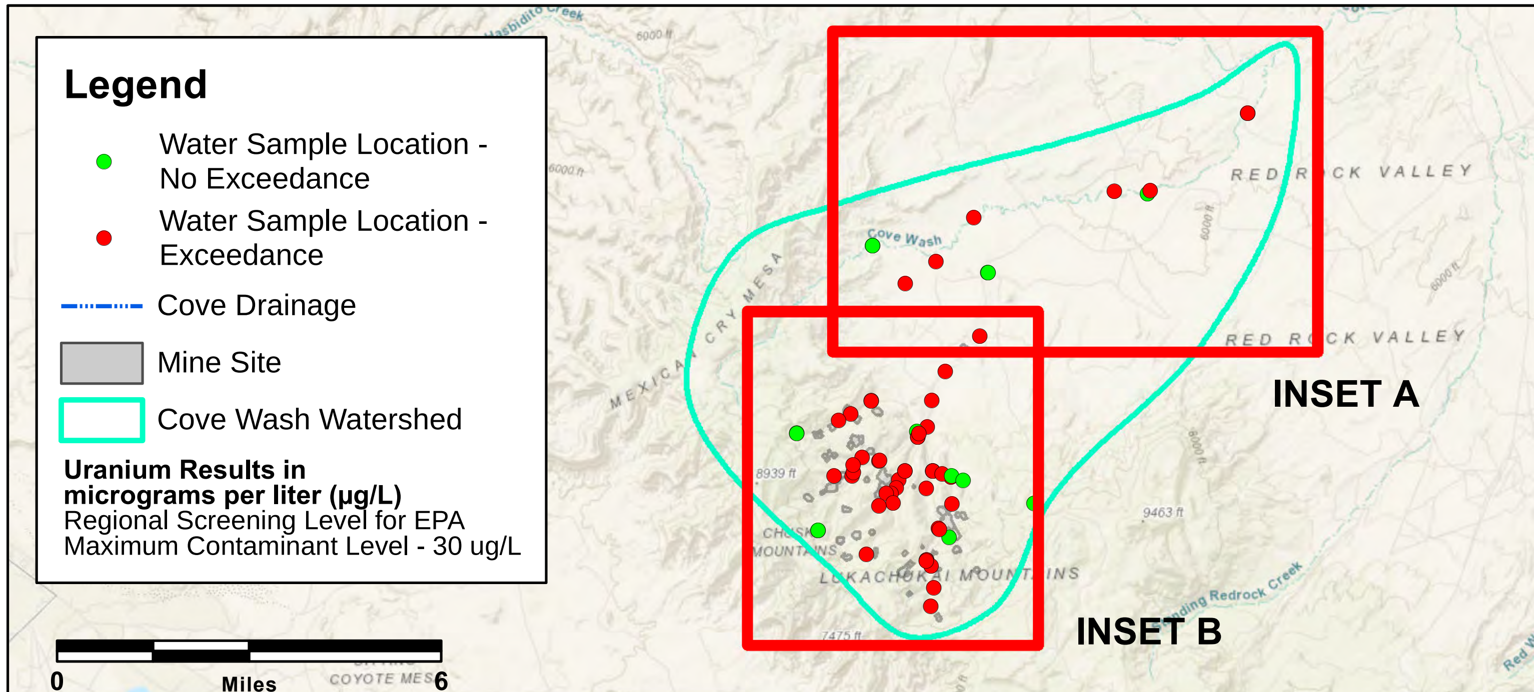

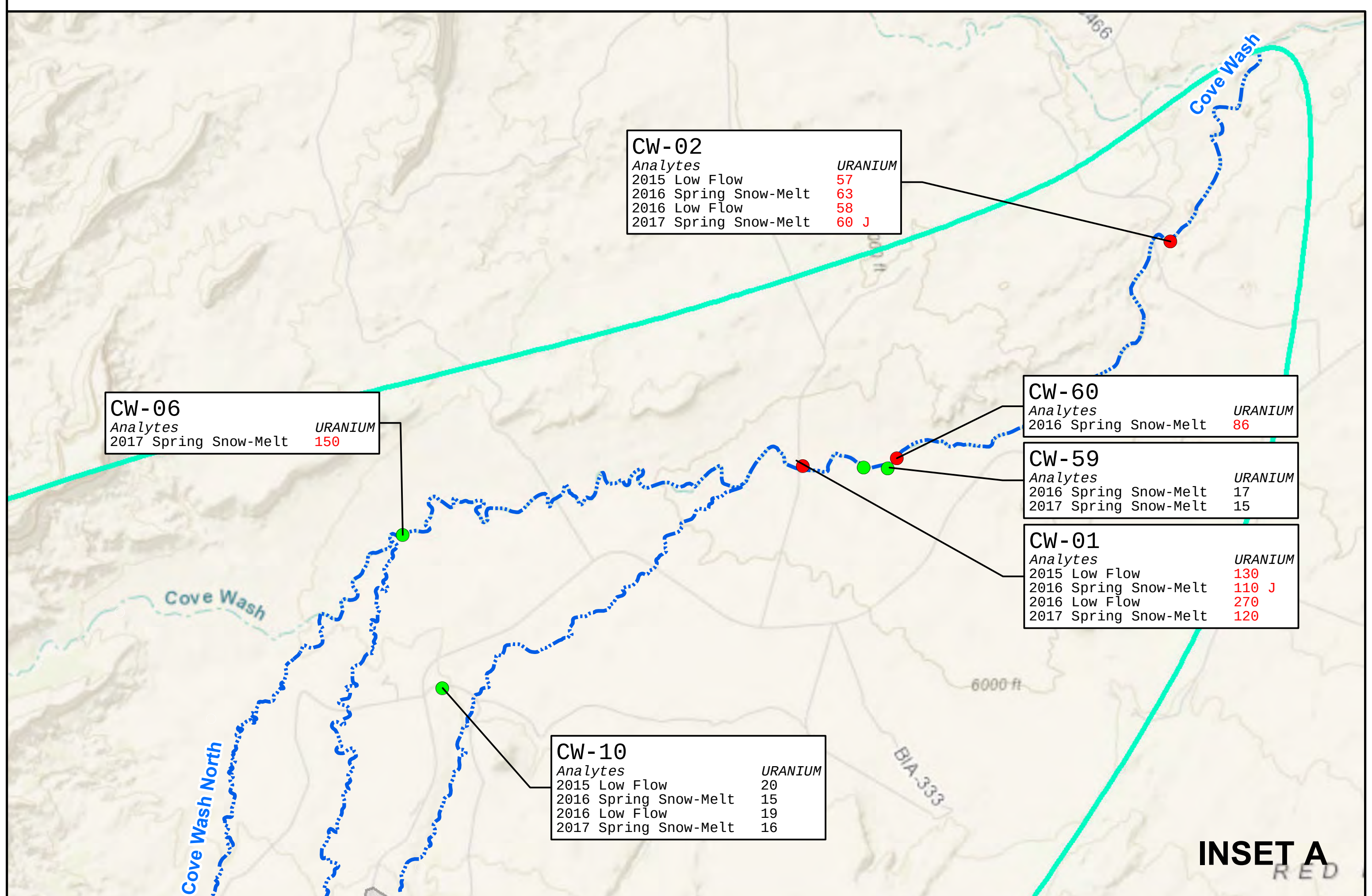

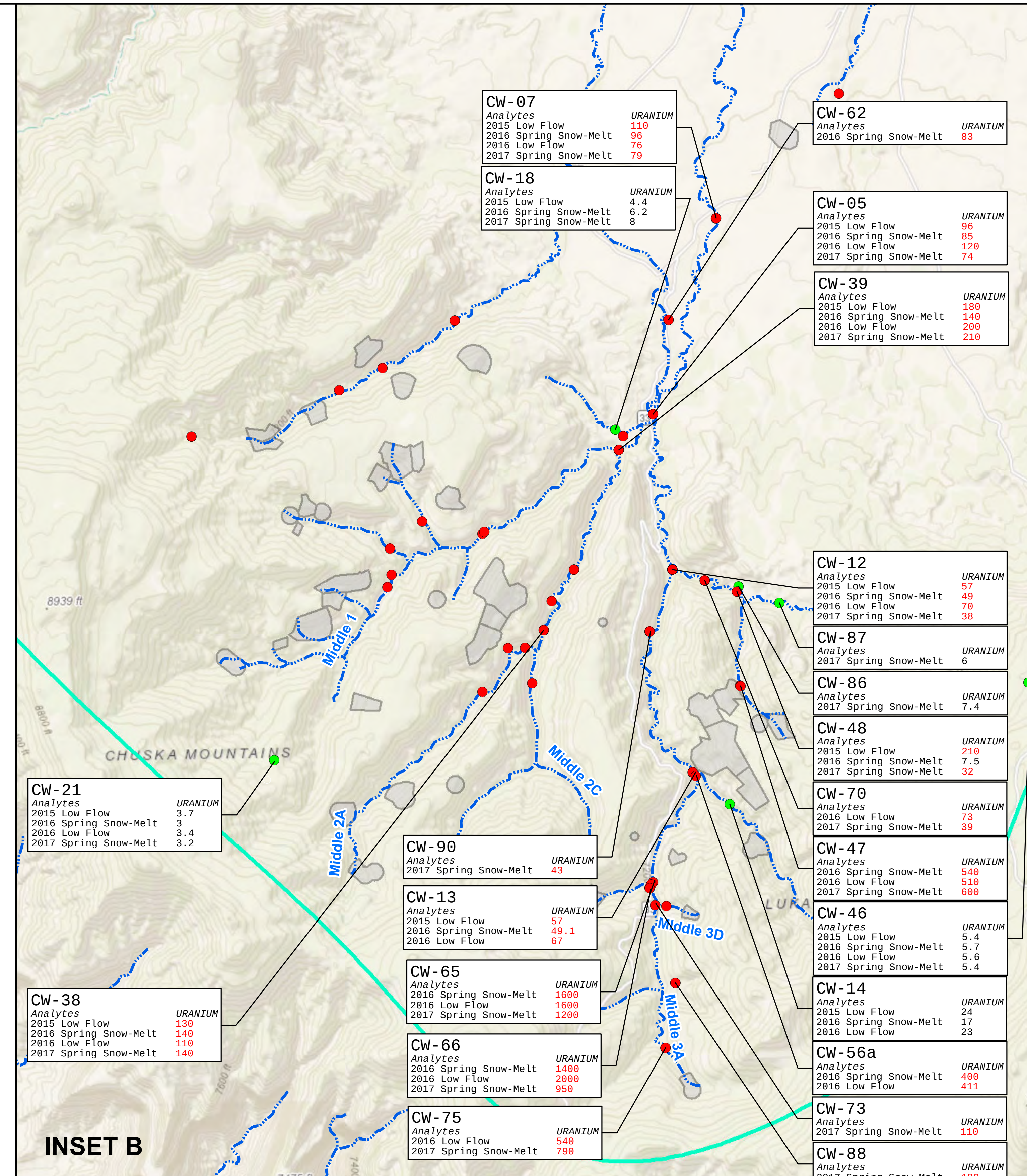

N
0 Miles 1.2

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FIGURE 16
COVE WASH MIDDLE 3 - TOTAL URANIUM RESULTS
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

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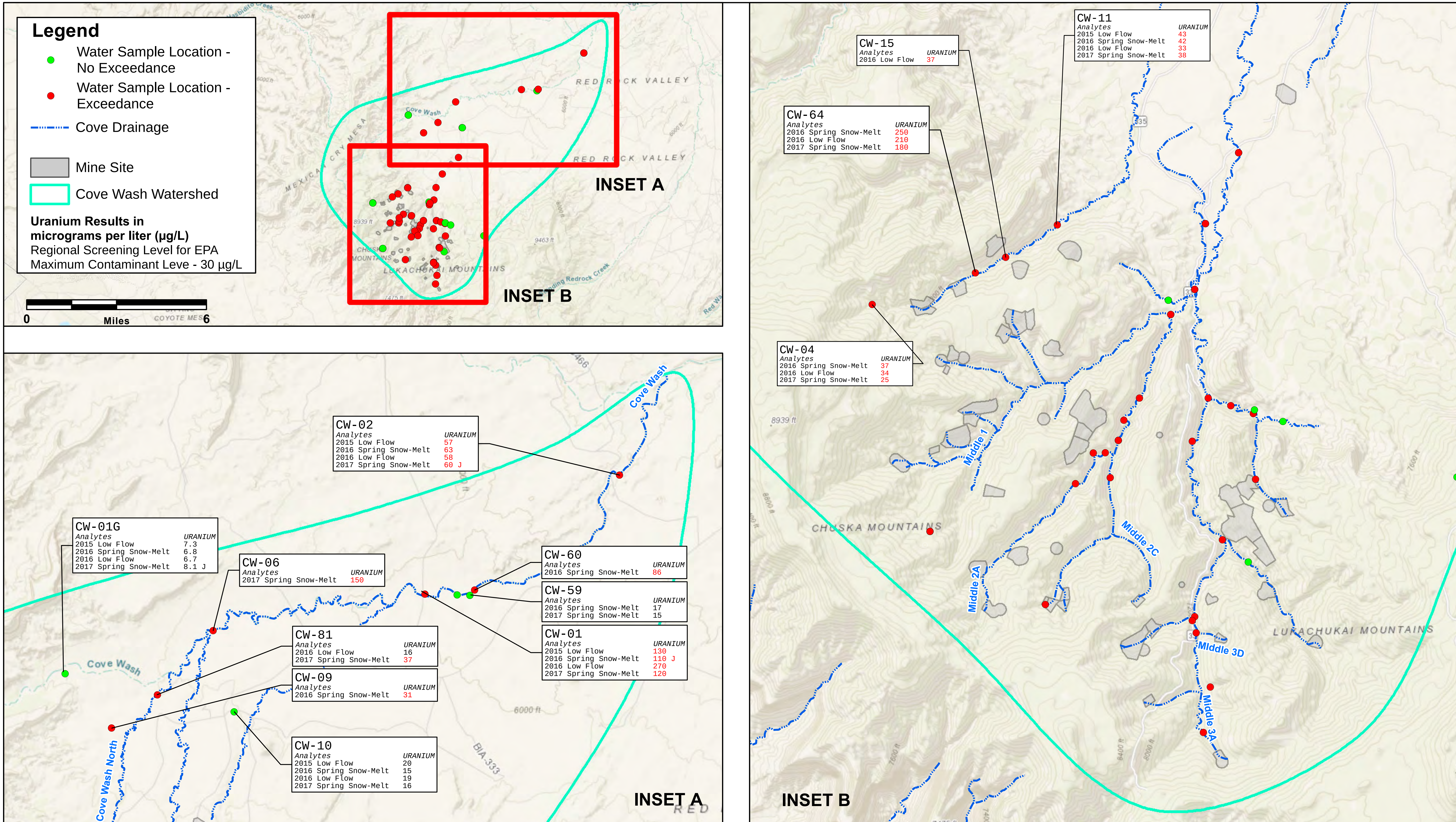
DCN:0100-08-AAYN



0 Miles 1.2

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FIGURE 17
COVE WASH NORTH - TOTAL URANIUM RESULTS
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

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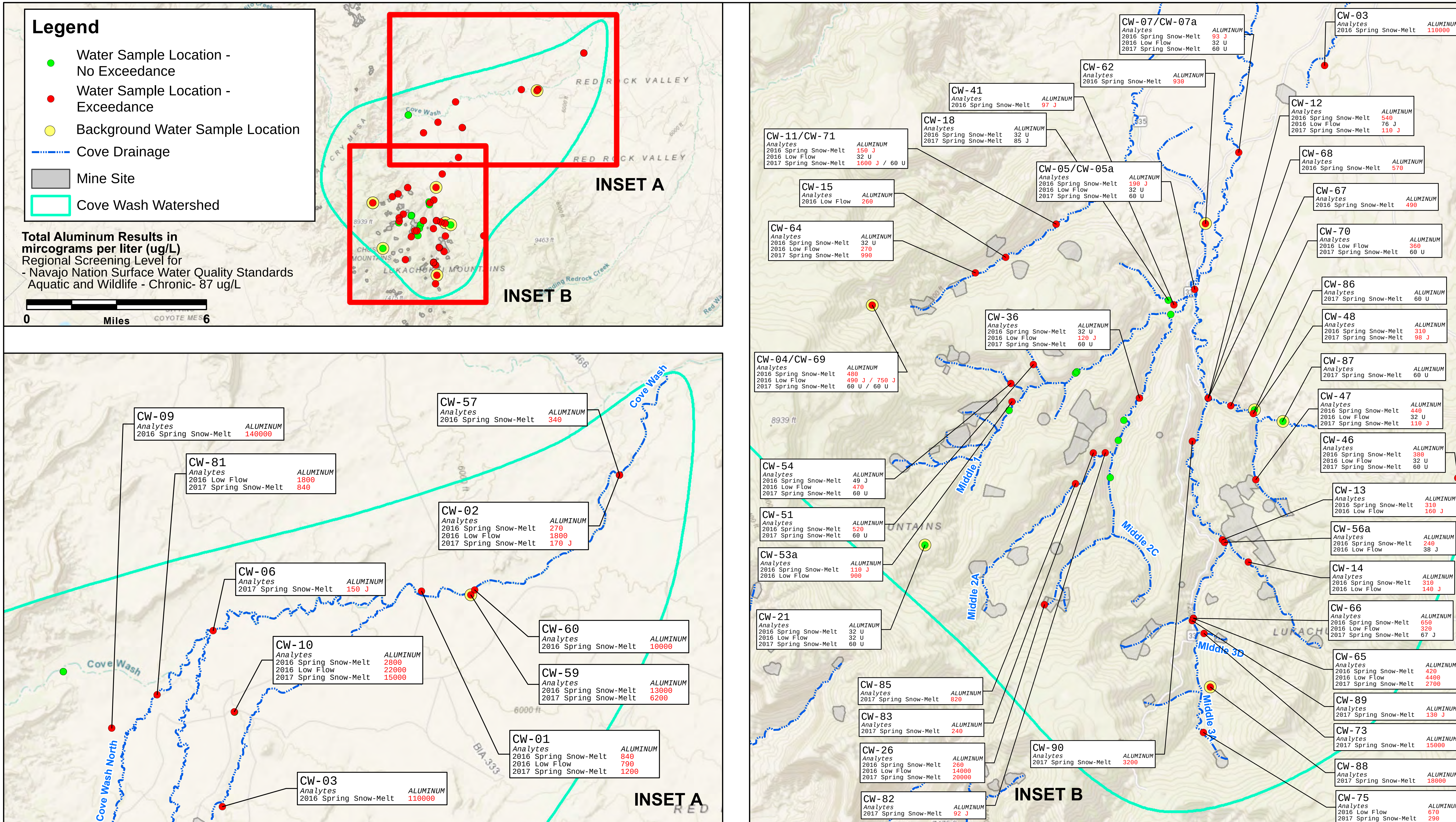

N

0 Miles 1.2

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FIGURE 18
WATER SAMPLES – TOTAL ALUMINUM EXCEEDANCES OF SCREENING LEVELS
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

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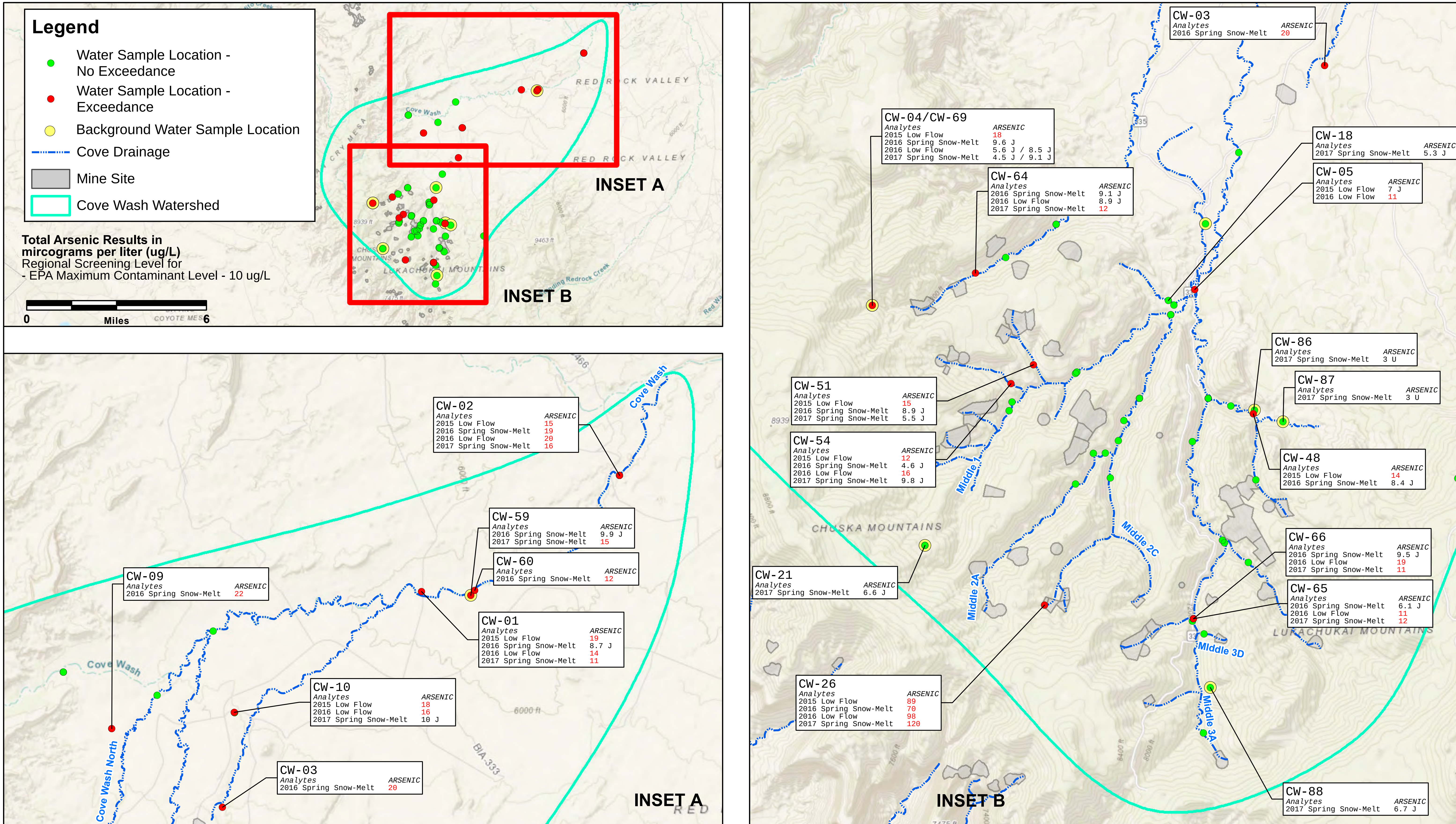

N

0 Miles 1.2

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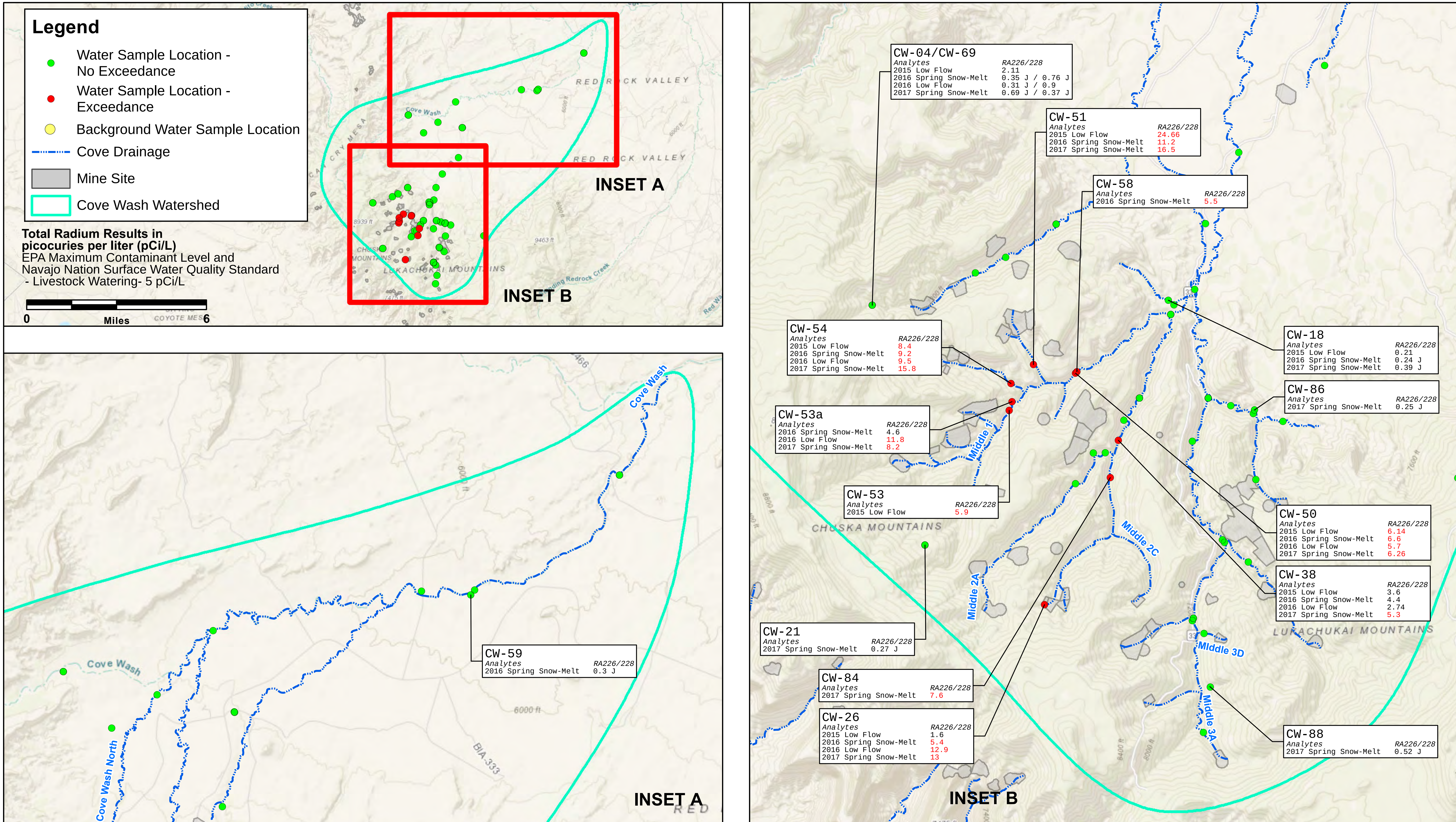
FIGURE 19
WATER SAMPLES – TOTAL ARSENIC EXCEEDANCES OF SCREENING LEVELS
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

Contract: EP-S5-13-02; **TDD:** 0025/1302-T25-R9-16-03-0001 **DCN:** 0100-08-AAYN



0 Miles 1.2

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FIGURE 20
WATER SAMPLES – TOTAL RADIUM EXCEEDANCES OF SCREENING LEVELS
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

Contract: EP-S5-13-02; **TDD:** 0025/1302-T25-R9-16-03-0001

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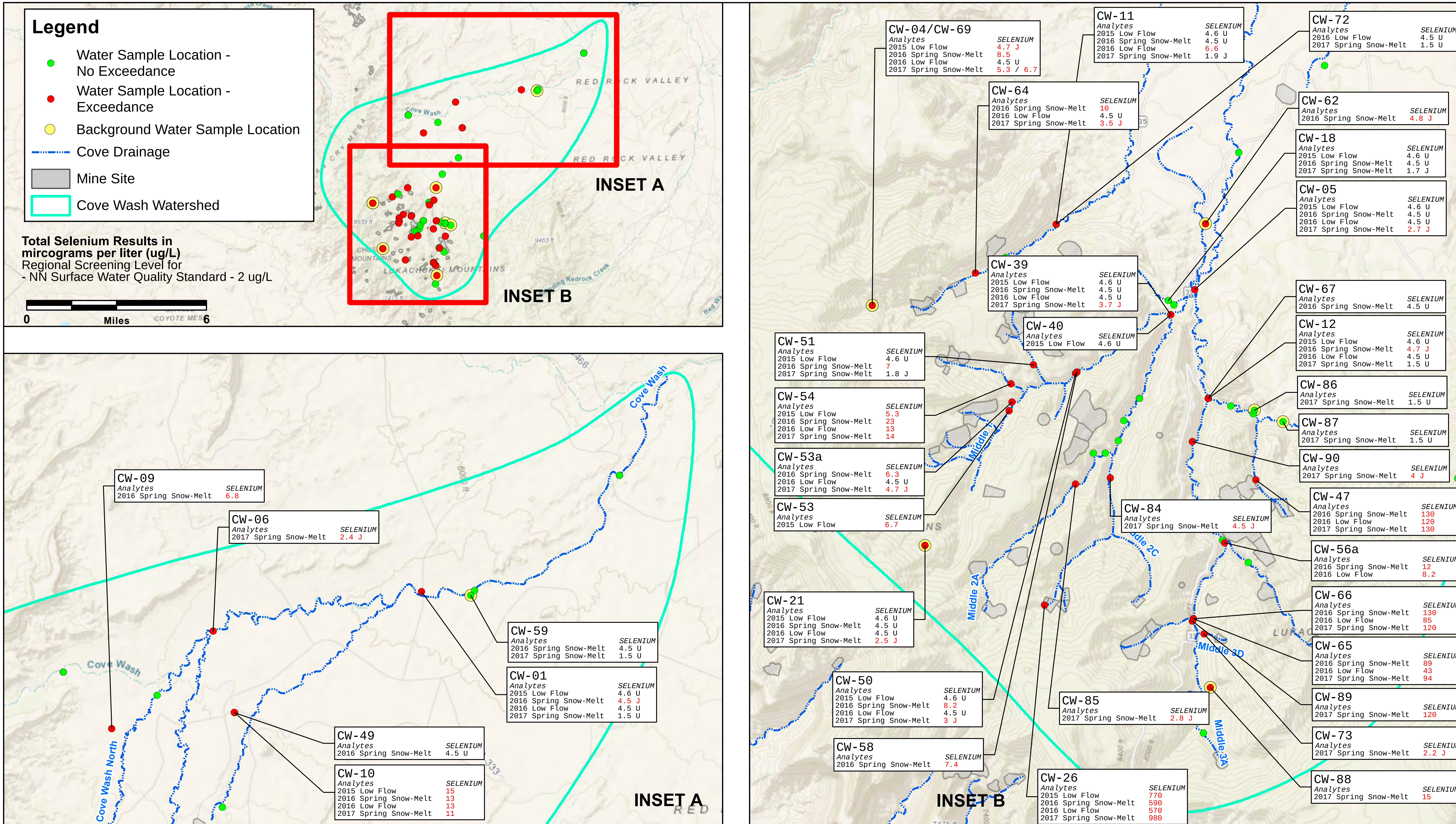

0 Miles 1.2

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FIGURE 21
WATER SAMPLES – TOTAL SELENIUM EXCEEDANCES OF SCREENING LEVELS
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

Contract: EP-S5-13-02; **TDD:** 0025/1302-T25-R9-16-03-0001

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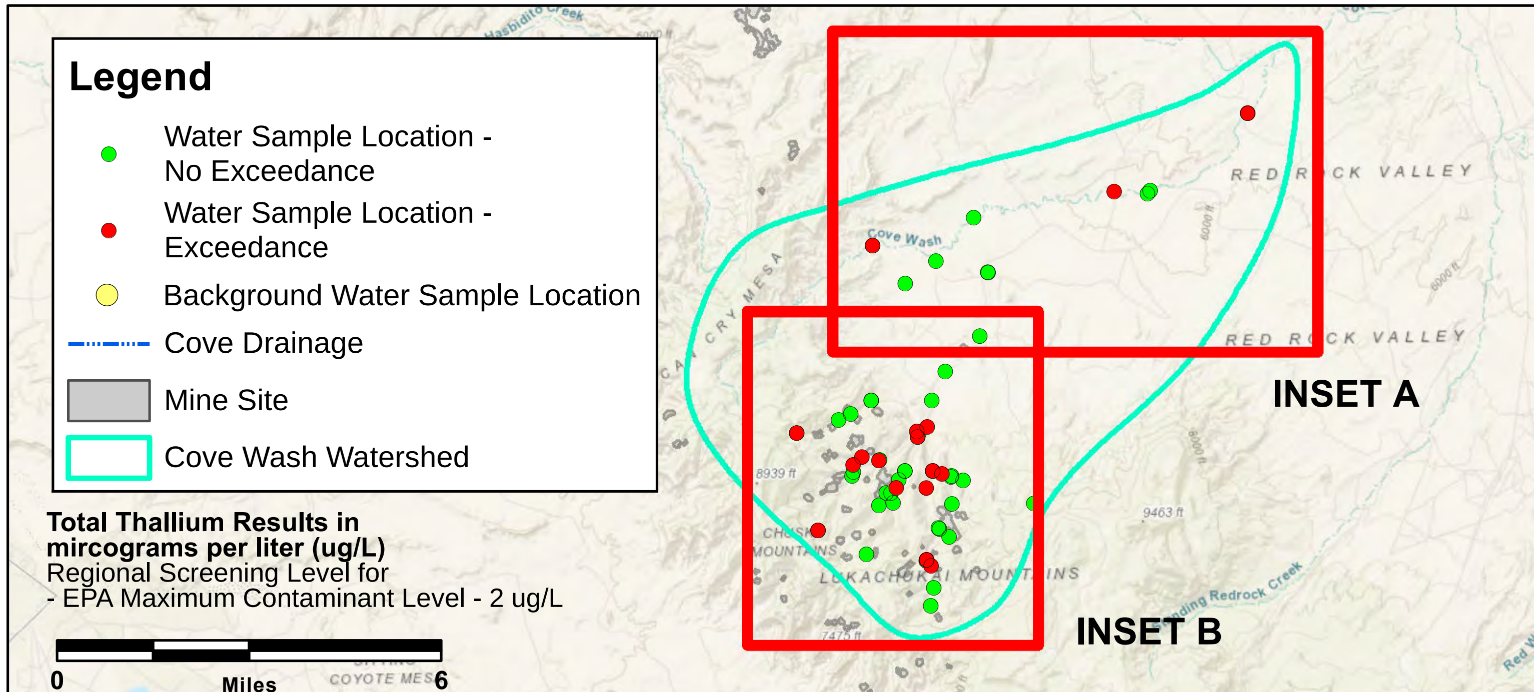

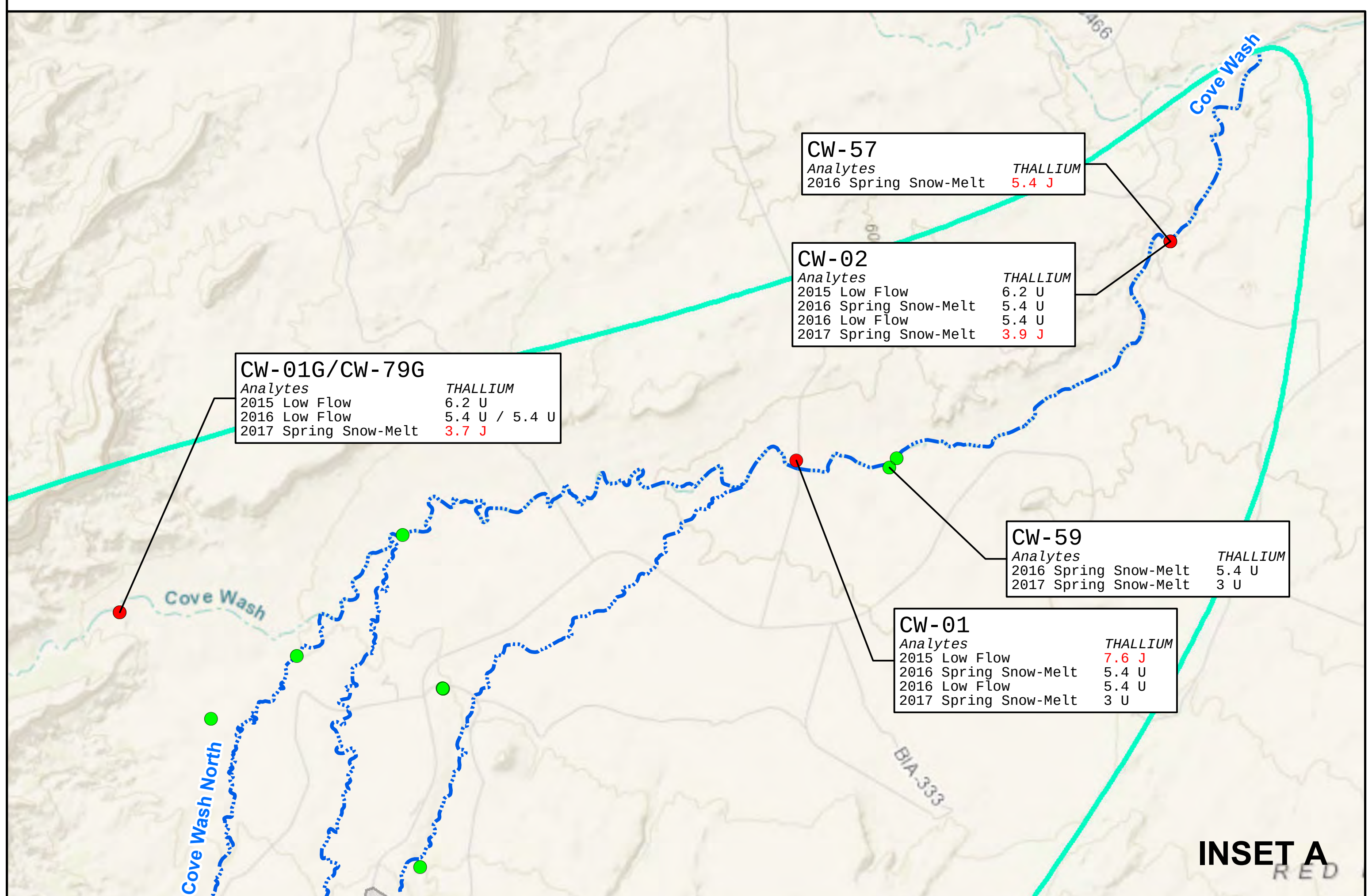

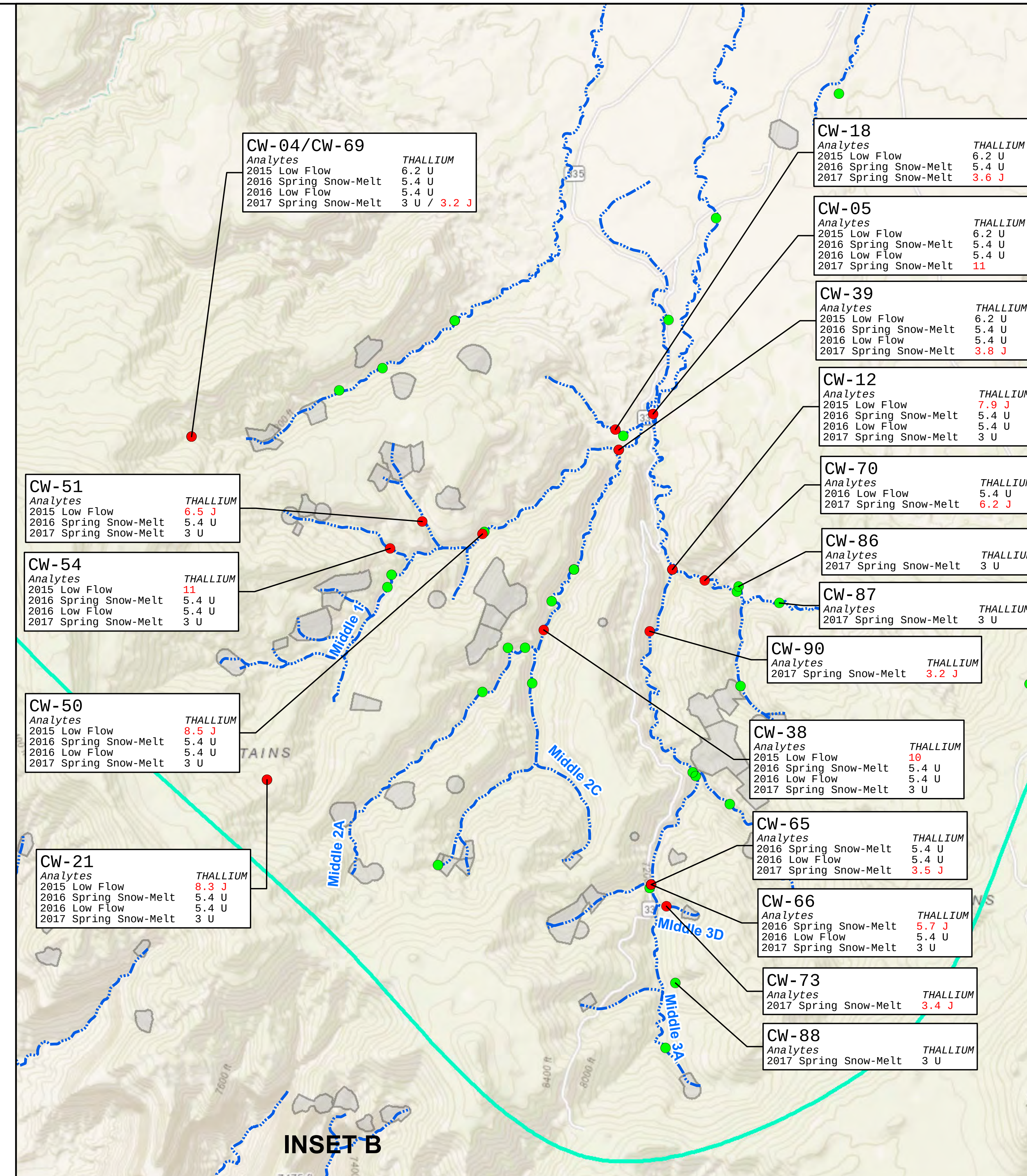

0 Miles 1.2

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FIGURE 22
WATER SAMPLES – TOTAL THALLIUM EXCEEDANCES OF SCREENING LEVELS
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

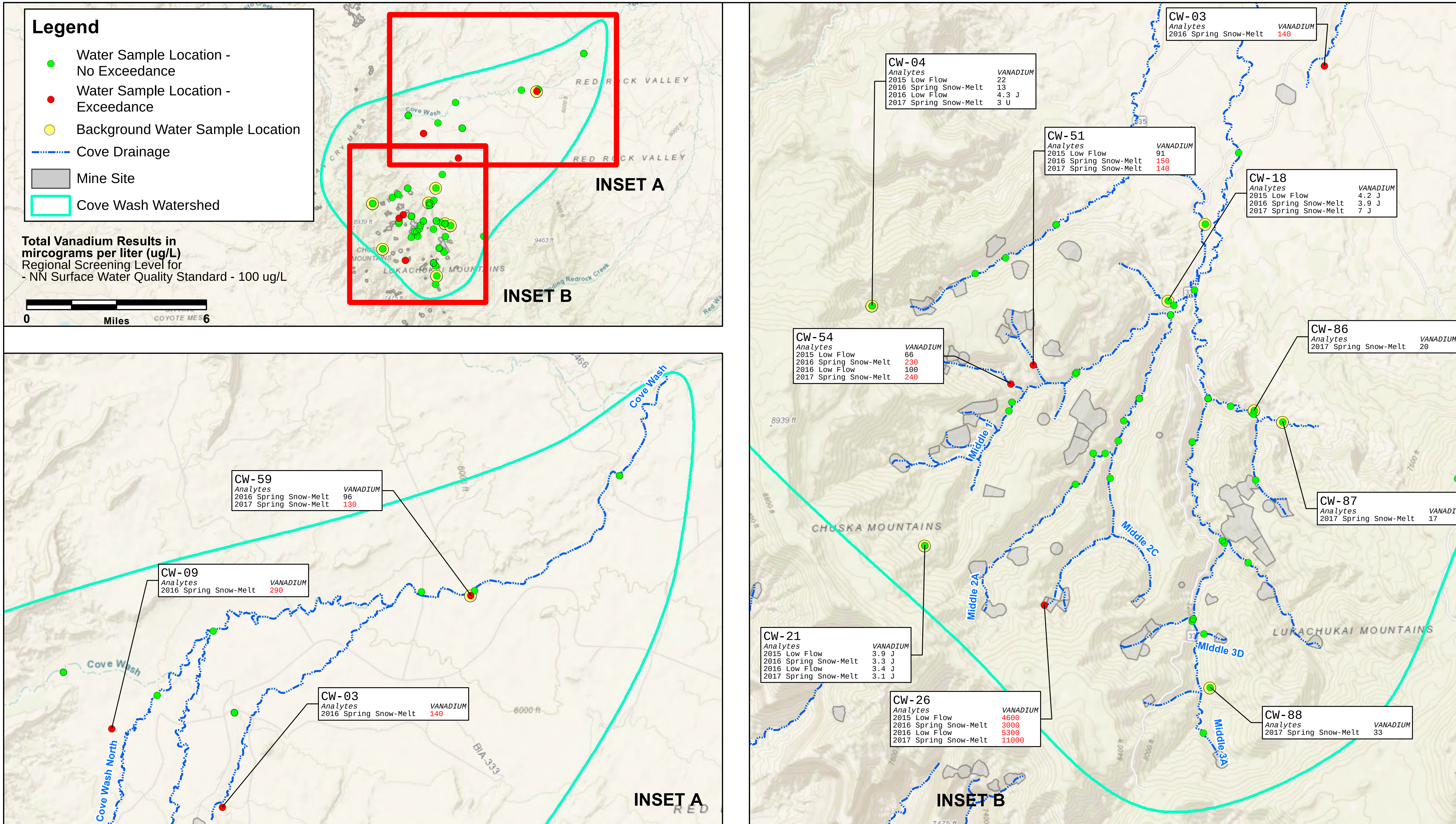

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FIGURE 23
WATER SAMPLES – TOTAL VANADIUM EXCEEDANCES OF SCREENING LEVELS
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

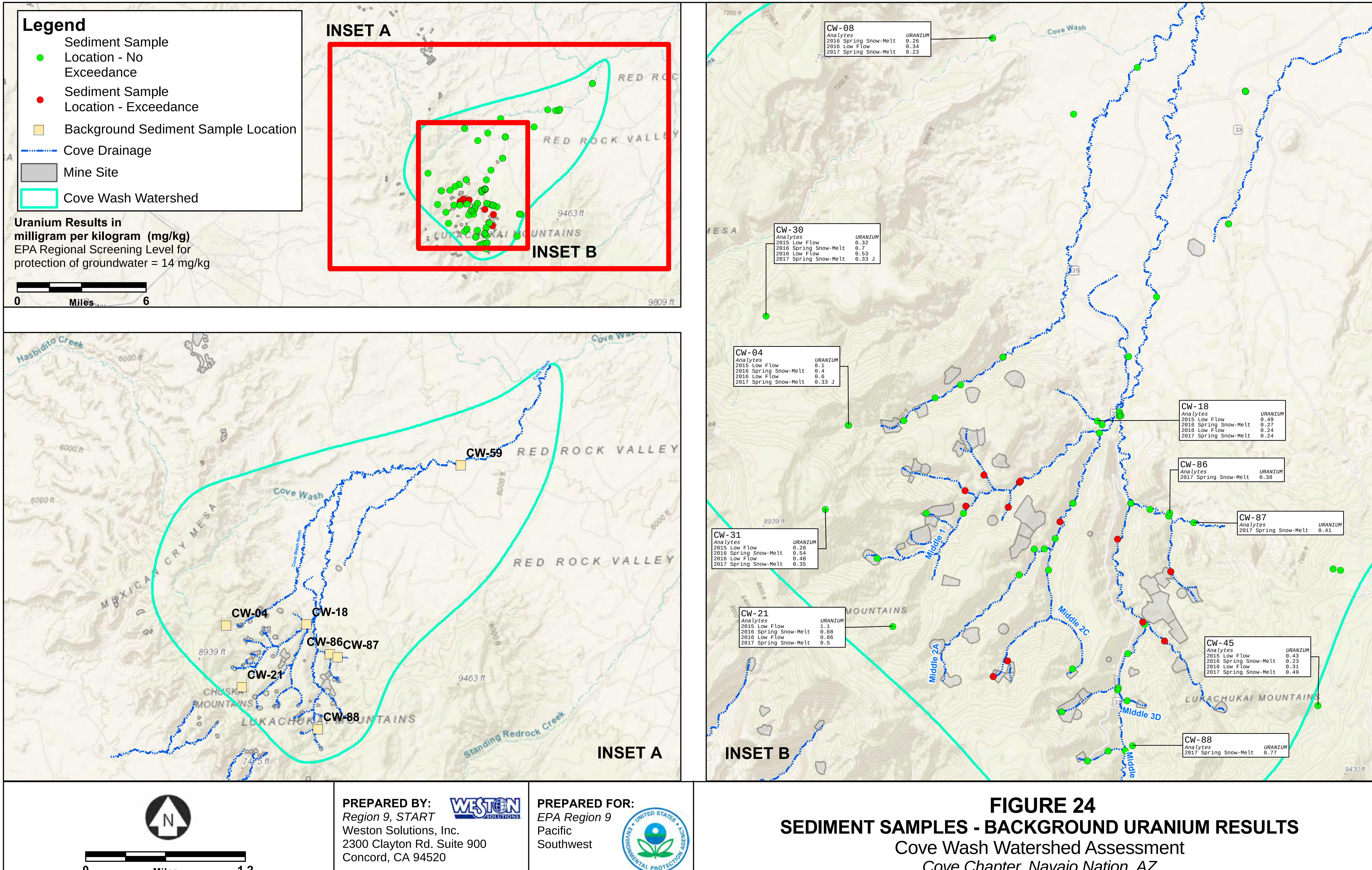

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FIGURE 24
SEDIMENT SAMPLES - BACKGROUND URANIUM RESULTS
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

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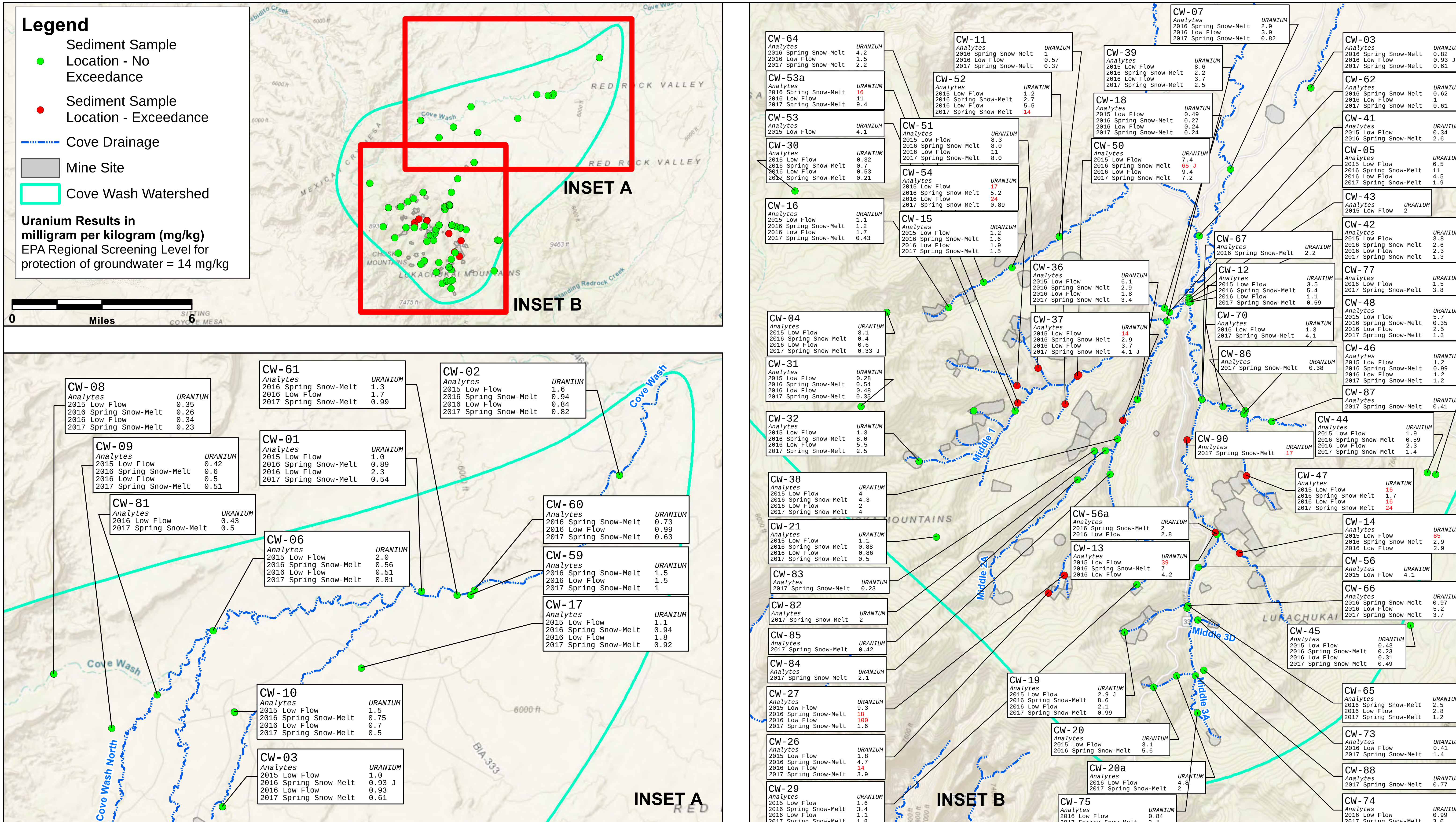

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FIGURE 25
SEDIMENT SAMPLES - URANIUM RESULTS
Cove Wash Watershed Assessment
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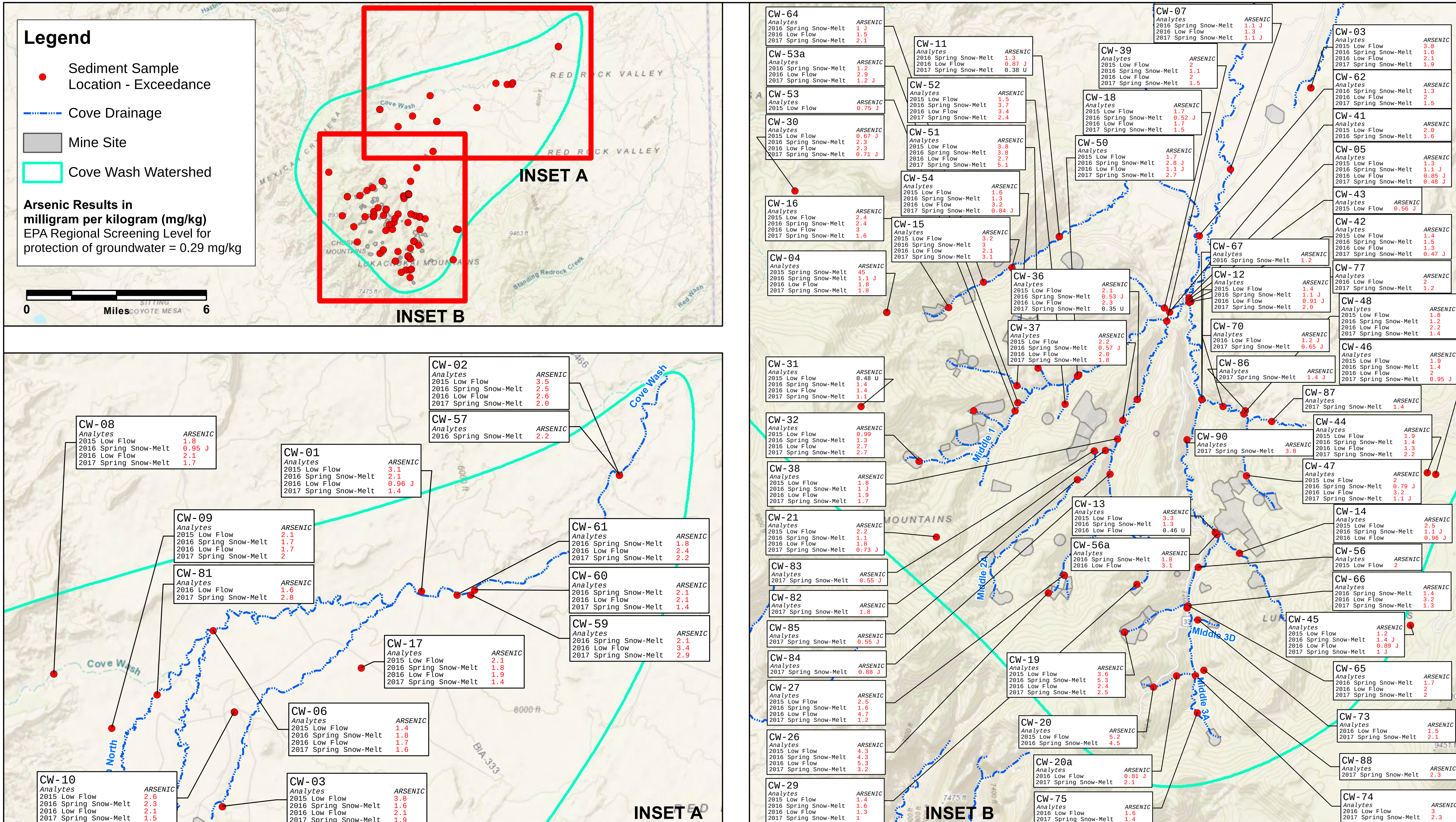

N

0 Miles 1.2

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FIGURE 26
SEDIMENT SAMPLES - ARSENIC RESULTS
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

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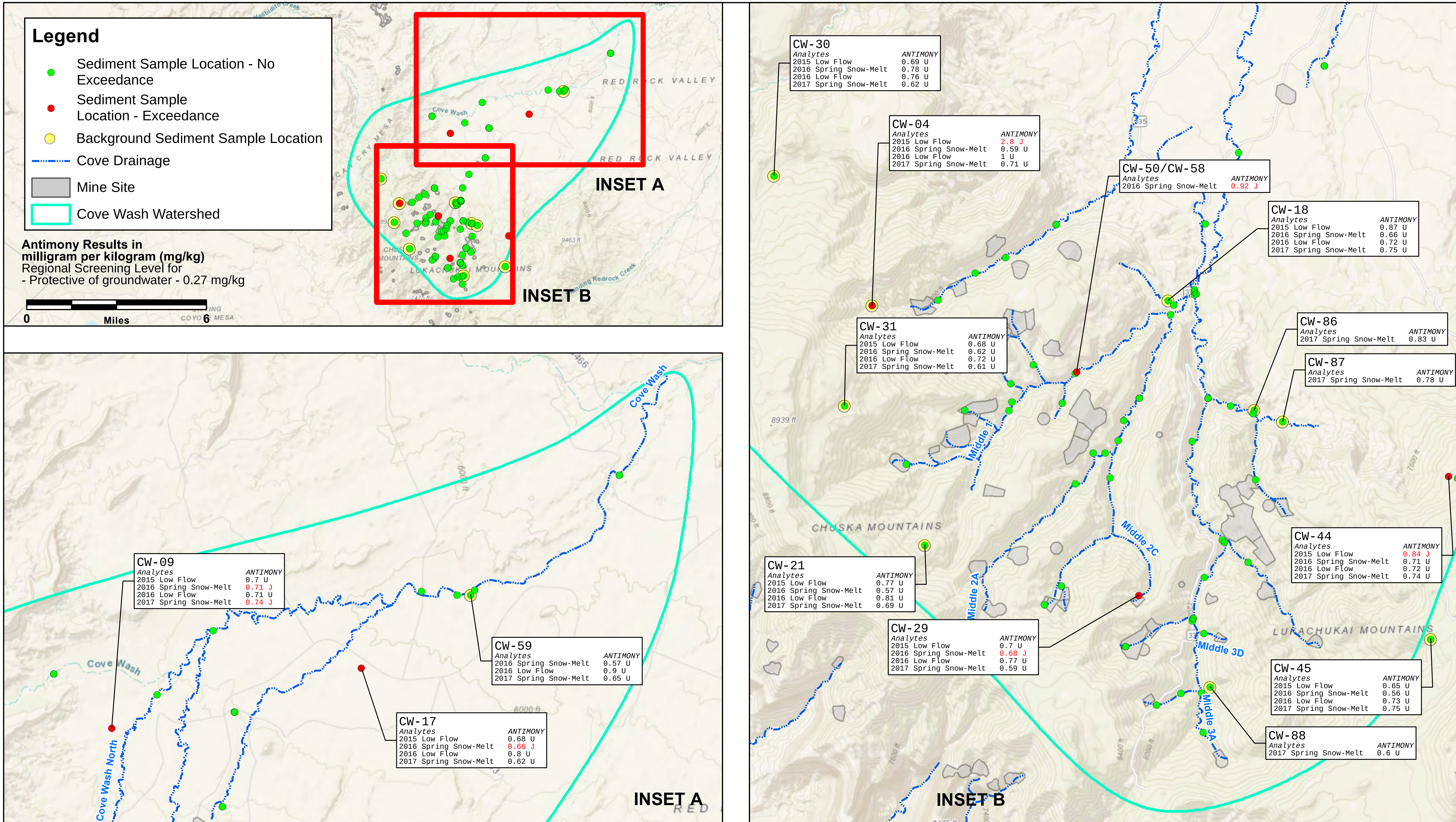

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FIGURE 27
SEDIMENT SAMPLES – ANTIMONY EXCEEDANCES OF SCREENING LEVELS
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

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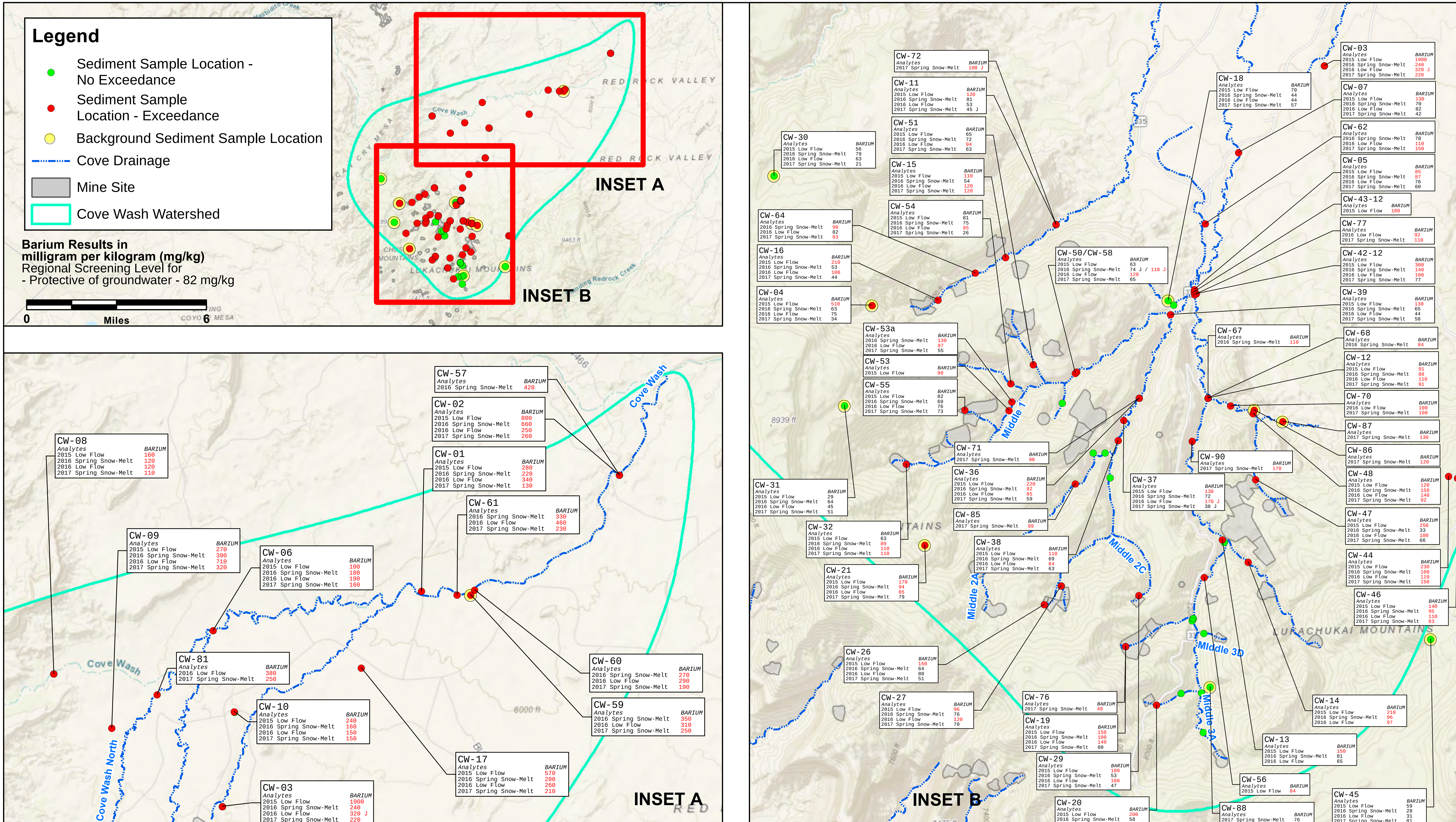

0 Miles 1.2

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FIGURE 28
SEDIMENT SAMPLES – BARIUM EXCEEDANCES OF SCREENING LEVELS
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

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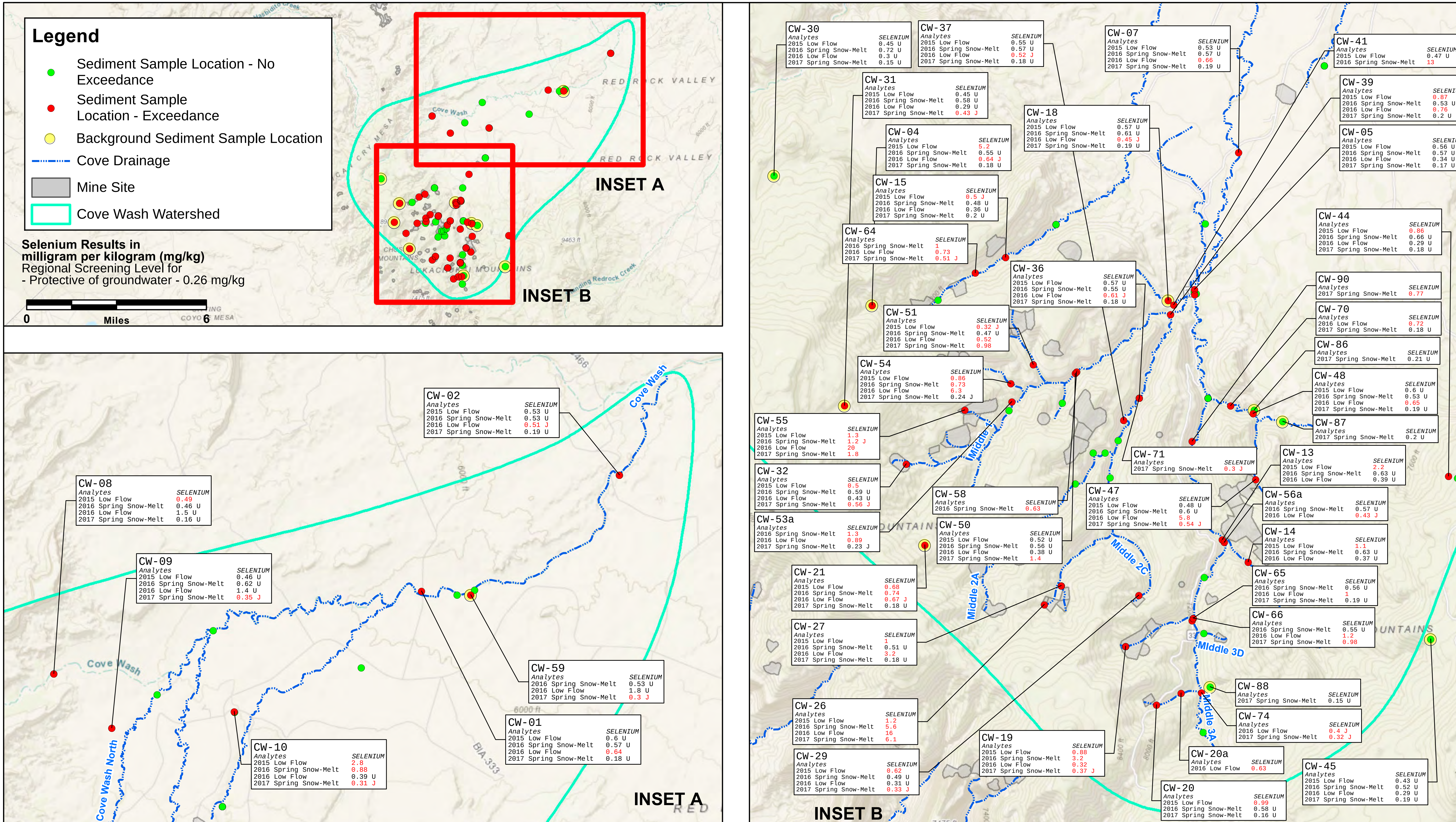

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FIGURE 29
SEDIMENT SAMPLES – SELENIUM EXCEEDANCES OF SCREENING LEVELS
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

Contract: EP-S5-13-02; **TDD:** 0025/1302-T25-R9-16-03-0001

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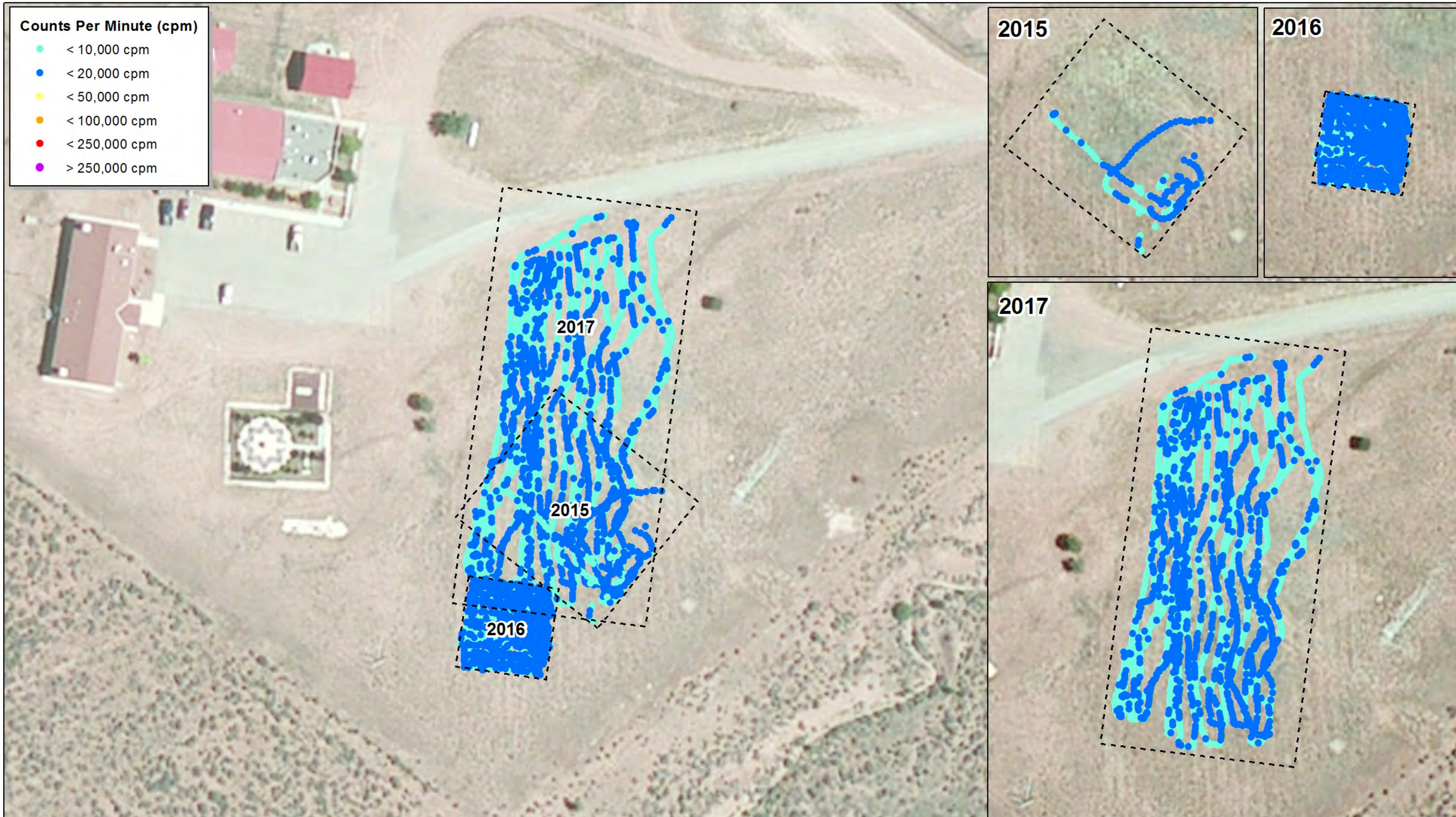

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Figure 30
Cove Chapter House Gamma Radiation Scanning
Cove Wash Watershed Assessment
Apache County, Navajo Nation, AZ

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0 50 100 Feet

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Figure 31
Mesa IV Sheep Camp Gamma Radiation Scanning
Cove Wash Watershed Assessment
Apache County, Navajo Nation, AZ

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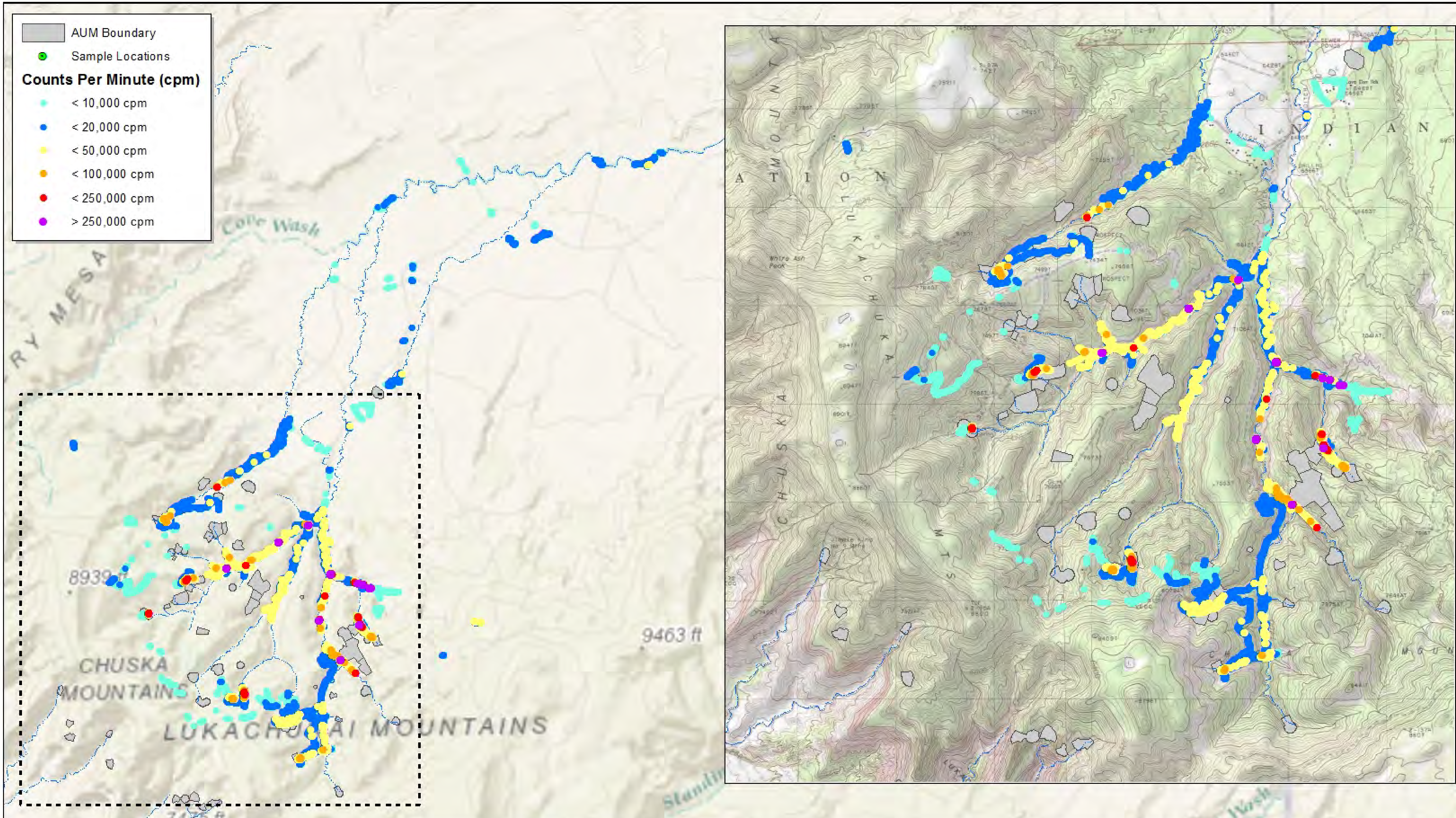

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Figure 32

2015 - 2017 Sampling Events Maximum Gamma Radiation Scanning Results

Cove Wash Watershed Assessment

Apache County, Navajo Nation, AZ

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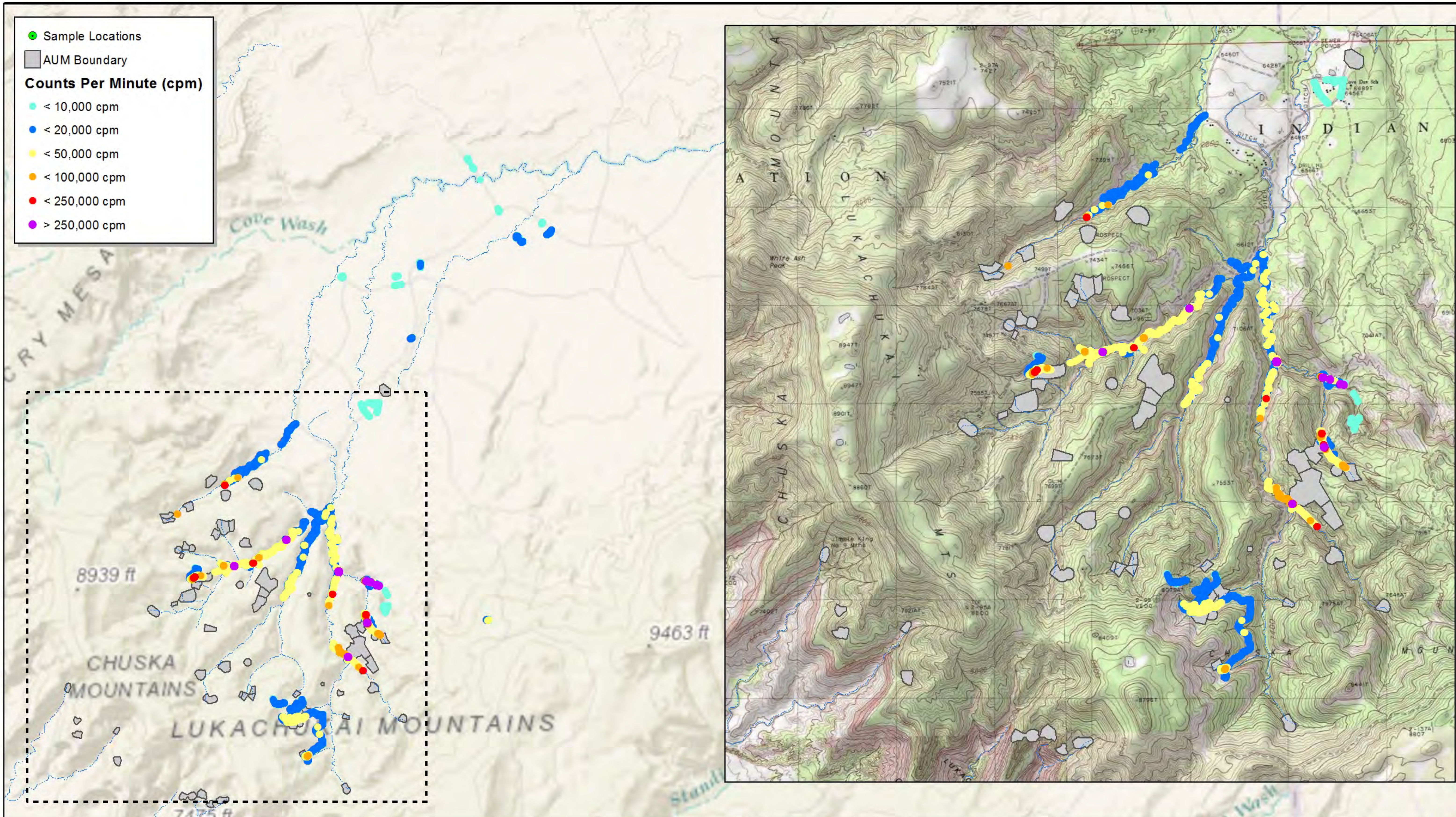

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Figure 33
2015 Low Flow Sampling Event Gamma Radiation Scanning
Cove Wash Watershed Assessment
Apache County, Navajo Nation, AZ

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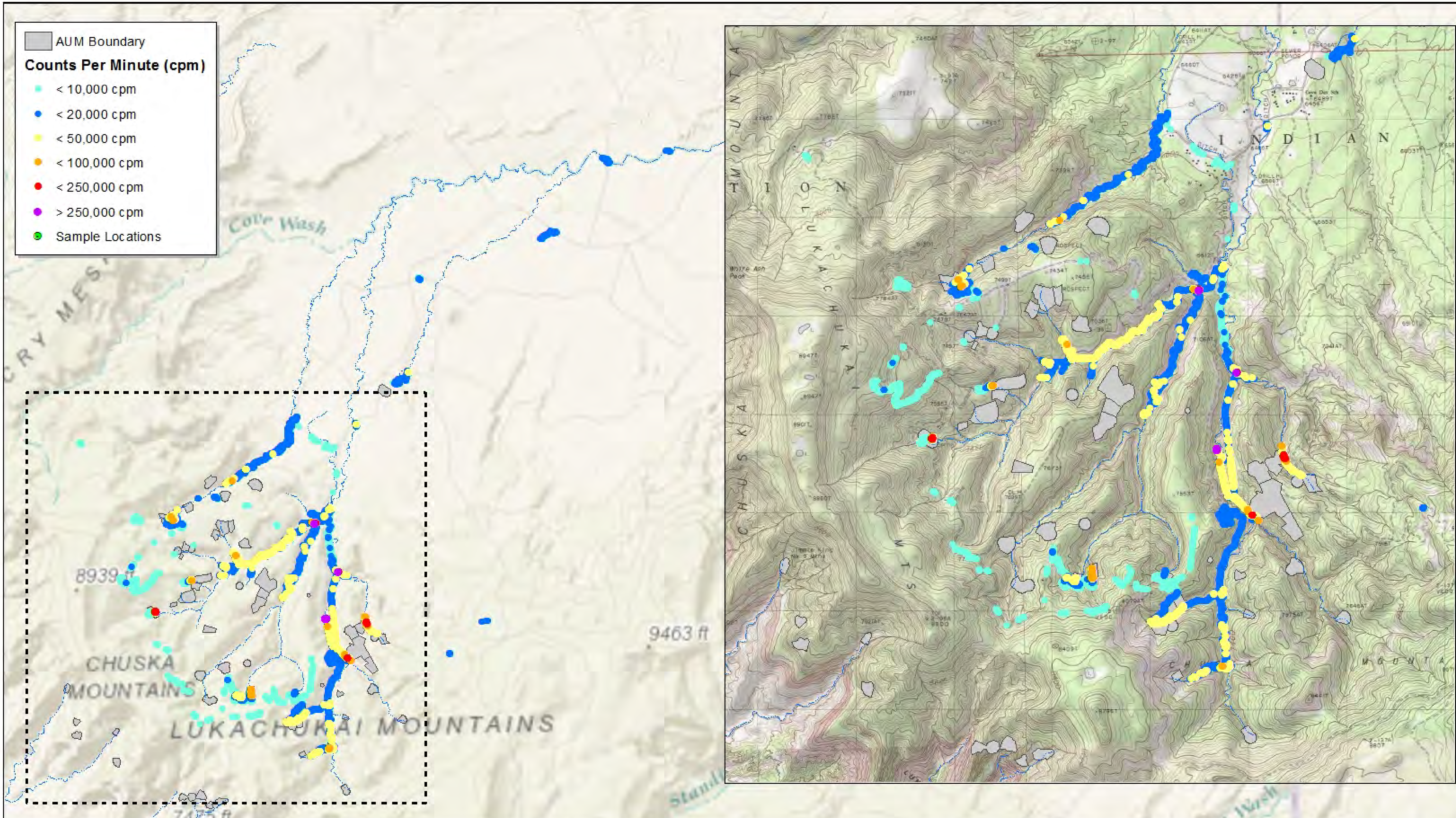

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Figure 34
2016 Spring Snowmelt Sampling Event Gamma Radiation Scanning
Cove Wash Watershed Assessment
Apache County, Navajo Nation, AZ

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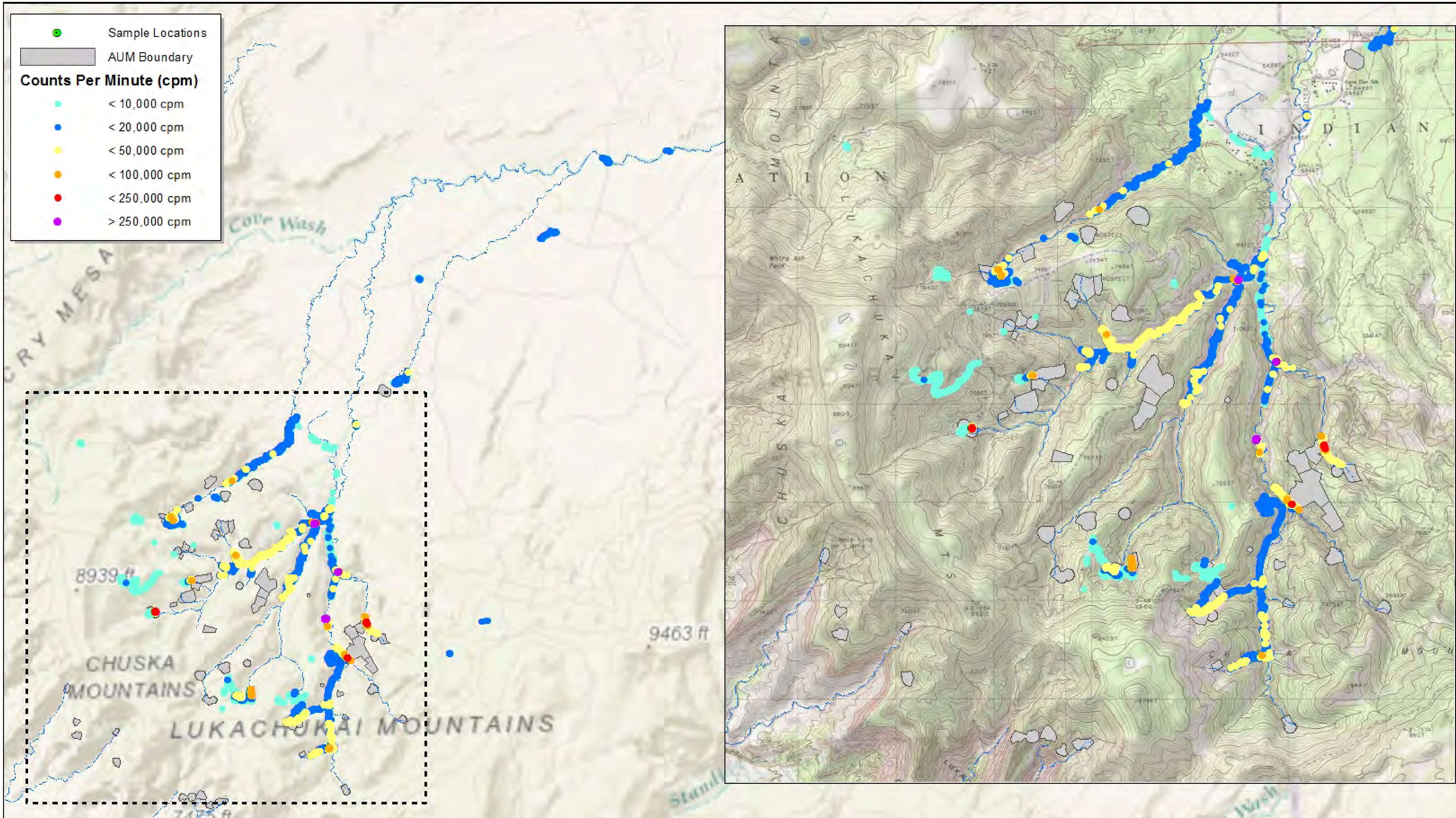

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Figure 35
2016 Low Flow Sampling Event Gamma Radiation Scanning
Cove Wash Watershed Assessment
Apache County, Navajo Nation, AZ

Contract: EP-S5-13-02; **TDD:** 0025/1302-T25-R9-16-03-0001

Document Control Number: 0100-08-AAYN

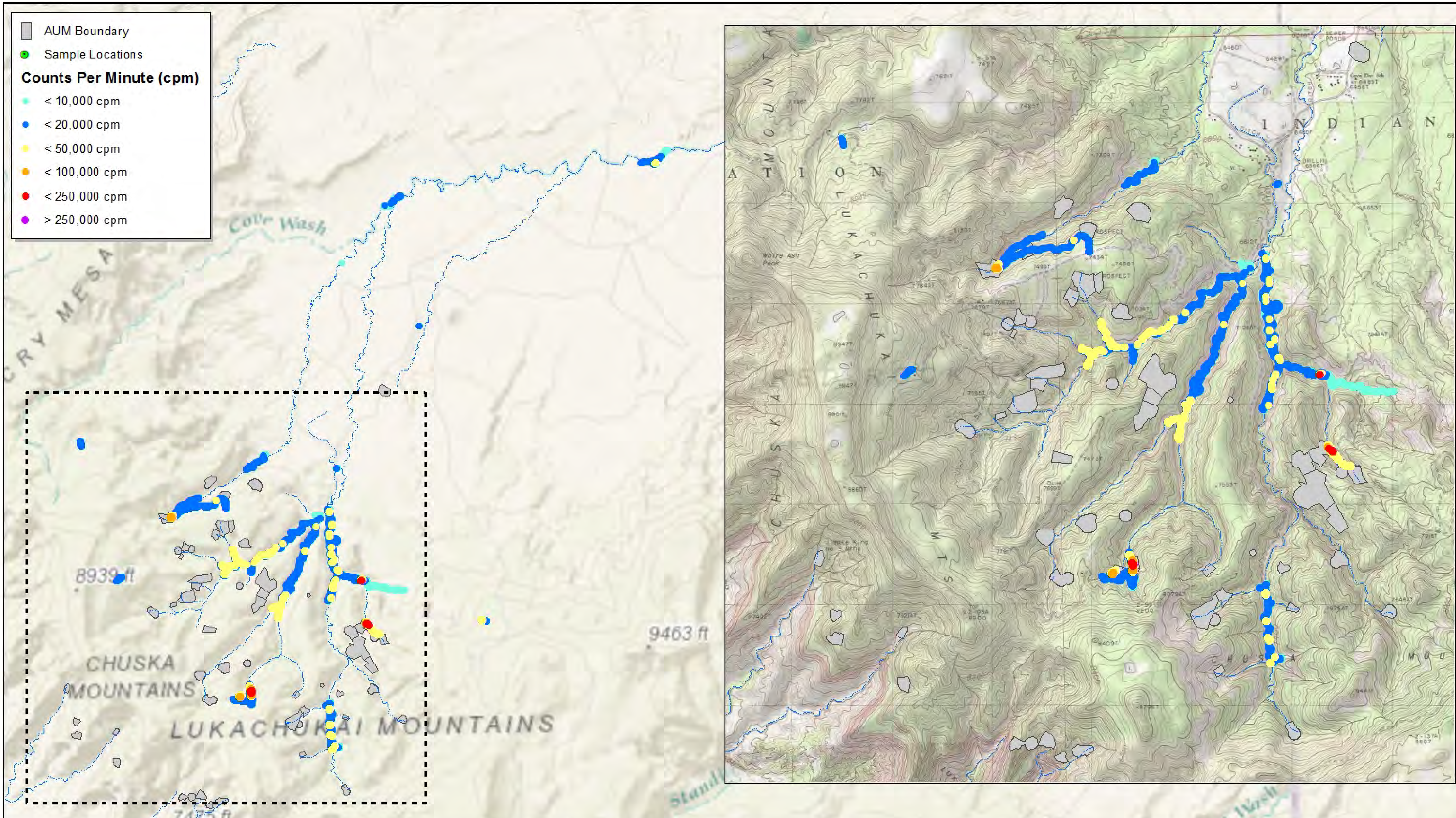

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Figure 36
2017 Spring Snowmelt Sampling Event Gamma Radiation Scanning
Cove Wash Watershed Assessment
Apache County, Navajo Nation, AZ

Contract: EP-S5-13-02; **TDD:** 0025/1302-T25-R9-16-03-0001 **Document Control Number:** 0100-08-AAYN

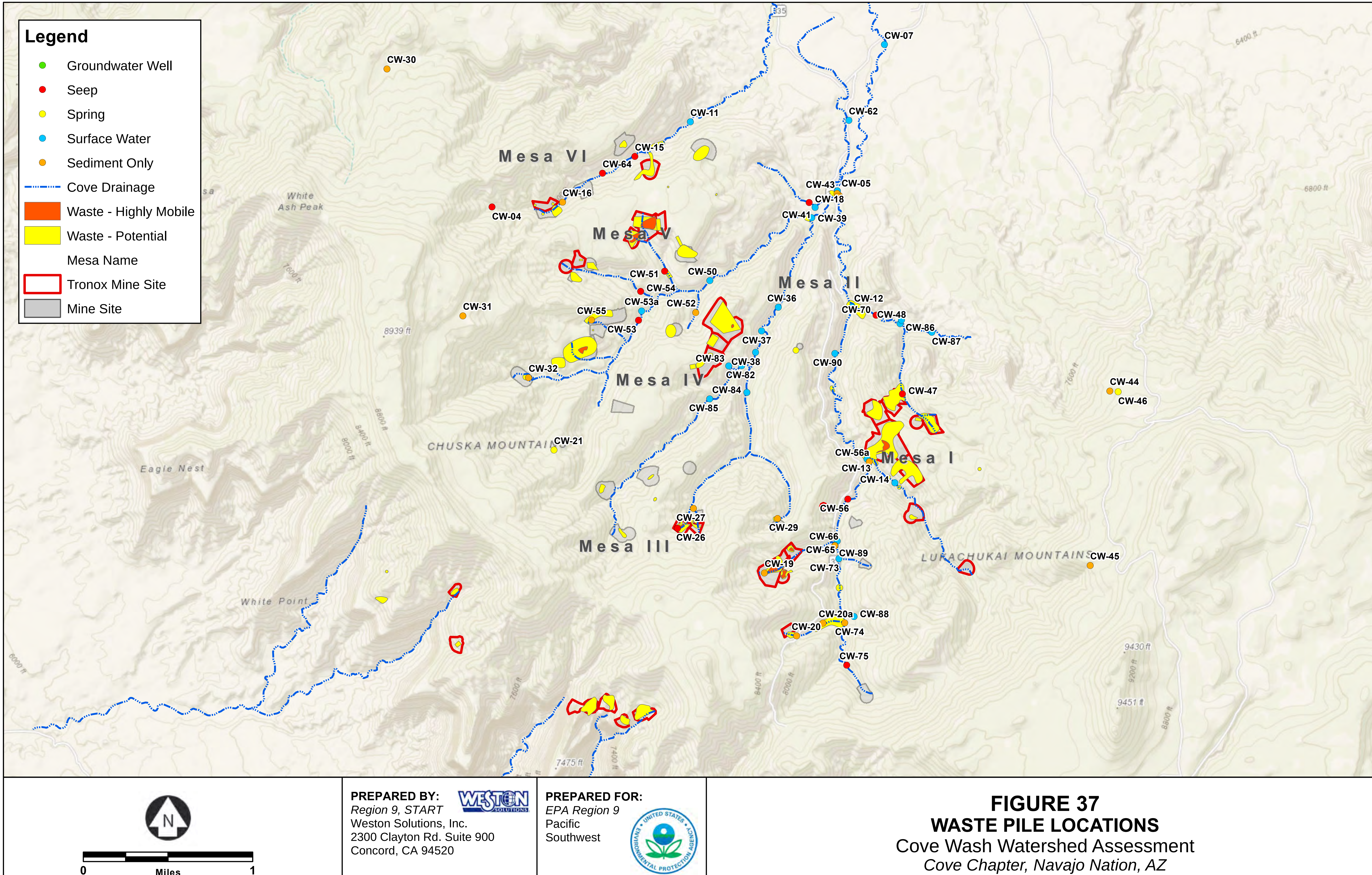

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FIGURE 37
WASTE PILE LOCATIONS
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

Contract: EP-S5-13-02; **TDD:** 0025/1302-T25-R9-16-03-0001

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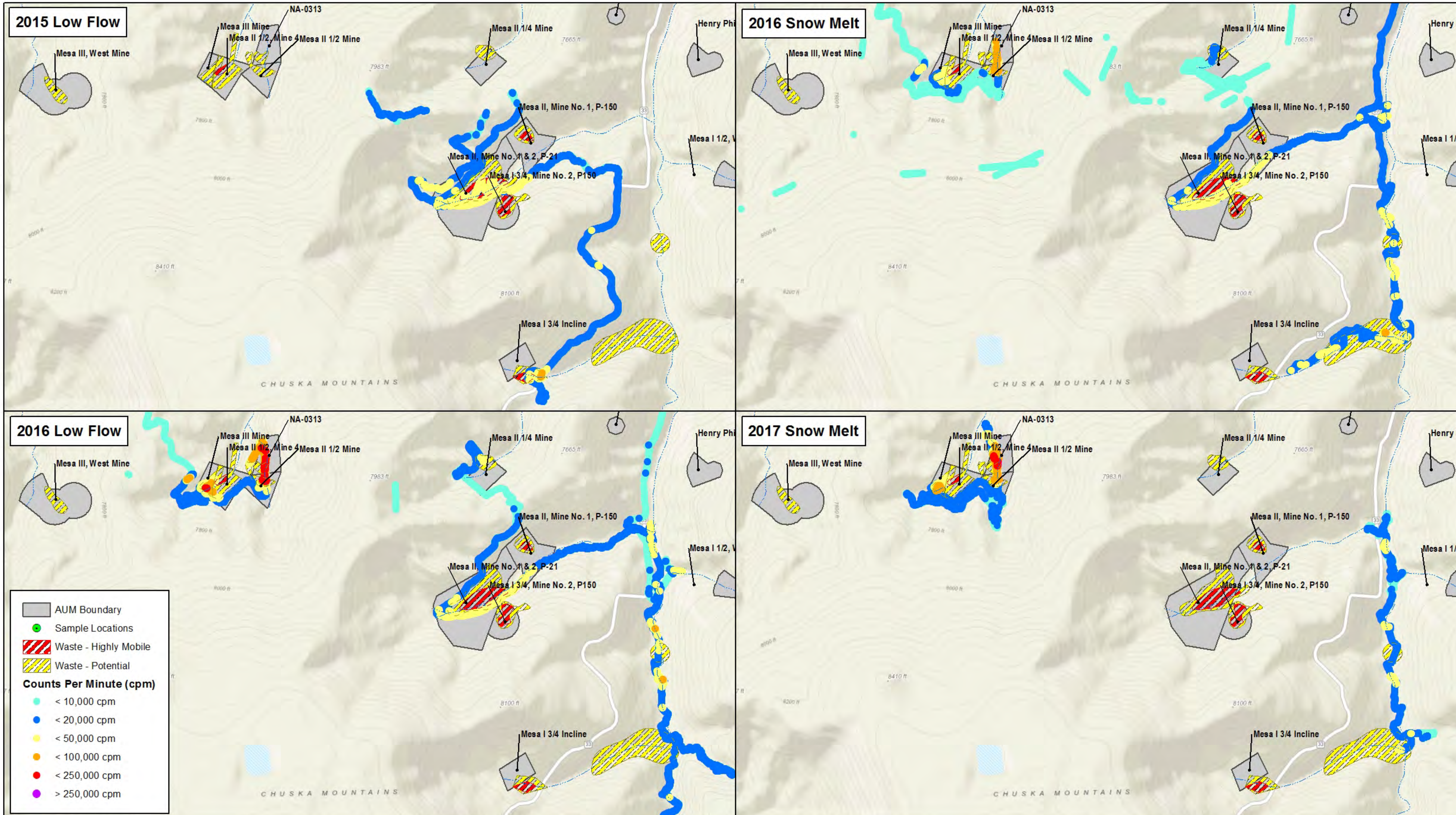

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Figure 38
Gamma Radiation Scanning Results at Mesa II Waste Pile Locations
Cove Wash Watershed Assessment
Apache County, Navajo Nation, AZ

Contract: EP-S5-13-02; **TDD:** 0025/1302-T25-R9-16-03-0001

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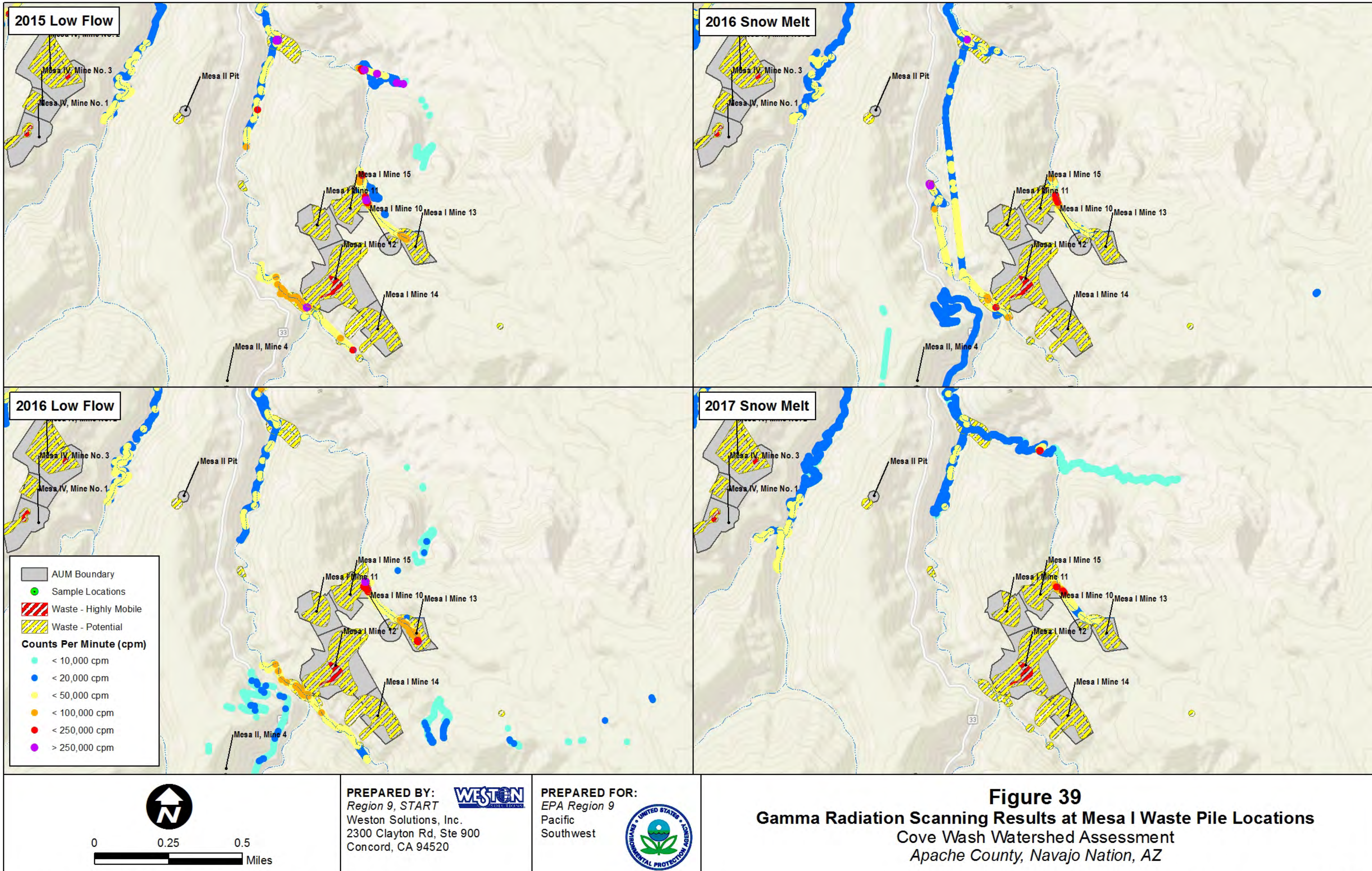

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Figure 39
Gamma Radiation Scanning Results at Mesa I Waste Pile Locations
Cove Wash Watershed Assessment
Apache County, Navajo Nation, AZ

Contract: EP-S5-13-02; **TDD:** 0025/1302-T25-R9-16-03-0001

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APPENDIX A:

REVISED 2017 SAMPLING AND ANALYSIS PLAN

REVISED
SAMPLING AND ANALYSIS PLAN

COVE WASH WATERSHED ASSESSMENT SITE

Navajo Nation, Cove Chapter, Apache County, Arizona

Prepared for:

United States Environmental Protection Agency
Emergency Response Section, Region 9

Contract No.: EP-S5-13-02
TDD No.: 0025/1302-T25-R9-16-03-0001

Document Control No.: 0100-08-AAVA

April 2017

Prepared by:

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REVISED
SAMPLING AND ANALYSIS PLAN

COVE WASH WATERSHED ASSESSMENT SITE

Navajo Nation, Cove Chapter, Apache County, Arizona

Contract No.: EP-S5-13-02
TDD No.: 0011/1302-T11-R9-15-03-0001

Document Control No.: 0100-08-AAVA

April 2017

Prepared by: ______________________________ ____________
Tara Fitzgerald, START Project Manager — Date
Weston Solutions, Inc.

Approved by: ______________________________ ____________
Gaelle Glickfield, Task Monitor — Date
U.S. Environmental Protection Agency, Region 9

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ABBREVIATIONS AND ACRONYMS

$\delta^{18}O$	$^{18}O/^{16}O$
AOC	area(s) of concern
AUM	abandoned uranium mine
bgs	below ground surface
°C	degrees Celsius
COC	constituent(s) of concern
cpm	counts per minute
DMP	Data Management Plan
DQI	Data Quality Indicators
DQO	Data Quality Objectives
EPA	U. S. Environmental Protection Agency
ERT	Environmental Response Team
GIS	geographic information system
GPS	Global Positioning System
IDW	investigation-derived waste(s)
KPA	Kinetic Phosphorous Analysis
LCS	Laboratory Control Samples
MCL	Maximum Contaminant Level
MS/MSD	Matrix Spike/Matrix Spike Duplicate
µg/L	micrograms per liter
µm	micrometer
NNEPA	Navajo Nation Environmental Protection Agency
NNSWQS	Navajo Nation Surface Water Quality Standards
pCi/g	picocuries per gram
PE	performance evaluation
PM	Project Manager
PPE	personal protective equipment
QA	quality assurance
QC	quality control

ABBREVIATIONS AND ACRONYMS, CONT.

RPD	relative percent difference
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan
SD	standard deviation
SOP	Standard Operating Procedures
START	Superfund Technical Assessment and Response Team
TAL	Target Analyte List
TDD	Technical Direction Document
TM	Task Monitor
USGS	U. S. Geological Survey
WESTON	Weston Solutions, Inc.

1. INTRODUCTION

The U. S. Environmental Protection Agency (EPA) tasked Weston Solutions, Inc.'s (WESTON®) Superfund Technical Assessment and Response Team (START) to conduct a watershed assessment at the Cove Wash Watershed Sites in the Cove Chapter of the Navajo Nation, Apache County, Arizona.

The watershed assessment includes sampling of surface water and sediment samples to delineate the source(s) contributing to the contamination in drainages throughout the watershed. Water parameters such as temperature and conductivity will be measured at each surface water sampling point. Additionally, the flow at each surface water sampling point will be estimated. Waste volumes will be determined by measuring surface areas and elevations of mine waste located in the drainages of the Cove Wash. Ground surface gamma radiation surveys will be conducted within Cove Wash watershed drainages to identify areas of high gamma activity. Groundwater wells, seeps, and springs will be sampled in order to assess potential impacts of historical uranium mining in the Cove Wash watershed.

This revised Sampling and Analysis Plan (SAP) describes the project and data use objectives, data collection rationale, data quality assurance (QA) goals, and requirements for sampling and analysis activities. It also defines the sampling and data collection methods that will be used for this project. This SAP is intended to accurately reflect the planned data-gathering activities for this task; however, site conditions, budget, and additional EPA direction may warrant modifications. All significant changes will be documented in site records.

The specific field sampling and chemical analysis information in this SAP was prepared according to the following EPA documents: *EPA Requirements for Quality Assurance Project Plans, EPA QA/R 5, EPA/240/B 01/003 (EPA 2001b); Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA QA/G 4, EPA/240/B-06/001 (EPA 2006); Guidance on Choosing a Sampling Design for Environmental Data Collection, EPA QA/G 5S, EPA/240/R02/005 (EPA 2002a); and Uniform Federal Policy for Implementing Environmental Quality System, EPA/505/F-03/001 (EPA 2005).*

1.1 PROJECT ORGANIZATION

The following is a list of project personnel and their responsibilities.

EPA Federal Task Monitor (TM)—The TM is Gaelle Glickfield. Ms. Glickfield is the primary decision-maker and will direct the project, specify tasks, and ensure that the project is proceeding on schedule and within budget. Additional duties include coordination of all preliminary and final reporting and communication with the Navajo Nation Environmental Protection Agency (NNEPA), START Project Manager (PM), EPA Environmental Response Team (ERT), EPA QA Office, and community residents. The EPA TM is also responsible for access to each property to be investigated.

START PM—The START PM is Ms. Tara Fitzgerald. The START PM is responsible for implementing the SAP, coordination of project tasks and field sampling, project management, and completion of all preliminary and final reporting.

Principal Data Users—Data generated during the implementation of this SAP will be utilized by the EPA TM to make decisions regarding further action at the site, if necessary.

Analytical Laboratory Support—The START-contracted laboratories are Isotech Laboratories, Inc. and ALS. The laboratories are responsible for sample analyses by definitive analytical methodologies. START is responsible for field data analysis and data validation of laboratory-generated data.

1.2 DISTRIBUTION LIST

Copies of the SAP will be distributed to the following persons and organizations:

Gaelle Glickfield, EPA Region 9 TM
WESTON START Field Team
WESTON START Project Files

1.3 STATEMENT OF THE SPECIFIC PROBLEM

A total of 50 abandoned uranium mines (AUMs) are located within the Cove Wash watershed. Twenty-six of the AUMs were historically operated by Kerr McGee, which became Tronox. Previous studies have identified uranium and other constituents of concerns (COCs), including arsenic and molybdenum, within surface water, groundwater, and sediments (Lameman-Austin 2012, NNEPA 2014). Previous gamma screenings conducted in 2008 by WESTON identified elevated levels in the AUMs throughout the watershed and within surveyed drainages below. Additionally, unreclaimed mining waste has been identified within Cove Wash drainages during previous investigations. Due to the large number of AUMs present within the Cove Wash watershed, it is not clear which AUMs are contributing to the elevated concentrations of COCs. The watershed assessment will collect samples throughout the watershed, downstream of each AUM if possible, in order to determine the source(s) of COCs.

2. SITE BACKGROUND

2.1 SITE LOCATION AND DESCRIPTION

The Site consists of the Cove Wash watershed, which includes 50 of the 70 AUMs within the Lukachukai Mountains. The Cove Wash watershed is located within the Navajo Nation and extends at the highest elevations in the Lukachukai Mountains and downstream to Cove, Arizona. The watershed contains approximately 52 miles of tributaries and is defined by the U.S. Geological Survey (USGS) as Hydrologic Unit Code 140801050903. Annual precipitation averages 12 to 16 inches throughout the watershed. The site location is shown in Figure 1. AUMs located in the Cove Wash watershed are shown in Figure 2.

The Cove Wash watershed is not a known drinking water source, but may have been historically used by residents before drinking water was provided by a municipal source 20 years ago. However, it is not entirely clear if residents are currently using surface water and/or groundwater wells for drinking water (Lameman-Austin 2012, NNEPA 2014). Additionally, the Cove Wash watershed is used extensively for drinking water for grazing livestock. Livestock are dependent on surface water and groundwater for drinking.

2.2 SITE HISTORY

Uranium outcrops were discovered within the Cove Wash watershed in the late 1940s. In the late 1940s Dan Phillips obtained a 528-acre lease, and Koley Black obtained a 640-acre lease. Mr. Phillips and Mr. Black assigned a 75% interest in their leases to F.A. Sutton, Inc. Uranium and vanadium ore shipments from the watershed began in 1950 (NNEPA 2004). The mine sites were situated along mesas throughout the watershed. Uranium and vanadium mining ceased in the 1960s and the mine sites were abandoned. The Navajo Nation reclaimed AUMs in the 1990s, but inaccessible mine waste remains present throughout the watershed (Lameman-Austin 2012).

2.3 SITE-SPECIFIC THREATENED AND ENDANGERED SPECIES PROTECTIVE MEASURES

The U.S. Fish and Wildlife Service reviewed the Biological Assessment Report for the Cove Wash Radiological Survey and concurred with the EPA's determination that planned sampling activities may affect, but not adversely affect the Mexican spotted owl, Navajo sedge and Zuni fleabane (EPA 2014; USFWS 2014). The following describes protective measure that will be conducted to minimize impacts from the sampling teams to the threatened and endangered species.

The canyon areas of the Cove Wash watershed are suitable nesting habitats for the Mexican spotted owl from spring to summer. During June 2015 sampling activities, Mexican spotted owls were visually observed within a drainage running between Mesa I and Mesa II. In November 2015, a Navajo Nation Fish & Wildlife Service conducted reconnaissance activities within the three main drainages of the Cove Wash watershed and determined that suitable habitat was located for the Mexican spotted owl. Mexican spotted owl surveys conducted in 2016, as well as sampling events conducted in 2016, determined that Mexican spotted owls were present in Cove

Middle 1, Cove Middle 3, and Cove Middle North drainages. Care should be taken during field activities in the canyons to ensure that Mexican spotted owl nests are avoided. In the event Mexican spotted owl nests are observed during watershed assessment activities, sampling team members will be notified and the time to pass the nesting areas will be kept to a minimum and personnel will not linger or disturb the Mexican spotted owls if they are encountered.

Wet or moist sediments and soil along the Cove Wash watershed provide aquatic habitats for plants including the Navajo sedge. Upland areas along mine roads in the watershed may be habitat for the Zuni fleabane. The sampling team members will avoid trampling on vegetation while traversing the streams and upland areas. Sediment samples will be collected at locations that will not impact vegetation.

2.4 PREVIOUS INVESTIGATIONS

In 1999, the EPA collected surface water and groundwater samples within the Cove Wash watershed and analyzed the samples for metals and radionuclides. Uranium and other metals exceeded EPA Maximum Contaminant Levels (MCLs) for drinking water in some samples collected during the investigation. Of the 21 water samples collected, 12 water samples contained COCs in exceedance of EPA MCLs for at least one COC, including arsenic, uranium, selenium, and vanadium (Lameman-Austin 2012).

In 2008, WESTON conducted AUM screenings throughout the Lukachukai Mountains, including AUMs located within the Cove Wash watershed. The AUM screenings consisted of gamma radiation screenings in the vicinity of a majority of AUMs in the watershed. Gamma readings two to three times background were detected at multiple AUMs during the 2008 AUM screenings.

In 2011, Terri Lameman-Austin conducted a study of the uranium distribution throughout the Cove Wash watershed as part of a Master's Degree fulfillment requirement with the assistance of the USGS. A total of seven surface water, three groundwater, and 26 sediment, rock, and soil samples were collected and analyzed for metals, including uranium and other trace metals. Uranium concentrations exceeded the EPA MCL of 30 micrograms per liter (µg/L) in all surface water samples collected during the study. Arsenic was detected above the EPA MCL of 10 µg/L in one surface water sample collected within the Cove Wash watershed. Uranium was detected above the MCL in one well sample (Ellison Well).

Surface water and groundwater samples were also analyzed for major cations and anions, alkalinity, and stable oxygen isotopes (^{16}O and ^{18}O) in order to determine the ratio of $^{18}O/^{16}O$ ($\delta^{18}O$). As ^{16}O has a lower vapor pressure that ^{18}O, the $\delta^{18}O$ results can be used to determine additional information about surface water sources and the study report recommends that future investigations analyze water samples for $\delta^{18}O$. The study report also noted that uranium isotope (^{234}U and ^{238}U) concentrations in water samples can be used to evaluate groundwater residence times. Selected samples will be analyzed for stable oxygen isotopes. All water samples collected during this watershed assessment will be submitted for uranium isotope analysis, ^{234}U and ^{238}U.

The NNEPA completed a Surface Water Quality Assessment Report (Integrated 305(b) Report (pending revision) and 303(d) Listing) in 2014 (NNEPA 2014). The report summarized water quality sampling events conducted at two locations downgradient of historical mining activity in the Cove Wash watershed. Data used for the assessment were from a 2001 sampling event for one sampling location, and from 2011 and 2012 for the second sampling location. The NNEPA compared concentrations of COCs found at the two locations to Navajo Nation Surface Water Quality Standards (NNSWQS) adopted by the Navajo Nation in 2013 and pending approval by the EPA. Sampling results for the surface water location in 2001 did not meet NNSWQS standards for gross alpha radioactivity, chlorine, and selenium. Sampling results for the surface water samples in 2011 and 2012 did not meet NNSWQS standards for gross alpha radioactivity, aluminum, and dissolved oxygen. The assessment recommended that the Cove Wash watershed be designated as impaired per the U.S. Clean Water Act Sections 305(b) and 303(d). The assessment also recommends that a total maximum daily load for gross alpha radioactivity be developed for the Cove Wash watershed.

In June 2015, the first sampling event was conducted within the Cove Wash watershed. A Spring Snowmelt sampling event was conducted from March 21, 2016 to April 1, 2016. START initially collected water and sediment samples only from the lower elevation areas of the Site because the higher elevation areas were inaccessible due to snowpack. Based on these limitations, WESTON temporarily demobilized project personnel on March 31 and April 1, 2016. WESTON personnel were re-mobilized to the Site on April 26, 2016, and sampling of the upper elevation areas of the Cove Wash watershed commenced on April 27, 2016. Sampling was concluded on May 3, 2016.

A final meeting was held on May 4, 2016 with WESTON and EPA regarding the completed sampling event and considerations for the upcoming low-flow sampling event at the Cove Wash watershed planned for June 2016. WESTON personnel demobilized from Farmington on May 5, 2016. WESTON mobilized project personnel for a low-flow sampling event on June 16, 2016. Sampling concluded on June 29, 2016. A final meeting was held on June 29, 2016 with WESTON and EPA regarding the completed sampling event and considerations for additional sampling events at the Cove Wash watershed. WESTON personnel demobilized from Farmington by July 1, 2016. Sampling results for 2015, 2016, and 2017 will be discussed in a watershed assessment report pending April 2017 field activities.

3. PROJECT OBJECTIVES

3.1 DATA USE OBJECTIVES

START will collect surface water, groundwater, and sediment samples, as well as conduct gamma radiation surveys in order to further characterize drinking water contamination and delineate the source(s) contributing to the contamination in the watershed. The analytical data collected as part of this watershed assessment will be used to answer the following site-specific study questions:

A. What is the extent of COC concentrations in surface water, groundwater, and sediments throughout the Cove Wash watershed?

B. Are the concentrations of COCs in surface water and groundwater present at concentrations above the MCL for drinking water?

C. Are the concentrations of COCs in sediments present at concentrations above the EPA Regional Screening Levels (RSLs) for protection of groundwater?

D. Is waste rock present within Cove Wash watershed drainages contributing to elevated concentrations of COCs within the watershed?

E. What are potential sources of contamination contributing to elevated concentrations of COCs within the watershed?

3.2 PROJECT TASKS AND SAMPLING OBJECTIVES

The EPA tasked START to prepare this SAP to support the environmental data collection activities needed to document implementation and completion of the removal assessment. The purpose of data collection procedures presented in this SAP is to determine: the number, location, and type of proposed samples; the field sample collection and laboratory analytical methods and procedures; and the data quality assurance and validation procedures. The primary objectives for this assessment are to delineate AUM sources of contamination to the Cove Wash watershed and characterize contamination within the watershed. The data collected will be utilized to:

1. Determine the potential threat to human health or the environment from COCs originating from AUM waste within the Cove Wash watershed drainages which exceed the proposed action level protective of human health.
2. Determine the lateral ground surface boundaries where elevated gamma radiation activity is present within the Cove Wash watershed drainages.
3. Identify waste rock boundaries within Cove Wash watershed drainages.
4. Determine current COC concentrations within groundwater from wells throughout the Cove Wash watershed.

3.3 ENVIRONMENTAL SCREENING LEVELS

The screening levels for surface water and groundwater are MCLs for drinking water. Screening levels for sediments are EPA RSLs for the protection of groundwater. These screening levels will serve as evaluation tools to help determine whether further characterization or other actions are recommended for the Site. Screening levels are presented in Tables 3-1 and 3-2 in Section 3.5.

3.4 DATA QUALITY OBJECTIVES (DQO)

The DQO process, as set forth in the EPA Guidance on Systematic Planning Using the Data Quality Objectives Process (EPA/240/B-06/001) (EPA 2006), was followed to establish the DQOs for this project. The DQOs and the outputs for this project are included in Appendix A.

3.5 DATA QUALITY INDICATORS (DQI)

Measurement Quality Objectives are criteria established to assess the viability and usability of data. These are based on both field and laboratory protocols that examine whether the DQIs meet the established criteria for this project. DQI goals for this project were developed using the guidelines provided in *EPA Guidance for Quality Assurance Project Plans,* EPA QA/G-5 (EPA 2002b).

All sampling will be guided by procedures detailed in Sections 4.0 and 6.0 as well as Standard Operating Procedures (SOPs) to ensure representativeness of sampling results. Screening levels for surface water/groundwater, and sediment are shown in Tables 3-1 and 3-2, respectively. Approved EPA methods and standard reporting limits will be used. All data not rejected will be considered complete.

Table 3-1 Screening Levels and DQI Goals for Surface Water and Groundwater

Analyte	Screening Level*	Reporting Limit (µg/L)	Accuracy (Percent Recovery for LCS)	Precision (RPD for MSD and duplicates)	Percent Complete
Arsenic	10 µg/L	10 µg/L	75-100	≤ 35%	≥90
Selenium	5 µg/L	5 µg/L	75-100	≤ 35%	≥90
Uranium	30 µg/L	1 µg/L	75-100	≤ 35%	≥90
Combined Radium - 226+228	5 pCi/L	1 pCi/L	75-100	≤ 35%	≥90
Gross-alpha radiation	15 pCi/L	5 pCi/L	75-100	≤ 35%	≥90

Notes:
* EPA Maximum Contaminant Level
≥ = greater than or equal to
≤ = less than or equal to
µg/L = micrograms per liter
LCS = laboratory control sample
MS/MSD = Matrix Spike/Matrix Spike Duplicate
pCi/L = picocuries per liter

RPD = relative percent difference

Table 3-2 Screening Levels and DQI Goals for Sediment

Analyte	Screening Level* (mg/kg)	Reporting Limit	Accuracy (Percent Recovery for LCS)	Precision (RPD for MS/MSD and duplicates)	Percent Complete
Arsenic	0.29	0.260mg/kg**	75-100	≤ 35%; ≤ 50% for field duplicates	≥90
Selenium	0.26	0.158mg/kg***	75-100	≤ 35%; ≤ 50% for field duplicates	≥90
Uranium	14	0.1 mg/kg	75-100	≤ 35%; ≤ 50% for field duplicates	≥90
Combined Radium - 226+228	Not Applicable	1 pCi/g	75-100	≤ 35%; ≤ 50% for field duplicates	≥90

Notes:
* EPA Regional Screening Level (RSL) - Protection of groundwater Soil Screening Level (mg/kg)
** The Reporting Limit for arsenic is 1 mg/kg, which exceeds the screening level. Therefore, the method detection limit will be used to evaluate arsenic concentrations in sediment.
** The Reporting Limit for selenium is 0.5 mg/kg, which exceeds the screening level. Therefore, the method detection limit will be used to evaluate arsenic concentrations in sediment.
≥ = greater than or equal to
≤ = less than or equal to
LCS = laboratory control sample
mg/kg – milligrams per kilogram
MS/MSD = Matrix Spike/Matrix Spike Duplicate
pCi/g = picocuries per gram
RPD = relative percent difference

3.6 SPECIAL TRAINING REQUIREMENTS/CERTIFICATIONS

The operation of the field analytical instruments requires specialized training that will be administered, prior to mobilization, to all START personnel scheduled to be on Site.

Data validation requires specialized training and experience. START will determine and verify a qualified data validation resource prior to data validation.

Field sampling personnel have experience with soil sampling at hazardous waste sites while wearing appropriate personal protective equipment (PPE). At least one field sampler will be trained and familiar with Global Positioning System (GPS) data collection and SCRIBE software. All sampling personnel must have appropriate training that complies with 29 Code of

Federal Regulations 1910.120. The site-specific health and safety plan for this project is to be appended to this plan by START (Appendix B).

4. SAMPLING RATIONALE AND DESIGN

START reviewed available site information including previously collected gamma radiation data, and the EPA's objectives for this removal assessment, to determine a specific sampling design. The following sections describe the specific sampling designs that will be implemented during this removal assessment. The number of samples to be collected and the analyses to be performed are presented in Section 5.2 in Tables 5-1 and 5-2. Sample locations were chosen in order to obtain information on Site conditions during various temporal conditions including monsoon, spring snow melt, and arid seasons.

4.1 SAMPLING SCHEDULE

Field activities are anticipated to take place over two weeks from April 17, 2017, to April 29, 2017. Up to nine START personnel will conduct field activities during the watershed assessment. The sampling schedule is summarized in Table 4-1.

Table 4-1: Sampling Schedule Summary

Date	Hike Team Locations	ATV Team Locations	Comments
4/17/2017	Mobilize	Mobilize	-
4/18/2017	Set up ERIC and collect samples at dam and in vicinity as a group to review sampling protocol (CW-05, CW-18, CW-39, CW-42, CW-77).	Set up ERIC and collect samples at dam and in vicinity as a group to review sampling protocol (CW-05, CW-18, CW-39, CW-42, CW-77).	Diné College interns onsite. Go over HASP and sample protocol with interns.
4/19/2017	Sample Upper Middle 3 - CW-20/20a, CW-74, CW-75.	Sample Upper Middle 3 - CW-65, CW-66, CW-19, CW-19-12 (subsurface), CW-73.	Any additional locations with water in these drainages should be sampled in order to further characterize this area.
4/20/2017	Sample Cove Middle 2 - CW-36, CW-37, CW-38.	Three days - Sample Cove Wash North - CW-11, CW-15, CW-16, and CW-64. Sample upper Middle 1 locations that must be accessed via the Mesa road - CW-32, CW-55. Sample Middle 2 locations that must be accessed from the Mesa road - CW-26, CW-27, and CW-29.	Diné College interns onsite. CMEH botanist onsite.-
4/21/2017	Two days - Sample Cove Middle 2 -4 or more new sample locations upstream -CW-82, CW-83, CW-84, CW-85.	Three days - Sample Cove Wash North - CW-11, CW-15, CW-16, and CW-64. Sample upper Middle 1 locations that must be accessed via the Mesa road - CW-32, CW-55. Sample Middle 2 locations that must be accessed from the Mesa road - CW-26, CW-27, and CW-29.	CMEH botanist onsite.--
4/22/2017	Two days - Sample Cove Middle 2 -4 or more new sample locations upstream -CW-82, CW-83, CW-84, CW-85.	Three days - Sample Cove Wash North - CW-11, CW-15, CW-16, and CW-64. Sample upper Middle 1 locations that must be accessed via the Mesa road - CW-32, CW-55. Sample Middle 2 locations that must be accessed from the Mesa road - CW-26, CW-27, and CW-29.	-

4/23/2017	Day off	Day off	
4/24/2017	Sample Middle 1 sites accessible via drainage - CW-50, CW-51, CW-52, CW-54, CW-53a.	Sample upper Mesa I site and background sites to south of Mesa I - CW-44, CW-45, CW-46, CW-47.	Although there are many sites for the hike team, CW-51 and CW-52 are always dry. Total of 3 water sample volumes to be collected by hike team.
4/25/2017	Sample Middle 3 sites - CW-12, CW-18, CW-48, and CW-70. If time - continue on to CW-13, CW-14, and CW-56a	Sample additional background locations to north - CW-04, CW-21, CW-30, CW-31. Pick up sample volumes from ATV road along Middle 3 to facilitate sampling.	If CW-70 is dry, do not collect sediment sample. May need waders at CW-13 location and further upstream. Collect background gamma scan at background location CW-31.
4/26/2017	Complete sampling up Middle 3 sites if not finished. Work with ATV team to sample locations downstream of dam (CW-05).*	Collect sample locations downstream of dam (CW-05).*	Diné College interns onsite.
4/27/2017	Complete sampling of locations downstream of dam (CW-05).*	Potentially collect gamma scanning data from the mesa roads.	Diné College interns onsite.
4/28/2017	Demobe from ERIC, return ATVs, ship all samples.	Demobe from ERIC, return ATVs, ship all samples.	-
4/29/2017	Demobilization.	Demobilization.	-

Notes:
*- Samples to be collected downstream of the dam (sample location CW-05) are not individually called out in Table 4-1, but included for sampling on April 26, 2017 and April 27, 2017.

4.2 DETERMINATION OF BACKGROUND

Sampling and analysis of background samples for gamma radiation, metals (including uranium), and selected radioisotopes are required to determine naturally-occurring gamma radiation and COC concentrations in an area with similar geology and no known or suspected impacts from mining. The background area will be selected in the field according to the Background Location Selection Criteria (NNEPA and EPA 2010). The background area will be easily accessible, an appropriate distance from the Site, and historically undeveloped based on visual observation. Background locations determined during the 2012 watershed study by Teri Lameman-Austin (Lameman-Austin 2012) will be sampled during the watershed assessment. Although historical contamination from AUMs is already established in the Cove Wash watershed, background concentrations remain important in understanding the contributions of individual abandoned mines to the concentrations of COCs in the watershed. Background sampling locations collected during previous sampling events are shown in Figure 3.

4.2.1 Background Gamma Radiation Investigation Level

A gamma radiation survey unit measuring 50-feet by 50-feet will be established in the selected background location. Gamma radiation in surface soil will be measured using a GPS assisted portable ratemeter and detector. The background survey unit will consist of transects spaced 5-feet apart, which will provide 99-100% characterization of the Site. The transect width is based on the field-of-view of the detector which is about 3-feet in diameter. The surveyor will walk at a pace of 3-feet per second. The mean and standard deviation (SD) of the gamma radiation measurements in the background surface soil will be calculated to develop the investigation level for gamma radiation at the site. An acceptable background area will have a low mean and SD. In the event poor satellite reception prevents the GPS from recording positions, the approximate sampling area location will be identified on a printed aerial image or topographic map in the field. The GPS continues to log gamma radiation measurements from the ratemeter at 1-second intervals without satellite reception.

4.2.2 Background Surface Water and Sediment Sampling

Surface water and sediment samples collected from locations in June 2015 upstream of historical mining activity in the Cove Wash watershed are shown in Figure 3. Surface water will be collected at all background locations collected during previous sampling events pending surface water presence.

4.2.3 Stationary Gamma Measurements

Stationary 1-minute gamma measurements will be collected at selected suspect locations across the Site, identified by the gamma-scanning data. The stationary measurements will be more accurate than scanning measurements because they are integrated over 1-minute intervals versus 1-second intervals for the gamma scanning measurements. Stationary measurements will be made with the same type of instrumentation, and at the same height (6-inches) above ground surface as the gamma-scanning measurements. The precise height above ground surface is not critical during scanning measurements, but should be consistently set at 6-inches for each stationary measurement. These measurements will be collected using the same type of instrument and GPS system, though a second instrument set may be required for these measurements at suspect areas in order to efficiently conduct the required measurements in the time allotted.

4.2.4 Gamma Scanning

The 1-minute stationary gamma measurements described in Section 4.1.3 will likely depict a representation gamma activity at areas of specific concern. However, these 1-minute measurements may not coincide with the overall Site conditions. Gamma scanning will be employed to locate the spots with the maximum gamma activity.

Gamma scanning does not provide a quantitative assessment of Site conditions but is an excellent tool to assess the relative gamma activity of the area. The scanning procedure allows rapid assessment of a large area, sensitive detection of gamma radiation levels in excess of the background value, reasonably accurate delineation of areas where gamma radiation levels are elevated, and identification of small areas with the highest gamma count rates that have the highest potential for an observed release. The gamma scanning results will be presented on maps using geographic information system (GIS) software to illustrate areas of elevated gamma activity and to identify where additional measurements and sampling efforts should be placed.

Gamma scanning will be performed in Cove Wash drainages containing visible waste rock from upstream AUMs. The field team member will walk the area around the points where the highest 1-minute measurements were collected, attempting to locate the spot of maximum gamma count rate. When performing this scan, 100% of the hot spot should be surveyed.

Gamma scanning will be conducted using a GPS assisted portable ratemeter and detector. The detector will be hand-held approximately 6-inches above the soil surface. The instrument will be set with an open window to allow detection of the broad spectrum of gamma energies associated with the naturally occurring radionuclides. Gamma activity measurements are recorded at 1-second intervals by the GPS with corresponding positional data. The field-of-view for this detector system is roughly a circle of about 3-feet in diameter.

Gamma activity is recorded by the GPS in units of gamma counts per minute (cpm). The data are collected in 1-second intervals and the ratemeter calculates the gamma counts as cpm. Any slight variation in the collected count rate is magnified by this automated conversion and individual readings will be more variable than those from the 1-minute gamma measurements. Individual gamma scan measurements will include occasional statistical outliers that do not indicate elevated gamma activity.

Because of this statistical variation, these gamma-scanning data are not used for comparison to the observed release criteria for gamma measurements. These data are used to qualitatively evaluate the Site and identify areas where sediment samples should be collected and stationary gamma measurements made.

4.2.5 Surface Water and Sediment Sampling

An estimated 50 surface water samples, including up to eight background samples, may be collected from the Cove Wash watershed at locations at, or downstream, of AUMs within the watershed. The locations will include previous investigation sampling locations and June 2015 watershed assessment sampling locations. A total of 20 surface water/sediment sampling locations will correspond with previous investigation sampling locations (Lameman-Austin 2012, NNEPA 2014). Surface water and sediment sampling locations are located directly downgradient of historical uranium mines and directly downstream of where drainages converge. The sampling locations are meant to delineate potential sources of COCs to the Cove Wash watershed. Additionally, up to 10 additional surface water and sediment samples may be collected in depositional areas (areas in drainages with sediment accumulation) at field determined locations. Additional samples may be collected based on field observation and gamma scanning. It is likely that many sampling locations will not contain surface water during the sampling event. In the case that surface water is not present, sediment samples will still be collected at each sampling location.

A sample volume of approximately 9.8 liters will be collected at each surface water location. Approximately 5.25 liters of surface water will be filtered using 0.45 micrometer filter before analysis. The samples will be filtered on site. As the criteria to which these results will be compared are the EPA's drinking water standards, all mud and other material must be removed before analysis. Otherwise, entrained mud and sediments which contain uranium and radium will influence the analytical result of the water. Approximately 1-gallon of collected surface water will be submitted for all analyses without filtering in order to determine total concentrations of COCs. Gamma spectrometry analysis is not recommended for water samples as the sensitivity of the analysis is not adequate to meet the EPA drinking water criteria. The laboratory will be requested to perform gross alpha analysis on each sample. Isotopic and total uranium analysis will be conducted, preferably by Kinetic Phosphorous Analysis (KPA), and radium isotopes (Ra-226 / Ra-228) analysis. The suite of metals to be analyzed in each surface water sample includes aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chromium (total), cobalt, copper, iron, lead, lithium, manganese, magnesium, mercury, molybdenum, nickel, potassium, phosphorous, selenium, silver, sodium, strontium, thallium, total uranium, vanadium, and zinc.

Alkalinity, ammonia, and major anions (including chloride, fluoride, nitrate and nitrite as total nitrogen, and sulfate anions) will be measured for all filtered surface water samples only. Additional metals, alkalinity, ammonia, and major anions were added in the revised SAP based on review of June 2015 sampling results and additional input from Terri Lameman-Austin and the USGS.

In addition, $\delta^{18}O$ and the activity ratio of $^{234}U/^{238}U$ in water samples can be used to evaluate the residence time of surface water and groundwater within the subsurface. Therefore, selected surface water samples will be analyzed for stable isotopes ^{16}O and ^{18}O. The concentrations of uranium isotope ^{234}U will be determined as part of the isotopic uranium analysis for all water samples.

A sample mass of approximately 1 kilogram will be collected at all sediment sampling locations from a depth of 0 to 6-inches using a dedicated disposable plastic trowel or hand auger, and will be homogenized. Rocks of greater than approximately 0.25-inch diameter should be discarded, as should any biological material such as grass or twigs.

Sediment samples will be analyzed by gamma spectrometry for radium and uranium isotopes. The suite of metals to be analyzed in each sediment sample include the modified TAL metals, total uranium and molybdenum.

4.2.6 Groundwater Sampling

Well-construction information is not available for the groundwater wells to be sampled. Groundwater samples collected in 2011 during the uranium distribution study conducted by Terri Lameman-Austin were sampled by purging wells for 1 to 2 minutes and collecting the groundwater sample before the well went dry. Water level readings could not be collected as the wells are surrounded by a stone masonry box. The groundwater wells will be sampled following the same protocol utilized by Terri Lameman-Austin. One groundwater sampling location planned for the April 2017 collection event is shown in Figure 4. If additional wells are located during the sampling event, they will be sampled as well. Up to 8 groundwater wells can be sampled during the sampling event. When possible, additional well construction data will be collected at each well.

A sample volume of approximately 9.8 liters will be collected at each surface water location. Approximately 5.25 liters of surface water will be filtered using 0.45 micrometer filter before analysis. The samples will be filtered on site. As the criteria to which these results will be compared are the EPA's drinking water standards, all mud and other material must be removed before analysis. Otherwise, entrained mud and sediments which contain uranium and radium will influence the analytical result of the water. Approximately 1-gallon of collected surface water will be submitted for all analyses without filtering in order to determine total concentrations of COCs. Gamma spectrometry analysis is not recommended for water samples as the sensitivity of the analysis is not adequate to meet the EPA drinking water criteria. The laboratory will be requested to perform gross alpha analysis on each sample. Isotopic and total uranium analysis will be conducted, preferably by Kinetic Phosphorous Analysis (KPA), and radium isotopes (Ra-226 / Ra-228) analysis. The suite of metals to be analyzed in each surface water sample includes aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chromium (total), cobalt, copper, iron, lead, lithium, manganese, magnesium, mercury, molybdenum, nickel, potassium, phosphorous, selenium, silver, sodium, strontium, thallium, total uranium, vanadium, and zinc.

Alkalinity, ammonia, and major anions (including chloride, fluoride, nitrate and nitrite as total nitrogen, and sulfate anions) will be measure for all filtered surface water samples only.

Additional metals, alkalinity, ammonia, and major anions were added in the revised SAP based on review of June 2015 sampling results and additional input from Terri Lameman-Austin and the USGS.

In addition, $\delta^{18}O$ and the activity ratio of $^{234}U/^{238}U$ in water samples can be used to evaluate the residence time of surface water and groundwater within the subsurface. Therefore, selected surface water samples will be analyzed for stable isotopes ^{16}O and ^{18}O. The concentrations of uranium isotope ^{234}U will be determined as part of the isotopic uranium analysis for all water samples.

4.2.7 Subsurface Sediment Sampling

In addition to two subsurface background samples, up to eight subsurface samples (up to 10% of sediment locations) will be collected within mining waste deposited in Cove Wash watershed drainages using a hand auger or dedicated plastic trowel. Subsurface samples will be collected in order to further characterize mine waste that has migrated into the watershed. The depth of subsurface sediment samples will be determined in the field and will range from 6 to 18 inches.

4.3 CONSTITENTS OF CONCERN

Analytes detected during previous surface water sampling events at concentrations above the EPA MCL are COCs, including arsenic, selenium, uranium, radium 226, and gross-alpha radioactivity.

5. REQUEST FOR ANALYSES

Gamma radiation will be measured at the selected background locations, and at locations of mine waste in Cove Wash watershed drainages. Up to 45 surface water locations and 10 groundwater locations will be sampled. Surface and groundwater samples will be submitted for metals, alkalinity, ammonia, major anions, uranium and radium isotopes, gross-alpha radiation, and stable isotopes analysis. Up to 45 sediment locations will be sampled. Sediment samples will be submitted for metals, uranium and radium isotopes, and gross-alpha radiation analysis. All samples will be submitted to a START contracted laboratory.

5.1 FIELD ANALYSIS

5.1.1 Water Quality Measurements

Field measurements will be collected at each surface water sampling location including pH, temperature, conductivity, oxidation-reduction potential, and turbidity. Flow measurements will be collected at each surface water sampling location where flow is fast enough to measure. Flow will be estimated in the field. Visual observation of each surface water sample will be recorded.

5.1.2 Gamma Radiation in Surface Soils

Gamma radiation in surface soil will be measured in the field using a GPS assisted ratemeter and detector. Operational checks will be conducted on the paired meter and detector combinations before the field activities using a check source with 1 or 5 microcuries of Cobalt-60. The optimal high voltage setting for the instrument will be set using a Fluke voltage meter.

To provide quality control (QC) for the field analytical effort, the following measures will be utilized:

- Analytical precision and sensitivity of the gamma radiation survey equipment will be established before beginning the field measurements and will be verified throughout the field survey event through operational and background checks.
- Whenever possible, the same paired GPS-linked meter and detector used to establish the relationship between gamma radiation activity and Ra-226 concentrations in soil will be used for all surveys conducted at the Site.

5.2 LABORATORY ANALYSIS

5.2.1 Surface water and Groundwater Analyses

Surface and groundwater samples will be submitted for metals, alkalinity, ammonia, major anions, uranium and radium isotopes, gross-alpha radiation, and stable isotopes analysis. Sediment samples will be submitted for metals, uranium and radium isotopes, and gross-alpha radiation analysis to ALS Environmental and Isotech Laboratories. Sample containers, preservatives, holding times, and estimated number of soil confirmation and QC samples are summarized in Table 5-1.

To provide QC for the analytical program, the following samples will be collected/analyzed:

- Duplicate samples will be collected from 10 percent of the soil sampling locations or one per sample design group. Duplicate soil samples will be collected as a 50/50 split of the sample after collection and homogenization.
- If non-dedicated sampling equipment is used to collect soil samples at the site, a rinsate blank will be collected at a rate of one per day to evaluate decontamination procedures. The rinsate blank will be collected by pouring deionized water over the decontaminated sample collection device (e.g., trowel or hand auger) and capturing the water in the specified sample container.

Table 5-1 Surface Water and Groundwater Sampling and Analysis Summary

Method	Uranium Isotopes by DOE HASL 300 U-02-RC Modified, Ra-226 by EPA 903.0 Modified, Ra-228 by EPA 904.0 Modified, and Gross Alpha Radiation by EPA 900.1- High Solids (Dissolved and Undissolved)		Alkalinity by EPA 310.0, and Major Ions by EPA 300.0	Ammonia by EPA 350.1	Metals by EPA 200.7 and 200.8		Stable isotopes by CRDS
Field Sample Container and Preservative	1-gallon poly with HNO_3	1-gallon poly (unpreserved)	1-L poly (unpreserved)		500-mL poly with HNO_3	500-mL poly (unpreserved)	125-mL poly (unpreserved)
Sample Container and Preservative After Filtration	N/A	1-gallon poly with HNO_3	500-mL poly (unpreserved)	250-mL poly with H_2SO_4	N/A	500-mL poly with HNO_3	N/A
Container and Preservative Submitted to Laboratory	1-gallon poly with HNO_3 (unfiltered)	1-gallon poly with HNO_3 (filtered)	500-mL poly (filtered and unpreserved)	250-mL poly with H_2SO_4 (filtered)	500-mL poly with HNO_3 (unfiltered)	500-mL poly with HNO_3 (filtered)	125-mL poly (unfiltered and unpreserved)
Additional Preservation	None		Ice to 4°C	Ice to 4°C	Ice to 4°C		None
Analysis Holding Time	180 days		28 days	180 days	28-180 days		None
Laboratory	ALS Environmental						Isotech Laboratories
Maximum Estimated Number of Unique Discrete Samples	55	55	55	55	55		27
Maximum Estimated Number of Duplicate Samples	6	6	6	6	6		3
Maximum Total Site Sample Analyses	61	61	61	61	61		30

Location ID	Water Sample ID	Location	Latitude	Longitude
GW-01	CW-GW-01G	Red Point Dug Well	36.584991	-109.241684
CW-01	CW-SW-01	Cove Wash (Downstream)	36.596252	-109.17356
CW-02	CW-SW-02	Cove Wash (Downstream)	36.613418	-109.1356
CW-03	CW-SW-03	Cove Wash North	36.563918	-109.21204

CW-04	CW-SW-04	Background (Upstream)	36.542796	-109.26423
CW-05	CW-SW-05	Dam (Historical)	36.543625	-109.22727
CW-06	CW-SW-06	Cove Wash (Downstream)	36.59084	-109.21318
CW-07	CW-SW-07	Cove Wash Middle (Historical)	36.556102	-109.22198
CW-08	CW-SW-08	Background (Downstream)	36.584666	-109.2435
CW-09	CW-SW-09	Cove Wash North	36.576215	-109.23273
CW-10	CW-SW-10	Cottonwood Spring (Seeping capped well)	36.578312	-109.20941
CW-11	CW-SW-11	Cove Wash North	36.549811	-109.24287
CW-12	CW-SW-12	Cove Wash Middle 3	36.53364	-109.22597
CW-13	CW-SW-13	Cove Wash Middle 3	36.520617	-109.22465
CW-14	CW-SW-14	Cove Wash Middle 3E	36.518529	-109.22174
CW-15	CW-SW-15	Cove Wash North	36.54688	-109.24869
CW-16	CW-SW-16	Cove Wash North	36.54309	-109.25645
CW-17	CW-SW-17	Cove Wash South (Downstream)	36.584724	-109.18524
CW-18	CW-SW-18	Background (Cove Wash Middle 1)	36.542664	-109.23028
CW-19	CW-SW-19	Cove Mesa 2 (Historical)	36.511004	-109.23584
CW-20/20A	CW-SW-20	Cove Wash Middle 3C (Downstream of CW-20)	36.506631	-109.229642
CW-21	CW-SW-21	Background (Mesa IV Springs)	36.520639	-109.25845
CW-26	CW-SW-26	Cove Wash Middle 2 (Historical)	36.514976	-109.245
CW-27	CW-SW-27	Cove Wash Middle 2B	36.516673	-109.24303
CW-29	CW-SW-29	Cove Wash Middle 2C	36.515664	-109.23425
CW-30	CW-SW-30	Background (West Upstream)	36.554764	-109.27482
CW-31	CW-SW-31	Background (Upstream)	36.533559	-109.26728
CW-32	CW-SW-32	Cove Wash Middle 1E	36.528104	-109.26039
CW-36	CW-SW-36	Cove Wash Middle 2 (Historical)	36.533745	-109.23377
CW-37	CW-SW-37	Cove Wash Middle 2 (Historical)	36.531749	-109.23559
CW-38	CW-SW-38	Cove Wash Middle (Historical)	36.529913	-109.23627
CW-39	CW-SW-39	Cove Wash Middle 2	36.541361	-109.23004

CW-42	CW-SW-42	Irrigation Ditch	36.543225	-109.22708
CW-44	CW-SW-44	Background (Pine Water Springs Drainage)	36.526051	-109.1988
CW-45	CW-SW-45	Background (Deer Springs Drainage)	36.511164	-109.20118
CW-46	CW-SW-46	Background (Pine Water Springs)	36.525872	-109.19778
CW-47	CW-SW-47	Cove Wash Middle 3F	36.525663	-109.22075
CW-48	CW-SW-48	Cove Wash Middle 3F	36.53215	-109.22088
CW-50	CW-SW-50	Cove Wash Middle 1	36.536141	-109.24098
CW-51	CW-SW-51	Cove Wash Middle 1A	36.537003	-109.24575
CW-52	CW-SW-53	Cove Wash Middle 1G	36.533434	-109.24254
CW-53a	CW-SW-53a	Cove Wash Middle 1 (Near original location)	36.533641	-109.248269
CW-54	CW-SW-54	Cove Wash Middle 1B	36.535315	-109.24834
CW-55	CW-SW-55	Cove Wash Middle 1C	36.53294	-109.25363
CW-56a	CW-SW-56a	Cove Wash Middle 3A (Near original location)	36.52038	-109.224413
CW-59	CW-SW-59	Cove Wash Tributary 1 (Downstream)	36.595541	-109.16422
CW-60	CW-SW-60	Cove Wash between 01 and 02 (Downstream)	36.596295	-109.16347
CW-61	CW-SW-61	Cove Wash Tributary 2 (Downstream)	36.595593	-109.16679
CW-62	CW-SW-62	Downstream of Dam	36.549638	-109.22591
CW-64	CW-SW-64	Cove Wash North	36.545506	-109.25216
CW-65	CW-SW-65	Cove Wash Middle 3A	36.513428	-109.2281
CW-66	CW-SW-66	Cove Wash Middle 3A	36.513382	-109.22812
CW-70	CW-SW-70	Cove Wash Middle 3F	36.532903	-109.223409
CW-73	CW-SW-73	Cove Wash Middle 3D	36.512067	-109.226941
CW-74	CW-SW-74	Cove Wash Middle 3D	36.506627	-109.227337
CW-75	CW-SW-75	Cove Wash Middle 3D	36.502991	-109.227204
CW-77	CW-SW-77	Cove Wash Middle 3D	36.543152	-109.227264
CW-81	CW-SW-81	Cove Wash North	36.581191	-109.223994
CW-82	CW-SW-82	Cove Wash Middle 2A	36.528799	-109.23755
CW-83	CW-SW-83	Cove Wash Middle 2A	36.528353	-109.23915

CW-84	CW-SW-84	Cove Wash Middle 2	36.525785	-109.23746
CW-85	CW-SW-85	Cove Wash Middle 2	36.525421	-109.24192

Notes:
°C = degree Celsius
CRDS = cavity ring-down spectroscopy
NA = Not Applicable
TBD = To Be Decided

5.2.2 Sediment Analyses

Sediment samples will be analyzed for metals, uranium and radium isotopes, gross-alpha radiation. Sediment samples will be submitted to ALS Environmental – Fort Collins Laboratory. Sample containers, preservatives, holding times, and estimated number of soil confirmation and quality control samples are summarized in Table 5-2.

To provide quality control for the analytical program, the following measures will be utilized:

- Duplicate samples will be collected from 10% of the soil sampling locations or one per sample design group. Duplicate soil samples will be collected as a 50/50 split of the sample after collection and homogenization.
- If non-dedicated sampling equipment is used to collect soil samples at the site, a rinsate blank will be collected at a rate of one per day to evaluate decontamination procedures. The rinsate blank will be collected by pouring deionized water over the decontaminated sample collection device (e.g., trowel or hand auger) and capturing the water in the specified sample container.

Table 5-2 Sediment Sampling and Analysis Summary

Method	Ra-226/Ra-228 by EPA 901.1 Modified	Uranium Isotopes by EPA 908.0 Modified	Gross Alpha Radiation by EPA 900.0 Modified	Metals by EPA 6010B
Sample Container	8-ounce poly jar	4-ounce glass jar		
Preservation	Ice to 4 °C	None	None	Ice to 4°C
Analysis Holding Time	180 days	180 days	180 days	180 days
Laboratory	ALS Environmental			
Estimated Number of Unique Discrete Samples	58	58	58	58
Estimated Number of Duplicate Samples	6	6	6	6

Location ID	2016 Sediment Sample ID	Location	Latitude	Longitude
CW-01	CW-SS-01	Cove Wash (Downstream)	36.596252	-109.173558
CW-02	CW-SS-02	Cove Wash (Downstream)	36.613418	-109.135597
CW-03	CW-SS-03	Cove Wash North	36.563918	-109.21204
CW-04	CW-SS-04	Background (Upstream)	36.542796	-109.264232
CW-05	CW-SS-05	Dam (Historical)	36.543625	-109.227271
CW-06	CW-SS-06	Cove Wash (Downstream)	36.59084	-109.213178
CW-07	CW-SS-07	Cove Wash Middle (Historical)	36.556102	-109.221976
CW-08	CW-SS-08	Background (Downstream)	36.584666	-109.243504
CW-09	CW-SS-09	Cove Wash North	36.576215	-109.232732
CW-10	CW-SS-10	Cottonwood Spring (Seeping capped well)	36.578312	-109.209407
CW-11	CW-SS-11	Cove Wash North	36.549811	-109.242872
CW-12	CW-SS-12	Cove Wash Middle 3	36.53364	-109.225966
CW-13	CW-SS-13	Cove Wash Middle 3	36.520617	-109.224645
CW-14	CW-SS-14	Cove Wash Middle 3E	36.518529	-109.221741
CW-15	CW-SS-15	Cove Wash North	36.54688	-109.248685

CW-16	CW-SS-1	Cove Wash North	36.54309	-109.256445
CW-17	CW-SS-17	Cove Wash South (Downstream)	36.584724	-109.185238
CW-18	CW-SS-18	Background (Cove Wash Middle 1)	36.542664	-109.230283
CW-19	CW-SS-19	Cove Mesa 2 (Historical)	36.511004	-109.235835
	CW-SS-19-12			
CW-20/20a	CW-SS-20	Cove Wash Middle 3C (Downstream of CW-20)	36.506631	-109.229642
CW-21	CW-SS-21	Background (Mesa IV Springs)	36.520639	-109.258446
	CW-SS-21-12			
CW-26	CW-SS-26	Cove Wash Middle 2 (Historical)	36.514976	-109.244995
CW-27	CW-SS-27	Cove Wash Middle 2B	36.516673	-109.243032
CW-29	CW-SS-29	Cove Wash Middle 2C	36.515664	-109.234246
CW-30	CW-SS-30	Background (West Upstream)	36.554764	-109.274818
CW-31	CW-SS-31	Background (Upstream)	36.533559	-109.267278
CW-32	CW-SS-32	Cove Wash Middle 1E	36.528104	-109.26039
CW-36	CW-SS-36	Cove Wash Middle 2 (Historical)	36.533745	-109.233774
CW-37	CW-SS-37	Cove Wash Middle 2 (Historical)	36.531749	-109.235585
CW-38	CW-SS-38	Cove Wash Middle (Historical)	36.529913	-109.236268
CW-39	CW-SS-39	Cove Wash Middle 2	36.541361	-109.230037
CW-42	CW-SS-42-12	Irrigation Ditch	36.543225	-109.227079
CW-44	CW-SS-44	Background (Pine Water Springs Drainage)	36.526051	-109.198802
CW-45	CW-SS-45	Background (Deer Springs Drainage)	36.511164	-109.201177
CW-46	CW-SS-46	Background (Pine Water Springs)	36.525872	-109.19778
	CW-SS-46-12			
CW-47	CW-SS-47	Cove Wash Middle 3F	36.525663	-109.220754
CW-48	CW-SS-48	Cove Wash Middle 3F	36.53215	-109.220882
CW-50	CW-SS-50	Cove Wash Middle 1	36.536141	-109.240984
CW-51	CW-SS-51	Cove Wash Middle 1A	36.537003	-109.245747
CW-52	CW-SS-52	Cove Wash Middle 1G	36.533434	-109.242537
CW-53a	CW-SS-53A	Cove Wash Middle 1 (Near original location)	36.533641	-109.248269

CW-54	CW-SS-54	Cove Wash Middle 1B	36.535315	-109.248342
CW-55	CW-SS-55	Cove Wash Middle 1C	36.53294	-109.253629
CW-56a	CW-SS-56a	Cove Wash Middle 3A (Near original location)	36.517206	-109.226763
CW-59	CW-SS-59	Cove Wash Tributary 1 (Downstream)	36.595541	-109.164215
CW-60	CW-SS-60	Cove Wash between 01 and 02 (Downstream)	36.596295	-109.163473
CW-61	CW-SS-61	Cove Wash Tributary 2 (Downstream)	36.595593	-109.166794
CW-62	CW-SS-62	Downstream of Dam	36.549638	-109.22591
CW-64	CW-SS-64	Cove Wash North	36.545506	-109.252157
CW-65	CW-SS-65	Cove Wash Middle 3A	36.513428	-109.228101
CW-66	CW-SS-66	Cove Wash Middle 3A	36.513382	-109.228117
CW-70	CW-SS-70	Cove Wash Middle 3F	36.532903	-109.223409
CW-73	CW-SS-73	Cove Wash Middle 3D	36.512067	-109.226941
CW-74	CW-SS-74	Cove Wash Middle 3D	36.506627	-109.227337
CW-75	CW-SS-75	Cove Wash Middle 3D	36.502991	-109.227204
CW-77	CW-SS-77 CW-SS-77-12	Cove Wash Middle 3D	36.543152	-109.227264
CW-81	CW-SS-81	Cove Wash North	36.581191	-109.223994
CW-82	CW-SS-82	Cove Wash Middle 2A	36.528799	-109.23755
CW-83	CW-SS-82	Cove Wash Middle 2A	36.528353	-109.23915
CW-84	CW-SS-84	Cove Wash Middle 2	36.525785	-109.23746
CW-85	CW-SW-85	Cove Wash Middle 2	36.525421	-109.24192

Notes:
°C = degree Celsius
NA = Not Applicable
TBD = To Be Decided
1 Subsurface depths will be determined based on field observations

6. FIELD METHODS AND PROCEDURES

6.1 FIELD PROCEDURES

The following sections describe field procedures and equipment used during the site activities.

6.1.1 Equipment

The equipment listed below may be utilized to obtain environmental data from the respective media according to the following sampling SOPs or their equivalent:

Ludlum Model 44-10 2-inch by 2-inch sodium iodide detector
Ludlum Model 2241 Meter
Trimble GeoXT 6000 GPS
ERT SOP #2012 Soil Sampling
ERT SOP #2006 Sample Decontamination

The following is a partial list of equipment that may come in contact with samples:

Dedicated plastic scoops
Dedicated plastic sample jars or sealable plastic bags
Non-dedicated hand auger
Disposable nitrile gloves

6.1.2 Equipment Maintenance

Field instrumentation for the collection of samples will be operated, maintained, and have operational checks conducted by the sampling team according to the SOPs listed in Section 6.1.1 or their equivalent. Field instrumentation utilized for health and safety purposes will be operated, maintained, and have operational checks conducted by the sampling team according to the manufacturer's instruction. Operational checks and field use data will be recorded in the instrument or field logbooks.

6.1.3 Inspection/Acceptance Requirements for Supplies and Consumables

There are no project-specific inspection/acceptance criteria for supplies and consumables. It is standard operating procedure that personnel will not use broken or defective materials; items will not be used past their expiration date; supplies and consumables will be checked against order and packing slips to verify the correct items were received; and the supplier will be notified of any missing or damaged items.

6.1.4 Field Logbooks

Field logbooks will document where, when, how, and from whom any vital project information was obtained. Logbook entries will be complete and accurate enough to permit reconstruction of field activities. Logbooks are bound with consecutively numbered pages. Each page will be dated and the time of entry noted in military time. All entries will be legible, written in ink, and signed by the individual making the entries. Language will be factual, objective, and free of personal opinions. The following information will be recorded, if applicable, during the collection of each sample:

- Sampling location and description
- Property sketch showing sampling, removal excavations, and in-place capping locations with measured distances
- Sampler's and documenter's name(s)
- Date and time sample collection, removal excavation, and in-place capping occurred
- Type of samples, excavated, or capped material
- Type of sampling equipment used and matrix
- Field observations and details (e.g., rain, odors, etc.)
- Field instrument reading
- Shipping arrangements (air bill numbers)
- Receiving laboratory(ies)

START members will be on site performing different duties related to sample collection, processing, and analysis. Each logbook will document the information relevant to the site radiation activity, and at a minimum will include:

- Team members and their responsibilities
- Time of activities
- Deviations from sampling plans, site safety plans, and SAP procedures
- Levels of safety protection
- Calibration information
- Analytical data

6.1.5 Photographs

Photographs will be taken at representative sampling locations and at other areas of interest on site. They will serve to verify information entered in the field logbook. When a photograph is taken, the following information will be recorded in the appropriate field logbook or field computer tablet:

- Time, date, location, and, if appropriate, weather conditions
- Description of the subject photographed
- Name of person taking the photograph

6.1.6 Electronic Sample Logging

The sampling team may utilize field management software to prepare sample labels and chain-of-custody forms. Blank sample labels and chain-of-custody forms will also be available. The following information should be entered for each sample after collection:

- Sample name
- Sample date and time
- Number of sample bottles
- Type of preservation
- Analyses

In addition to these items, the software may also be used to keep track of other information such as sample depth, field measurements, and split samples. The field team will generate chain-of-custody forms for each cooler of samples packaged and sent to a laboratory. Each chain-of-custody form will refer to the shipping method and tracking number. Printed chain-of-custody forms will be submitted to the laboratory with the samples. The use of field management software will require that the field team have access to a computer, a printer, computer paper, and labels while in the field. The field data manager will be responsible for implementing the software.

The Data Management Plan (DMP) is included as Appendix D.

6.1.7 Mapping Equipment

Sampling points and site features will be located and documented with a GPS unit. The GPS will be used to assign precise geographic coordinates to sampling locations on the site. GPS mapping will be done by personnel trained in the use of the equipment and will be completed according to the manufacturer's instructions. Expected output from the use of GPS mapping will be site maps with sampling locations and major site features. Sampling locations and gamma survey areas will be identified on a printed aerial image or topographic map at locations of poor GPS satellite reception.

6.2 BACKGROUND LOCATION SURVEY PROCEDURES

The background location will be selected in the field according to the Background Location Selection Criteria (NNEPA and EPA 2010) as follows:

- Similar elevation as the Site
- Similar geology as the Site
- Upwind (gradient, stream) from the Site
- Undisturbed with natural vegetation
- Not in drainage or area impacted by flooding
- Distance to residential structures (structures should be within range of vision)
- Accessible (by vehicle and equipment)

- Should not be near a mine site or similar contaminant source
- If possible, avoid anthills and rodent holes
- Ask nearby residents about area history

6.2.1 Background Gamma Radiation Sampling

A gamma radiation survey unit measuring 50-feet by-50 feet will be established in the selected background location. Gamma radiation in surface soil will be measured using GPS assisted ratemeter and detector described in section 6.3. The detector will be positioned 6-inches above the ground surface. The background survey unit will consist of transects spaced 3-feet apart, which will provide 99-100% characterization of the site. The transect width is based on the field-of-view of the detector which is 3-feet in diameter. The surveyor will walk at a pace of 3-feet per second. The mean and SD of the gamma radiation measurements in the background surface soil will be calculated to develop the investigation level for gamma radiation at the site. An acceptable background area will have a low mean and SD.

6.2.2 Background Surface Water and Groundwater Sampling

In general, background surface water locations should be collected directly upstream of potentially contaminated areas of concern. However, based on a sampling event conducted in 2011, sampling location surface water may not be present upstream of all AUMs due to their locations at the top of the Lukachukai Mountain range. Background surface water samples will be collected upstream of areas of concern (AOC) whenever possible. In the event that surface water is not present, background surface water samples will be collected in other Cove Wash drainages that are upstream of any AOC.

Groundwater wells present within the watershed are mostly downgradient of historical mining activities in the watershed. Seeps are present within the Cove Wash watershed, and they may also be used as background groundwater sample locations as necessary.

6.3 SURFACE GAMMA RADIATION SURVEY PROCEDURES

The survey equipment for measuring gamma radiation consists of a paired Ludlum Model 2241 meter and Model 44-10 (2-inch by 2-inch sodium iodide) detector in conjunction with a Trimble GeoXT 6000 GPS which will have operational checks conducted before field activities. Performance of the radiation survey equipment will be verified throughout the field activities through operational checks and background checks as necessary. Whenever possible, the same paired gamma activity survey system will be used for all surveys conducted at the site.

The detector will be carried at approximately 6-inches above ground surface. The Trimble will be used for geospatial information collection and analysis. Real-time in situ surface soil survey will consist of transects spaced 5-feet apart covering 99-100% of the mine waste located in drainages at a pace of 3-feet per second. If an immovable obstruction is encountered during the survey, the scanning survey will be performed around the feature.

If gamma radiation measurements along the perimeter of the Site exceed the investigation level, lateral step-out delineation will continue beyond the current site boundary until the recorded gamma radiation measurements are below the investigation level. Co-located static one-minute gamma radiation counts at surface soil sampling locations will be used to establish the relationship between gamma radiation measurements in cpm and Ra-226 concentration in soil.

6.4 SEDIMENT SAMPLING PROCEDURES

Sediment samples will be collected from the Cove Wash watershed from surface locations (0 to 6 inches below ground surface [bgs]) and subsurface locations (depth to be determined in field). Additional samples may be collected from floodplain terraces if identified in the field.

6.4.1 Surface Sediment

In addition to the eight background surface soil samples detailed in Section 4.1.2, up to 53 surface soil samples will be collected at selected sampling locations. Surface soil samples will be co-located with one-minute static gamma radiation counts to establish a relationship between Ra-226 concentrations and gamma radiation measurements in cpm in soil. Surface soil samples will be collected using a disposable trowel and placed into a dedicated 8-ounce plastic sample jar or plastic sealable bag. If present, non-soil material including rocks larger than approximately 0.25 inch median diameter will be removed from the soil sample. Sample jars will be stored in a cooler according to the laboratory requirements in Table 5-1. Non-dedicated sampling equipment will be decontaminated after every sample according to Section 6.6.

Surface soil samples will be collected from 0 to 6-inches. All sample information will be logged in the electronic data collection device, photographed, and marked with a GPS.

Nine duplicate samples (or 10% of total samples) will be collected and given false sample IDs for the purpose of QA/QC. Additional surface soil samples may be collected based on field observations.

All sampling locations will be recorded in an electronic data collection device as sampling is completed. Each field sampling team will document each individual sampling location in the device, which includes: the site name, where the sample was collected with a representative sketch of the area, GPS coordinates of the sampling location, date, time, sample identification, sampling team members, and photographs taken.

6.4.2 Subsurface Soil

In addition to the two background subsurface soil samples detailed in Section 4.1.2, up to eight subsurface soil samples will be collected at site and analyzed for Ra-226 by EML HASL 300 4.5.2.3 method. Subsurface sampling locations will be co-located with the surface sampling locations, at locations determined in the field. One subsurface sample will be collected from the surface water diversion dam.

Subsurface soil samples will be collected using a hand auger and/or shovel.

One duplicate sample (or 10% of total samples) will be collected and given a false sample ID for the purpose of QA/QC. Additional subsurface soil samples may be collected based on field observations.

6.5 FIELD DECONTAMINATION PROCEDURES

Decontamination activities will be conducted by START in accordance with ERT SOP #2006. All surface soil samples will be collected using dedicated equipment. All shallow sub-surface soil samples will be collected using a hand auger or shovel and a plastic scoop. The hand auger or shovel is the only non-dedicated sampling equipment that will come into contact with the soil sample. The hand auger or shovel will be decontaminated between each sub-surface sampling location. Decontamination of sampling equipment must be conducted consistently to assure the quality of samples collected. Dedicated equipment intended for one-time use will not be decontaminated, but will be packaged for appropriate disposal. Decontamination will occur prior to and after each use of a piece of non-dedicated equipment. All non-dedicated sample handling devices will be decontaminated according to the following procedure:

- Non-phosphate detergent and tap water wash using a brush to scrub solids from the surface;
- Tap water rinse; and
- Triple deionized/distilled water rinse.

In order to ensure that water and sediment with elevated concentrations of COCs are not transported offsite, a G-M pancake probe may be utilized to determine that alpha, beta, and gamma radiation levels remain at background (offsite within Cove, Az) on personnel and sampling equipment as needed. Personnel health and safety equipment such as waders will be scanned using the G-M pancake probe before leaving the site. In addition, any remaining sediment on personnel or sampling equipment will be removed prior to leaving the site each day by dry washing or using water obtained from offsite.

7. DISPOSAL OF INVESTIGATION-DERIVED WASTE (IDW)

In the process of collecting environmental samples at the Site, several different types of potentially contaminated IDW will be generated, including the following:

- Used PPE
- Disposable sampling equipment
- Decontamination fluids

The EPA's National Contingency Plan requires that management of IDW generated during site investigations comply with all relevant or appropriate requirements to the extent practicable. This SAP will follow the U.S. EPA Office of Emergency and Remedial Response Management of Investigation-Derived Wastes during Site Inspections (Directive 9345.3-02), May 1991 (EPA 1991), which provides the guidance for management of IDW during site investigations. Listed below are the procedures that will be followed for handling IDW. The procedures are flexible enough to allow the site investigation team to use its professional judgment on the proper method for the disposal of each type of IDW generated at each sampling location.

- Used PPE and disposable sampling equipment will be double bagged in plastic trash bags and disposed of in a municipal refuse dumpster. These wastes are not considered hazardous and can be sent to a municipal landfill. Any PPE or dedicated equipment that is to be disposed of that can still be reused will be rendered inoperable before disposal.

- Decontamination fluids will consist of water with residual contaminants and/or non-phosphate detergent. These fluids will be left onsite to evaporate.

8. SAMPLE IDENTIFICATION, DOCUMENTATION AND SHIPMENT

8.1 SAMPLE NOMENCLATURE

A unique, identifiable name will be assigned to each soil sample. Soil samples will be identified according to the following nomenclature:

[Sample Site][Sample Description]-[Sample Number]-[Sample Depth]-[Sample Date]

Where:

> Sample Site – "CW" will designate the samples as collected from Cove Wash.
>
> Sample Description – "SW" will designate surface water, "GW" will designate groundwater samples, and "SS" will designate sediment samples.
>
> Sample Number – Number representing the specific sampling location where the sample was collected starting with 01.
>
> Sample Depth – In the case of sediment, subsurface samples will be identified with a number indicating the sample depth sequence, where "#" indicates the depth of the subsurface sample in inches.
>
> Sample Date – The date the sample is collected will be presented in a yymmdd format where yy represents the last two digits of the year, mm represents the month, and dd represents the day.

For example, a subsurface sediment sample labeled CW-SS-94-12-170420 would be collected at 12 inches bgs on April 20, 2017. Surface water samples will not be identified with a depth.

For example, the surface water sample collected at location CW-01 on April 20, 2017 will be identified as follows: CW-SW-01-170420.

Field duplicate samples will be given a false location identifier.

8.2 CONTAINER, PRESERVATION, AND HOLDING TIME REQUIREMENTS

All sample containers will be delivered to START in a pre-cleaned condition. Container, preservation, and holding time requirements are summarized in Tables 5-1 and 5-2.

8.3 SAMPLE LABELING, PACKAGING, AND SHIPPING

All samples collected will be labeled in a clear and precise way for proper identification in the field and for tracking in the laboratory. Sample labels will be affixed to the sample containers and will contain the following information:

- Sample number
- Date and time of collection
- Site name
- Analytical parameter and method of preservation
- Samples will be stored in a secure location onsite pending analysis and shipment to the laboratory. Sample coolers will be retained in the custody of site personnel at all times or secured so as to deny access to anyone else.
- The procedures for shipping soil samples are:
  - If ice is used, it will be packed in double sealable plastic bags.
  - The drain plug of the cooler will be sealed with tape to prevent melting ice from leaking.
  - The bottom of the cooler will be lined with bubble wrap to prevent breakage during shipment.
  - Screw caps will be checked for tightness.
  - Containers will have custody seals affixed so as to prevent opening of the container without breaking the seal.
  - All glass sample containers will be wrapped in bubble wrap.
  - All containers will be sealed in plastic bags.
  - All samples will be placed in coolers with the appropriate chain-of-custody forms. All forms will be enclosed in plastic bags and affixed to the underside of the cooler lid. If samples require refrigeration during shipment then bags of ice will be placed on top of and around samples. Empty space in the cooler will be filled with bubble wrap or Styrofoam peanuts to prevent movement and breakage during shipment. Each ice chest will be securely taped shut with strapping tape, and custody seals will be affixed to the front, right, and back of each cooler.
- Samples will be shipped for immediate delivery to the laboratory. Upon shipping, the laboratory will be notified of:
  - Sampling contractor's name.
  - Site name.
  - Shipment date and expected delivery date.
  - Total number of samples, by matrix and the relative level of contamination for each sample (i.e., low, medium, or high).
  - Carrier; air bill number(s), method of shipment (e.g., priority).
  - Irregularities or anticipated problems associated with the samples.
  - Whether additional samples will be sent; whether this is the last shipment.

8.4 CHAIN-OF-CUSTODY FORMS AND QA/QC SUMMARY FORMS

A chain-of-custody form will be maintained for all samples to be submitted for analysis, from the time the sample is collected until its final deposition. Every transfer of custody must be noted and a signature affixed. Corrections on sample paperwork will be made by drawing a single line through the mistake and initialing and dating the change. The correct information will be entered above, below, or after the mistake. When samples are not under the direct control of the individual responsible for them, they must be stored in a locked container sealed with a custody seal. The chain-of-custody form must include the following:

- Sample identification numbers
- Identification of sample to be used for MS/MSD purposes
- Site name
- Sample date
- Number and volume of sample containers
- Required analyses
- Signature and name of samplers
- Signature(s) of any individual(s) with control over samples
- Airbill number
- Note(s) indicating special holding times and/or detection limits

The chain-of-custody form will be completed and sent with the samples for each laboratory and each shipment. Each sample cooler should contain a chain-of-custody form for all samples within the sample cooler.

A sample summary form will be completed for each method and each matrix of the sampling event. The sample number for all blanks, reference samples, laboratory QC samples (MS/MSDs), and duplicates will be documented on this form. This form is not sent to the laboratory. The original form will be sent to the reviewer who is validating and evaluating the data; a photocopy of the original will be made for the START project file.

9. QUALITY ASSURANCE AND CONTROL (QA/QC)

9.1 QUALITY CONTROL/QUALITY ASSURANCE SAMPLES

QA/QC samples to be collected during this sampling are listed in Table 5-1 and described in the following subsections. QA/QC described in the following sections pertains to samples collected for laboratory analysis to obtain definitive data and do not pertain to field measurements. QA/QC relevant to field measurement data is discussed in section 5.1.

9.1.1 Equipment Blank Samples

For non-dedicated equipment (such as hand augers) to collect samples, equipment rinsate blanks will be collected at a rate of one per day to evaluate field decontamination procedures. An equipment rinsate blank consists of a sample of analyte-free water passed through or over a decontaminated sampling device into a 500-milliliter plastic bottle.

9.1.2 Assessment of Sample Variability

Duplicate soil samples will be collected at selected sampling locations. These locations will be chosen randomly in the field and will be collected at a rate of one for every 10 field samples. The duplicate sample will be obtained by splitting the homogenized sample collected from the soil location. The duplicate sample will be placed in an 8-ounce plastic jar and labeled accordingly.

9.1.3 Laboratory Quality Control Samples

Analyses for radioisotopes do not typically have MS/MSD requirements; therefore, none will be performed.

9.2 ANALYTICAL AND DATA PACKAGE REQUIREMENTS

It is required that all samples be analyzed according to the methods listed in Tables 5-1 and 5-2. The laboratory is required to supply documentation to demonstrate that their data meet the requirements specified in the method. Ra-226 determination requires a 21-day ingrowth period prior to analysis. Therefore, the preliminary results will be delivered to START within four (4) weeks of sample delivery. A complete analytical data package will be required from the analytical laboratory 30 working days after sample delivery. The laboratory will also provide all data electronically in a Microsoft Excel-compatible format or delimited text file in the format specified for SCRIBE. The data validator will provide a full validation data package to the START PM within 15 days after receipt of the complete analytical data package from the laboratory.

All field measurements and QA/QC information will be documented in logbooks, field forms, and spreadsheets, or may be directly downloaded into a database.

Deliverables for this project must meet the guidelines in EPA Region 9 Laboratory Documentation Requirements for Data Evaluation, R9/QA/00.4.1 (EPA 2001a). The following data requirements specify and emphasize general documentation requirements and are not intended to supersede or change requirements of each method.

- A copy of the chain-of-custody, sample log-in records, and a case narrative describing the analyses and methods used.
- Analytical data (results) for up to three significant figures for all samples, method blanks, MS/MSD, Laboratory Control Samples (LCS), duplicates, Performance Evaluation (PE) samples, and field QC samples.
- QC summary sheets/forms that summarize the following:
    - MS/MSD/LCS recovery summary
    - Method/preparation blank summary
    - Initial and continuing calibration summary (including retention time windows)
    - Sample holding time and analytical sequence (i.e., extraction and analysis)
    - Calibration curves and correlation coefficients
    - Duplicate summary
    - Detection limit information
- Analyst bench records describing dilution, sample weight, percent moisture (solids), sample size, sample extraction and cleanup, final extract volumes, and amount injected.
- Standard preparation logs, including certificates of analysis for stock standards.
- Detailed explanation of the quantitation and identification procedure used for specific analyses, giving examples of calculations from the raw data.
- The final deliverable report will consist of sequentially numbered pages.

9.3 DATA MANAGEMENT

Data collected during the removal assessment will consist of field and laboratory data. Field activities and sample information will be documented in a logbook as discussed in Section 6.1.4. Field and laboratory data including gamma radiation measurements, Ra-226 sample results, and location coordinates, will be loaded in SCRIBE. All data including logbook, complete analytical and validation data packages, photographs, and electronic data will be archived by START. The laboratory data summary and validation reports will be included in the final report submitted to EPA. The DMP is included as Appendix D.

9.4 DATA VALIDATION

Data validation will be performed by START or their subcontractor according to the EPA Region IX Superfund Data Evaluation/Validation Guidance R9QA/006.1 (EPA 2001a). The standard data quality review requirements of a Tier 2 validation of 100% of the data (as defined in Requirements for Quality Assurance Project Plans [EPA 2001b]) will satisfy the data quality requirements for this portion of the project. Upon completion of validation, data will be classified as one of the following: acceptable for use without qualifications, acceptable for use with qualifications, or unacceptable for use. If during or after the evaluation of the project's analytical data it is found that the data contain excess QA/QC problems or if the data do not meet the DQI goals, then the independent reviewer may determine that additional data evaluation is necessary. Additional evaluation may include EPA Region IX Superfund Data Evaluation/Validation Guidance R9QA/006.1 for evaluation Tier 3.

To meet evaluation and project requirements, the following criteria will be evaluated during a Tier 2 evaluation:

- Data package completeness
- Laboratory QA/QC summaries
- Holding times
- Blank contamination
- Matrix related recoveries
- Field duplicates
- Random data checks
- Preservation and holding times
- Blank analyses
- Interference check samples
- Laboratory control samples
- Duplicate sample analysis
- Matrix spike sample analyses
- Sample serial dilution
- Field duplicate/replicate
- Overall assessment of data

Upon completion of evaluation, an analytical data evaluation Tier 2 review report will be delivered to the PM, and the data will be classified within the report as one of the following:

- Acceptable for use without qualifications
- Acceptable for use with qualifications
- Unacceptable for use

The data with applicable qualifications will be attached to the report. Unacceptable data may be more thoroughly examined to determine whether corrective action could mitigate data usability.

9.5 FIELD VARIANCES

As conditions in the field may vary, it may become necessary to implement minor modifications to this plan. When appropriate, the START QA Coordinator and the EPA TM will be notified of the modifications and a verbal approval obtained before implementing the modifications. Modifications to the original plan will be recorded in Site records and documented in the final report.

9.6 ASSESSMENT OF PROJECT ACTIVITIES

9.6.1 Assessment Activities

The following assessment activities will be performed by the START:

- All project deliverables (SAP, Data Summaries, Data Validation Reports, Removal Assessment Report) will be peer-reviewed by START prior to submission to EPA. In time-critical situations, the peer review may be concurrent with the release of a draft document to EPA.
- The START QA Coordinator will review project documentation such as logbooks and chain-of-custody forms to ensure the SAP was followed and that sampling activities were adequately documented. The START QA Coordinator will document deficiencies, and the START PM will be responsible for corrective actions.

9.6.2 Project Status Reports to Management

It is standard procedure for the START PM to report to the TM any issues, as they occur, that arise during the course of the project that could affect data quality, data use objectives, the project objectives, or project schedules. As requested by EPA, START will provide unvalidated data as they are received from the laboratory.

9.6.3 Reconciliation of Data with DQOs

Assessment of data quality is an ongoing activity throughout all phases of a project. The following outlines the methods to be used by the START for evaluating the results obtained from the project.

Review of the DQO outputs and the sampling design will be conducted by the START QA Coordinator prior to sampling activities. The reviewer will submit comments to the START PM for action, comment, or clarification. This process will be iterative.

A preliminary data review will be conducted by START. The purpose of this review is to look for problems or anomalies in the implementation of the sample collection and analysis procedures and to examine QC data for information to verify assumptions underlying the DQOs and the SAP. When appropriate to sample design, basic statistical quantities will be calculated and the data will be graphically represented. When appropriate to the sample design and if specifically tasked to do so by the TM, START will select a statistical hypothesis test and identify assumptions underlying the test.

10. REFERENCES

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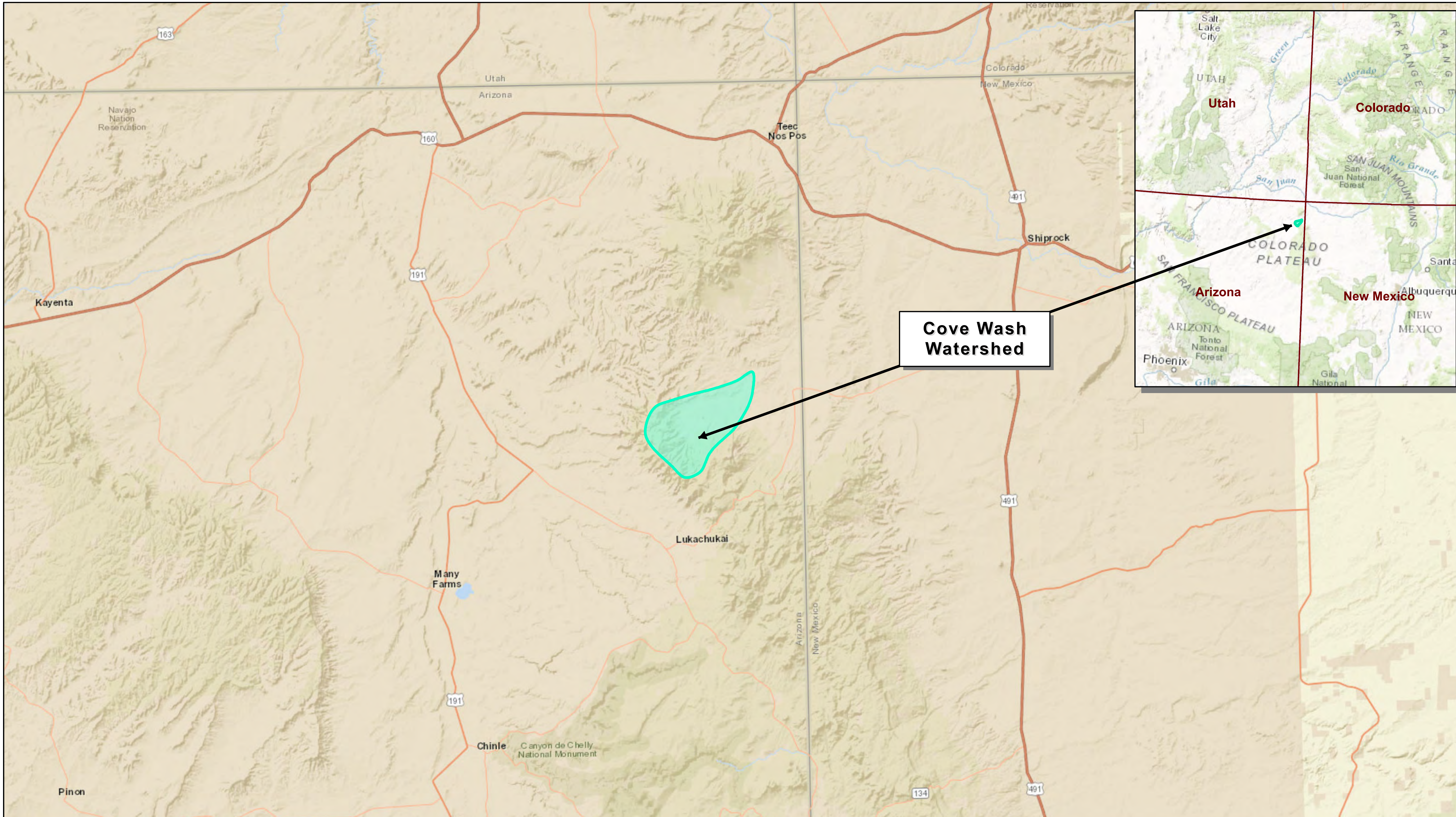
FIGURES



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Southwest

FIGURE 1
SITE LOCATION
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

Contract: EP-S5-13-02; **TDD:** 0025/1302-T25-R9-16-03-0001

Document Control Number: 0100-08-AAVA

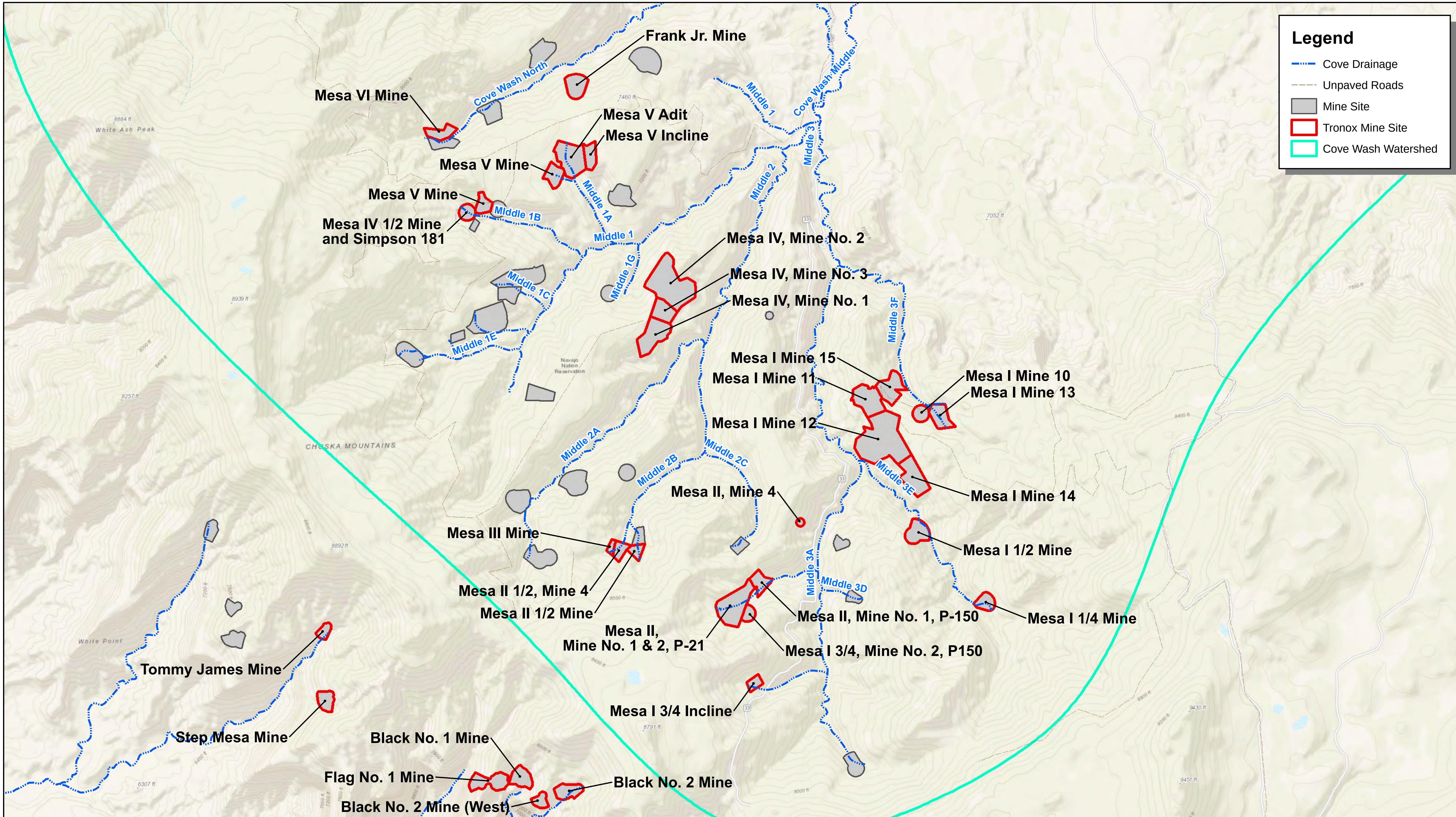

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FIGURE 2
ABANDONED URANIUM MINES
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

Contract: EP-S5-13-02; **TDD:** 0025/1302-T25-R9-16-03-0001

Document Control Number: 0100-08-AAVA

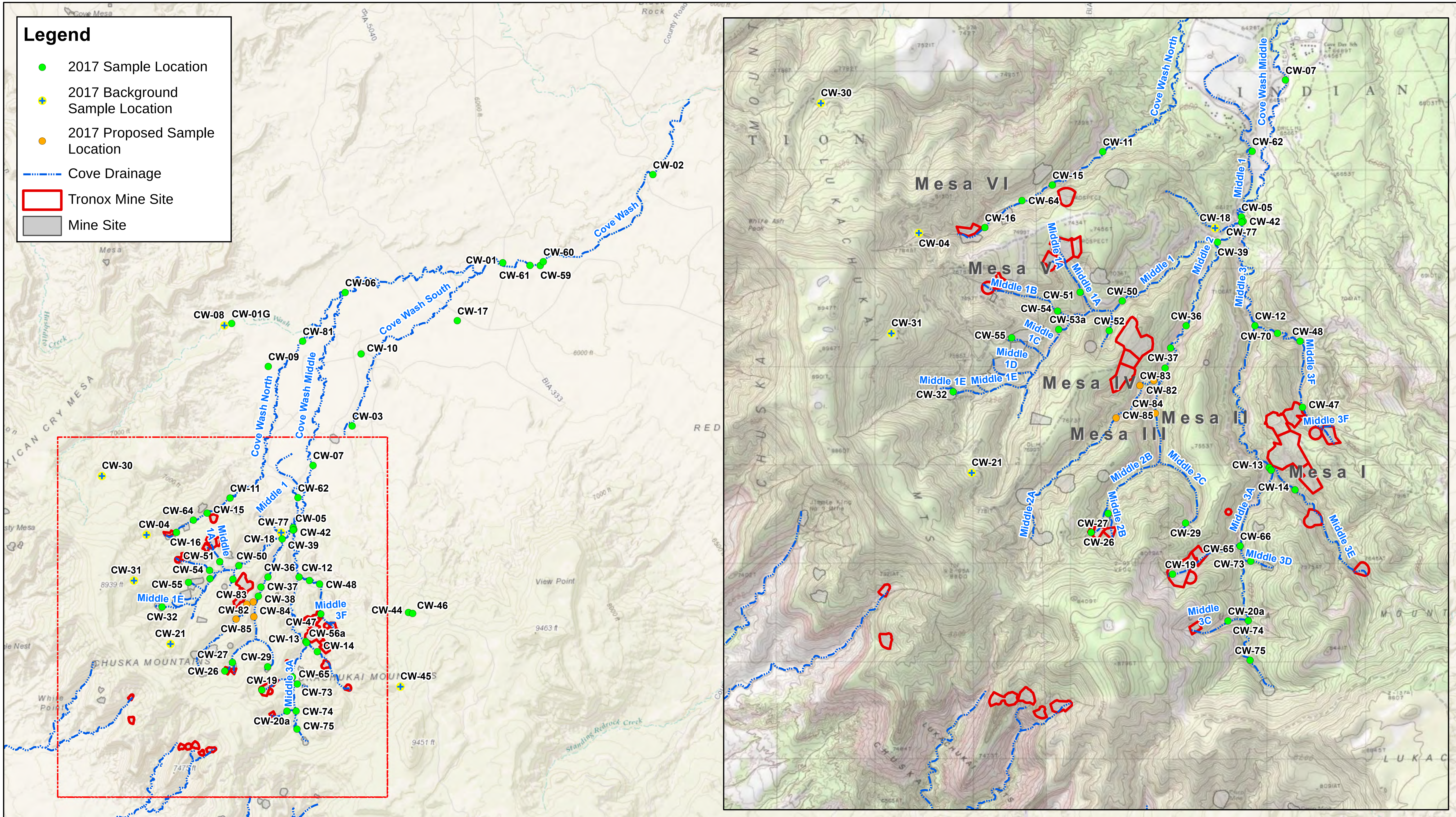

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FIGURE 3
2017 SAMPLE LOCATIONS
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

Contract: EP-S5-13-02; **TDD:** 0025/1302-T25-R9-16-03-0001

Document Control Number: 0100-08-AAVA

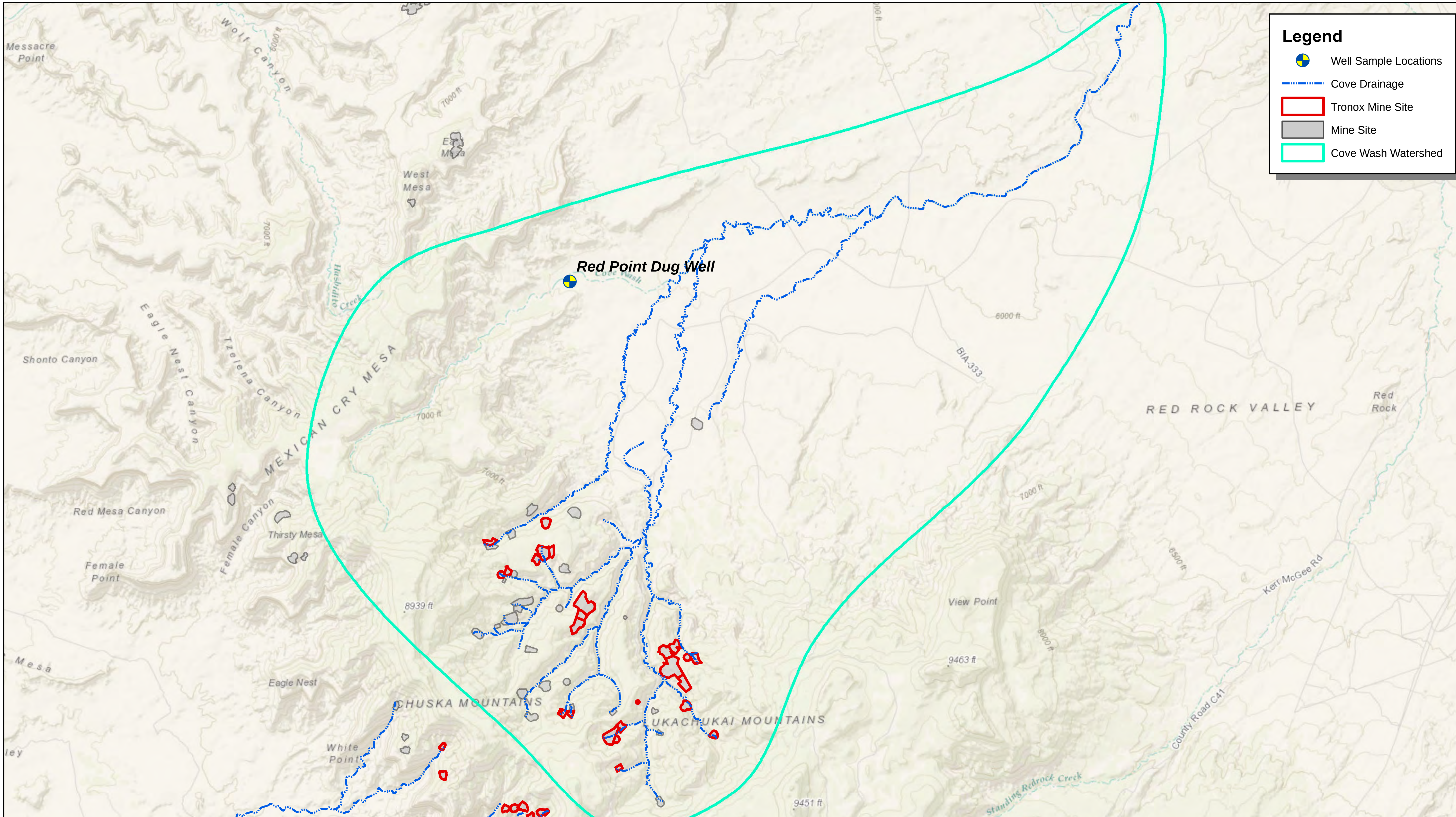

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FIGURE 4
GROUNDWATER SAMPLE LOCATION
Cove Wash Watershed Assessment
Cove Chapter, Navajo Nation, AZ

Contract: EP-S5-13-02; **TDD:** 0025/1302-T25-R9-16-03-0001

Document Control Number: 0100-08-AAVA

APPENDIX A:
DATA QUALITY OBJECTIVE WORKSHEET

Data Quality Objective Process Worksheet

1. **State the Problem:** Summarize the contamination problem that will require new environmental data, and identify the resources available to resolve the problem.

   Planning Team:

   Gaelle Glickfield, USEPA
   Edwin Poalinelli, USEPA
   Tara Fitzgerald, Weston Solutions, Inc.

   Gaelle Glickfield of the USEPA is the primary decision maker of the scoping team.

   Problem:

   A total of 50 abandoned uranium mines (AUMs) are located within the Cove Wash watershed. Twenty-six of the AUMs were historically operated by Kerr McGee, which became Tronox. Previous studies have identified uranium and other constituents of concerns (COCs), including arsenic and molybdenum, within surface water, groundwater, and sediments. Previous gamma screenings conducted in 2008 by WESTON identified elevated levels in the AUMs throughout the watershed and within surveyed drainages below. Additionally, unreclaimed mining waste has been identified within Cove Wash drainages during previous investigations. Due to the large number of AUMs present within the Cove Wash watershed, it is not clear which AUMs are contributing to the elevated concentrations of COCs. The watershed assessment will collect samples throughout the watershed, downstream of each AUM if possible, in order to determine the source(s) of COCs. The data will be specifically used to determine if surface water and sediments have been impacted by historic uses and to support future decisions.

   Available Resources:

   WESTON personnel, a subcontracted botanist, and a subcontracted laboratory will be utilized throughout the project. Due to the analysis time for radium, preliminary data will be available 30 days after fieldwork concludes.

2. **Identify the Decision:** Identify the decision that requires new environmental data to address the contamination problem.

   Data will be used to assess whether contaminants are present in Site surface water and sediments at concentrations that would pose a danger to human health, groundwater, and/or livestock.

   Principal Study Questions:

   a) What is the extent of COCs concentrations in surface water, groundwater, and sediments throughout the Cove Wash watershed?

b) Are the concentrations of COCs in surface water and groundwater present at concentrations above the Maximum Contaminant Level (MCL) for drinking water?

c) Are the concentrations of COCs in sediments present at concentrations above the EPA Regional Screening Levels (RSL) for protection of groundwater?

d) Is waste rock present within Cove Wash watershed drainages contributing to elevated concentrations of COCs within the watershed?

e) What are potential sources of contamination contributing to elevated concentrations of COCs within the watershed?

Define the alternative actions that could result from the resolution of the principal study question:

a) Surface water, groundwater, and sediments are not impacted. Additional characterization may be required.

b) Surface water, groundwater, and/or sediment contaminant concentrations are above screening levels protective of human health, and/or groundwater, and/or livestock. Additional characterization and/or remedial actions may be required.

Decision Statement:

If COCs are found in surface water, groundwater, or sediment samples in excess of screening levels then options for further site characterization or remediation will be considered.

3. Identify Inputs to the Decision: Identify the information needed to support the decision, and specify which inputs require new environmental data.

Information required to resolve the decision statement: Definitive data from chemical analysis of samples are required. Based on a review of the available site history, the goal of the sampling will be to collect and analyze surface water, groundwater, and sediment for possible site contaminants due to previous mining activities conducted on and upstream of the Site. These contaminants include metals, radium-226, radium-228, and gross alpha radiation. Additional analytes will be collected in order to assist with determination of potential sources of contamination. These analytes include: uranium isotopes, major cations and anions, alkalinity, and stable oxygen isotopes.

Source(s) for information: The primary source of information will be the results of WESTON's sampling event, botany surveys, and Mexican Spotted Owl surveys.

- **Information needed to establish screening levels:** The Cove Wash watershed is not a known drinking water source, but may have been historically used by residents before drinking water was provided by a municipal source 20 years ago. However, it is not entirely clear if residents are currently using surface water and/or groundwater wells for drinking water. Additionally, the Cove Wash watershed is used extensively for drinking water for grazing livestock. Livestock are dependent on surface water and groundwater for drinking. Screening levels were determined in order to correspond with the use of the Site for drinking water and groundwater protection purposes. The surface water and groundwater screening level is the USEPA MCL. The sediment screening level is the USEPA RSL - Protection of groundwater Soil Screening Level. Screening levels for livestock developed by the Navajo Nation Environmental Protection Agency are pending approval by the USEPA, and will be evaluated if and when they are approved.

These screening levels will serve as a tool to help determine whether further characterization or remediation at the Site is necessary.

Confirm that measurement methods exist to provide data:

Surface Water:

- EPA Method 200.7 and 200.8 for metals
- EPA Method 908.0 for uranium isotopes
- EPA Method 903.0 for radium 226
- EPA Method 904.0 for radium 228
- EPA Method 900.1 – High Solids for gross alpha radiation
- EPA Method 350.1 for ammonia
- EPA Method 310.0 for alkalinity
- EPA Method 300.0 for major ions
- CRDS for stable oxygen isotopes

Sediments:

- EPA Method 6010B / 7471 for metals
- DOE HASL 300 U-02-RC Modified for uranium isotopes
- DOE HASL 300 U-02-RC Modified for Radium-226/Radium-228

4. **Define the Study Boundaries:** Specify the spatial and temporal aspects of the environmental media that the data must represent to support the decision.

Specific characteristics that define population being studied: The Site consists of the Cove Wash watershed, which includes 50 of the 70 AUMs within the Lukachukai Mountains. The Cove Wash watershed is located within the Navajo Nation and extends at the highest elevations in the Lukachukai Mountains and downstream to Cove, Arizona. The watershed contains approximately 52 miles of tributaries and is defined by the U.S. Geological Survey as Hydrologic Unit Code 140801050903.

Spatial boundary of decision statement:

Surface water - The boundaries of the Site at the surface water varying in depths of less than 1-inch to up to several feet in depth.

Groundwater – The boundaries of the Site to unknown depths at local groundwater sources. Groundwater depth information will be obtained whenever possible during field activities.

Sediments – The boundaries of the Site at depths of the surface to up to 2 feet below ground surface.

Temporal boundary of decision statement: The data will represent the conditions of contaminants at the time of sampling. Sampling events are being conducted at multiple times of the year in order to determine the temporal effects on contaminant levels within the watershed.

When to collect samples: Field activities are anticipated to take place over two weeks beginning on April 17, 2017.

Practical constraints on data collection: Access is limited at some sampling locations depending on weather and/or changing road conditions. Some surface water and sediment sampling locations within drainages are not accessible by vehicle or on foot. Surface water is present temporally throughout the watershed.

5. **Develop a Decision Rule:** Develop logical "if...then" statements that define the conditions that would cause the decision maker to choose among alternative actions.

Statistical parameter that characterizes a population: Each analytical result, not statistical parameter, will be evaluated against the screening levels.

Specify the screening level(s) for the study: The surface water and groundwater screening level is the USEPA MCL. The sediment screening level is the USEPA RSL - Protection of groundwater Soil Screening Level. Screening levels for livestock developed by the Navajo Nation Environmental Protection Agency are pending approval by the USEPA, and will be evaluated if and when they are approved.

Decision Rules:

a) If COCs are found in surface water, groundwater, or sediment samples in excess of screening levels then options for further site characterization or remediation will be considered.

6. **Specify the Limits on Decision Errors - Specify the decision maker's acceptable limits on decision errors, which are used to establish performance goals for limiting uncertainty in the data.**

Biased sampling for surface water, groundwater, and sediment samples will be conducted. Use of biased sampling points precludes statistical determination of limits on decision errors. Measurement error, rather than sampling error, is deemed to be the primary factor affecting any decision error. Validated, definitive data will be required to limit measurement error. Sampling error will be limited to the extent practicable by following approved EPA methods and applicable SOPs. Sampling error and tolerable limits cannot be quantified.

7. **Optimize the Design for Obtaining Data:** Identify the most resource-effective sampling and analysis design for generating data that are expected to satisfy the DQOs.

The goals of the sampling event are to establish whether surface water, groundwater, and/or sediments contain COCs above screening levels and if so, to use the data collected to determine potential sources of COCs within the Cove Wash watershed. In order to determine where COCs are being released into the watershed, surface water and sediment samples will be collected upstream and downstream of mines and at drainage headwaters and confluences.

An estimated 50 surface water and sediment samples, including up to eight background samples, may be collected from the Cove Wash watershed at locations at or downstream of AUMs within the watershed. The locations will include previous investigation sampling locations and June 2015 watershed assessment sampling locations. A total of 20 surface water/sediment sampling locations will correspond with previous investigation sampling locations. Up to 10 groundwater samples will be collected, including previously sampled wells when available.

APPENDIX C:
STANDARD OPERATING PROCEDURES

SAMPLING EQUIPMENT DECONTAMINATION

SOP#: 2006
DATE: 08/11/94
REV. #: 0.0

1.0 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to provide a description of the methods used for preventing, minimizing, or limiting cross-contamination of samples due to inappropriate or inadequate equipment decontamination and to provide general guidelines for developing decontamination procedures for sampling equipment to be used during hazardous waste operations as per 29 Code of Federal Regulations (CFR) 1910.120. This SOP does not address personnel decontamination.

These are standard (i.e. typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitation, or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. Environmental Protection Agency (U.S. EPA) endorsement or recommendation for use.

2.0 METHOD SUMMARY

Removing or neutralizing contaminants from equipment minimizes the likelihood of sample cross contamination, reduces or eliminates transfer of contaminants to clean areas, and prevents the mixing of incompatible substances.

Gross contamination can be removed by physical decontamination procedures. These abrasive and non-abrasive methods include the use of brushes, air and wet blasting, and high and low pressure water cleaning.

The first step, a soap and water wash, removes all visible particulate matter and residual oils and grease. This may be preceded by a steam or high pressure water wash to facilitate residuals removal. The second step involves a tap water rinse and a distilled/deionized water rinse to remove the detergent. An acid rinse provides a low pH media for trace metals removal and is included in the decontamination process if metal samples are to be collected. It is followed by another distilled/deionized water rinse. If sample analysis does not include metals, the acid rinse step can be omitted. Next, a high purity solvent rinse is performed for trace organics removal if organics are a concern at the site. Typical solvents used for removal of organic contaminants include acetone, hexane, or water. Acetone is typically chosen because it is an excellent solvent, miscible in water, and not a target analyte on the Priority Pollutant List. If acetone is known to be a contaminant of concern at a given site or if Target Compound List analysis (which includes acetone) is to be performed, another solvent may be substituted. The solvent must be allowed to evaporate completely and then a final distilled/deionized water rinse is performed. This rinse removes any residual traces of the solvent.

The decontamination procedure described above may be summarized as follows:

1. Physical removal
2. Non-phosphate detergent wash
3. Tap water rinse
4. Distilled/deionized water rinse
5. 10% nitric acid rinse
6. Distilled/deionized water rinse
7. Solvent rinse (pesticide grade)
8. Air dry
9. Distilled/deionized water rinse

If a particular contaminant fraction is not present at the site, the nine (9) step decontamination procedure specified above may be modified for site specificity. For example, the nitric acid rinse may be eliminated if metals are not of concern at a site. Similarly, the solvent rinse may be eliminated if organics are not of concern at a site. Modifications to the standard procedure should be documented in the site specific work plan or subsequent report.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

The amount of sample to be collected and the proper sample container type (i.e., glass, plastic), chemical preservation, and storage requirements are dependent on the matrix being sampled and the parameter(s) of interest.
More specifically, sample collection and analysis of decontamination waste may be required before beginning proper disposal of decontamination liquids and solids generated at a site. This should be determined prior to initiation of site activities.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

- The use of distilled/deionized water commonly available from commercial vendors may be acceptable for decontamination of sampling equipment provided that it has been verified by laboratory analysis to be analyte free (specifically for the contaminants of concern).

- The use of an untreated potable water supply is not an acceptable substitute for tap water. Tap water may be used from any municipal or industrial water treatment system.

- If acids or solvents are utilized in decontamination they raise health and safety, and waste disposal concerns.

- Damage can be incurred by acid and solvent washing of complex and sophisticated sampling equipment.

5.0 EQUIPMENT/APPARATUS

Decontamination equipment, materials, and supplies are generally selected based on availability. Other considerations include the ease of decontaminating or disposing of the equipment. Most equipment and supplies can be easily procured. For example, soft-bristle scrub brushes or long-handled bottle brushes can be used to remove contaminants. Large galvanized wash tubs, stock tanks, or buckets can hold wash and rinse solutions. Children's wading pools can also be used. Large plastic garbage cans or other similar containers lined with plastic bags can help segregate contaminated equipment. Contaminated liquid can be stored temporarily in metal or plastic cans or drums.

The following standard materials and equipment are recommended for decontamination activities:

5.1 Decontamination Solutions

- Non-phosphate detergent
- Selected solvents (acetone, hexane, nitric acid, etc.)
- Tap water
- Distilled or deionized water

5.2 Decontamination Tools/Supplies

- Long and short handled brushes
- Bottle brushes
- Drop cloth/plastic sheeting
- Paper towels
- Plastic or galvanized tubs or buckets
- Pressurized sprayers (H_2O)
- Solvent sprayers
- Aluminum foil

5.3 Health and Safety Equipment

Appropriate personal protective equipment (i.e., safety glasses or splash shield, appropriate gloves, aprons or coveralls, respirator, emergency eye wash)

5.4 Waste Disposal

- Trash bags
- Trash containers
- 55-gallon drums
- Metal/plastic buckets/containers for storage and disposal of decontamination solutions

6.0 REAGENTS

There are no reagents used in this procedure aside from the actual decontamination solutions. Table 1 (Appendix A) lists solvent rinses which may be required for elimination of particular chemicals. In general, the following solvents are typically utilized for decontamination purposes:

- 10% nitric acid is typically used for inorganic compounds such as metals. An acid rinse may not be required if inorganics are not a contaminant of concern.
- Acetone (pesticide grade)[1]
- Hexane (pesticide grade)[1]
- Methanol[1]

[1] - Only if sample is to be analyzed for organics.

7.0 PROCEDURES

As part of the health and safety plan, a decontamination plan should be developed and reviewed. The decontamination line should be set up before any personnel or equipment enter the areas of potential exposure. The equipment decontamination plan should include:

- The number, location, and layout of decontamination stations.
- Decontamination equipment needed.
- Appropriate decontamination methods.
- Methods for disposal of contaminated clothing, equipment, and solutions.
- Procedures can be established to minimize the potential for contamination. This may include: (1) work practices that minimize contact with potential contaminants; (2) using remote sampling techniques; (3) covering monitoring and sampling equipment with plastic, aluminum foil, or other protective material; (4) watering down dusty areas; (5) avoiding laying down equipment in areas of obvious contamination; and (6) use of disposable sampling equipment.

7.1 Decontamination Methods

All samples and equipment leaving the contaminated area of a site must be decontaminated to remove any contamination that may have adhered to equipment. Various decontamination methods will remove contaminants by: (1) flushing or other physical action, or (2) chemical complexing to inactivate contaminants by neutralization, chemical reaction, disinfection, or sterilization.

Physical decontamination techniques can be grouped into two categories: abrasive methods and non-abrasive methods, as follows:

7.1.1 Abrasive Cleaning Methods

Abrasive cleaning methods work by rubbing and wearing away the top layer of the surface containing the contaminant. The mechanical abrasive cleaning methods are most commonly used at hazardous waste sites. The following abrasive methods are available:

<u>Mechanical</u>

Mechanical methods of decontamination include using metal or nylon brushes. The amount and type of contaminants removed will vary with the hardness of bristles, length of time brushed, degree of brush contact, degree of contamination, nature of the surface being cleaned, and degree of contaminant adherence to the surface.

<u>Air Blasting</u>

Air blasting equipment uses compressed air to force abrasive material through a nozzle at high velocities. The distance between nozzle and surface cleaned, air pressure, time of application, and angle at which the abrasive strikes the surface will dictate cleaning efficiency. Disadvantages of this method are the inability to control the amount of material removed and the large amount of waste generated.

<u>Wet Blasting</u>

Wet blast cleaning involves use of a suspended fine abrasive. The abrasive/water mixture is delivered by compressed air to the contaminated area. By using a very fine abrasive, the amount of materials removed can be carefully controlled.

7.1.2 Non-Abrasive Cleaning Methods

Non-abrasive cleaning methods work by forcing the contaminant off a surface with pressure. In general, the equipment surface is not removed using non-abrasive methods.

Low-Pressure Water

This method consists of a container which is filled with water. The user pumps air out of the container to create a vacuum. A slender nozzle and hose allow the user to spray in hard-to-reach places.

High-Pressure Water

This method consists of a high-pressure pump, an operator controlled directional nozzle, and a high-pressure hose. Operating pressure usually ranges from 340 to 680 atmospheres (atm) and flow rates usually range from 20 to 140 liters per minute.

Ultra-High-Pressure Water

This system produces a water jet that is pressured from 1,000 to 4,000 atmospheres. This ultra-high-pressure spray can remove tightly-adhered surface films. The water velocity ranges from 500 meters/second (m/s) (1,000 atm) to 900 m/s (4,000 atm). Additives can be used to enhance the cleaning action.

Rinsing

Contaminants are removed by rinsing through dilution, physical attraction, and solubilization.

Damp Cloth Removal

In some instances, due to sensitive, non-waterproof equipment or due to the unlikelihood of equipment being contaminated, it is not necessary to conduct an extensive decontamination procedure. For example, air sampling pumps hooked on a fence, placed on a drum, or wrapped in plastic bags are not likely to become heavily contaminated. A damp cloth should be used to wipe off contaminants which may have adhered to equipment through airborne contaminants or from surfaces upon which the equipment was set.

Disinfection/Sterilization

Disinfectants are a practical means of inactivating infectious agents. Unfortunately, standard sterilization methods are impractical for large equipment. This method of decontamination is typically performed off-site.

7.2 Field Sampling Equipment Decontamination Procedures

The decontamination line is setup so that the first station is used to clean the most contaminated item. It progresses to the last station where the least contaminated item is cleaned. The spread of contaminants is further reduced by separating each decontamination station by a minimum of three (3) feet. Ideally, the contamination should decrease as the equipment progresses from one station to another farther along in the line.

A site is typically divided up into the following boundaries: Hot Zone or Exclusion Zone (EZ), the Contamination Reduction Zone (CRZ), and the Support or Safe Zone (SZ). The decontamination line should be setup in the Contamination Reduction Corridor (CRC) which is in the CRZ. Figure 1 (Appendix B) shows a typical contaminant reduction zone layout. The CRC controls access into and out of the exclusion zone and confines decontamination activities to a limited area. The CRC boundaries should be conspicuously marked. The far end is the hotline, the boundary between the exclusion zone and the contamination reduction zone. The size of the decontamination corridor depends on the number of stations in the decontamination process, overall dimensions of the work zones, and amount of space available at the site. Whenever possible, it should be a straight line.

Anyone in the CRC should be wearing the level of protection designated for the decontamination crew. Another corridor may be required for the entry and exit of heavy equipment. Sampling and monitoring equipment and sampling supplies are all maintained outside of the CRC. Personnel don their equipment away from the CRC and enter the exclusion zone through a separate access control point at the hotline. One person (or more) dedicated to decontaminating equipment is recommended.

7.2.1 Decontamination Setup

Starting with the most contaminated station, the decontamination setup should be as follows:

Station 1: Segregate Equipment Drop

Place plastic sheeting on the ground (Figure 2, Appendix B). Size will depend on amount of equipment to be decontaminated. Provide containers lined with plastic if equipment is to be segregated. Segregation may be required if sensitive equipment or mildly contaminated equipment is used at the same time as equipment which is likely to be heavily contaminated.

Station 2: Physical Removal With A High-Pressure Washer (Optional)

As indicated in 7.1.2, a high-pressure wash may be required for compounds which are difficult to remove by washing with brushes. The elevated temperature of the water from the high-pressure washers is excellent at removing greasy/oily compounds. High pressure washers require water and electricity.

A decontamination pad may be required for the high-pressure wash area. An example of a wash pad may consist of an approximately 1 1/2 foot-deep basin lined with plastic sheeting and sloped to a sump at one corner. A layer of sand can be placed over the plastic and the basin is filled with gravel or shell. The sump is also lined with visqueen and a barrel is placed in the hole to prevent collapse. A sump pump is used to remove the water from the sump for transfer into a drum.

Typically heavy machinery is decontaminated at the end of the day unless site sampling requires that the machinery be decontaminated frequently. A separate decontamination pad may be required for heavy equipment.

Station 3: Physical Removal With Brushes And A Wash Basin

Prior to setting up Station 3, place plastic sheeting on the ground to cover areas under Station 3 through Station 10.
Fill a wash basin, a large bucket, or child's swimming pool with non-phosphate detergent and tap water. Several bottle and bristle brushes to physically remove contamination should be dedicated to this station . Approximately 10 - 50 gallons of water may be required initially depending upon the amount of equipment to decontaminate and the amount of gross contamination.

Station 4: Water Basin

Fill a wash basin, a large bucket, or child's swimming pool with tap water. Several bottle and bristle brushes should be dedicated to this station. Approximately 10-50 gallons of water may be required initially depending upon the amount of equipment to decontaminate and the amount of gross contamination.

Station 5: Low-Pressure Sprayers

Fill a low-pressure sprayer with distilled/deionized water. Provide a 5-gallon bucket or basin to contain the water during the rinsing process. Approximately 10-20 gallons of water may be required initially depending upon the amount of equipment to decontaminate and the amount of gross contamination.

Station 6: Nitric Acid Sprayers

Fill a spray bottle with 10% nitric acid. An acid rinse may not be required if inorganics are not a contaminant of concern. The amount of acid will depend on the amount of equipment to be decontaminated. Provide a 5-gallon bucket or basin to collect acid during the rinsing process.

Station 7: Low-Pressure Sprayers

Fill a low-pressure sprayer with distilled/deionized water. Provide a 5-gallon bucket or basin to collect water during the rinsate process.

Station 8: Organic Solvent Sprayers

Fill a spray bottle with an organic solvent. After each solvent rinse, the equipment should be rinsed with distilled/deionized water and air dried. Amount of solvent will depend on the amount of equipment to decontaminate. Provide a 5-gallon bucket or basin to collect the solvent during the rinsing process.

Solvent rinses may not be required unless organics are a contaminant of concern, and may be eliminated from the station sequence.

Station 9: Low-Pressure Sprayers

Fill a low-pressure sprayer with distilled/deionized water. Provide a 5-gallon bucket or basin to collect water during the rinsate process.

Station 10: Clean Equipment Drop

Lay a clean piece of plastic sheeting over the bottom plastic layer. This will allow easy removal of the plastic in the event that it becomes dirty. Provide aluminum foil, plastic, or other protective material to wrap clean equipment.

7.2.2 Decontamination Procedures

Station 1: Segregate Equipment Drop

Deposit equipment used on-site (i.e., tools, sampling devices and containers, monitoring instruments radios, clipboards, etc.) on the plastic drop cloth/sheet or in different containers with plastic liners. Each will be contaminated to a different degree. Segregation at the drop reduces the probability of cross contamination. Loose leaf sampling data sheets or maps can be placed in plastic zip lock bags if contamination is evident.

Station 2: Physical Removal With A High-Pressure Washer (Optional)

Use high pressure wash on grossly contaminated equipment. Do not use high- pressure wash on sensitive or non-waterproof equipment.

Station 3: Physical Removal With Brushes And A Wash Basin

Scrub equipment with soap and water using bottle and bristle brushes. Only sensitive equipment (i.e., radios, air monitoring and sampling equipment) which is waterproof should be washed. Equipment which is not waterproof should have plastic bags removed and wiped down with a damp cloth. Acids and organic rinses may also ruin sensitive equipment. Consult the manufacturers for recommended decontamination solutions.

Station 4: Equipment Rinse

Wash soap off of equipment with water by immersing the equipment in the water while brushing. Repeat as many times as necessary.

Station 5: Low-Pressure Rinse

Rinse sampling equipment with distilled/deionized water with a low-pressure sprayer.

Station 6: Nitric Acid Sprayers (required only if metals are a contaminant of concern)

Using a spray bottle rinse sampling equipment with nitric acid. Begin spraying (inside and outside) at one end of the equipment allowing the acid to drip to the other end into a 5-gallon bucket. A rinsate blank may be required at this station. Refer to Section 9.

Station 7: Low-Pressure Sprayers

Rinse sampling equipment with distilled/deionized water with a low-pressure sprayer.

Station 8: Organic Solvent Sprayers

Rinse sampling equipment with a solvent. Begin spraying (inside and outside) at one end of the equipment allowing the solvent to drip to the other end into a 5-gallon bucket. Allow the solvent to evaporate from the equipment before going to the next station. A QC rinsate sample may be required at this station.

Station 9: Low-Pressure Sprayers

Rinse sampling equipment with distilled/deionized water with a low-pressure washer.

Station 10 : Clean Equipment Drop

Lay clean equipment on plastic sheeting. Once air dried, wrap sampling equipment with aluminum foil, plastic, or other protective material.

7.2.3 Post Decontamination Procedures

1. Collect high-pressure pad and heavy equipment decontamination area liquid and waste and store in appropriate drum or container. A sump pump can aid in the collection process. Refer to the Department of Transportation (DOT) requirements for appropriate containers based on the contaminant of concern.

2. Collect high-pressure pad and heavy equipment decontamination area solid waste and store in appropriate drum or container. Refer to the DOT requirements for appropriate containers based on the contaminant of concern.

3. Empty soap and water liquid wastes from basins and buckets and store in appropriate

drum or container. Refer to the DOT requirements for appropriate containers based on the contaminant of concern.

4. Empty acid rinse waste and place in appropriate container or neutralize with a base and place in appropriate drum. pH paper or an equivalent pH test is required for neutralization. Consult DOT requirements for appropriate drum for acid rinse waste.

5. Empty solvent rinse sprayer and solvent waste into an appropriate container. Consult DOT requirements for appropriate drum for solvent rinse waste.

6. Using low-pressure sprayers, rinse basins, and brushes. Place liquid generated from this process into the wash water rinse container.

7. Empty low-pressure sprayer water onto the ground.

8. Place all solid waste materials generated from the decontamination area (i.e., gloves and plastic sheeting, etc.) in an approved DOT drum. Refer to the DOT requirements for appropriate containers based on the contaminant of concern.

9. Write appropriate labels for waste and make arrangements for disposal. Consult DOT regulations for the appropriate label for each drum generated from the decontamination process.

8.0 CALCULATIONS

This section is not applicable to this SOP.

9.0 QUALITYASSURANCE/ QUALITY CONTROL

A rinsate blank is one specific type of quality control sample associated with the field decontamination process. This sample will provide information on the effectiveness of the decontamination process employed in the field.

Rinsate blanks are samples obtained by running analyte free water over decontaminated sampling equipment to test for residual contamination. The blank water is collected in sample containers for handling, shipment, and analysis. These samples are treated identical to samples collected that day. A rinsate blank is used to assess cross contamination brought about by improper decontamination procedures. Where dedicated sampling equipment is not utilized, collect one rinsate blank per day per type of sampling device samples to meet QA2 and QA3 objectives.

If sampling equipment requires the use of plastic tubing it should be disposed of as contaminated and replaced with clean tubing before additional sampling occurs.

10.0 DATA VALIDATION

Results of quality control samples will be evaluated for contamination. This information will be utilized to qualify the environmental sample results in accordance with the project's data quality objectives.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow OSHA, U.S. EPA, corporate, and other applicable health and safety procedures.

Decontamination can pose hazards under certain circumstances. Hazardous substances may be incompatible with decontamination materials. For example, the decontamination solution may react with contaminants to produce heat, explosion, or toxic products. Also, vapors from decontamination solutions may pose a direct health hazard to workers by inhalation, contact, fire, or explosion.

The decontamination solutions must be determined to be acceptable before use. Decontamination materials may degrade protective clothing or equipment; some solvents can permeate protective clothing. If decontamination materials do pose a health hazard, measures should be taken to protect personnel or substitutions should be made to eliminate the hazard. The choice of respiratory protection based on contaminants of concern from the site may not be appropriate for solvents used in the decontamination process.

Safety considerations should be addressed when using abrasive and non-abrasive decontamination equipment. Maximum air pressure produced by abrasive equipment could cause physical injury. Displaced material requires control mechanisms.

Material generated from decontamination activities requires proper handling, storage, and disposal. Personal Protective Equipment may be required for these activities.

Material safety data sheets are required for all decontamination solvents or solutions as required by the Hazard Communication Standard (i.e., acetone, alcohol, and trisodiumphosphate).

In some jurisdictions, phosphate containing detergents (i.e., TSP) are banned.

12.0 REFERENCES

Field Sampling Procedures Manual, New Jersey Department of Environmental Protection, February, 1988.

A Compendium of Superfund Field Operations Methods, EPA 540/p-87/001.

Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual, USEPA Region IV, April 1, 1986.

Guidelines for the Selection of Chemical Protective Clothing, Volume 1, Third Edition, American Conference of Governmental Industrial Hygienists, Inc., February, 1987.

Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH/OSHA/USCG/EPA, October, 1985.

APPENDIX A

Table

Table 1. Soluble Contaminants and Recommended Solvent Rinse

TABLE 1 Soluble Contaminants and Recommended Solvent Rinse		
SOLVENT[1]	EXAMPLES OF SOLVENTS	SOLUBLE CONTAMINANTS
Water	Deionized water Tap water	Low-chain hydrocarbons Inorganic compounds Salts Some organic acids and other polar compounds
Dilute Acids	Nitric acid Acetic acid Boric acid	Basic (caustic) compounds (e.g., amines and hydrazines)
Dilute Bases	Sodium bicarbonate (e.g., soap detergent)	Acidic compounds Phenol Thiols Some nitro and sulfonic compounds
Organic Solvents [2]	Alcohols Ethers Ketones Aromatics Straight chain alkalines (e.g., hexane) Common petroleum products (e.g., fuel, oil, kerosene)	Nonpolar compounds (e.g., some organic compounds)
Organic Solvent[2]	Hexane	PCBs

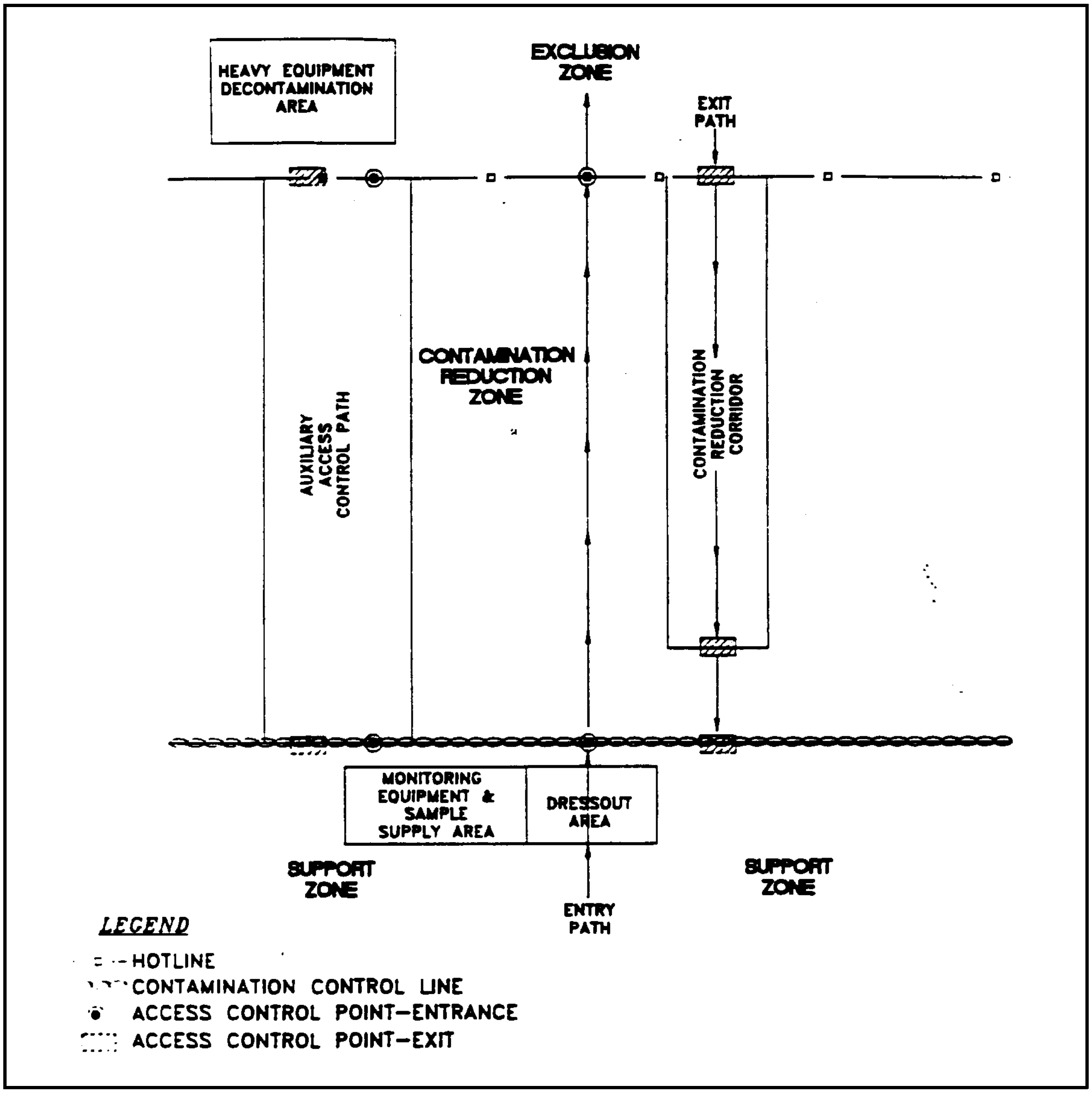
[1] - Material safety data sheets are required for all decontamination solvents or solutions as required by the Hazard Communication Standard

[2] - WARNING: Some organic solvents can permeate and/or degrade the protective clothing

APPENDIX B

Figures

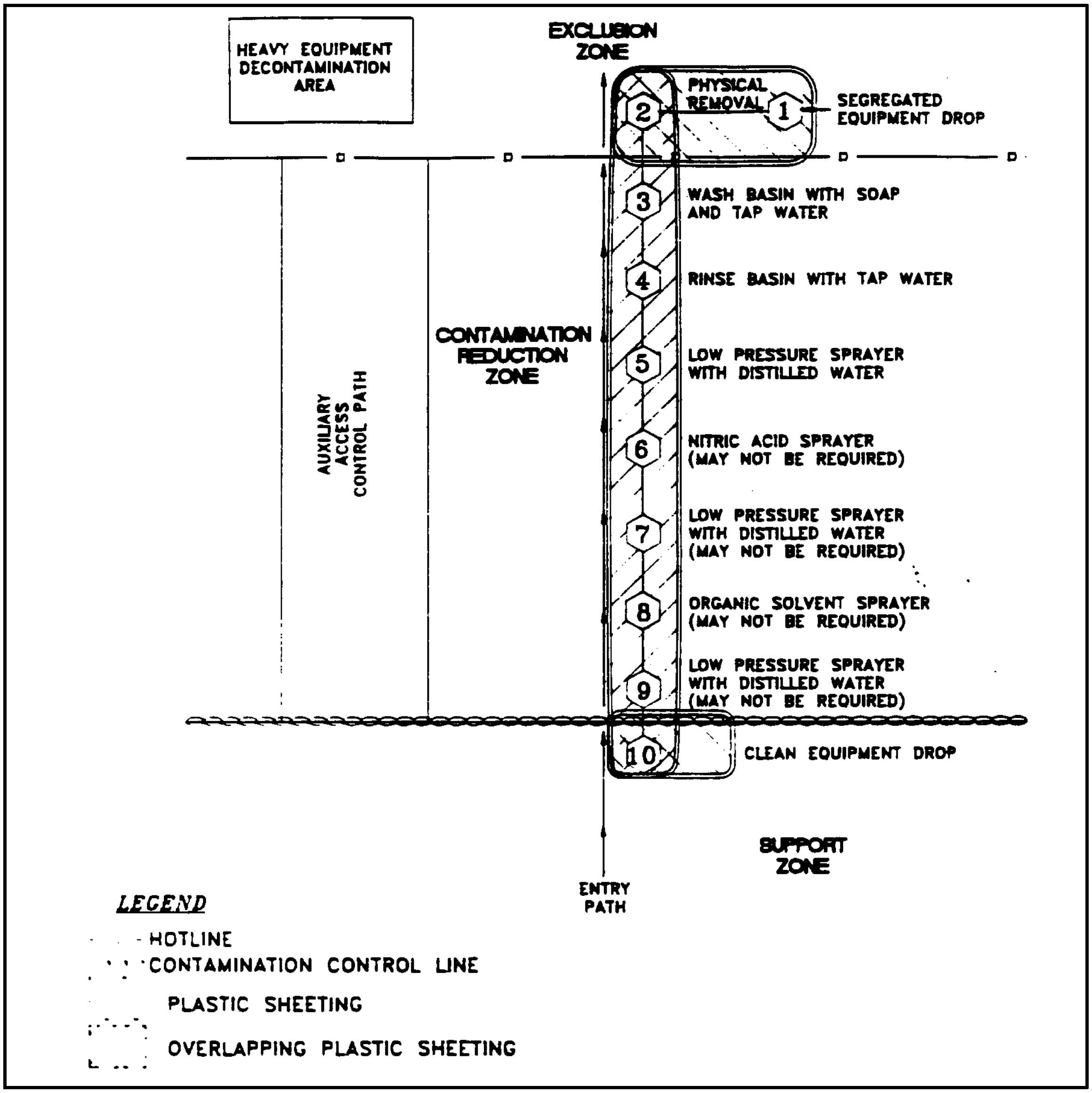
Figure 1. Contamination Reduction Zone Layout



APPENDIX B (Cont'd.)

Figures

Figure 2. Decontamination Layout



SOP#: 2012
DATE: 11/16/94
REV. #: 0.0

SOIL SAMPLING

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to describe the procedures for the collection of representative soil samples. Analysis of soil samples may determine whether concentrations of specific pollutants exceed established action levels, or if the concentrations of pollutants present a risk to public health, welfare, or the environment.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. Environmental Protection Agency (EPA) endorsement or recommendation for use.

2.0 METHOD SUMMARY

Soil samples may be collected using a variety of methods and equipment. The methods and equipment used are dependent on the depth of the desired sample, the type of sample required (disturbed vs. undisturbed), and the soil type. Near-surface soils may be easily sampled using a spade, trowel, and scoop. Sampling at greater depths may be performed using a hand auger, continuous flight auger, a trier, a split-spoon, or, if required, a backhoe.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Chemical preservation of solids is not generally recommended. Samples should, however, be cooled and protected from sunlight to minimize any potential reaction.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

There are two primary interferences or potential problems associated with soil sampling. These include cross contamination of samples and improper sample collection. Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary. Improper sample collection can involve using contaminated equipment, disturbance of the matrix resulting in compaction of the sample or inadequate homogenization of the samples where required, resulting in variable, non-representative results.

5.0 EQUIPMENT/APPARATUS

Soil sampling equipment includes the following:

- Sampling plan
- Maps/plot plan
- Safety equipment, as specified in the Health and Safety Plan
- Survey equipment
- Tape measure
- Survey stakes or flags
- Camera and film
- Stainless steel, plastic, or other appropriate homogenization bucket, bowl or pan
- Appropriate size sample containers
- Ziplock plastic bags
- Logbook
- Labels
- Chain of Custody records and seals
- Field data sheets
- Cooler(s)
- Ice
- Vermiculite
- Decontamination supplies/equipment
- Canvas or plastic sheet
- Spade or shovel

- Spatula
- Scoop
- Plastic or stainless steel spoons
- Trowel
- Continuous flight (screw) auger
- Bucket auger
- Post hole auger
- Extension rods
- T-handle
- Sampling trier
- Thin wall tube sampler
- Split spoons
- Vehimeyer soil sampler outfit
  - Tubes
  - Points
  - Drive head
  - Drop hammer
  - Puller jack and grip
- Backhoe

6.0 REAGENTS

Reagents are not used for the preservation of soil samples. Decontamination solutions are specified in the Sampling Equipment Decontamination SOP and the site specific work plan.

7.0 PROCEDURES

7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies required.

2. Obtain necessary sampling and monitoring equipment.

3. Decontaminate or pre-clean equipment, and ensure that it is in working order.

4. Prepare schedules, and coordinate with staff, client, and regulatory agencies, if appropriate.

5. Perform a general site survey prior to site entry in accordance with the site specific Health and Safety Plan.

6. Use stakes, flagging, or buoys to identify and mark all sampling locations. Specific site factors, including extent and nature of contaminant should be considered when selecting sample location. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions. All staked locations will be utility-cleared by the property owner prior to soil sampling.

7.2 Sample Collection

7.2.1 Surface Soil Samples

Collection of samples from near-surface soil can be accomplished with tools such as spades, shovels, trowels, and scoops. Surface material can be removed to the required depth with this equipment, then a stainless steel or plastic scoop can be used to collect the sample.

This method can be used in most soil types but is limited to sampling near surface areas. Accurate, representative samples can be collected with this procedure depending on the care and precision demonstrated by the sample team member. A stainless steel scoop, lab spoon, or plastic spoon will suffice in most other applications. The use of a flat, pointed mason trowel to cut a block of the desired soil can be helpful when undisturbed profiles are required. Care should be exercised to avoid use of devices plated with chrome or other materials. Plating is particularly common with garden implements such as potting trowels.

The following procedure is used to collect surface soil samples:

1. Carefully remove the top layer of soil or debris to the desired sample depth with a pre-cleaned spade.

2. Using a pre-cleaned, stainless steel scoop, plastic spoon, or trowel, remove and discard a thin layer of soil from the area which came in contact with the spade.

3. If volatile organic analysis is to be performed, transfer the sample directly into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or

other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval or location into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7.2.2 Sampling at Depth with Augers and Thin Wall Tube Samplers

This system consists of an auger, or a thin-wall tube sampler, a series of extensions, and a "T" handle (Figure 1, Appendix A). The auger is used to bore a hole to a desired sampling depth, and is then withdrawn. The sample may be collected directly from the auger. If a core sample is to be collected, the auger tip is then replaced with a thin wall tube sampler. The system is then lowered down the borehole, and driven into the soil to the completion depth. The system is withdrawn and the core is collected from the thin wall tube sampler.

Several types of augers are available; these include: bucket type, continuous flight (screw), and post-hole augers. Bucket type augers are better for direct sample recovery since they provide a large volume of sample in a short time. When continuous flight augers are used, the sample can be collected directly from the flights. The continuous flight augers are satisfactory for use when a composite of the complete soil column is desired. Post-hole augers have limited utility for sample collection as they are designed to cut through fibrous, rooted, swampy soil and cannot be used below a depth of three feet.

The following procedure will be used for collecting soil samples with the auger:

1. Attach the auger bit to a drill rod extension, and attach the "T" handle to the drill rod.

2. Clear the area to be sampled of any surface debris (e.g., twigs, rocks, litter). It may be advisable to remove the first three to six inches of surface soil for an area approximately six inches in radius around the drilling location.

3. Begin augering, periodically removing and depositing accumulated soils onto a plastic sheet spread near the hole. This prevents accidental brushing of loose material back down the borehole when removing the auger or adding drill rods. It also facilitates refilling the hole, and avoids possible contamination of the surrounding area.

4. After reaching the desired depth, slowly and carefully remove the auger from boring. When sampling directly from the auger, collect the sample after the auger is removed from the boring and proceed to Step 10.

5. Remove auger tip from drill rods and replace with a pre-cleaned thin wall tube sampler. Install the proper cutting tip.

6. Carefully lower the tube sampler down the borehole. Gradually force the tube samplerinto soil. Care should be taken to avoid scraping the borehole sides. Avoid hammering the drill rods to facilitate coring as the vibrations may cause the boring walls to collapse.

7. Remove the tube sampler, and unscrew the drill rods.

8. Remove the cutting tip and the core from the device.

9. Discard the top of the core (approximately 1 inch), as this possibly represents material collected before penetration of the layer of concern. Place the remaining core into the appropriate labeled sample container. Sample homogenization is not required.

10. If volatile organic analysis is to be performed, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the

caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly.

When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

11. If another sample is to be collected in the same hole, but at a greater depth, reattach the auger bit to the drill and assembly, and follow steps 3 through 11, making sure to decontaminate the auger and tube sampler between samples.

12. Abandon the hole according to applicable State regulations. Generally, shallow holes can simply be backfilled with the removed soil material.

7.2.3 Sampling at Depth with a Trier

The system consists of a trier, and a "T" handle. The auger is driven into the soil to be sampled and used to extract a core sample from the appropriate depth.

The following procedure will be used to collect soil samples with a sampling trier:

1. Insert the trier (Figure 2, Appendix A) into the material to be sampled at a 0º to 45º angle from horizontal. This orientation minimizes the spillage of sample.

2. Rotate the trier once or twice to cut a core of material.

3. Slowly withdraw the trier, making sure that the slot is facing upward.

4. If volatile organic analysis is to be performed, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7.2.4 Sampling at Depth with a Split Spoon (Barrel) Sampler

The procedure for split spoon sampling describes the collection and extraction of undisturbed soil cores of 18 or 24 inches in length. A series of consecutive cores may be extracted with a split spoon sampler to give a complete soil column profile, or an auger may be used to drill down to the desired depth for sampling. The split spoon is then driven to its sampling depth through the bottom of the augured hole and the core extracted.

When split spoon sampling is performed to gain geologic information, all work should be performed in accordance with ASTM D 1586-67 (reapproved 1974).

The following procedures will be used for collecting soil samples with a split spoon:

1. Assemble the sampler by aligning both sides of barrel and then screwing the drive shoe on the bottom and the head piece on top.

2. Place the sampler in a perpendicular position on the sample material.

3. Using a well ring, drive the tube. Do not drive past the bottom of the head piece or compression of the sample will result.

4. Record in the site logbook or on field data sheets the length of the tube used to penetrate the material being sampled, and the number of blows required to obtain this depth.

5. Withdraw the sampler, and open by unscrewing the bit and head and splitting the barrel. The amount of recovery and soil type should be recorded on the boring log. If a split sample is desired, a cleaned, stainless steel knife should be used to divide the tube contents in half, longitudinally. This sampler

is typically available in 2 and 3 1/2 inch diameters. However, in order to obtain the required sample volume, use of a larger barrel may be required.

6. Without disturbing the core, transfer it to appropriate labeled sample container(s) and seal tightly.

7.2.5 Test Pit/Trench Excavation

These relatively large excavations are used to remove sections of soil, when detailed examination of soil characteristics (horizontal, structure, color, etc.) are required. It is the least cost effective sampling method due to the relatively high cost of backhoe operation.

The following procedures will be used for collecting soil samples from test pit/trench excavations:

1. Prior to any excavation with a backhoe, it is important to ensure that all sampling locations are clear of utility lines, subsurface pipes and poles (subsurface as well as above surface).

2. Using the backhoe, a trench is dug to approximately three feet in width and approximately one foot below the cleared sampling location. Place excavated soils on plastic sheets. Trenches greater than five feet deep must be sloped or protected by a shoring system, as required by OSHA regulations.

3. A shovel is used to remove a one to two inch layer of soil from the vertical face of the pit where sampling is to be done.

4. Samples are taken using a trowel, scoop, or coring device at the desired intervals. Be sure to scrape the vertical face at the point of sampling to remove any soil that may have fallen from above, and to expose fresh soil for sampling. In many instances, samples can be collected directly from the backhoe bucket.

5. If volatile organic analysis is to be performed, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

6. Abandon the pit or excavation according to applicable state regulations. Generally, shallow excavations can simply be backfilled with the removed soil material.

8.0 CALCULATIONS

This section is not applicable to this SOP.

9.0 QUALITY ASSURANCE/ QUALITY CONTROL

There are no specific quality assurance (QA) activities which apply to the implementation of these procedures. However, the following QA procedures apply:

1. All data must be documented on field data sheets or within site logbooks.

2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation, and they must be documented.

10.0 DATA VALIDATION

This section is not applicable to this SOP.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OHSA and corporate health and safety procedures.

12.0 REFERENCES

Mason, B.J., Preparation of Soil Sampling Protocol: Technique and Strategies. 1983 EPA-600/4-83-020.

Barth, D.S. and B.J. Mason, Soil Sampling Quality Assurance User's Guide. 1984 EPA-600/4-84-043.

U.S. EPA. Characterization of Hazardous Waste Sites - A Methods Manual: Volume II. Available Sampling Methods, Second Edition. 1984 EPA-600/4-84-076.

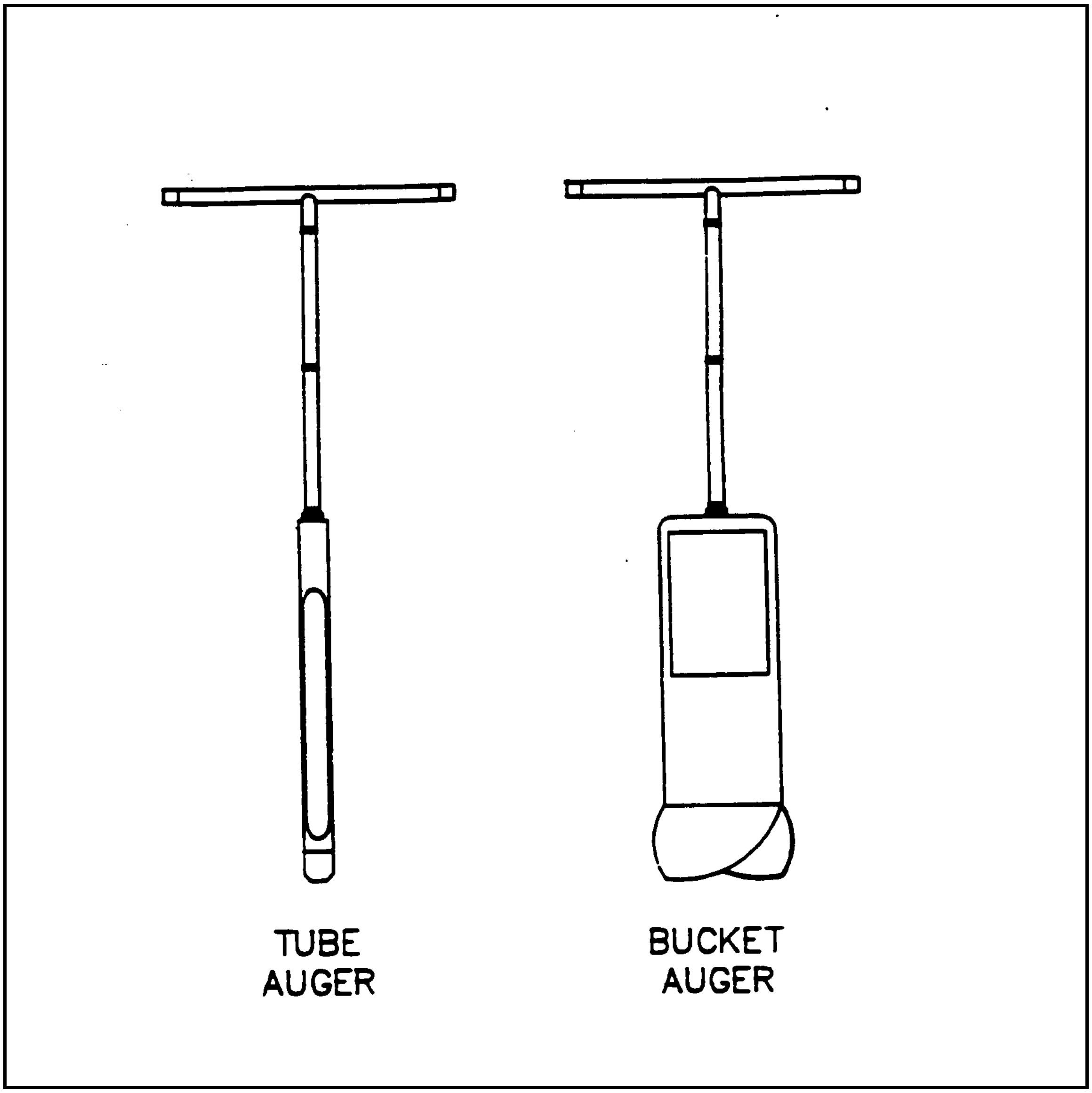
de Vera, E.R., B.P. Simmons, R.D. Stephen, and D.L. Storm. Samplers and Sampling Procedures for Hazardous Waste Streams. 1980 EPA-600/2-80-018.

ASTM D 1586-67 (reapproved 1974), ASTM Committee on Standards, Philadelphia, PA.

APPENDIX A

Figures

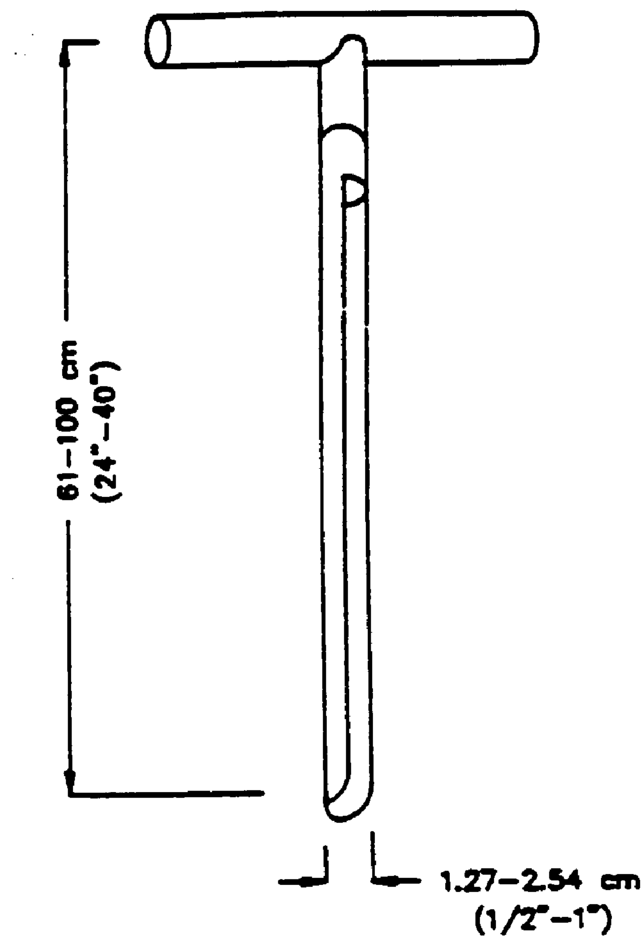
FIGURE 1. Sampling Augers



APPENDIX A (Cont'd)

Figures

FIGURE 2. Sampling Trier



SURFACE WATER SAMPLING

SOP#: 2013
DATE: 11/17/94
REV. #: 0.0

1.0 SCOPE AND APPLICATION

This standard operating procedure (SOP) is applicable to the collection of representative liquid samples, both aqueous and non-aqueous from streams, rivers, lakes, ponds, lagoons, and surface impoundments. It includes samples collected from depth, as well as samples collected from the surface.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitations or limitations imposed by the procedure or other procedure limitations. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. Environmental Protection Agency (EPA) endorsement or recommendation for use.

2.0 METHOD SUMMARY

Sampling situations vary widely, therefore, no universal sampling procedure can be recommended. However, sampling of both aqueous and non-aqueous liquids from the above mentioned sources is generally accomplished through the use of one of the following samplers or techniques:

C Kemmerer bottle
C Bacon bomb sampler
C Dip sampler
C Direct method

These sampling techniques will allow for the collection of representative samples from the majority of surface waters and impoundments encountered.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Once samples have been collected, the following procedure should be followed:

1. Transfer the sample(s) into suitable, labeled sample containers.

2. Preserve the sample if appropriate, or use pre-preserved sample bottles. Do not overfill bottles if they are pre-preserved.

3. Cap the container, place in a ziploc plastic bag and cool to 4°C.

4. Record all pertinent data in the site logbook and on field data sheets.

5. Complete the Chain of Custody record.

6. Attach custody seals to cooler prior to shipment.

7. Decontaminate all sampling equipment prior to the collection of additional samples with that sampling device.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

There are two primary interferences or potential problems with surface water sampling. These include cross contamination of samples and improper sample collection.

1. Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary. Refer to the Sampling Equipment Decontamination SOP.

2. Improper sample collection can involve using contaminated equipment, disturbance of the stream or impoundment substrate, and sampling in an obviously disturbed area.

Following proper decontamination procedures and minimizing disturbance of the sample site will eliminate these problems.

5.0 EQUIPMENT/APPARATUS

Equipment needed for collection of surface water samples may include (depending on technique chosen):

- Kemmerer bottles
- Bacon bomb sampler
- Dip sampler
- Line and messengers
- Sample bottles/preservatives
- Ziploc bags
- Ice
- Coolers
- Chain of Custody records, custody seals
- Field data sheets
- Decontamination equipment
- Maps/plot plan
- Safety equipment
- Compass
- Tape measure
- Survey stakes, flags, or buoys and anchors
- Camera and film
- Logbook/waterproof pen
- Sample bottle labels

6.0 REAGENTS

Reagents will be utilized for preservation of samples and for decontamination of sampling equipment. The preservatives required are specified by the analysis to be performed.

7.0 PROCEDURES

7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies needed.

2. Obtain the necessary sampling and monitoring equipment.

3. Decontaminate or pre-clean equipment, and ensure that it is in working order.

4. Prepare scheduling and coordinate with staff, clients, and regulatory agency, if appropriate.

5. Perform a general site survey prior to site entry, in accordance with the site specific Health and Safety Plan.

6. Use stakes, flagging, or buoys to identify and mark all sampling locations. If required the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions. If collecting sediment samples, this procedure may disturb the bottom.

7.2 Representative Sampling Considerations

In order to collect a representative sample, the hydrology and morphometrics of a stream or impoundment should be determined prior to sampling. This will aid in determining the presence of phases or layers in lagoons, or impoundments, flow patterns in streams, and appropriate sample locations and depths.

Water quality data should be collected in impoundments, and to determine if stratification is present. Measurements of dissolved oxygen, pH, and temperature can indicate if strata exist which would effect analytical results. Measurements should be collected at one-meter intervals from the substrate to the surface using the appropriate instrument (i.e., a Hydrolab or equivalent).

Water quality measurements such as dissolved oxygen, pH, temperature, conductivity, and oxidation-reduction potential can assist in the interpretation of analytical data and the selection of sampling sites and depths when surface water samples are collected.

Generally, the deciding factors in the selection of a sampling device for sampling liquids in streams, rivers, lakes, ponds, lagoons, and surface impoundments are:

1. Will the sample be collected from shore or from a boat?

2. What is the desired depth at which you wish to collect the sample?

3. What is the overall depth and flow direction of river or stream?

4. What type of sample will be collected (i.e., water or lagoon liquids)?

7.2.1 Sampler Composition

The appropriate sampling device must be of a proper composition. Selection of samplers constructed of glass, stainless steel, PVC or PFTE (Teflon) should be based upon the analyses to be performed.

7.3 Sample Collection

7.3.1 Kemmerer Bottle

A Kemmerer bottle (Figure 1, Appendix A) may be used in most situations where site access is from a boat or structure such as a bridge or pier, and where samples at depth are required. Sampling procedures are as follows:

1. Use a properly decontaminated Kemmerer bottle. Set the sampling device so that the sampling end pieces (upper and lower stoppers) are pulled away from the sampling tube (body), allowing the substance to be sampled to pass through this tube.

2. Lower the pre-set sampling device to the predetermined depth. Avoid bottom disturbance.

3. When the Kemmerer bottle is at the required depth, send down the messenger, closing the sampling device.

4. Retrieve the sampler and discharge from the bottom drain the first 10-20 mL to clear any potential contamination of the valve. Transfer the sample to the appropriate sample container.

7.3.2 Bacon Bomb Sampler

A bacon bomb sampler (Figure 2, Appendix A) may be used in situations similar to those outlined for the Kemmerer bottle. Sampling procedures are as follows:

1. Lower the bacon bomb sampler carefully to the desired depth, allowing the line for the trigger to remain slack at all times. When the desired depth is reached, pull the trigger line until taut. This will allow the sampler to fill.

2. Release the trigger line and retrieve the sampler.

3. Transfer the sample to the appropriate sample container by pulling up on the trigger.

7.3.3 Dip Sampler

A dip sampler (Figure 3, Appendix A) is useful in situations where a sample is to be recovered from an outfall pipe or along a lagoon bank where direct access is limited. The long handle on such a device allows access from a discrete location. Sampling procedures are as follows:

1. Assemble the device in accordance with the manufacturer's instructions.

2. Extend the device to the sample location and collect the sample by dipping the sampler into the substance.

3. Retrieve the sampler and transfer the sample to the appropriate sample container.

7.3.4 Direct Method

For streams, rivers, lakes, and other surface waters, the direct method may be utilized to collect water samples from the surface directly into the sample bottle. This method is not to be used for sampling lagoons or other impoundments where contact with contaminants is a concern.

Using adequate protective clothing, access the sampling station by appropriate means. For shallow stream stations, collect the sample under the water surface while pointing the sample container upstream; the container must be upstream of the collector. Avoid disturbing the substrate. For lakes and other impoundments, collect the sample under the water surface avoiding surface debris and the boat wake.

When using the direct method, do not use pre-preserved sample bottles as the collection method may dilute the concentration of preservative necessary for proper sample preservation.

8.0 CALCULATIONS

This section is not applicable to this SOP.

9.0 QUALITY ASSURANCE/ QUALITY CONTROL

There are no specific quality assurance (QA) activities which apply to the implementation of these procedures. However, the following general QA procedures apply:

1. All data must be documented on field data sheets or within site logbooks.

2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation and they must be documented.

10.0 DATA VALIDATION

This section is not applicable to this SOP.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA and corporate health and safety procedures.

More specifically, when sampling lagoons or surface impoundments containing known or suspected hazardous substances, adequate precautions must be taken to ensure the safety of sampling personnel. The sampling team member collecting the sample should not get too close to the edge of the impoundment, where bank failure may cause him/her to lose his/her balance. The person performing the sampling should be on a lifeline and be wearing adequate protective equipment. When conducting sampling from a boat in an impoundment or flowing waters, appropriate boating safety procedures should be followed.

12.0 REFERENCES

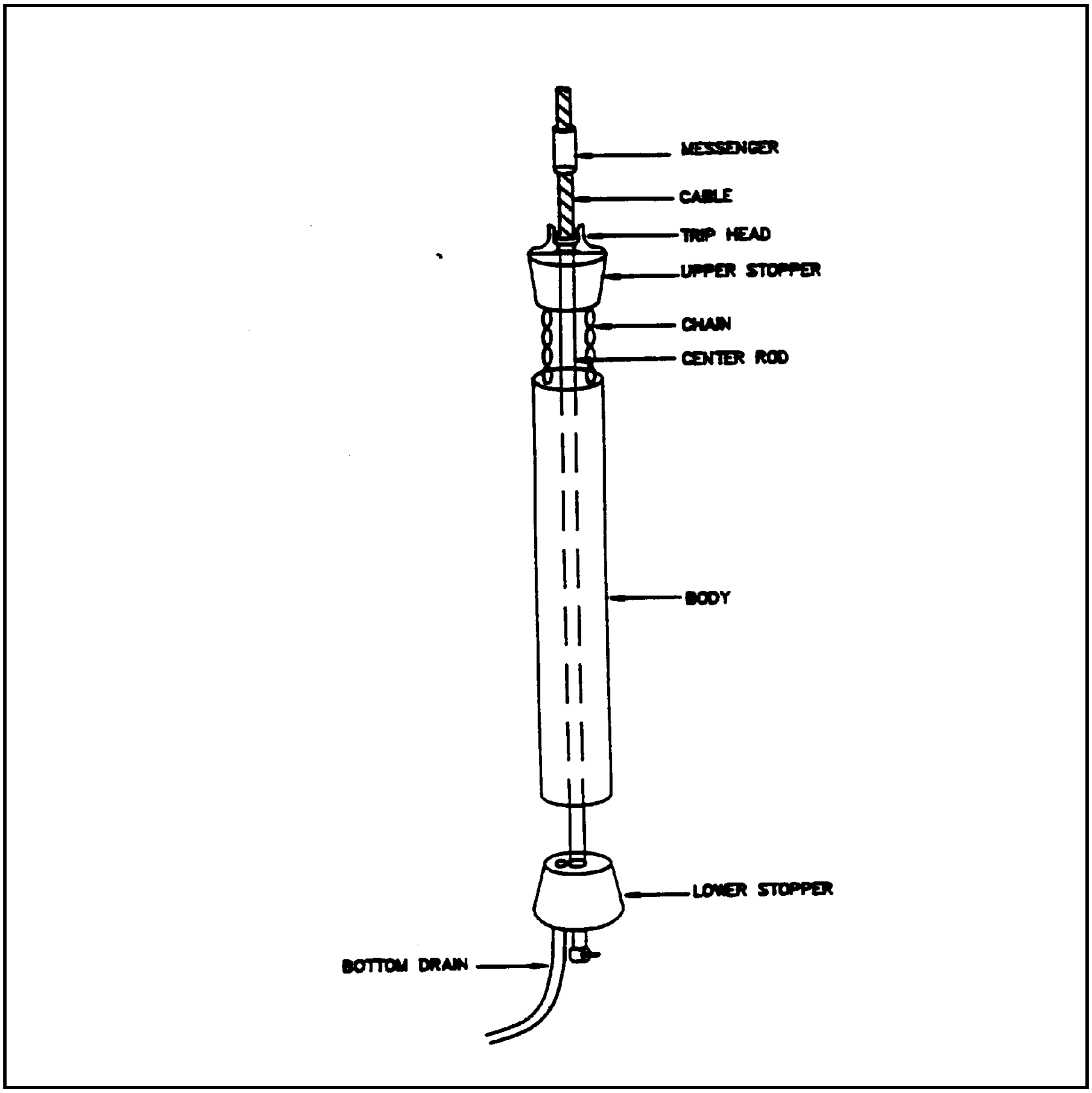
U.S. Geological Survey. 1977. National Handbook or Recommended Methods for Water Data Acquisition. Office of Water Data Coordination Reston, Virginia. (Chapter Updates available).

U.S. Environmental Protection Agency. 1984. Characterization of Hazardous Waste Sites - A Methods Manual: Volume II. Available Sampling Methods, Second Edition. EPA/600/4-84-076.

APPENDIX A

Figures

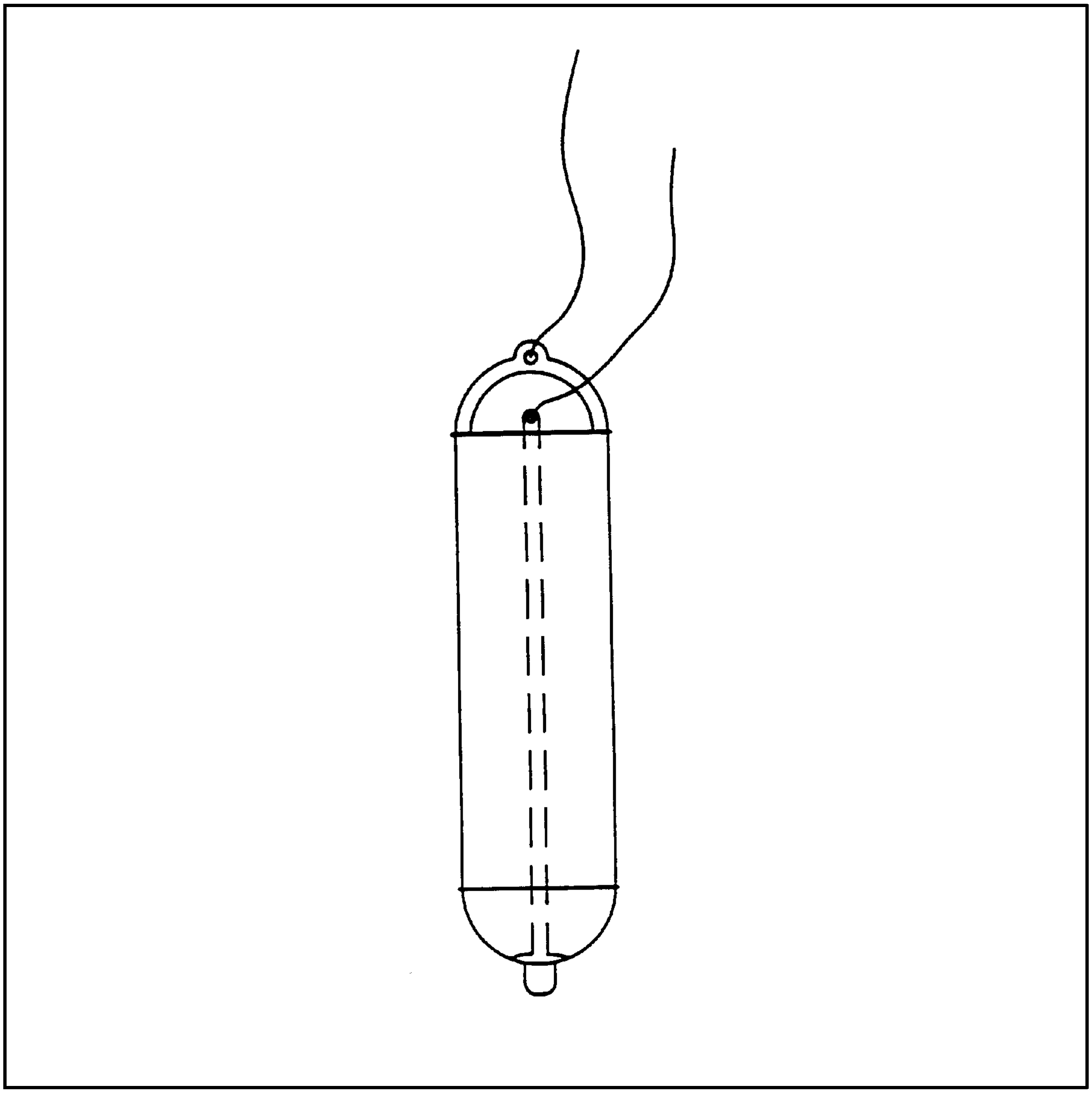
FIGURE 1. Kemmerer Bottle



APPENDIX A (Cont'd)

Figures

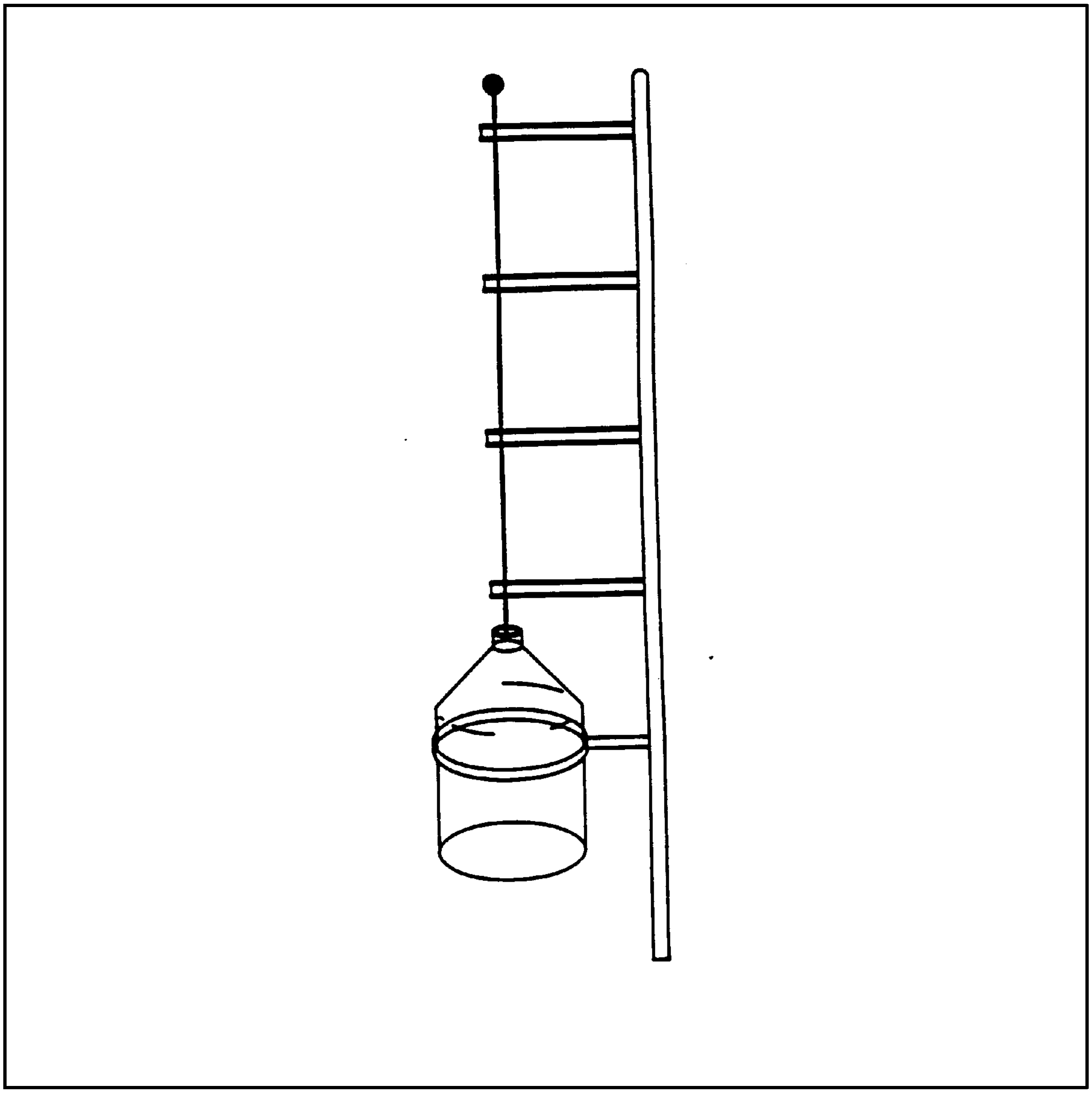
FIGURE 2. Bacon Bomb Sampler



APPENDIX A (Cont'd)

Figures

FIGURE 3. Dip Sampler



APPENDIX D:
DATA MANAGEMENT PLAN

		Site-Specific Data Management Plan			
		Project Name:	Cove Wash Watershed Assessment	**TDD Number/Site ID:**	0025/1302-T25-R9-16-03-0001
		Author:	Mark Frey	**Company:**	WESTON Solutions, Inc.
		Date Initiated:	February 12, 2015	**Last Updated:**	March 31, 2017
Viewer:	*Pending*				

This data management plan (DMP) is intended to provide guidance for data collection by field personnel and subsequent data management activities. The data collection and management practices presented in this plan are designed to ensure data integrity and consistency for all data collection personnel and from operational period to the next. This document is intended to be used in conjunction with a Regional data management plan and only includes the details specific to the site.

Data Processing - The following table outlines the specific requirements for various data types being collected during the project.

	Data Input (Input Device)	Data Type	Data Source	Target Database	Site-Specific Data Elements	Site-Specific Verification	Site-Specific SOP
1	Initial Reconnaissance (Photos, Scans, Reports, Maps, Gamma Scans)	Site Info, Spatial Data, Monitoring	AML, NNEPA, WESTON, EPA Region 9	Region 9 GIS Server, Region 9 Doc Server	Photos must be georeferenced, spatial data must be file geodatabase	Region 9 Auditor Rules	Appendix A5
2	Site Information (iPad – FileMaker, Trimble GeoXT)	Site Info	WESTON Field Team	Scribe	Site Name [Cove Wash Watershed], Site Number [099R]	Region 9 Auditor Rules	Appendix A2
3	Site Photographs (iPad – FileMaker, Trimble GeoXT, PhotosInfoPro)	Site Info	WESTON Field Team	EPAOSC.org, Region 9 Doc Server	Name / Description, Photos must be georeferenced	Field Personnel Review	Appendix A3, Appendix A5
4	Surface Sediment Grab Sampling (iPad – FileMaker/Sheets, Trimble GeoXT)	Sampling	WESTON Field Team	Scribe	Sample ID, Date, Time , Location (Lat/Long), Event ID [SedSampling_1506]	Region 9 Auditor Rules	Cove Wash Watershed Assessment Site SAP, Appendix A2, Appendix A7, Appendix A13
5	Subsurface Sediment Grab Sampling (iPad – FileMaker/Sheets, Trimble GeoXT)	Sampling	WESTON Field Team	Scribe	Sample ID, Date, Time , Location (Lat/Long), Event ID [SedSampling_1506]	Region 9 Auditor Rules	Cove Wash Watershed Assessment Site SAP, Appendix A2, Appendix A7, Appendix A13

	Data Input (Input Device)	Data Type	Data Source	Target Database	Site-Specific Data Elements	Site-Specific Verification	Site-Specific SOP
6	Sediment Sampling Laboratory Results (Scribe-Compatible EDD)	Sampling	Analytical Laboratory	Scribe	Metals (EPA 6010B), Uranium Isotopes (EPA 908.0), Ra-226/Ra-228 (EPA 901.1 Mod), Gross Alpha (EPA 901.1 Mod)	Region 9 Auditor Rules, EPA Site-Specific QAP	Cove Wash Watershed Assessment Site SAP, Appendix B5
7	Surface Water Grab Sampling (iPad – FileMaker/Sheets, Trimble GeoXT)	Sampling	WESTON Field Team	Scribe	Sample ID, Date, Time , Location (Lat/Long), Event ID [SWSampling_1506]	Region 9 Auditor Rules	Cove Wash Watershed Assessment Site SAP, Appendix A2, Appendix A7, Appendix A13
8	Groundwater Grab Sampling (iPad – FileMaker/Sheets, Trimble GeoXT)	Sampling	WESTON Field Team	Scribe	Sample ID, Date, Time , Location (Lat/Long), Event ID [GWSampling_1506]	Region 9 Auditor Rules	Cove Wash Watershed Assessment Site SAP, Appendix A2, Appendix A7, Appendix A13
9	Water Quality Survey (iPad – FileMaker/Sheets)	Monitoring	WESTON Field Team	Scribe	Instrument ID, Location (Latitude/Longitude), Date, Time, Parameter, Result (Measurement)	Calibration Log, Region 9 Auditor Rules	Cove Wash Watershed Assessment Site SAP, Appendix A2, Appendix A7, Appendix A13
10	Water Sampling Laboratory Results (Scribe-Compatible EDD)	Sampling	Analytical Laboratory	Scribe	Metals (EPA 200.7/EPA 200.8), Uranium Isotopes (EPA 908.0), Ra-226 (EPA 903.0), Gross Alpha (EPA 900.0), Stable Isotopes (CRDS)	Region 9 Auditor Rules, EPA Site-Specific QAP	Cove Wash Watershed Assessment Site SAP, Appendix B5
11	Stationary Gamma Radiation Survey (Ludlum 2241-3 Meter, Ludlum 44-20 Probe, Trimble GeoXT)	Monitoring	WESTON Field Team	Scribe	Instrument ID, Location (Latitude/Longitude), Date, Time, Parameter, Result (Measurement)	Calibration Log, Background Level, Investigation Level, Hotspots	Cove Wash Watershed Assessment Site SAP, Appendix A13
12	Background Gamma Radiation Survey (Ludlum 2241-3 Meter, Ludlum 44-20 Probe, Trimble GeoXT)	Monitoring	WESTON Field Team	Region 9 GIS Server	Instrument ID, Location (Latitude/Longitude), Date, Time, Parameter, Result (Measurement)	Calibration Log, Background Level, Investigation Level	Cove Wash Watershed Assessment Site SAP, Appendix A13
13	Wetland Delineation Surveys and Mapping (iPad – FileMaker, Trimble GeoXT) (Photos, Reports, Maps)	Site Info, Spatial Data	WESTON Field Team	Region 9 GIS Server, Region 9 Doc Server	Photos must be georeferenced, spatial data must be file geodatabase	Region 9 Auditor Rules	Appendix A2, Appendix A3, Appendix A5

Data Reporting - The following table outlines the specific requirements for various data reports being distributed during the project.

	Reporting Task	Data Inputs	Data Transformation	Deliverable Format(s)	Frequency
1	Gamma Radiation Monitoring	11, 12	Download, GPS Correction and Export, FTP Transfer, Publish	Flex Viewer via OSC Interface	Daily
2	Sediment and Subsurface Sediment Sampling Progress	4 – 6	Publish	Flex Viewer via OSC Interface	Daily
2	Surface Water and Groundwater Sampling Progress	7 – 10	Publish	Flex Viewer via OSC Interface	Daily
3	Analytical Report	6, 10	Data Collection and Analysis Summary	Scribe Subscription, Flex Viewer via OSC Interface, PDF Document	Project Completion
4	Assessment Report	2 – 12	Comprehensive Event Documentation and Summary	Flex Viewer via OSC Interface, PDF Document	Project Completion
5	Data Export (Backup)	3 – 12	Export / Publish	Raw Data Format	Daily
6	Calibration Log	9, 11, 12	Transcribe	Spreadsheet	Project Completion
7	Watershed Delineation Survey Report	13	Data Collection and Analysis Summary	PDF Document	Project Completion
8	Watershed Delineation Mapping	13	Download, GPS Correction and Export, FTP Transfer, Publish	Flex Viewer via OSC Interface	Project Completion

Attachment A2
ScribeMobile Application (FileMakerGo)

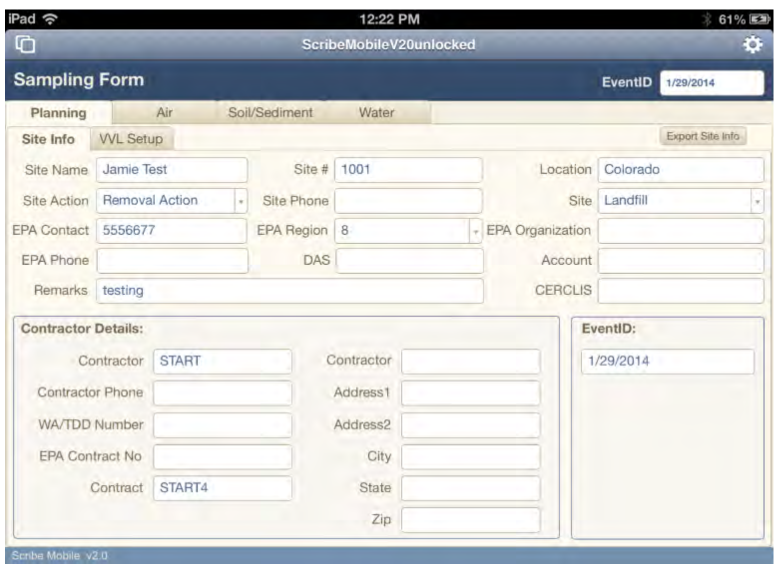
Revised: 3/31/2015

A ScribeMobile Application has been created for field capable iPads using the FileMakerGo application. The ScribeMobile form is best suited for an iPad 2nd generation or higher, running iOS 6.0 or higher, using the FileMakerGo app. The form can also be run on iPhone using the same app, or on Windows and Mac computers using FileMaker Pro. This SOP assumes the user is running the form on an iPad.

Planning

The structure of the mobile application is flat, meaning that each form can only be related to one EventID. For projects requiring separate EventIDs, such as a Sampling event and a Removal Assessment event, a new form must be used for the second event.

There are 2 tabs contained in the Planning Section of the application: Site Info and VVL Setup.



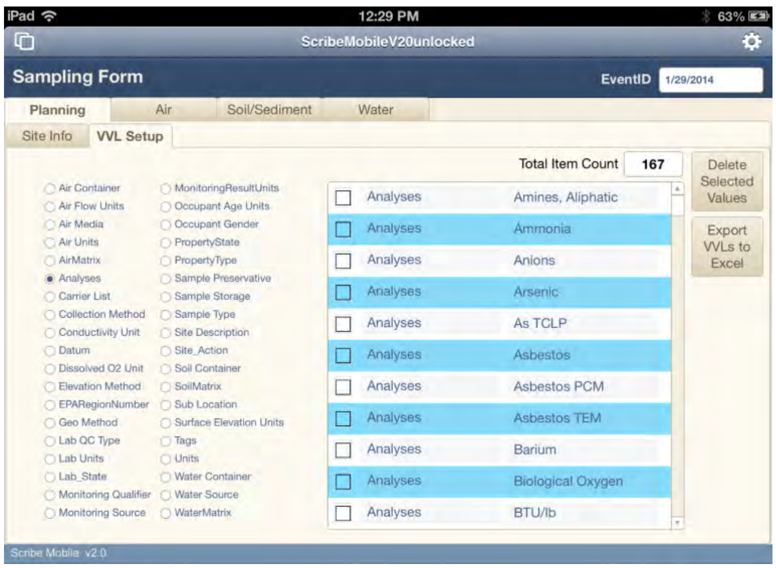
Site Info

[Note: Currently, no way to import into the Site Info tab in Scribe. Can import EventID info into Events tab.]

The Site Info tab should be populated with relevant site information. This is the location where EventID is created.

VVL Setup

The VVL Setup tab gives the field user the option of modifying the valid values list contained in the drop down menus of the sampling tabs of the application. The VVL Setup tab contains EPA IT Forum approved valid values. The columns on the left side of the screen are data elements that, when the radio button is selected, display the valid values for the selected data element in the box on the right side of the screen. The main function of this tab is to allow field users to modify the VVL while maintaining consistency with Scribe. The drop down menus on the media specific sampling tabs are restricted, meaning the user cannot perform entry in a data element box containing a drop down menu. If a value needs to be added, it must be added in the VVL Setup tab (see below for instructions).



<u>Delete valid values</u>

- Select data element by selecting corresponding radio button;
- Highlight valid value to be deleted by selecting row;
- Signify valid value to be deleted by placing X via a tap in box on highlighted row; and
- Select “Delete Selected Values” box to the right of the valid values box.

<u>Add a new valid value</u>

- Select data element by selecting corresponding radio button;
- Scroll to the bottom of valid values list;
- Highlight the empty row at the bottom of the list;
- Place an X via a tap in the box of the empty row;
- The data element will appear in the empty line; and
- Enter the new valid value in the right column of the valid values box.

Valid Values Export

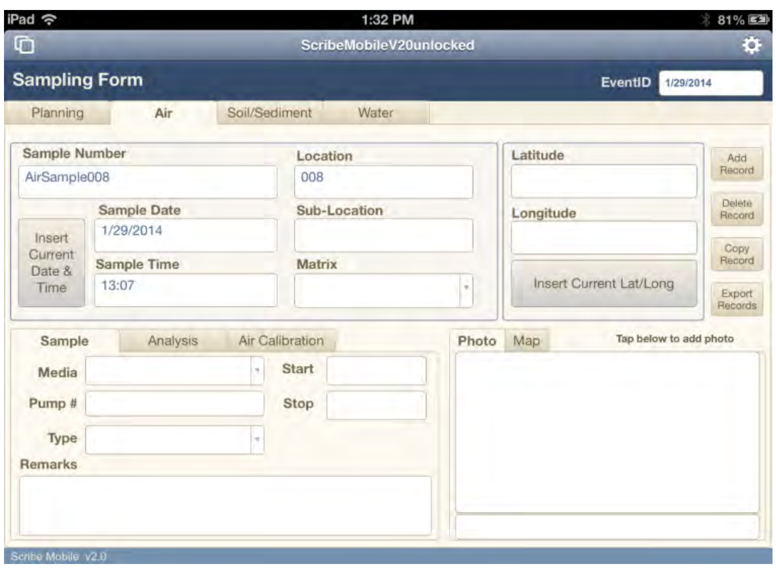
Once the valid values list has been modified to fit the project needs, the list can be exported as a csv spreadsheet for easy incorporation into Scribe's Auditor Rules, a Data Management Plan (DMP) or other project document. The export is performed by selecting the "Export VVLs to Excel" button to the right of the valid values box.

Air

The air sampling tab is formatted with air sampling specific data elements and valid values. The basic sample information is captured in the top half of the form. To create a new sample in the form, select the "Add Record" button on the right side of the form. There are also buttons to allow the user to "Delete Record," "Copy Record," and "Export Records."

Basic Sample Info

- Sample ID is auto-populated as "AirSample###;"
- Insert Current Date & Time button auto-populates current sample date and time;
- Matrix is populated with valid values from VVL Setup tab;
- Latitude and Longitude are captured using "Insert Current Lat/Long" button
    - **Note: ensure that iPad is Cellular capable (look in Settings>General and it should say Cellular in left column) or that Bluetooth GPS is connected to iPad; otherwise iPad will not be able to capture lat/long**



Air Specific Sample Info

Sample tab

- Media and Type are drop down menus populated with values in VVL Setup tab;
- Pump # is restricted as numeric entry only, to fit with Scribe restrictions.

Analysis tab

- Analyses, Tag, Container, Storage, Preservation, and LabQC are drop down menus populated with values in VVL setup tab;
- Multiple analyses can be added in this tab, once once analysis is assigned to the sample, the user can scroll down and add additional analyses;
- After the first Tag has been assigned to the first analysis, that Tag is not available for subsequent analyses. This is to minimize user error of assigning the same tag to multiple analyses; and
- To delete an analysis, tap the X button to the right of the LabQC box in the Analysis tab.

Air Calibration tab

- The Air Calibration tab was formatted to allow the user to enter three flow rates and a Start and Stop time, with the application calculating the Average Begin Rate, Average End Rate, Sampling Period, Average Flow Rate, and Volume.

Photo tab

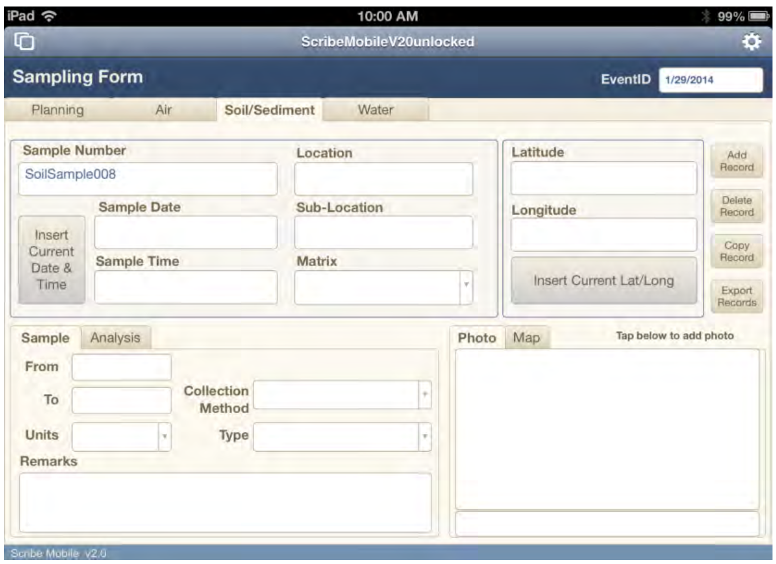
A photo can be captured via the Mobile application by tapping the box below the Photo tab. The photo will not be exported with the sample records, but the image name will be exported to map to the Image_Path field in Scribe.

Soil/Sediment

The soil/sediment sampling tab is formatted with soil/sediment sampling specific data elements and valid values. The basic sample information is captured in the top half of the form. To create a new sample in the form, select the “Add Record” button on the right side of the form. There are also buttons to allow the user to “Delete Record,” “Copy Record,” and “Export Records.”

Basic Sample Info

- Sample ID is autopopulated as "SoilSample###;"
- Insert Current Date & Time button autopulates current sample date and time;
- Matrix is populated with valid values from VVL Setup tab;
- Latitude and Longitude are captured using "Insert Current Lat/Long" button
    - **Note: ensure that iPad is Cellular capable (look in Settings>General and it should say Cellular in left column) or that bluetooth GPS is connected to iPad; otherwise iPad will not be able to capture lat/long**



Soil/Sediment Specific Sample Info

Sample tab

- Sample Collection Depth is recorded in the "From" and "To" fields, with "Units" being a drop down menu;
- Pump # is restricted as numeric entry only, to fit with Scribe restrictions.

Analysis tab

- Analyses, Tag, Container, Storage, Preservation, and LabQC are drop down menus populated with values in VVL setup tab;
- Multiple analyses can be added in this tab, once once analysis is assigned to the sample, the user can scroll down and add additional analyses;
- After the first Tag has been assigned to the first analysis, that Tag is not available for subsequent analyses. This is to minimize user error of assigning the same tag to multiple analyses; and
- To delete an analysis, tap the X button to the right of the LabQC box in the Analysis tab.

Photo tab

A photo can be captured via the Mobile application by tapping the box below the Photo tab. The photo will not be exported with the sample records, but the image name will be exported to map to the Image_Path field in Scribe.

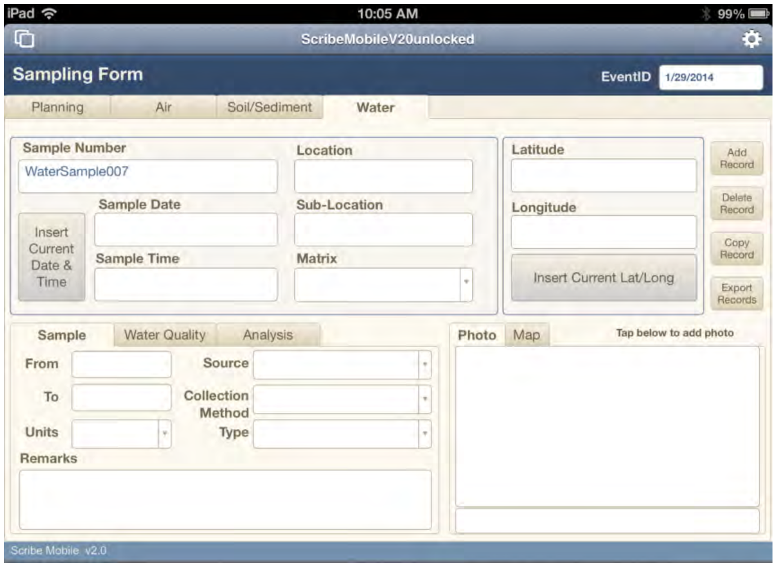
Water

The water sampling tab is formatted with water sampling specific data elements and valid values. The basic sample information is captured in the top half of the form. To create a new sample in the form, select the "Add Record" button on the right side of the form. There are also buttons to allow the user to "Delete Record," "Copy Record," and "Export Records."

Basic Sample Info

- Sample ID is autopopulated as "WaterSample###;"
- Insert Current Date & Time button autopulates current sample date and time;
- Matrix is populated with valid values from VVL Setup tab;
- Latitude and Longitude are captured using "Insert Current Lat/Long" button

- **Note: ensure that iPad is Cellular capable (look in Settings>General and it should say Cellular in left column) or that bluetooth GPS is connected to iPad; otherwise iPad will not be able to capture lat/long**



Water Specific Sample Info

Sample tab

- Sample Collection Depth is recorded in the “From” and “To” fields, with “Units” being a drop down menu;
- Source, Collection Method, and Type are drop down menus populated with values from the valid values list.

Water Quality tab

- Water quality parameters are recorded in this tab: Turbidity, Temp, pH, Conductivity, Dissolved Oxygen, ORP, and Salinity.

Analysis tab

- Analyses, Tag, Container, Storage, Preservation, and LabQC are drop down menus populated with values in VVL setup tab;
- Multiple analyses can be added in this tab, once once analysis is assigned to the sample, the user can scroll down and add additional analyses;
- After the first Tag has been assigned to the first analysis, that Tag is not available for subsequent analyses. This is to minimize user error of assigning the same tag to multiple analyses; and
- To delete an analysis, tap the X button to the right of the LabQC box in the Analysis tab.

Photo tab

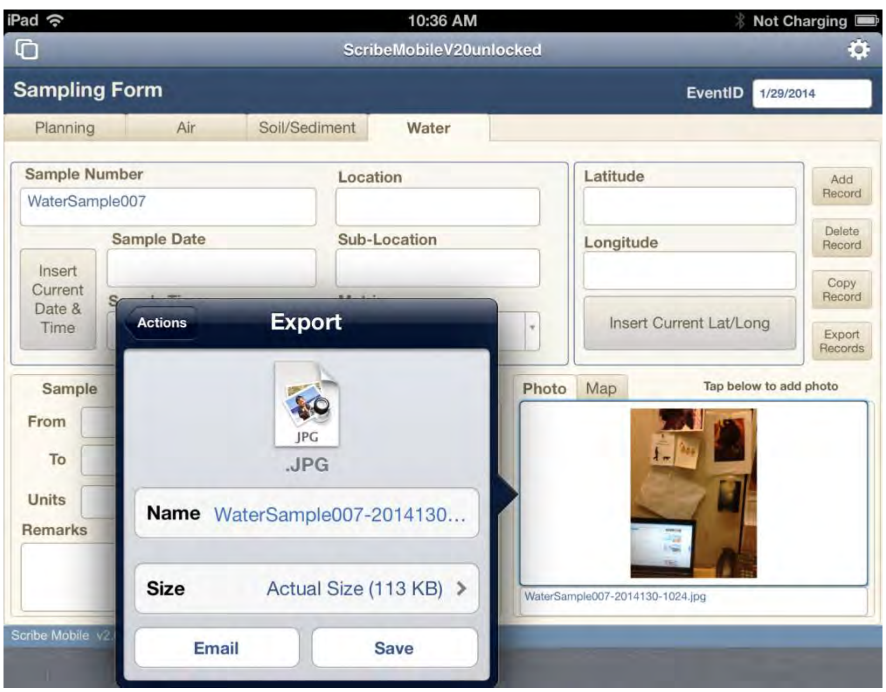
A photo can be captured via the Mobile application by tapping the box below the Photo tab. The photo will not be exported with the sample records, but the image name will be exported to map to the Image_Path field in Scribe.

Map

On each media specific sampling tab, there is a Map tab which allows user to verify location accuracy of lat/long captured by the iPad. The map is only viewable via an internet connection (Wifi or 4G).

Exporting Photos via iTunes File Sharing

To export photos, each time a photo is captured, a dialog box will open. User should select Export, then Save. The file will be saved to the FileMakerGo File Browser.

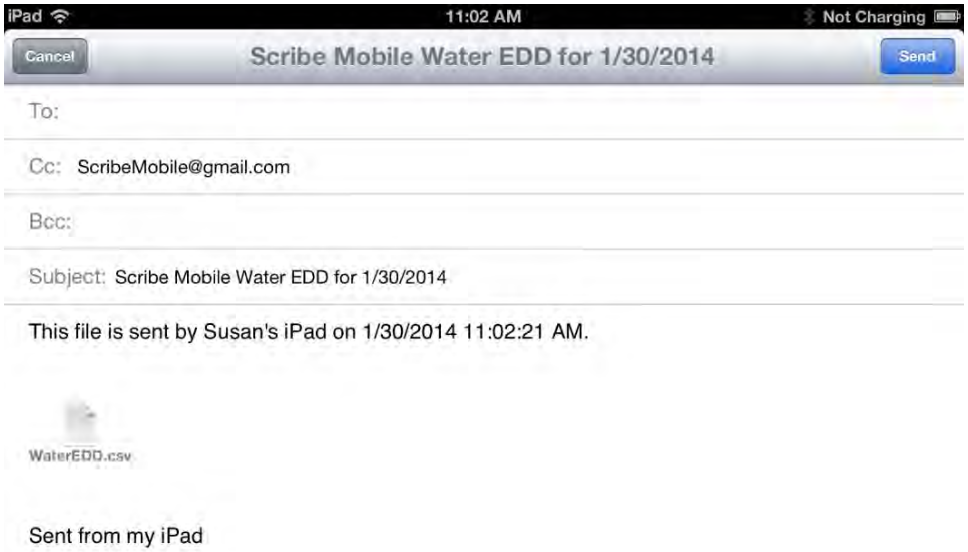


The user can then connect the iPad to the computer via the iPad cable, open iTunes, select "On This iPad" on the top right of the iTunes toolbar, then Apps, which will display Apps on the iPad that allow File Sharing. Select FileMakerGo and the forms and photos will be displayed. Exporting using this process allows the user to save multiple photos from the iPad at once, rather than exporting and email each photo.

Exporting Records and Importing into Scribe

To export and email media specific sampling records, select the Export Records button on the sampling tab. An email will appear with the export file attached. Add an email address to send the file to and send the email. Each sampling tab (Air, Water, Soil/Sediment) will produce a different export.

When the csv is opened in excel, it will look similar to:



	A	B	C	D	E	F	G	H	I	J	K
1	EventID	SamplesAirIDScribe	Sampler	Latitude	Longitude	Samp_No	SampleDate	SampleTime	Location	Sub_Location	Matrix
2	EventID			36	-94	AirSample1	1/16/2014	10:38:42 AM	AirLocation1	AirSubLocation1	Air
3	EventID			36	-94	AirSample1	1/16/2014	10:38:42 AM	AirLocation1	AirSubLocation1	Air
4	EventID			-35	-46	AirSample2	1/16/2014	4:11:44 PM	Test	Test	Asbestos
5	EventID					AirSample001	1/21/2014	12:35:46 AM	AirLocation1	AirSubLocation1	Air
6	EventID					AirSample001	1/21/2014	12:35:46 AM	AirLocation1	AirSubLocation1	Air
7	EventID					AirSample002	1/21/2014	12:35:44 AM	AirLocation1	AirSubLocation1	Air
8	EventID					AirSample002	1/21/2014	12:35:44 AM	AirLocation1	AirSubLocation1	Air
9	EventID					AirSample003	1/21/2014	12:35:42 AM	AirLocation1	AirSubLocation1	Air
10	EventID					AirSample003	1/21/2014	12:35:42 AM	AirLocation1	AirSubLocation1	Air

The exports from FileMakerGo have been formatted to map precisely to the fields in the media specific sampling tables in Scribe for ease of data uploading in the field.

NOTE: Prior to importing into Scribe, any field left blank in the export csv requires the user insert a space due to the insertion of a character by FileMakerGo app, which is not recognized by Scribe. If a space is not entered, an error will occur when the user tries to import data.

Importing into Scribe

Open Scribe project, navigate to File>Import>Custom Import.

In the Data Category dropdown, select the media specific sampling table that matches the data to be uploaded (Air, Water, Soil/Sediment).

Import Data File, Select Browse and navigate to location of export csv for upload.

Select Next, which will display the data to be uploaded. **QA the data to verify that fields mapped correctly and that all data from csv is included-easy way is to look at number of records in csv vs number of records being uploaded to Scribe).**

Select Next>Add Records.

Select Import.

Adding FileMakerGo forms to an iPad.

If a FileMaker form is revised/updated by a data manager with the FileMaker Advanced desktop application, field users have the capability to remotely add new forms to the iPad with the following steps:

1. Save the revised FileMakerGo file to your desktop (files can be emailed)
2. Connect the iPad to your computer and open iTunes
3. Click on the iPad icon at the top right
4. When you are viewing the iPad contents in iTunes, In the bar under the apple icon select Apps.
5. Scroll to the very bottom of the screen using the grey bar at the right (be sure you scroll all the way down- there is more stuff down there than it looks like)
6. Under the headings “File Sharing” and “Apps” click on FileMakerGo
7. You will see a list of the forms currently saved on the iPad
8. Click the add button and navigate to the saved file
9. This will add the file to the FileMakerGo app
10. Once you have the form added to the iPad, disconnect from the computer and open the FileMakerGo app.
11. Click the “two overlapping squares” icon in the top left
12. Select the toggle for “Files” (vs “windows”)
13. On the left you will see a column titled “Files on Device”
14. Select the newly added file to open

Appendix A – List of Records to be duplicated

When the “Copy Record” button is tapped, the following fields are populated in the duplicated record:

SamplesAirFlat fields duplicated
SAMPLESAIRFLAT::Samp_Location
SAMPLESAIRFLAT::Samp_Sub_Location
SAMPLESAIRFLAT::Samp_Matrix
SAMPLESAIRFLAT::Media_Type
SAMPLESAIRFLAT::Samp_SampleType
samplesairflat_TAGS::Analyses
samplesairflat_TAGS::Tag
samplesairflat_TAGS::Container
samplesairflat_TAGS::No_Container
samplesairflat_TAGS::Storage
samplesairflat_TAGS::Preservation
samplesairflat_TAGS::MS_MSD
samplesairflat_TAGS::Preliminary_Results
samplesairflat_TAGS::Description
SamplesSoilFlat fields duplicated
SAMPLESSOILFLAT::Samp_Location
SAMPLESSOILFLAT::Samp_Sub_Location
SAMPLESSOILFLAT::Samp_Matrix
SAMPLESSOILFLAT:: Samp_SampleCollection
SAMPLESSOILFLAT::Samp_SampleType
SAMPLESSOILFLAT::Samp_Depth_Units
samplessoilflat_TAGS::Analyses
samplessoilflat_TAGS::Tag
samplessoilflat_TAGS::Container
samplessoilflat_TAGS::No_Container
samplessoilflat_TAGS::Storage
samplessoilflat_TAGS::Preservation
samplessoilflat_TAGS::MS_MSD
samplessoilflat_TAGS::Preliminary_Results
samplessoilflat_TAGS::Description

SamplesWaterFlat fields duplicated
SAMPLESWATERFLAT::Samp_Location
SAMPLESWATERFLAT::Samp_Sub_Location
SAMPLESWATERFLAT::Samp_Matrix
SAMPLESWATERFLAT::Samp_SampleMedia
SAMPLESWATERFLAT:: Samp_SampleCollection
SAMPLESWATERFLAT::Samp_SampleType
SAMPLESWATERFLAT::Samp_Depth_Units
SAMPLESWATERFLAT::ConductUnits
SAMPLESWATERFLAT::DissO2Units
sampleswaterflat_TAGS::Analyses
sampleswaterflat_TAGS::Tag
sampleswaterflat_TAGS::Container

sampleswaterflat_TAGS::No_Container
sampleswaterflat_TAGS::Storage
sampleswaterflat_TAGS::Preservation
sampleswaterflat_TAGS::MS_MSD
sampleswaterflat_TAGS::Preliminary_Results
sampleswaterflat_TAGS::Description

Appendix B – Exported Air Monitoring Data Fields

When the “Export Record” button is tapped, the following fields are exported:

EventID
SamplesAirIDScribe
Sampler
Latitude
Longitude
Samp_No
SampleDate
SampleTime
Location
Sub_Location
Matrix
SampleMedia
SamplerID
SampleType
Start_Time
Stop_Time
Remarks
Samplesairflat_TAGS::Analyses
Samplesairflat_TAGS::Tag
Samplesairflat_TAGS::Container
Samplesairflat_TAGS::No_Container
Samplesairflat_TAGS::Storage
Samplesairflat_TAGS::Preservatio
Samplesairflat_TAGS::MS_MSD
Samplesairflat_TAGS::Preliminary_Results
Samplesairflat_TAGS::Description
Image_Path
Start1
Start2
Start3
Stop1
Stop2
Stop3
FlowRateTime
AvgStart
AvgStop
OverallFlowRate
Volume

Appendix C – Exported Soil Monitoring Data Fields

When the “Export Record” button is tapped, the following fields are exported:

EventID
SamplesSoilIDScribe
Sampler
Latitude
Longitude
Samp_No
SampleDate
SampleTime
Location
Sub_Location
Matrix
SampleCollection
SampleType
Samp_Depth
Samp_Depth_To
Samp_Depth_Units
Remarks
Samplessoilflat_TAGS::Analyses
Samplessoilflat_TAGS::Tag
Samplessoilflat_TAGS::Container
Samplessoilflat_TAGS::No_Container
Samplessoilflat_TAGS::Storage
Samplessoilflat_TAGS::Preservation
Samplessoilflat_TAGS::MS_MSD
Samplessoilflat_TAGS::Prelimiary_Results
Samplessoilflat_TAGS::Description
Image_Path

Appendix D – Exported Water Monitoring Data Fields

When the “Export Record” button is tapped, the following fields are exported:

EventID
SamplesWaterIDScribe
Sampler
Latitude
Longitude
Samp_No
SampleDate
SampleTime
Location
Sub_Locatoin
Matrix
SampleMedia
SampleCollection
SampleType
Samp_Depth
Samp_Depth_To
Samp_Depth_Units
Remarks
Turbidity
Temp
pH
Conductivity
ConductUnits
Diss_O2
DissO2Units
ORP
Salinity
Sampleswaterflat_TAGS::Analyses
Sampleswaterflat_TAGS::Tag
Sampleswaterflat_TAGS::Container
Sampleswaterflat_TAGS::No_Container
Sampleswaterflat_TAGS::Storage
Sampleswaterflat_TAGS::Preservation
Sampleswaterflat_TAGS::MS_MSD
Sampleswaterflat_TAGS::Preliminary_Results
Sampleswaterflat_TAGS::Description
Image_Path

Attachment A3
EPAOSC.org SOP

Revised 3/31/2015

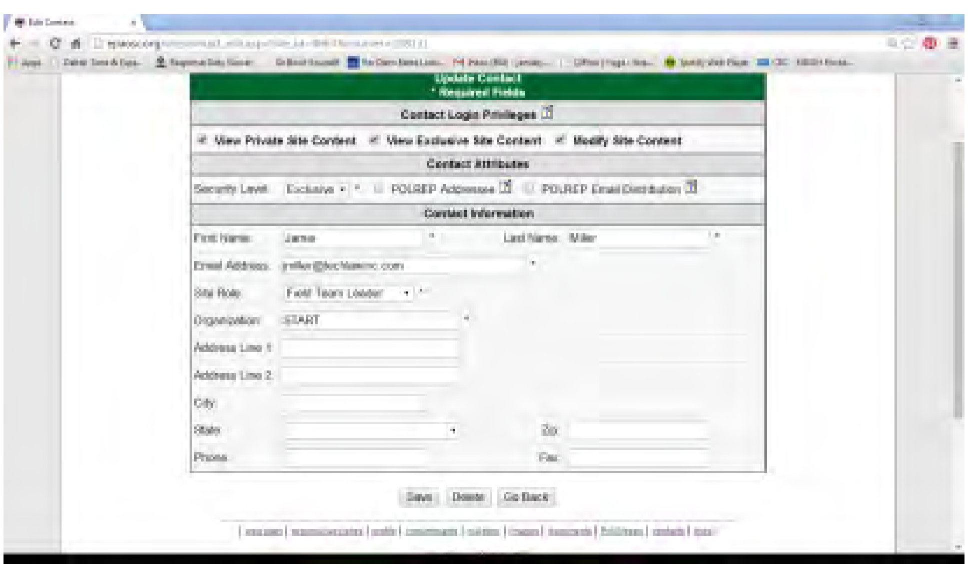
The EPA On Scene Coordinator (OSC) website is intended to be a resource for OSCs nationwide. It allows OSCs to access, track, and share information with other OSCs throughout the country.

The website has 8 distinct pages containing different information.

- Homepage: general information about the site and new items
- Web Sites: links to Region specific websites
- WebEOC: link to WebEOC, a web-based crisis management system designed for supporting the ICS method of response management
- Training: links to EPA offered trainings
- Equipment: links to National Equipment Management System (NEMS) and list of Vendor links
- Health and Safety: links to Health and Safety Resources, both EPA specific and otherwise
- OSC Directory: links to National On-Scnee Coordinator Phone Book and EPA Employee Directory
- Links and Resources: variety of resources OSCs might employ during a response

During response events, the OSC will task START with updating site photos and loading site-related documents to the response specific OSC website.

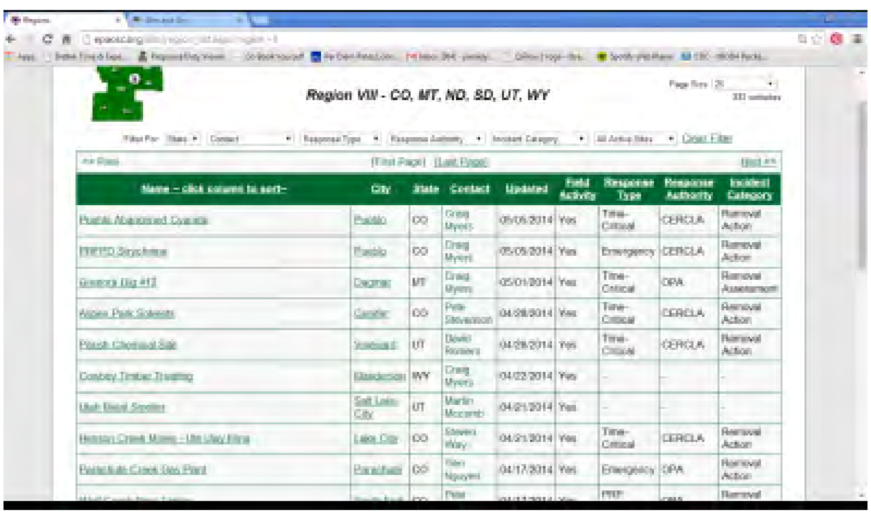
Prior to being able to modify the website, START must ensure that OSC has created one for the response. This capability is not available to START. OSC must also add START as a contact with editing privileges. Once added, if the OSC gives START "Modify Site Content" privileges, START can add additional contacts.



Upload Site Photos:

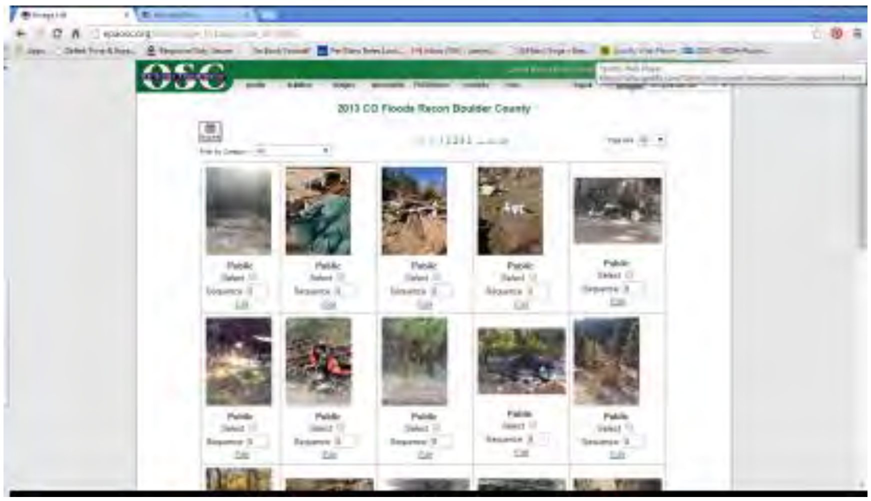
- Log in to EPAOSC.org (if a website has restricted access, it will not be visible in the website list unless a user has logged in with appropriate credentials)
- Navigate to the Websites tab
- Select appropriate Region to showcase website list

- Website list for Region will be displayed



- Select applicable website; list can be sorted or filtered by a variety of parameters

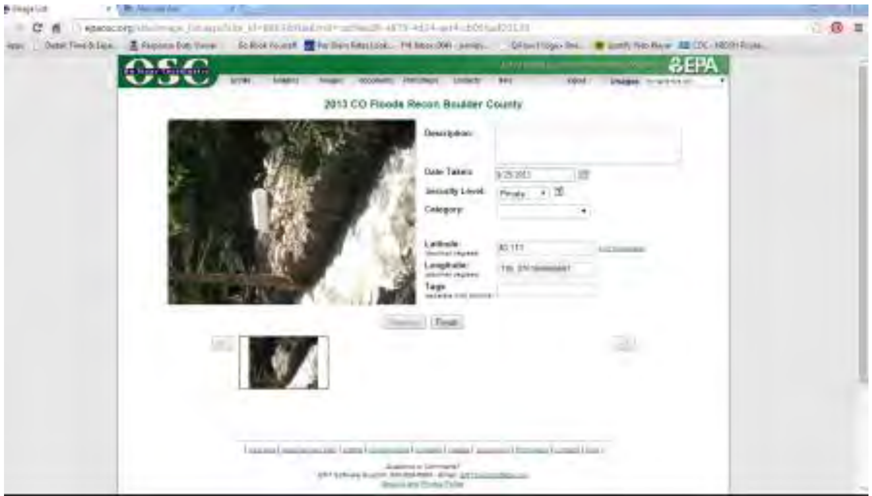
Select Images tab at top of screen and page will display images



- Scroll to bottom of page to Upload Image dialog box

- Browse to Images for upload and check the box for “Reduce image size for faster web browser viewing”
- Image will load

- Once loaded, Image editing form will open to allow START to enter applicable data
- If taken with a geotagging camera or GPS enabled iPad or iPhone, latitude/longitude and Date Taken should be populated from the photo's metadata

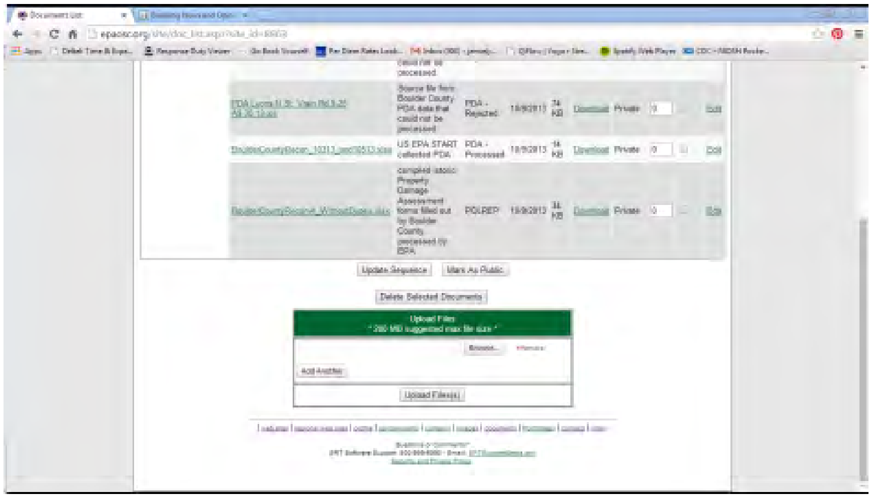


- Once loaded, user can edit photo's attributes by selecting "Edit" from the images list
- If erroneously added, a photo can be deleted by selecting the "Select" checkbox and scrolling to the bottom of the Images List to select "Delete Selected Images"

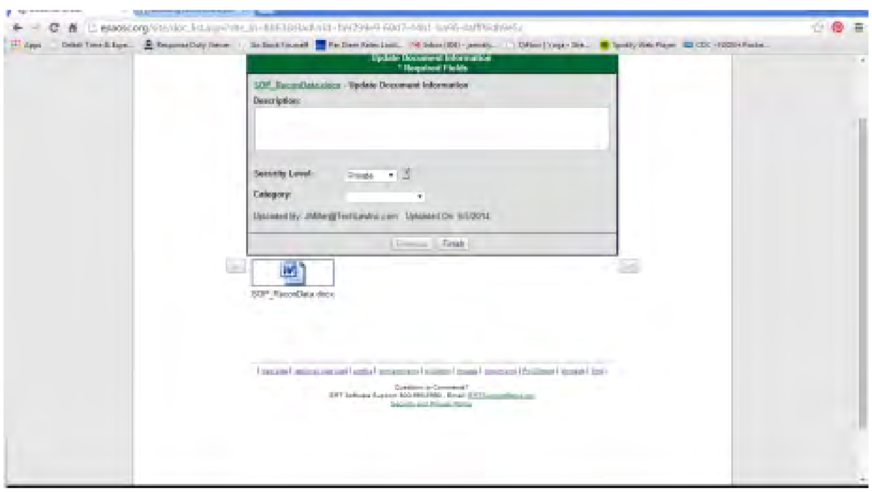
- Once photos are loaded, it is important that START QA all photos and attributes to verify accuracy, especially if photos are being pulled into any other web environment, such as the geospatial viewer
- **Note: if photos are being pulled via web service to be displayed on the geospatial viewer, the security level for photos must be set to Public**

Upload Documents:

- Login to EPAOSC.org and navigate to response specific website
- Select Documents tab
- Scroll to bottom of Documents list to Upload Files dialog box\



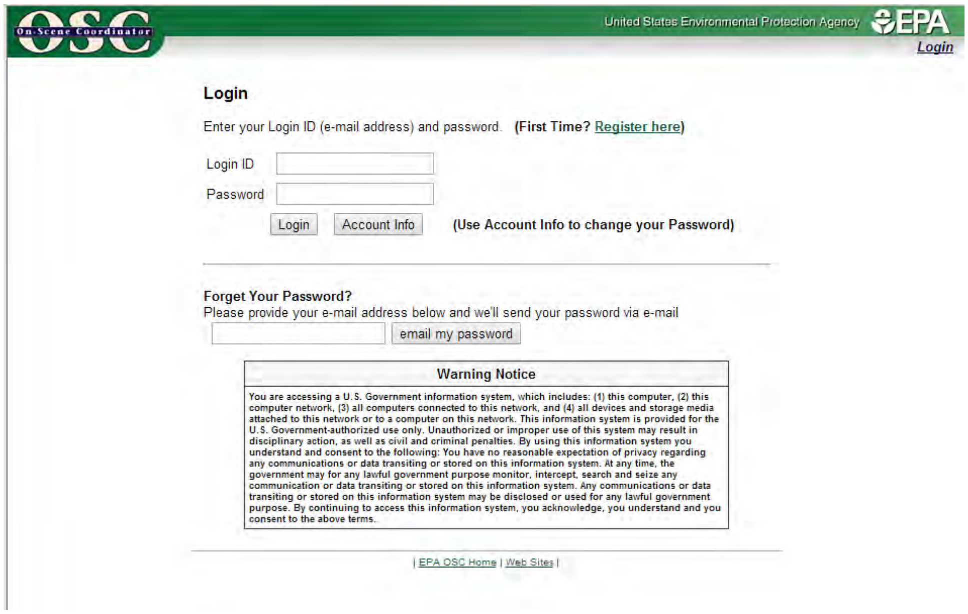
- Navigate to Document for Upload
- Add a Description and Category, select Finish



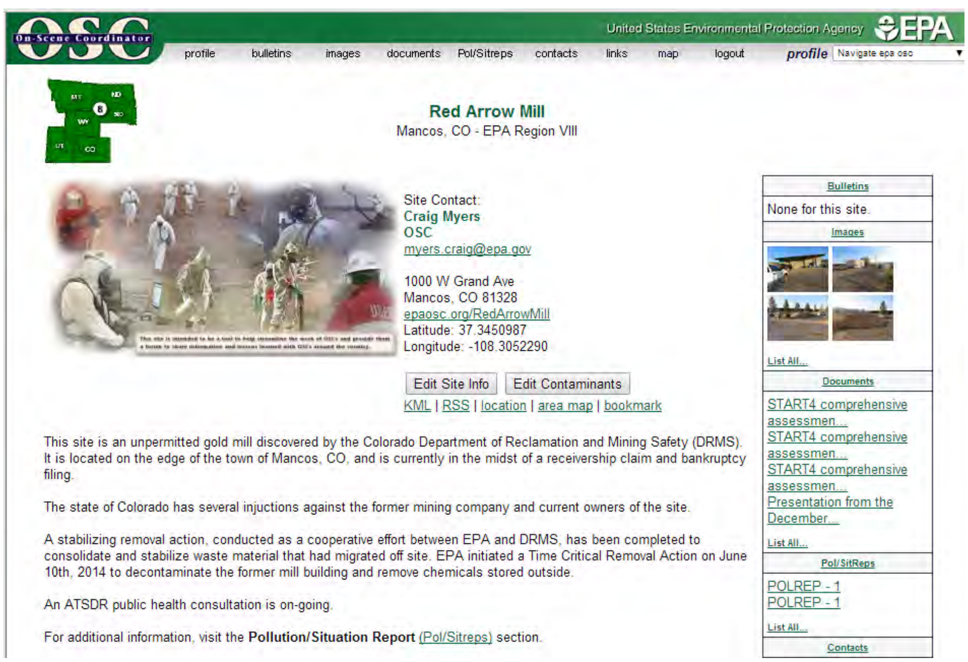
- Once Document is loaded, START can Edit attributes or Delete document form the Document list page in the same way Photos are edited or deleted

Adding a Flexviewer to EPAOSC.org:

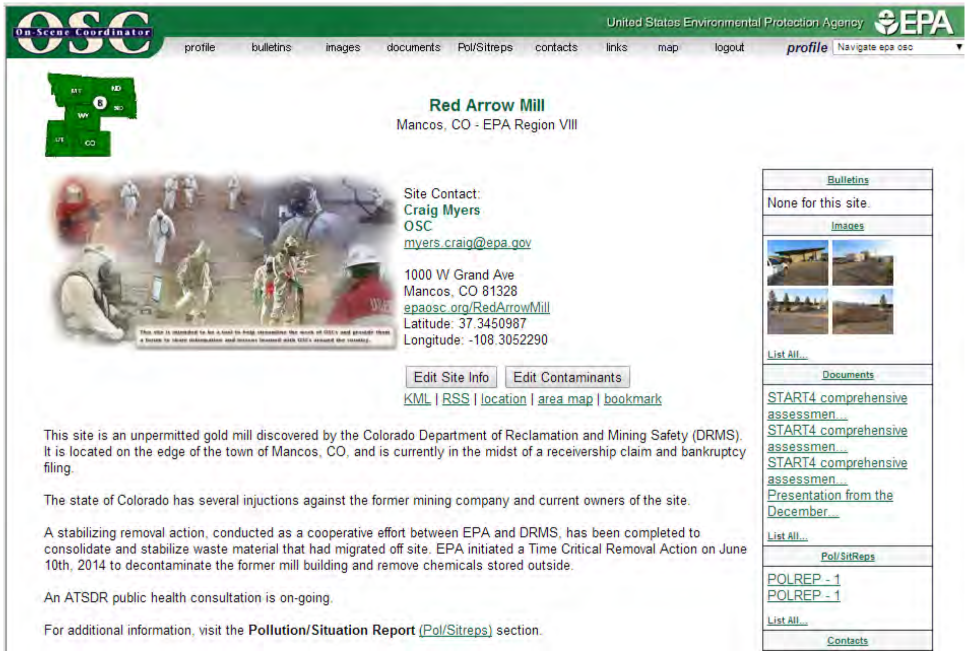
- Request Administrator Access to the Site from the site OSC.
- Login to epaosc.org.



- Once you are logged navigate to the front page of the site.



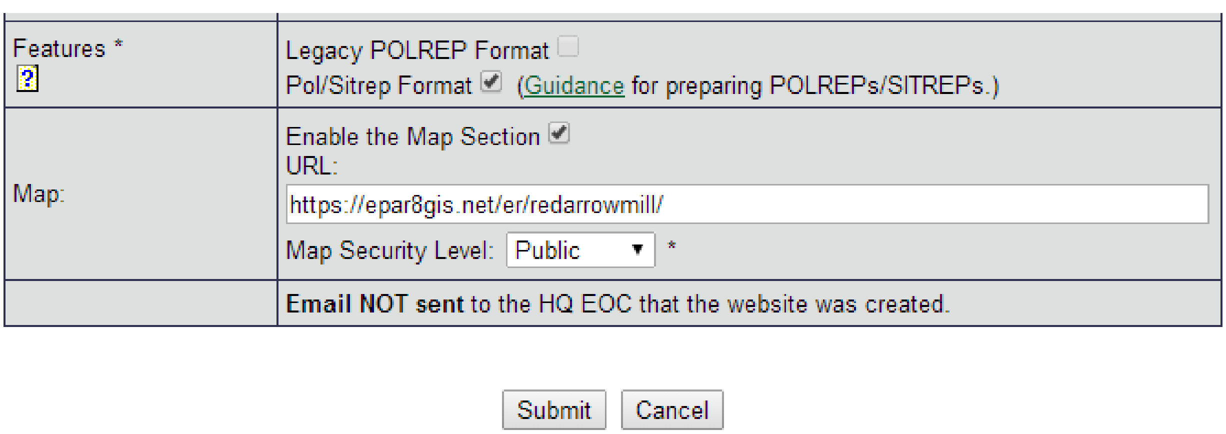
- To add the geospatial viewer to the site click on edit site info.



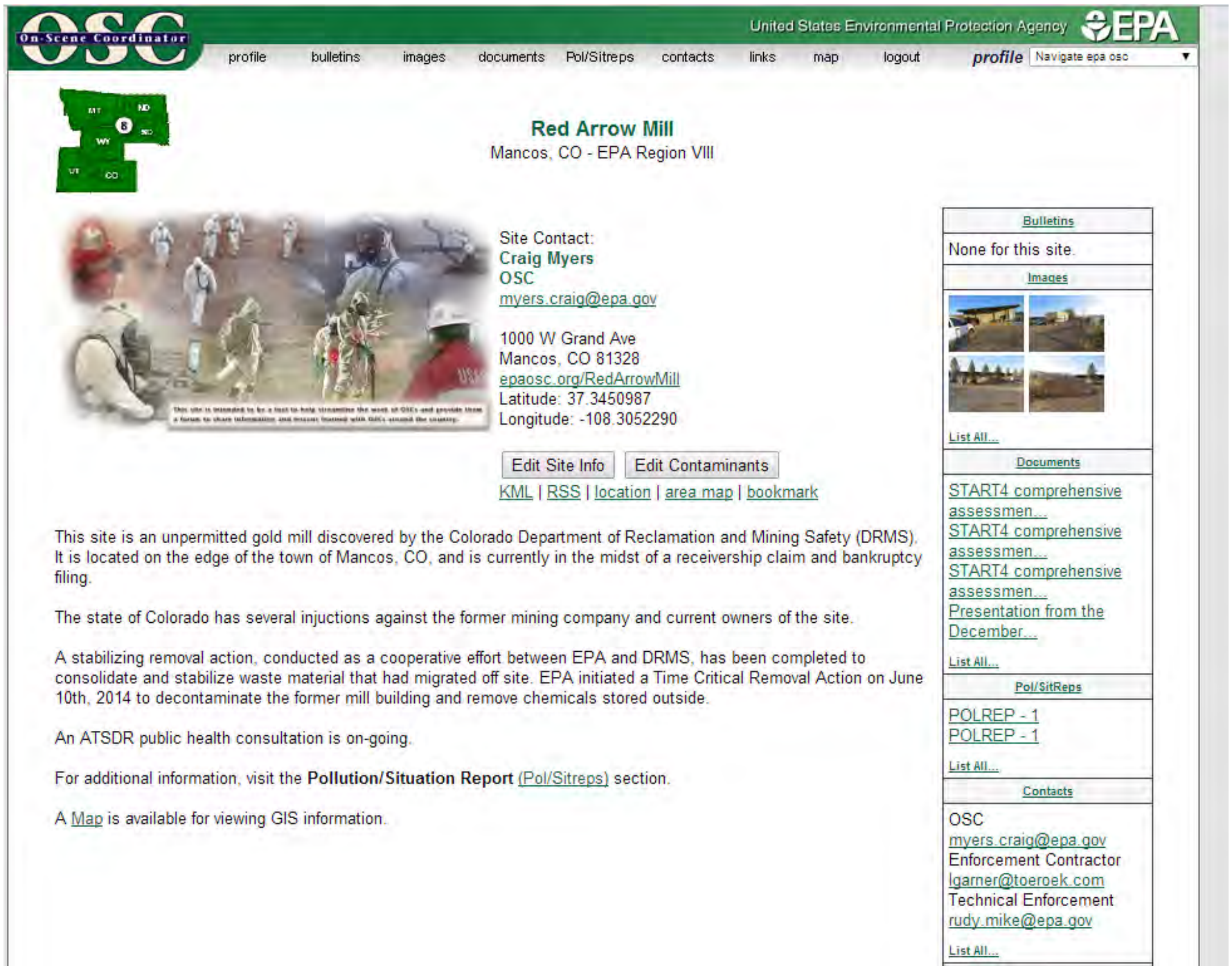
- Scroll to the bottom of the page and click "Enable the Map Section". After that add the geospatial viewer url to the url section. Finally select the security setting for your geospatial viewer. The security settings are as followed:

  Public: Anybody with an epaosc.org login.
  Private: Anybody with an epa.gov login or site members.
  Exclusive: Site members only.

  Finally click *submit*



- A geospatial viewer is now a part of your site.



Attachment A5
Photos and Recon Data

Updated 3/31/2015

Required Equipment

- iPad loaded with PhotosInfoPro
- iPad cable to connect to computer
- Computer with iTunes
- EPAOSC.net account with photo uploading privileges
- MiFi for internet access in the field
- Bluetooth GPS (Garmin GLO)

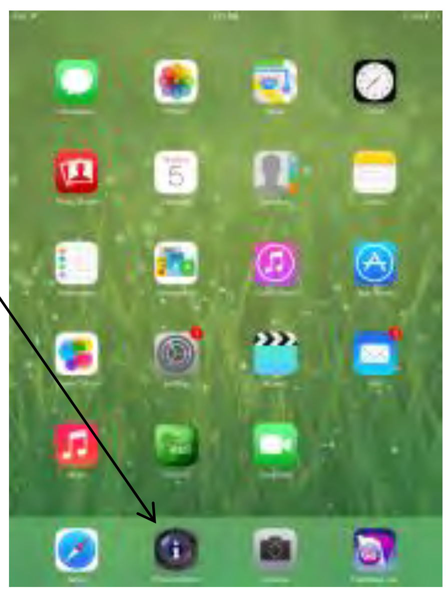
Functions

<u>Search Recon Grids</u>

- Collect specific digital images of targets/areas of interest
- Collect general images or site photos that can be loaded to the viewer to show spatial coverage of reconnaissance

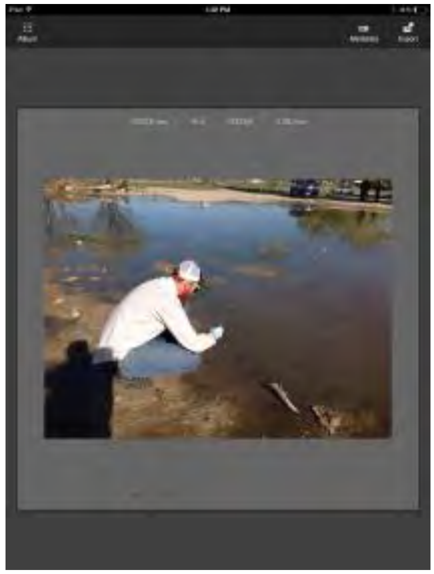
<u>Collect and Process Images</u>

- Take photo using camera on the iPad
- Open PhotosInfoPro app on the iPad



- Select photo to be processed and ensure that latitude longitude were captured

- Select metadata on the top right of the application



- There are four tabs on the right side of the application; Field Teams will modify the top tab displaying a narrative symbol (enter a narrative description) and the second tab displaying a key symbol (enter tags/keywords)

- Note Recon Zone, general site area, or other relevant information in each photo's narrative description

- When ready to upload photos to EPAOSC.org website, open PhotosInfoPro app, select Library which will display all the photos on the iPad

- Select the photos that need to be uploaded to the website and select the Export button on the top right of the app which will display "iTunes File Sharing" "FTP" etc. Select iTunes File Sharing.

- Connect iPad to computer via the iPad cable, open iTunes and select iPad on the top right to view the contents of the iPad, then select Apps from the center of the iTunes screen. Scroll down and there will be an area for "Apps allowing File Sharing," select PhotosInfoPro and the export should show up to the right on the screen. Save the export to the computer.

Upload Images to EPAOSC website

- Login to epaosc.org and go to *Web Sites*, *Region 9*, and select the appropriate website. Navigate to images page and scroll down to the upload images area. Upload images in batches, and website will pull metadata from photos (date taken, latitude/longitude, category, tags). QA all photos uploaded for accuracy.

Complete Field QA Checklist

- ✓ Verify metadata is pulled from the photo after upload;
- ✓ All fields on website should be populated;
- ✓ Verify that Description and Category correlate with image;
- ✓ Verify that valid values are used for Category and Tag fields;
- ✓ Verify that image is in correct orientation (rotate on computer prior to upload);
- ✓ Check spelling, punctuation, etc. (consistency is key);
- ✓ Check lat/long location by clicking "Find Coordinates" button on website; and
- ✓ After upload, check the viewer to verify that images have been located on viewer with correct symbology.

Attachment A7
SCRIBE Field User Guidance

Revised: 3/31/2015

Entering Samples into SCRIBE

1. Open SCRIBE

2. Either open an existing project or click “next” in the New Project Wizard to create a new project

3. Select the appropriate SCRIBE template

4. For a new project, enter the site name, site number and region. Entering the region is important because it dictates how your CLP numbers auto-populate later. Also, select a location to save the file to, or it will automatically save it in the SCRIBE program files on your hard drive.

5. Enter the site information as appropriate.

6. On the left side of the screen, you will see a list of sections. Under the “Sampling” heading click whatever media is appropriate for your sample type.

7. To enter a sample, click “Add a Sample” on the bottom of the page or click the “add” icon on the top bar.

    a. Alternatively you can import in samples from the SCRIBE Mobile Application export and proceed to step 10

8. In the sample # field enter your sample number (it will auto fill with a number that you can type over, see tip on setting the sample mask below). If this is the first time a sample has been collected at the location, name the sample however your project FSP dictates. If a sample has already been collected at the location, see sample nomenclature discussion below.

9. In the location field, enter the sample location (note sample nomenclature discussion).

10. Fill in date, time, sample, matrix (whatever fields are appropriate for your project).

11. At the top of the window, click the analysis tab.

12. If you are sending samples to CLP, set the CLP settings prior to adding analysis by clicking on the “CLP/Tag settings” button at the lower right of the screen. Enter your first assigned CLP number in the “Next CLP Sample #” field. *Add the CLP Case #.*

13. To add analysis, select an option from the dropdown under the “analysis” heading. If the samples are going to CLP, select an analysis that has the prefix “CLP” (for example “CLP TAL Metals ICP-MS”).

14. If you selected a CLP analysis, the CLP sample number column will auto-populate with a CLP number (based on the number you entered in the CLP/ Tag settings). The number will begin with an “M” for metal analysis and “H” for organic analysis.

15. Select or type the appropriate container type, number of bottles, collection, storage, and preservative. If the option you need is not available in the drop down, you can type it in. (if it is something you use frequently consider talking to a data manager about adding it to the template)

16. If the sample is the MS-MSD select Y in the MS-MSD column and remember to change your bottle number to reflect additional volume. The bottle number here determines how many labels will print and what appears on the chain.

17. To add another analysis, click “add analysis” at the bottom of the window and repeat steps 12-15 as many times as you need to.

18. So now you have 1 sample ready! If you have additional samples that are getting the same analysis and need to enter them, click back into the “sample details” tab and click “copy” at the top of the page.

19. On the sample detail page that pops up EVERYTHING stays the same, except the auto filled sample number field and the CLP tag numbers. Remember to change the sample #, location, date, time, etc. Also if the bottle numbers change (i.e. the sample is/ isn’t the MS-MSD) you need to click over to the analysis tab and change that too.

20. Go through creating and copying samples until you have everything entered.

21. To check over your samples, close out of the form view by clicking the grey X. Then you can see all the samples in datasheet view.

22. Datasheet view in default layout does not include the sample time. If you would like to see it here go to “view” → “select columns”, and check the sample time box. Then, on the upper right of the screen save the layout.

23. If you want to be able to view your CLP number is datasheet view, you must click down to the “Samples” heading and add the CLP number column.

24. NOTE: SCRIBE is programmed to skip the letters you are not allowed to use for CLP (I, O, U, and V) but it is a good idea to check over your CLP numbers and make sure they are within the range you were assigned and in the correct format.

Creating Labels

1. Have the datasheet view open in the appropriate section with all your samples entered.

2. At the bottom of the page select “print labels” → “label setup”

3. Select the label size (we customarily use Avery 5163, but it is on the box if you are not sure or choose to use a different size) and click “next.”

4. In the window that pops up, the information that will appear on the label is displayed on the right, and additional options are on the left. If you would like to add information to the label, drag/ drop it from the left to the right box.

5. If you are sending samples to a CLP lab you must add the CLP sample number field, as it does not appear on the default setup. The field titled “sample #” should be renamed to something else (“alternate ID” or “alias”) or removed from the label to avoid confusion at the lab.

6. When you drop a new piece of information in, it will not have a title. The bracketed text shows what is pulled in from the sample form. So if you want a title you can type it in in front of the bracket.

7. To move a data field’s position on the label, highlight the field and use the arrows on the right to move it up or down.

8. Click “finish” to print. This will bring up a document containing the labels that you can review.

9. Click the printer icon to print.

10. If you would only like to print some of the labels go back to the datasheet view and apply a filter. Click the filter icon at the top of the page and enter in what you would like to filter for (sample #, sample date, etc.). Next to the value field you can click “select” and browse a list so you don’t have to type in the values. Click “ok” then follow the label printing procedure. When you are finished, return to datasheet view and click “remove filter” at the top left.

Creating Chain of Custody

1. Under the "sample management" list, click "chain of custody."

2. At the bottom of the screen click "add chain of custody."

3. In the upper right corner of the window that pops up, select the "COC Format" you require. The choices are "SCRIBE", "CLP Inorganics", "CLP Organics", and "CLP Generic." The CLP formats will include the CLP sample numbers on the chain.

4. Fill in a COC name that makes sense to you (it will auto fill with the site #/ date if you prefer). Your information goes in the "contact name" and "contact phone number" fields at the top left.

5. Select your lab from the dropdown list and all of the lab information will auto populate. If your lab is not listed, you can type in all the fields.

6. Type any necessary information in the special instructions box, such as turnaround requirements or cooler return requests.

7. If the shipment is complete, check the "case complete" option. If not, indicate additional shipments will follow in the instructions box. This will avoid Kent getting questions from the lab.

8. Click "assign samples to COC" and highlight the samples you would like to go on the COC. When you have them all highlighted, click "Assign to COC."

9. Click "print chain of custody" and select "report setup."

10. In the "Report Header" popup box, set the report headings in a way that is appropriate for your project. For CLP projects, make sure that one of the boxes shows the CLP case #. In the lower right of the box, select if the COC is going to the lab or region (you will need to print both: lab goes to the lab and region is emailed to your chemist and retained for the files). If you select lab, the project name will not show up on the COC, but the site number will.

11. Click OK.

12. Review the information on the COC to make sure it is correct.

13. If sample information you want on the COC doesn't show up (i.e. sample time or sampler) go to the samples tab in the COC section and go to "view" → "select columns", and check the sample time or sampler box. To save the layout with the new visible columns press "save layout" button located on the upper right of the.

14. If you see an error in your lab information or want to change the report format, go back to the COC tab. Highlight the COC you want to fix and click "edit" at the top of the page. If you double click the COC, it will only take you over to the samples tab.

15. Print the COC. You may want extra copies for your records.

16. Repeat for other labs.

17. The same day as sample shipment, an electronic chain of custody must be uploaded to SMO.

    a. In SCRIBE, view the chain of custody screen

    b. Click export → COC XML File (.xml)

    c. Select the COCs you wish to export and click OK

    d. Save the .xml in an appropriate location

    e. Access https://epasmoweb.fedcsc.com (you must create an account to upload COCs)

    f. Follow the prompts to upload the COC

    g. Save the confirmation email from SMO for site records

Note: Setting sample mask

SCRIBE can automatically increment sample numbers as samples are added in SCRIBE to accommodate the sample numbering scheme. A sample mask in SCRIBE can contain text and numbers. The numeric portion of the sample mask will auto-increment as samples are added to SCRIBE. By default, SCRIBE prefixes the numeric portion of the sample number with the Site number used to start the SCRIBE project, but this can be changed.

1. Click on the "Sampling" heading.

2. In the "ID Mask Column" enter the format of your sample naming scheme for the appropriate media.

3. Any numbers or text you enter will show exactly as you type them. Any # symbols that you enter will become the auto incrementing portion of the sample name.

4. Example: if you enter UASO###, your samples will add in the following manner: UASO001, UASO002, UASO003 etc.

5. Click "close" when you are done.

SCRIBE General Importing Tips and Techniques

- Ensure sample ids are unique; SCRIBE will overwrite existing records with duplicate sample ids
- Import into matrix specific sample table; SCRIBE is designed to place information into Sampling Locations and Sample tables via the information imported into the matrix specific tables
    - Ex: import a sample into Soil/Sed SCRIBE table and it will put the GPS coordinates and related sample info into the Sampling Locations table and the other sample information into the Samples table
- When changes are made to a record, ensure that the pencil icon that shows up on the left side of the record disappears before closing the table or switching to another table; when the pencil disappears, it means the change has been saved; the user can make the pencil disappear by clicking away from the record
- Prior to importing, save a backup copy of database in the case that the import fails or the file is corrupted. When selecting Custom Import from the File Menu, a dialog box will pop up asking if the user wants to backup. Since SCRIBE does not have an Undo function, saving a backup copy from which the user can restore their database in its former state is advisable.
- The Copy button at the top of the SCRIBE screen cannot be used to copy attributes of a record; when selected, it makes a new copy of an entire record meaning it adds a new sample or lab results containing the attributes of the sample or lab result that contained the cursor when the Copy button was selected. To use the copy an attribute function, as in copy and paste a word, the keystrokes of Ctrl + C must be used.

Lab Results Table Importing

- QA comment field: depending on level of validation performed on data, fill in this field in EDD prior to import. L2 VAL = preliminary or un-validated lab results; L4 VAL = validated lab results

Prior to import of Lab Results EDD, project specific decisions regarding lab results presentation must be decided on

- Verify with Project Manager what reporting guidelines should be used when presenting results: should non detects be presented as Reporting Limit with a U qualifier, Method Detection Limit with a U qualifier, or as only a U qualifier with no value? Ensure that correct value is in Result field.
- Is qualifier presented in Result_Qualifier field or Lab_Result_Qualifier field? Be aware of the type of qualifier and what field so that the EDD can be mapped correctly for import. Result presentation queries have been written with specific field names, so accurate data mapping is critical.
- Reportable result field is sometimes used to delineate data to be displayed on the viewer or other type of Viewer; check with PM to decide what level of data needs to be presented as “reportable” and fill in this field on EDD accordingly.

Attachment A13
TRIMBLE DEVICE GUIDANCE

Revised: 05/01/2015

Contents

How to create files and collect data points

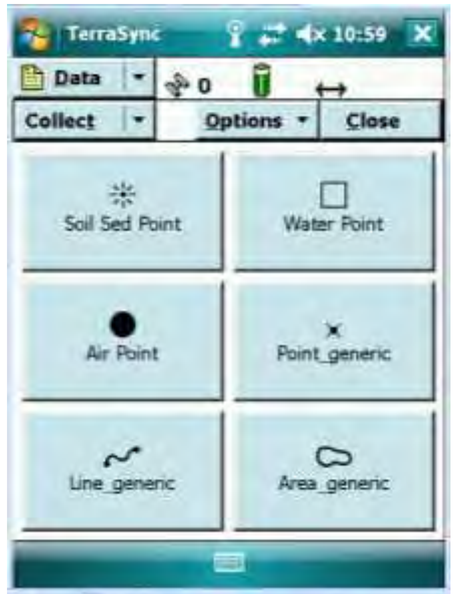
1. Turn on Trimble unit
2. In the windows Start menu select "Programs," find Terra Sync and double tap to start

3. To create a new file, tap the "Status" box and select "Data"

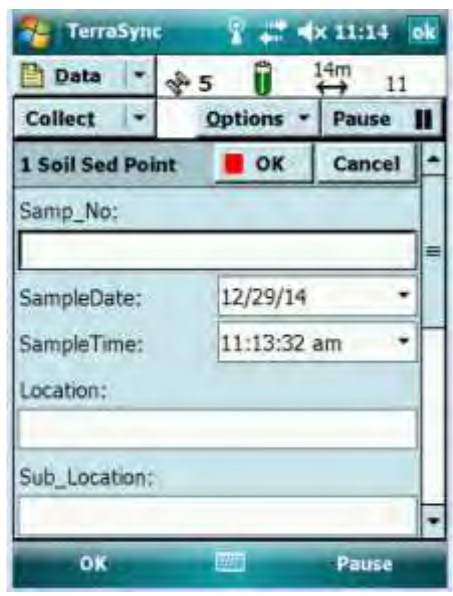
4. The data menu will default to creating a new data file.
    a. Enter a file name (i.e. XYZ Site MMDDYY)
    b. In "Data Dictionary" select "ScribeMobile"
    c. Click "Create"

    d. To open an existing file, click "New" and then select "Existing File" in the dropdown
5. Creating a new file will bring you to the data screen where you will see the 6 options for features (soil sed, water, air, point generic, line generic, area generic).

6. Click on the feature that meets your need

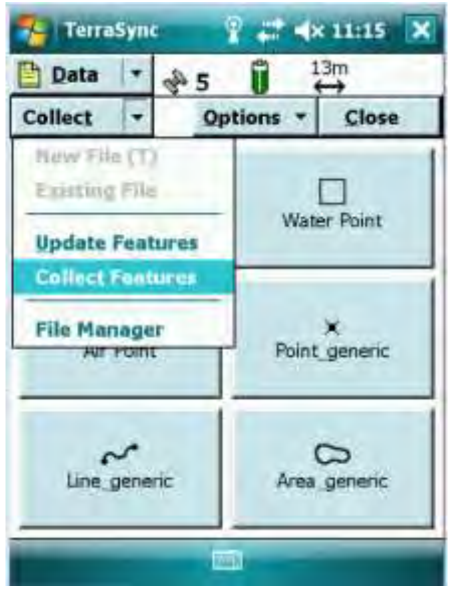


7. Fill in the fields in accordance with your site DMP (date and time auto fill)

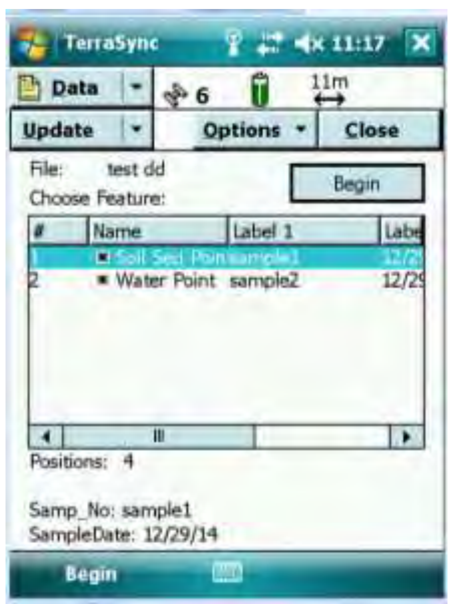


8. When finished, click "Ok"

9. To edit a feature that is already collected:
   a. Click “Collect” and select “Update Features” from the drop down



   b. Highlight the sample you would like to edit and click “begin”



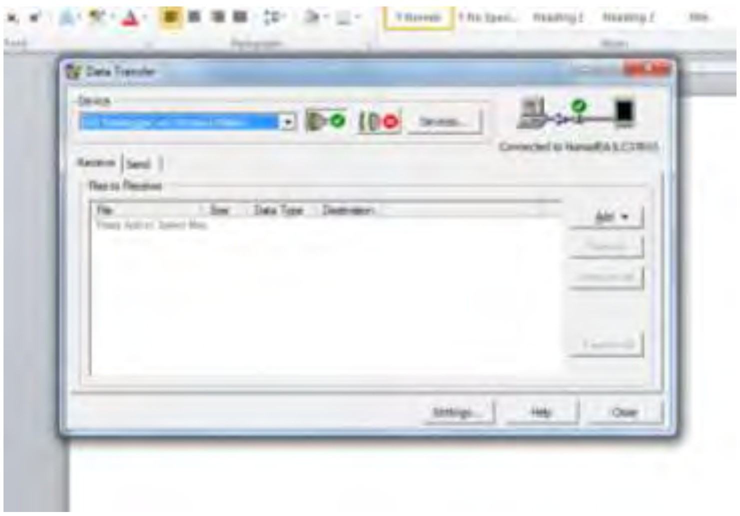
   c. This option defaults to only updating the meta data (i.e. sample ID, date, time) and does not update the GPS location
   d. Update your sample information and click “Ok” to finish
   e. If you would like to change the locational data, click the “Log” button. Select the “Update Feature (Replace)” radio button in the popup.
   f. Update the GPS location and click “ok” to finish

10. When finished with all features, click “close” to close the file. The file must be closed to download the file.

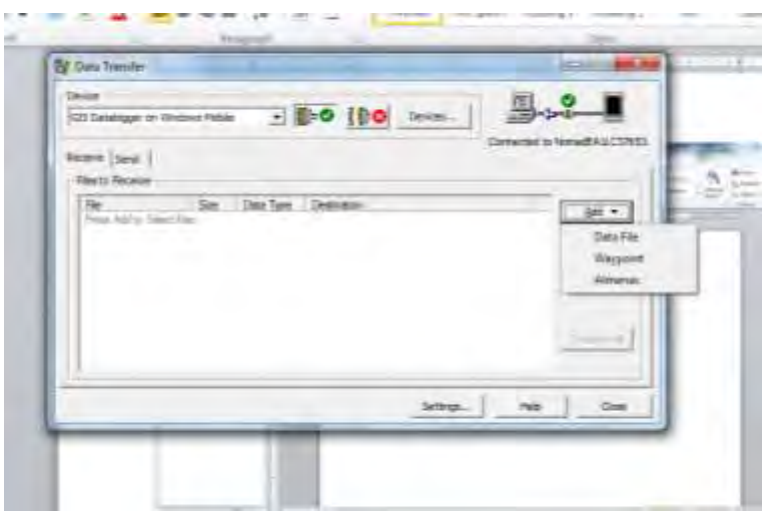
How to download SSF data files from a Trimble device

*SSF Files can be converted to an excel file for importing into scribe – use this option if you want to import your lat longs into scribe and display data on a viewer. If you are having maps made, check with your GIS person if they prefer a SSF or a shapefile (see next section for shapefile exports)

1. Connect the device to your computer (for a Nomad with a USB to mini USB)
2. Wait for the Windows Mobile Device Center to open and select “Connect without setting up your computer”
3. Open Trimble Data Transfer utility
4. Under the “Device” heading, select “Windows Datalogger on Windows Mobile”. The icon showing a cord and green check mark should be selected (if not, click it). Under the picture of a computer and a datalogger, the text should indicate it connected to your device

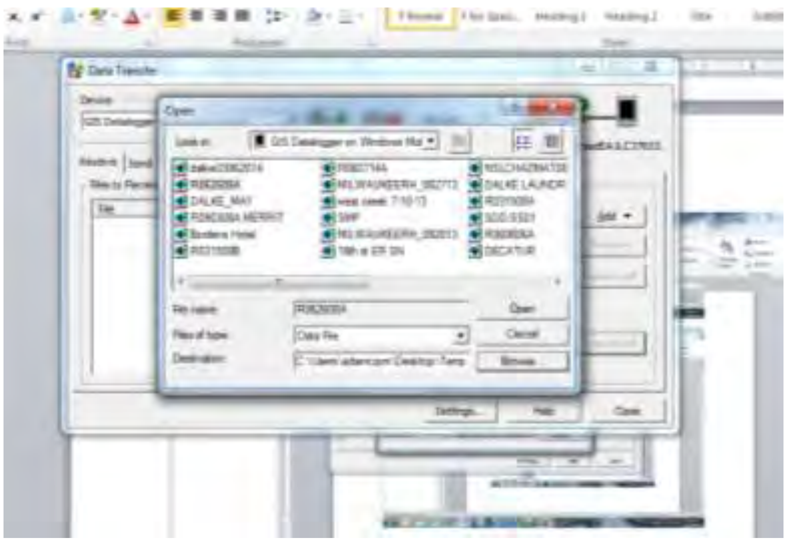


5. Make sure the “Receive” tab is selected (this is the default)
6. On the right side of the window, click the “Add” button and select “Data File” from the dropdown



7. In the popup, find your data file. Data files that have never been downloaded from the device will appear highlighted in blue. Highlight your file by clicking on it.
8. Fill in the file destination by clicking on the browse button and selecting the save location

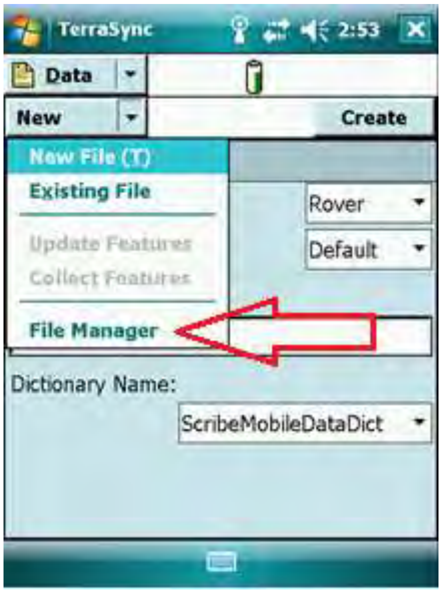
9. Click "open", this will close the popup and bring you back to the main screen

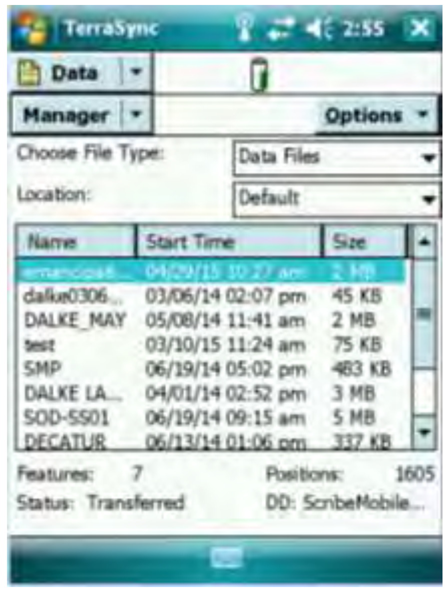


10. Ensure the file(s) you would like to download appear in the white box under the heading "Files to Receive" header and click "Transfer All"
11. You will get a message indicating the number of successfully transferred files. Navigate to the destination folder and make sure there is a .SSF file in the folder.
12. Email the .SSF file to a data manager with the Pathfinder Office program (currently Megan Adamczyk or John Lucotch) to differentially correct and export your file.

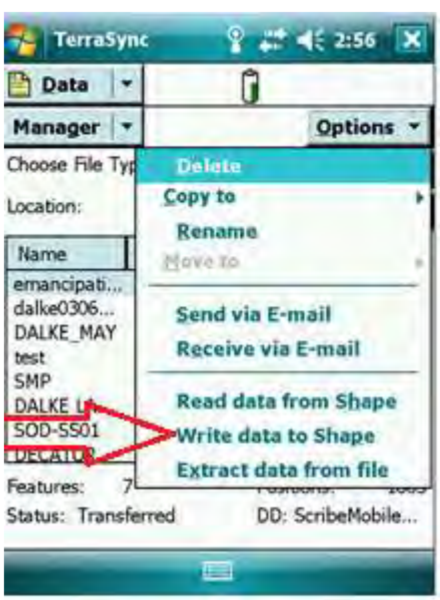
How to Download Shapefiles from a Trimble device

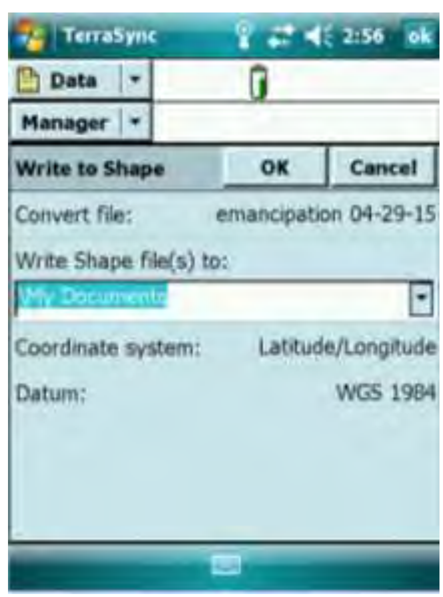
1. On the Trimble, go to the data section of the main upper left corner dropdown
2. Click the dropdown that says "New" and select "File Manager" (File manager shows all files on the device)





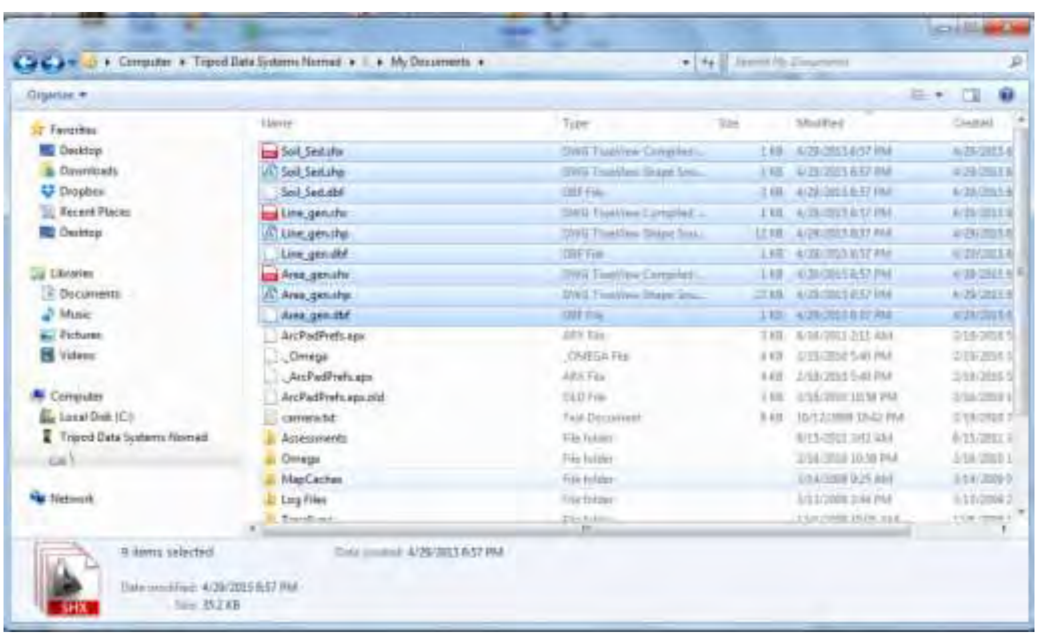
3. In the options dropdown select "Write data to shape"
4. In the convert file screen take note of where the file is saving to (revise location if you wish), then click ok





5. Connect the trimble to your computer with Windows Mobile Device center (should automatically pop up- green circle icon)

6. Use file manager to navigate to the saved location.

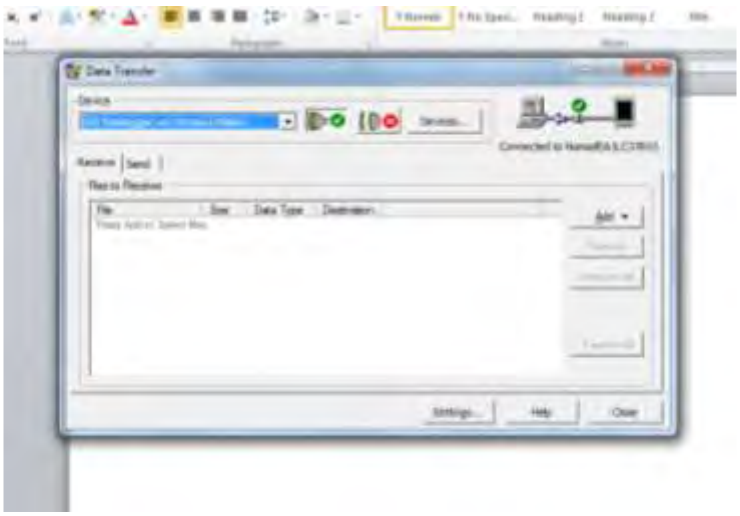


For each feature class you collected (i.e. soil/ sed point, area generic, line generic) there will be a .shx, a .shp, and a .dbf file. These are what the GIS person needs to map your features.

How to add a data dictionary to a Trimble device

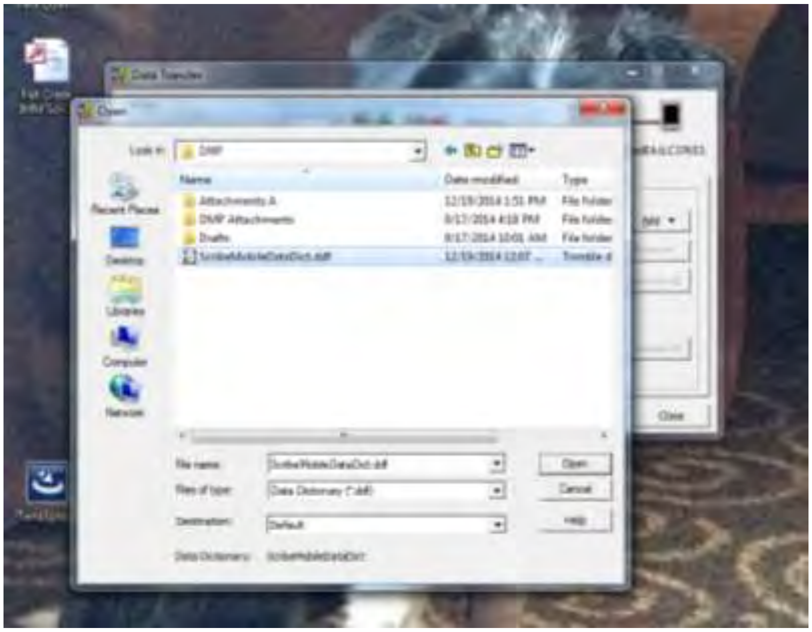
(you should only need to do this for rental units or if you have a custom data dictionary because the default ScribeMobile data dictionary is installed on Trimble devices at the EPA warehouse)

1. Obtain a data dictionary file from a data manager
   a. this is a .DDF file
   b. .DDF files can only be created in the Pathfinder Office software
2. Connect the device to your computer (for a Nomad with a USB to mini USB)
3. Wait for the Windows Mobile Device Center to open and select “Connect without setting up your computer”
4. Open Trimble Data Transfer utility
5. Open the Terra Sync program on the Trimble Device
6. Under the “Device” heading, select “Windows Datalogger on Windows Mobile”. The icon showing a cord and green check mark should be selected (if not, click it). Under the picture of a computer and a datalogger, the text should indicate it connected to your device



7. Select the “Send” tab
8. On the right side of the window, click the “Add” button and select “Data Dictionary” from the dropdown

9. In the resulting popup, browse to the .DDF file and select the file. Leave the location as “default”.



10. Click “open”
11. Make sure the .DDF shows up under the “Files to Send” header
12. Click “Transfer All”
13. You should see a message indicating how many files were transferred

How to Create a Bluetooth Connection with a Trimble ProXRT and a datalogger

*The steps are illustrated with a Juno 5, the steps to connect to a Nomad are the same, but the menus may have a slightly different appearance

Turn the ProXRT on and make sure the Bluetooth light (blue) is flashing. If it is not, then hold down the green power button until it starts flashing.

From the Desktop of the Juno:

Tap on the Start Flag

Tap on Settings

Tap on Bluetooth

At the top right tap on Mode

Click in the “Turn On Bluetooth” box

At the top left click on “Devices”

You should see ProXRT with its Serial Number listed in the Select a device to connect with.

ProXRT-2, ######

0000

Tap on ProXRT serial Number and tap Next

Enter 0000 (zeros) for the Passkey and tap Next

Tap on Advanced

Tap in the box for Serial Port

ProXRT-2, ######

Tap on Save

Assigning the ProXRT to a COM Port

Upper left tap on COM ports

Tap on New Outgoing Port

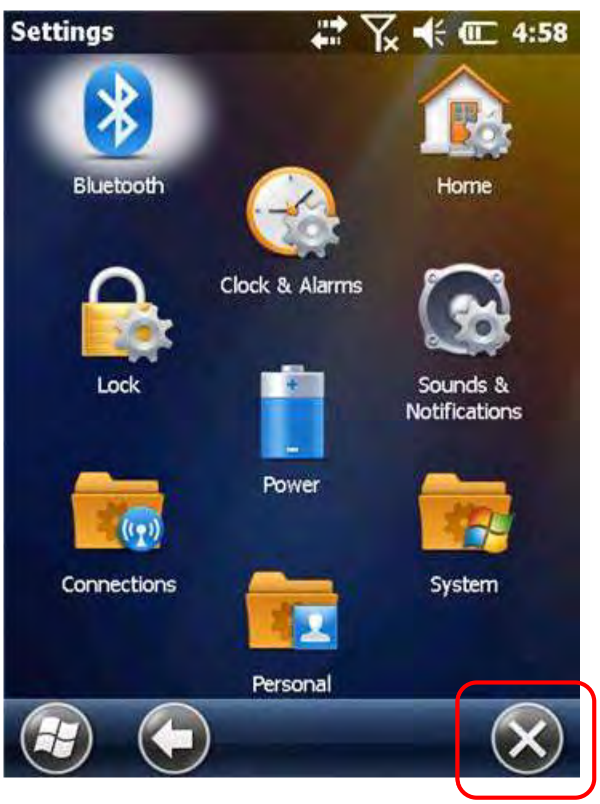
ProXRT-2, ######

Select the ProXRT and tap Next

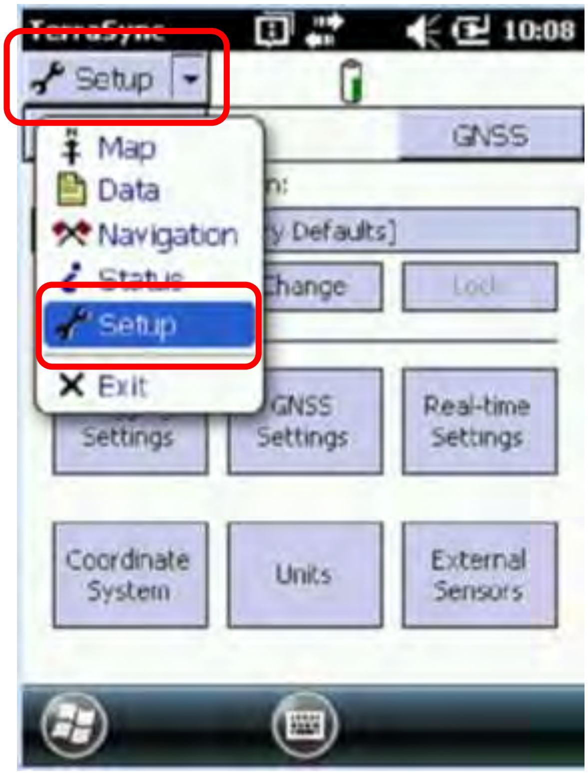
Select an available CM port and uncheck Secure Connection

Uncheck Secure Connection, Click Finish

Click OK



Tap on “X” bottom Right Open TerraSync



Tap on the dropdown menu at the upper left and then tap on Setup menu

Tap on GNSS Settings

Set the GNSS comport to the Bluetooth comport you picked on the previous page of this document.

Attachment B5
Import Guidance

Scribe General Importing Tips and Techniques

- Ensure sample ids are unique; Scribe will overwrite existing records with duplicate sample ids
- Import into matrix specific sample table; Scribe is designed to place information into Sampling Locations and Sample tables via the information imported into the matrix specific tables
    - **Example:** import a sample into Soil/Sed Scribe table and it will put the GPS coordinates and related sample info into the Sampling Locations table and the other sample information into the Samples table
- When changes are made to a record, ensure that the pencil icon that shows up on the left side of the record disappears before closing the table or switching to another table; when the pencil disappears, it means the change has been saved; the user can make the pencil disappear by clicking away from the record
- Prior to importing, save a backup copy of database in the case that the import fails or the file is corrupted. When selecting Custom Import from the File Menu, a dialog box will pop up asking if the user wants to backup. Since Scribe does not have an Undo function, saving a backup copy from which the user can restore their database in its former state is advisable.
- The Copy button at the top of the Scribe screen cannot be used to copy attributes of a record; when selected, it makes a new copy of an entire record meaning it adds a new sample or lab results containing the attributes of the sample or lab result that contained the cursor when the Copy button was selected. To use the copy an attribute function, as in copy and paste a word, the keystrokes of Ctrl + C must be used.

Lab Results Table Importing

- QA comment field: depending on level of validation performed on data, fill in this field in EDD prior to import. L2 VAL = preliminary or un-validated lab results; L4 VAL = validated lab results

Prior to import of Lab Results EDD, project specific decisions regarding lab results presentation must be decided on

- Verify with Project Manager what reporting guidelines should be used when presenting results: should non detects be presented as Reporting Limit with a U qualifier, Method Detection Limit with a U qualifier, or as only a U qualifier with no value? Ensure that correct value is in Result field.
- Is qualifier presented in Result_Qualifier field or Lab_Result_Qualifier field? Be aware of the type of qualifier and what field so that the EDD can be mapped correctly for

import. Result presentation queries have been written with specific field names, so accurate data mapping is critical.

- Reportable result field is sometimes used to delineate data to be displayed on Startview or other type of Viewer; check with PM to decide what level of data needs to be presented as "reportable" and fill in this field on EDD accordingly.

Scribe Import Mapping

Property Information Import Map

Destination: Property Table Scribe Fields	**Source: Manual Entry/Spreadsheet**	
	Import Fields	**Data Population Method**
PropertyID	PropertyID	Input Text
PropertyAddress	PropertyAddress	Input Text
PropertyAccess	PropertyAccess	Input Text
PropertyDate	PropertyDate	Input Text
PropertyComment	PropertyComment	Input Text

Air Monitoring Data (DataRAM) Import Map

Destination: Monitoring Table Scribe Fields	**Source: DataRAM download (processed) Air Sample Data Dictionary**	
	Import Fields	**Data Population Method**
Mon_Time	Mon_Time	AutoPopulate
Mon_Parameter	Mon_Parameter	Input Text
Mon_Date	Mon_Date	AutoPopulate
Location	Location	Input Text
InstrumentID	InstrumentID	Input Text
Sub_Location	Sub_Location	Input Text
PropertyID	PropertyID	Input Text
Mon_Operator	Mon_Operator	PickList of Valid Values
Mon_Measurement	Mon_Measurement	Input Number
Mon_Meas_Units	Mon_Meas_Units	PickList of Valid Values
Instrument_SN	Instrument_SN	Input Text

Destination: Monitoring Table Scribe Fields	Source: DataRAM download (processed) Air Sample Data Dictionary	
	Import Fields	Data Population Method
Instrument_Model	Instrument_Model	Input Text
Instrument_Manufacturer	Instrument_Manufacturer	Input Text
Instrument_Descr	Instrument_Descr	Input Text
Instrument_Cal_Date	Instrument_Cal_Date	Input Text
EventID	EventID	Input Text

Soil Sampling Import Map

Destination: Soil Samples Table Scribe Fields	Source: GPS Data Dictionary	
	Import Fields	Data Population Method
Samp_No	SampleID	Input Text
Location	Location	PickList of Valid Values
SampleType	SampleType	PickList of Valid Values
SampleTime	SampleTime	AutoPopulate
SampleDate	SampleDate	AutoPopulate
Matrix	Matrix	PickList of Valid Values
Remarks	Remarks	Input Text
Samp_Depth	Samp_Depth	Input number
Samp_Depth_To	Samp_Depth_To	Input number
Samp_Depth_Units	Samp_Depth_Units	PickList of Valid Values
SampleCollection	SampleCollection	PickList of Valid Values
Sampler	Sampler	PickList of Valid Values
Description	Description	Input Text
Longitude		AutoPopulate
Latitude		AutoPopulate
EventID		PickList of Valid Values
Coll_Method		PickList of Valid Values
Coord_Sys_Desc		AutoPopulate

Soil Sampling Import Map

Destination: Soil Samples Table Scribe Fields	Source: GPS Data Dictionary	
	Import Fields	Data Population Method
Datum		AutoPopulate
Easting		AutoPopulate
ElevDatum		AutoPopulate
ElevMethod		AutoPopulate
GeoMethod		AutoPopulate
GeoScale		AutoPopulate
Altitude		AutoPopulate
Image_Path		
Imported		
Location_Image_Path		
LocationComment		
LocationDescription		
Northing		
PropertyID		
RecordId		

APPENDIX B:

URANIUM ISOTOPIC VARIATION BY SAMPLING SEASON

Uranium Isotopic Variation by Sampling Season

Sample Locations	Geologic Layer	Type	Sample Information	2017 Spring Snowmelt Results - Dissolved Uranium Concentration (ug/L)	U234/U238 ratio - 2017 Spring Snow Melt Sampling Event	Percent Difference (%) - 2017 Spring Snowmelt to 2016 Low Flow Sampling Event	U234/U238 - 2016 Low Flow Sampling Event	Percent Difference (%) - 2016 Low Flow to 2016 Spring Snowmelt Sampling Event	U234/U238 - 2016 Spring Snowmelt Sampling Event	Percent Difference (%) - 2016 Spring Snowmelt to 2015 Low Flow Sampling Event	U234/U238 - 2015 Low Flow Sampling Event
SW-21	Morrison	Spring	Background (Mesa IV Springs)	3.2	2.57	-36%	2.93	24%	2.70	34%	2.36
SW-46	Chuska	Spring	Background (Pine Water Springs)	5.4	2.02	52%	1.50	-51%	2.02	62%	1.40
SW-87	Wingate	Surface Water	Cove Wash Middle 3 - Unnamed Tributary	6	2.48	-	-	-	-	-	-
SW-86	Wingate	Surface Water	Cove Wash Middle 3 - Unnamed Tributary	7.4	2.29	-	-	-	-	-	-
SW-18	Wingate	Seep	Background (Cove Wash Middle 1)	8	1.59	-	-	-	1.66	32%	1.34
GW-01	Chinle	Seep	Red Point Dug Well	8.1	2.42	-13%	2.56	49%	2.06	-66%	2.72
SW-59	Chinle	Surface Water	Cove Wash Tributary 1 (Downstream)	15	1.89	-	-	-	1.63	-	
SW-10	Chinle	Seep	Cottonwood Springs	16	1.88	-3%	1.91	-2%	1.93	23%	1.71
SW-04	Morrison	Seep	Background (Upstream)	25	2.45	5%	2.40	2%	2.38	88%	1.50
SW-48	Wingate	Surface Water	Cove Wash Middle 3	32	1.19	-	-	-	2.00	95%	1.05
SW-83	Wingate	Surface Water	Cove Wash Middle 2A	36	1.35	-	-	-	-	-	-
SW-81	Chinle	Surface Water	Cove Wash North	37	1.73	-40%	2.14	-	-	-	-
SW-11	Wingate	Surface Water	Cove Wash North	38	1.27	-10%	1.37	6%	1.31	-10%	1.40
SW-12	Wingate	Surface Water	Cove Wash Middle 3	38	1.08	2%	1.06	-11%	1.17	12%	1.05
SW-70	Wingate	Surface Water	Cove Wash Middle 3F	39	1.20	8%	1.12	-	-	-	-
SW-90	Wingate	Surface Water	Cove Wash Middle 3A - Rock Fall	43	1.12	-	-	-	-	-	-
SW-02	Chinle	Surface Water	Cove Wash (Downstream)	60	1.42	-5%	1.47	4%	1.43	7%	1.36
SW-82	Wingate	Surface Water	Cove Wash Middle 2A	64	1.20	-	-	-	-	-	-
SW-85	Wingate	Surface Water	Cove Wash Middle 2A	65	1.14	-	-	-	-	-	-
SW-05	Wingate	Surface Water	Dam (Historical)	74	1.02	-1%	1.03	-1%	1.04	4%	1.00
SW-07	Chinle	Surface Water	Cove Wash Middle (Historical)	79	1.07	-1%	1.08	3%	1.05	3%	1.02
SW-37	Wingate	Surface Water	Cove Wash Middle 2 (Historical)	110	1.03	-3%	1.06	6%	1.00	-3%	1.03
SW-73	Entrada/Carmel	Surface Water	Cove Wash Middle 3D	110	1.20	-	-	-	-	-	-
SW-01	Chinle	Surface Water	Cove Wash (Downstream)	120	1.15	3%	1.11	-2%	1.14	4%	1.10
SW-36	Wingate	Surface Water	Cove Wash Middle 2 (Historical)	140	1.02	-3%	1.04	1%	1.03	1%	1.02
SW-38	Wingate	Surface Water	Cove Wash Middle (Historical)	140	1.03	3%	1.00	5%	0.95	-9%	1.04
SW-06	Chinle	Surface Water	Cove Wash (Downstream)	150	1.02	-	-	-	-	-	-
SW-64	Entrada/Carmel	Seep	Cove Wash North	180	1.18	3%	1.15	2%	1.13	-	-
SW-88	Entrada/Carmel	Surface Water	Cove Wash Middle 3 - Unnamed Tributary	180	1.35	-	-	-	-	-	-
SW-53	Wingate	Seep	Cove Wash Middle 1	190	1.00	0%	1.00	0%	1.00	1%	0.99
SW-26	Morrison	Seep	Cove Wash Middle 2 (Historical)	200	1.09	-1%	1.09	3%	1.06	-2%	1.07
SW-39	Wingate	Surface Water	Cove Wash Middle 2	210	1.03	2%	1.01	0%	1.01	-2%	1.03
SW-50	Wingate	Surface Water	Cove Wash Middle 1	230	1.01	1%	1.00	2%	0.98	1%	0.97
SW-84	Wingate	Surface Water	Cove Wash Middle 2B	250	1.00	-	-	-	-	-	-
SW-51	Wingate	Seep	Cove Wash Middle 1A	540	0.92	-	-	-	0.91	-2%	0.93
SW-47	Entrada/Carmel	Seep	Cove Wash Middle 3F	600	1.05	0%	1.04	-1%	1.05	-	-
SW-54	Wingate	Seep	Cove Wash Middle 1B	640	0.97	-7%	1.05	3%	1.02	6%	0.96
SW-75	Morrison	Seep	Cove Wash Middle 3D	790	1.12	0%	1.13	-	-	-	-
SW-66	Entrada/Carmel	Surface Water	Cove Wash Middle 3A	950	1.05	4%	1.01	-6%	1.07	-	-
SW-65	Entrada/Carmel	Surface Water	Cove Wash Middle 3A	1200	1.07	-2%	1.09	4%	1.05	-	-
SW-03	Chinle	Surface Water	Cove Wash	-	-	-	-	-	1.98	55%	1.43
SW-13	Wingate	Surface Water	Cove Wash Middle 3A	-	-	-	1.08	-14%	1.22	14%	1.08
SW-14	Wingate	Surface Water	Cove Wash Middle 3A	-	-	-	1.20	-15%	1.35	28%	1.07
SW-15	Wingate	Surface Water	Cove Wash North	-	-	-	1.53	-	-	-	-
SW-56	Wingate	Seep	Cove Wash Middle 3A	-	-	-	1.05	1%	1.04	-	-
SW-58	Wingate	Surface Water	Cove Wash Middle 1	-	-	-	-	-	1.00	-	-
SW-60	Chinle	Surface Water	Cove Wash	-	-	-	-	-	1.26	-	-
SW-62	Chinle	Surface Water	Cove Wash Middle	-	-	-	-	-	1.05	-	-
SW-67	Wingate	Surface Water	Cove Wash Middle 3A	-	-	-	-	-	1.10	-	-
SW-68	Wingate	Surface Water	Cove Wash Middle 3A	-	-	-	-	-	1.09	-	-

APPENDIX C:

WATER RESULTS TABLES WITH HIGHLIGHTED EXCEEDANCES

Cove Wash Watershed Assessment
2015 Low Flow Sampling Event
Water - Total Metals Results

Sample Location	Sample Date	Sample Information	Northing	Easting	Antimony (µg/L)	Arsenic (µg/L)	Barium (µg/L)	Beryllium (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Cobalt (µg/L)	Copper (µg/L)	Lead (µg/L)	Mercury (µg/L)	Molybdenum (µg/L)	Nickel (µg/L)	Selenium (µg/L)	Silver (µg/L)	Thallium (µg/L)	Uranium (µg/L)	Vandium (µg/L)	Zinc (µg/L)
Navajo Nation Surface Water Quality Standards - Primary Human Contact Standard (µg/L)					747	30	98,000	1,870	470	NCNS	NCNS	9,330	15	280	NCNS	18,670	4,670	4,670	75	2,800	NCNS	280,000
Navajo Nation Surface Water Quality Standards - Secondary Human Contact Standard (µg/L)					747	280	98,000	1,870	470	NCNS	NCNS	9,330	15	280	NCNS	18,670	4,670	4,670	75	2,800	NCNS	280,000
Navajo Nation Surface Water Quality Standards - Fish Consumption (µg/L)					640	80	NCNS	85	8	NCNS	NCNS	NCNS	NCNS	0.15	NCNS	4,600	670	8,000	1	NCNS	NCNS	5,100
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Total Metals					NA	NA	NCNS	NCNS	NA	NCNS	NCNS	NA	NA	2.4	NCNS	NA	33	NA	NA	NCNS	NCNS	NA
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)) - Total Metals					NA	NA	NCNS	NCNS	NA	NCNS	NCNS	NA	NA	0.012	NCNS	NA	2	NCNS	NA	NCNS	NCNS	NA
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) - Total Metals					NCNS	200	NCNS	NCNS	50	1,000	1,000	500	100	10	NCNS	NCNS	50	NCNS	NCNS	NCNS	100	25,000
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Total Metals					NCNS	2,000	500	NCNS	50	1,000	5,000	5,000	10,000	NCNS	50	2,000	20	NCNS	NCNS	NCNS	1,000	10,000
EPA Maximum Contaminant Level - Drinking Water (µg/L)					6	10	2,000	4	5	100	NA	1,300	15	2	NA	NA	50	NA	2	30	NA	NA
CW-GW-01	6/17/2015	Red Point Dug Well	4050237.040	657330.869	5.9 U	9.3 J	370	0.51 U	0.78 J	1.5 U	1.3 U	4.1 J	2.2 U	0.06 U	2.9 U	2.6 J	4.6 U	1.7 U	6.2 U	7.3	86	20 J
CW-SW-01	6/16/2015	Cove Wash	4051657.362	663305.231	5.9 U	**19**	280	1.4 J	0.76 U	1.5 U	1.3 U	2.2 U	2.5 J	0.06 U	12	3.9 J	4.6 U	1.7 U	7.6 U	**130**	23	2.5 U
CW-SW-02	6/16/2015	Cove Wash	4053607.153	666731.839	5.9 U	**15**	140	1.6 J	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	9.1 J	2.4 U	4.6 U	1.7 U	6.2 U	**57**	45	2.5 U
CW-SW-04	6/17/2015	Background	4045556.747	655368.538	5.9 U	**18**	210	1.2 J	0.76 U	4.3 J	2.3 J	6.7 J	7.4	0.06 U	2.9 U	7.5 J	**4.7 J**	1.7 U	6.2 U	1.5	22	34
CW-SW-05	6/18/2015	Historical Sample - Area 1 - Dam Surface Sample - Cove Wash Middle	4045700.298	658683.857	5.9 U	7 J	290	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	7.6 J	2.4 U	4.6 U	1.7 U	6.2 U	**96**	12	2.5 U
CW-SW-49	6/18/2015	Duplicate of SW-05	4045700.372	658683.674	5.9 U	9.6 J	300	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	6.8 J	2.7 J	4.6 U	1.7 U	6.2 U	**96**	13	2.5 U
CW-SW-07	6/17/2015	Historical Sample - W07 - Cove Wash Middle	4047111.161	659124.125	5.9 U	9.3 J	290	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	8.5 J	2.4 U	4.6 U	1.7 U	6.2 U	**110**	15	2.5 U
CW-SW-10	6/17/2015	Cottonwood Spring	4049594.294	660201.047	5.9 U	**18**	**1300**	2.2 J	1.7 J	25	12	30	**32**	0.06 U	2.9 U	33	**15**	1.7 U	6.2 U	20	88	160
CW-SW-11	6/19/2015	Cove Wash North	4046369.715	657266.457	5.9 U	6.6 J	180	0.51 U	0.88 J	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	2.9 U	2.8 J	4.6 U	1.7 U	6.2 U	**43**	6 J	2.5 U
CW-SW-12	6/18/2015	Cove Wash Middle 3	4044603.441	658812.815	5.9 U	8.3 J	340	0.51 U	0.76 U	1.6 J	1.3 U	2.2 U	2.8 J	0.06 U	7.4 J	3.6 J	4.6 U	1.7 U	**7.9 J**	**57**	32	6.2 J
CW-SW-13	6/18/2015	Cove Wash Middle 3	4043160.908	658957.686	5.9 U	5.4 U	430	0.51 U	0.76 U	1.5 J	1.3 U	2.2 U	2.2 U	0.06 U	6.5 J	3.6 J	4.6 U	1.7 U	6.2 U	**57**	21	7.8 J
CW-SW-14	6/18/2015	Cove Wash Middle 3E	4042934	659222	5.9 U	9.4 J	460	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	2.9 U	2.6 J	4.6 U	1.7 U	6.2 U	24	18	11 J
CW-SW-18	6/19/2015	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	5.9 U	5.4 U	310	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	2.9 U	2.4 J	4.6 U	1.7 U	6.2 U	4.4	4.2 J	4.2 J
CW-SW-21	6/20/2015	Background - Mesa IV Springs	4043108	655931	5.9 U	5.4 U	310	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	2.9 U	2.6 J	4.6 U	1.7 U	**8.3 J**	3.7	3.9 J	15 J
CW-SW-22	6/20/2015	Duplicate of SW-21	4043108	655931	5.9 U	5.4 U	310	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	2.9 U	2.4 U	4.6 U	1.7 U	6.2 U	3.5	3.2 J	21
CW-SW-26	6/16/2015	Historical Sample - W006 - Cove Wash Middle 2	4042501.621	657146.877	5.9 U	**89**	110	0.51 U	0.76 U	2.6 J	1.6 J	4.7 J	2.2 U	0.06 U	**780**	5.5 J	**770**	1.7 U	6.2 U	**170**	**4600**	20 J
CW-SW-36	6/23/2015	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	5.9 U	9 J	260	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	29	2.7 J	4.6 U	1.7 U	6.2 U	**150**	15	3.3 J
CW-SW-37	6/23/2015	Historical Sample - W004 - Middle 2	4044377.806	657955.461	5.9 U	7.4 J	270	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	19	2.9 J	4.6 U	1.7 U	6.2 U	**110**	6.8 J	8.4 J
CW-SW-38	6/23/2015	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	5.9 U	5.4 U	260	0.51 U	0.81 J	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	28	3.3 J	4.6 U	1.7 U	**10**	**130**	9.8 J	6.4 J
CW-SW-39	6/23/2015	Cove Wash Middle 2	4045453.339	658432.518	5.9 U	8 J	280	0.51 U	0.87 J	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	15	2.5 J	4.6 U	1.7 U	6.2 U	**180**	14	2.5 U
CW-SW-40	6/23/2015	Duplicated of SW-39	4045453.339	658432.518	5.9 U	6.7 J	290	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	16	2.5 J	4.6 U	1.7 U	6.2 U	**180**	15	2.5 U
CW-SW-46	6/23/2015	Pine Water Springs	4043788.61	661352.387	5.9 U	5.4 U	9.8 J	0.51 U	0.76 U	1.5 U	1.3 U	160	2.2 U	0.06 U	2.9 U	3.2 J	4.6 U	1.7 U	6.2 U	5.4	1.5 J	34
CW-SW-48	6/24/2015	Cove Wash Middle 3	4044751.928	656807.090	5.9 U	**14**	190	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	2.9 U	2.8 J	4.6 U	1.7 U	6.2 U	**210**	12	2.5 U
CW-SW-50	6/25/2015	Cove Wash Middle 1	4044856.247	657463.154	5.9 U	5.4 U	280	0.51 U	0.92 J	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	7.4 J	2.9 J	4.6 U	1.7 U	**8.5 J**	**180**	21	2.5 U
CW-SW-51	6/25/2015	Cove Wash Middle 1A	4044944.041	657035.048	5.9 U	**15**	190	0.51 U	1 J	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	42	2.4 U	4.6 U	1.7 U	**6.5 J**	**500**	91	7.7 J
CW-SW-53	6/25/2015	Cove Wash Middle 1	4044478	656787	5.9 U	8.5 J	290	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	4.9 J	2.4 U	**6.7**	1.7 U	6.2 U	**130**	25	2.5 U
CW-SW-54	6/25/2015	Cove Wash Middle 1B	4044751.928	656807.09	5.9 U	**12**	200	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	17	2.4 U	**5.3**	1.7 U	**11**	**380**	66	2.5 U

Notes:
NCNS = No Current Numeric Standard
NA = Not Applicable
NRWQC = Navajo Recommended Water Quality Criteria
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Cove Wash Watershed Assessment
2015 Low Flow Sampling Event
Water - Dissolved Metal Results

Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Dissolved Metals					88	340	NA	NA	0.87-7.7*	NA	NA	5.9-50*	25-280*	2.4	NA	225-1513*	NA	1-64*	700	NA	NA	56-380*
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)- Dissolved Metals					30	150	NA	NA	0.13-0.64*	NA	NA	4.3-29*	0.97-11*	0.012	NA	25-168*	NA	NA	150	NA	NA	57-382*
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) -Dissolved Metals					NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Dissolved Metals					NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sample Location	Sample Date	Sample Information	Northing	Easting	Antimony (µg/L)	Arsenic (µg/L)	Barium (µg/L)	ryllium (µg	Cadmium (µg/L)	Chromium (µg/L)	Cobalt (µg/L)	Copper (µg/L)	Lead (µg/L)	Mercury (µg/L)	Molybdenum (µg/L)	Nickel (µg/L)	Selenium (µg/L)	Silver (µg/L)	Thallium (µg/L)	Uranium (µg/L)	Vandium (µg/L)	Zinc (µg/L)
CW-GW-01F	6/17/2015	Red Point Dug Well	4050237.040	657330.869	5.9 U	8.4 J	380	0.51 U	0.76 U	1.5 U	1.3 U	2.6 J	2.2 U	0.06 U	2.9 U	2.5 J	4.6 U	1.7 U	6.2 U	6.5	87	22
CW-GW-03F	6/17/2015	Ellison Well	4049637.733	658749.123	5.9 U	11	130	0.51 U	**1.3 J**	1.5 U	1.3 U	**83**	2.2 U	0.06 U	5.3 J	4.5 J	4.6 U	1.7 U	6.8 J	52	3.8 J	210
CW-SW-01F	6/16/2015	Cove Wash	4051657.362	663305.231	5.9 U	18	250	1.6 J	**1.1 J**	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	15	3.3 J	4.6 U	1.7 U	6.2 U	150	31	2.5 U
CW-SW-02F	6/16/2015	Cove Wash	4053607.153	666731.839	5.9 U	25 J	140	1.6 J	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	9.7 J	3.1 J	4.6 U	1.7 U	6.2 U	57	43	2.5 U
CW-SW-04F	6/17/2015	Background	4045556.747	655368.538	5.9 U	9.1 J	96 J	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	2.9 U	2.6 J	4.6 U	1.7 U	6.2 U	0.62	2.6 J	4.7 U
CW-SW-05F	6/18/2015	Historical Sample - Area 1 - Dam Surface Sample - Cove Wash Middle	4045700.298	658683.857	5.9 U	5.7 J	290	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	7.5 J	2.4 U	4.6 U	1.7 U	6.2 U	97	12	2.5 U
CW-SW-49F	6/18/2015	Duplicate of SW-05	4045700.372	658683.674	5.9 U	8.3 J	300	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	7.4 J	2.4 U	4.6 U	1.7 U	6.2 U	98	11	2.5 U
CW-SW-07F	6/17/2015	Historical Sample - W07 - Cove Wash Middle	4047111.161	659124.125	5.9 U	6.6 J	280	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	8 J	2.4 U	4.6 U	1.7 U	6.2 U	100	15	2.5 U
CW-SW-10F	6/17/2015	Cottonwood Spring	4049594.294	660201.047	5.9 U	13	180	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	2.9 U	3.6 J	8.1	1.7 U	6.2 U	15	33	2.5 U
CW-SW-11F	6/19/2015	Cove Wash North	4046369.715	657266.457	5.9 U	5.7 J	170	0.51 U	**0.85 J**	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	2.9 U	2.4 U	4.6 U	1.7 U	6.2 U	43	3.7 J	2.5 U
CW-SW-12F	6/18/2015	Cove Wash Middle 3	4044603.441	658812.815	5.9 U	5.4 U	310	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	7 J	3.4 J	4.6 U	1.7 U	6.6 J	60	16	4.2 J
CW-SW-13F	6/18/2015	Cove Wash Middle 3	4043160.908	658957.686	5.9 U	6.3 J	390	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	5.2 J	2.5 J	4.6 U	1.7 U	6.7 J	54	10	9.1 J
CW-SW-14F	6/18/2015	Cove Wash Middle 3E	4042934	659222	5.9 U	7.5 J	420	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	2.9 U	2.4 U	4.6 U	1.7 U	6.2 U	21	9.8 J	2.5 U
CW-SW-18F	6/19/2015	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	5.9 U	5.4 U	290	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	2.9 U	2.9 J	4.6 U	1.7 U	6.2 U	3.9	3.9 J	2.6 J
CW-SW-21F	6/20/2015	Background - Mesa IV Springs	4043108	655931	5.9 U	5.4 U	310	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	2.9 U	3.1 J	4.6 U	1.7 U	6.2 U	4	3.6 J	15 J
CW-SW-22F	6/20/2015	Duplicate of SW-21	4043108	655931	5.9 U	5.4 U	310	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	2.9 U	3.2 J	4.6 U	1.7 U	6.2 U	4.1	6.4 J	23
CW-SW-26F	6/17/2015	Historical Sample - W006 - Cove Wash Middle 2	4042501.621	657146.877	5.9 U	78	140	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	760	2.5 J	730	1.7 U	6.2 U	170	4000	2.5 U
CW-SW-36F	6/23/2015	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	5.9 U	12	250	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	27	2.4 U	4.6 U	1.7 U	7 J	140	11	7.5 J
CW-SW-37F	6/23/2015	Historical Sample - W004 - Middle 2	4044377.806	657955.461	5.9 U	5.6 J	280	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	20	3.7 J	4.6 U	1.7 U	6.2 U	110	7 J	2.6 J
CW-SW-38F	6/23/2015	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	5.9 U	6.3 J	260	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	27	2.4 U	4.6 U	1.7 U	6.2 U	130	8.5 J	2.5 U
CW-SW-39F	6/23/2015	Cove Wash Middle 2	4045453.339	658432.518	5.9 U	8.7 J	280	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	15	2.8 J	4.6 U	1.7 U	6.2 U	170	13	2.5 U
CW-SW-40F	6/23/2015	Duplicate of SW-39	4045453.339	658432.518	5.9 U	8.2 J	290	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	16	2.4 U	4.6 U	1.7 U	6.2 U	170	13	2.5 U
CW-SW-46F	6/23/2015	Pine Water Springs	4043788.61	661352.387	5.9 U	5.4 U	9.5 J	0.51 U	0.76 U	1.5 U	1.3 U	**140**	2.2 U	0.06 U	2.9 U	2.6 J	4.6 U	1.7 U	6.2 U	5.3	1.4 U	33
CW-SW-48F	6/24/2015	Cove Wash Middle 3	4044751.928	656807.090	5.9 U	11	180	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	2.9 U	2.8 J	4.6 U	1.7 U	6.2 U	210	11	2.5 U
CW-SW-50F	6/25/2015	Cove Wash Middle 1	4044856.247	657463.154	5.9 U	9.6 J	260	0.51 U	**1.5 J**	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	7.5 J	3.3 J	7.1	1.7 U	8.2 J	190	13	2.5 U
CW-SW-51F	6/25/2015	Cove Wash Middle 1A	4044944.041	657035.048	5.9 U	8.5 J	190	0.51 U	**0.84 J**	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	38	2.4 U	4.6 U	1.7 U	6.2 U	520	82	2.5 U
CW-SW-53F	6/25/2015	Cove Wash Middle 1	4044478	656787	5.9 U	6.6 J	280	0.51 U	**0.91 J**	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	4.5 J	2.4 U	4.6 U	1.7 U	8.9 J	130	22	2.5 U
CW-SW-54F	6/25/2015	Cove Wash Middle 1B	4044751.928	656807.09	5.9 U	11	200	0.51 U	0.76 U	1.5 U	1.3 U	2.2 U	2.2 U	0.06 U	16	2.9 J	4.9 J	1.7 U	6.2 U	390	66	2.5 U

Notes:
Not Calculable = The Navajo Nation Environmental Protection Agency Screening Level requires the calcium concentration of each sample collected. Calcium was not analyzed for in water samples collected during the sampling event.
NCNS = No Current Numeric Standard
NA = Not Applicable
NRWQC = Navajo Recommended Water Quality Criteria
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels
* = The value is hardness dependent. Hardness was not evaluated for these samples. Individual exceedances are estimated

Cove Wash Watershed Assessment
2015 Low Flow Sampling Event
Water - Total Gross Alpha and Total Radium Results

Sample ID	Sample Information	Date	Northing	Easting	Total Adjusted Gross Alpha Radiation (pCi/L)	GAR with Total Uncertainty (pCi/L)	Radium 226 (pCi/L)	Radium 226 with Total Uncertainty (pCi/L)	Radium 228 (pCi/L)	Radium 228 with Total Uncertainty (pCi/L)	Combined Radium (Radium 226 + Radium 228) (pCi/L)
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (pCi/L)					15	NA	NA	NA	NA	NA	5
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (pCi/L)					NCNS	NCNS	NCNS	NCNS	NCNS	NCNS	5
EPA Maximum Contaminant Level - Drinking Water (pCi/L)					15	NA	5	5	5	5	5
CW-GW-01	Red Point Dug Well	6/17/2015	4050237.040	657330.869	-4.438	3.1 ± 1.7	0.21 U	0.21 U ± 0.14	0.46 U	0.46 U ± 0.2	0.46 U
CW-SW-01	Cove Wash	6/16/2015	4051657.362	663305.231	4.37	103 ± 17	3.14	3.14 ± 0.94	0.65	0.65 ± 0.35	3.79
CW-SW-02	Cove Wash	6/16/2015	4053607.153	666731.839	-12.24	37.3 ± 6.6	0.39	0.39 ± 0.21	0.66 U	0.66 U ± 0.31	0.39
CW-SW-04	Background	6/17/2015	4045556.747	655368.538	**<u>21.22</u>**	23.1 ± 4.4	1.37	1.37 ± 0.48	0.74	0.74 ± 0.37	2.11
CW-SW-05	Historical Sample - Area 1 - Dam Surface Sample - Cove Wash Middle	6/18/2015	4045700.298	658683.857	-25.53	44.4 ± 8.1	2.35	2.35 ± 0.74	0.56 U	0.56 U ± 0.3	2.35
CW-SW-49	Duplicate of SW-05	6/18/2015	4045700.372	658683.674	-30.2	38.8 ± 7.3	1.75	1.75 ± 0.57	0.49 U	0.49 U ± 0.23	1.75
CW-SW-07	Historical Sample - W07 - Cove Wash Middle	6/17/2015	4047111.161	659124.125	-28.4	44.8 ± 8.4	1.9	1.9 ± 0.61	0.54 U	0.54 U ± 0.26	1.9
CW-SW-10	Cottonwood Spring	6/17/2015	4049594.294	660201.047	-2	66 ± 16	1.43	1.43 ± 0.49	0.99	0.99 ± 0.37	2.42
CW-SW-11	Cove Wash North	6/19/2015	4046369.715	657266.457	-10.15	25.3 ± 5.4	0.33	0.33 ± 0.19	0.54 U	0.54 U ± 0.27	0.33
CW-SW-12	Cove Wash Middle 3	6/18/2015	4044603.441	658812.815	4.19	44.9 ± 8.8	3.7	3.7 ± 1.1	0.46 U	0.46 U ± 0.3	3.7
CW-SW-13	Cove Wash Middle 3	6/18/2015	4043160.908	658957.686	-5.41	33 ± 6.3	3.07	3.07 ± 0.9	0.54 U	0.54 U ± 0.28	3.07
CW-SW-14	Cove Wash Middle 3E	6/18/2015	4042934	659222	-3.5	13.7 ± 3.2	1.8	1.8 ± 0.58	0.55 U	0.55 U ± 0.27	1.8
CW-SW-18	Background - Cove Wash Middle 1 BKG	6/19/2015	4045597.485	658407.848	-3.072	1 U ± 1.1	0.21	0.21 ± 0.16	0.58 U	0.58 U ± 0.26	0.21
CW-SW-21	Background - Mesa IV Springs	6/20/2015	4043108	655931	-0.427	3.3 ± 1.6	0.21 U	0.21 U ± 0.12	0.56 U	0.56 U ± 0.24	0.56 U
CW-SW-22	Duplicate of SW-21	6/20/2015	4043108	655931	-3.43	1.7 U ± 1.3	0.22	0.22 ± 0.16	0.46 U	0.46 U ± 0.22	0.22
CW-SW-26	Historical Sample - W006 - Cove Wash Middle 2	6/16/2015	4042501.621	657146.877	-28.14	104 ± 17	1.6	1.6 ± 0.53	0.50 U	0.50 U ± 0.25	1.6
CW-SW-36	Historical Sample - W005 - Cove Wash Middle 2	6/23/2015	4044602.301	658113.531	-26.39	72 ± 13	3.25	3.25 ± 0.95	0.51 U	0.51 U ± 0.27	3.25
CW-SW-37	Historical Sample - W004 - Middle 2	6/23/2015	4044377.806	657955.461	-14.92	58 ± 11	2.27	2.27 ± 0.7	0.50 U	0.50 U ± 0.26	2.27
CW-SW-38	Historical Sample Area 4 - Cove Wash Middle	6/23/2015	4044173	657898	-28.19	56 ± 10	3.6	3.6 ± 1.1	0.56 U	0.56 U ± 0.28	3.6
CW-SW-39	Cove Wash Middle 2	6/23/2015	4045453.339	658432.518	-58.34	70 ± 12	3.31	3.31 ± 0.98	0.58 U	0.58 U ± 0.31	3.31
CW-SW-40	Duplicated of SW-39	6/23/2015	4045453.339	658432.518	-49.38	76 ± 13	3.5	3.5 ± 1	0.57 U	0.57 U ± 0.25	3.5
CW-SW-46	Pine Water Springs	6/23/2015	4043788.61	661352.387	-1.475	3.3 ± 1.6	0.22 U	0.22 U ± 0.15	0.1 U	0.1 U ± 0.23	0.22 U
CW-SW-48	Cove Wash Middle 3	6/24/2015	4044751.928	656807.090	-53.52	91 ± 16	1.68	1.68 ± 0.56	0.50 U	0.50 U ± 0.26	1.68
CW-SW-50	Cove Wash Middle 1	6/25/2015	4044856.247	657463.154	-59.91	76 ± 14	5.5	5.5 ± 1.5	0.64	0.64 ± 0.29	**<u>6.14</u>**
CW-SW-51	Cove Wash Middle 1A	6/25/2015	4044944.041	657035.048	-58.2	304 ± 50	24	24 ± 6.2	0.66	0.66 ± 0.29	**<u>25</u>**
CW-SW-53	Cove Wash Middle 1	6/25/2015	4044478	656787	-43.15	53 ± 10	5.9	5.9 ± 1.6	0.47 U	0.47 U ± 0.24	**<u>5.9</u>**
CW-SW-54	Cove Wash Middle 1B	6/25/2015	4044751.928	656807.09	-126.5	166 ± 27	8.4	8.4 ± 2.2	0.51 U	0.51 U ± 0.23	**<u>8.4</u>**

Notes:
EPA = Environmental Protection Agency
NCNS = No Current Numeric Standard
NA = Not Applicable
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
pCi/L = picocurie per Liter
<u>Bold, Underlined and Highlighted</u> = Analytical result exceeds screening levels
± = plus or minus

Cove Wash Watershed Assessment
2015 Low Flow Sampling Event
Water - Dissolved Gross Alpha and Dissolved Radium Results

Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (pCi/L)					NA	NA	NA	NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (pCi/L)					NCNS	NCNS	NCNS	NCNS	NCNS	NCNS	NCNS
EPA Maximum Contaminant Level - Drinking Water (pCi/L)					NA	NA	NA	NA	NA	NA	NA
Sample ID	Date	Sample Information	Northing	Easting	Gross Alpha Radiation (pCi/L)	GAR with Total Uncertainty (pCi/L)	Radium 226 (pCi/L)	Radium 226 with Total Uncertainty (pCi/L)	Radium 228 (pCi/L)	Radium 228 with Total Uncertainty (pCi/L)	Combined Radium (Radium 226 + Radium 228) (pCi/L)
CW-GW-01F	6/17/2015	Red Point Dug Well	4050237.040	657330.869	5.6	5.6 ± 2.1	0.22 U	0.22 U ± 0.14	0.38 U	0.38 U ± 0.25	0.38 U
CW-SW-01F	6/16/2015	Cove Wash	4051657.362	663305.231	64	64 ± 11	1.84	1.84 ± 0.61	0.61 U	0.61 U ± 0.29	1.84
CW-SW-02F	6/16/2015	Cove Wash	4053607.153	666731.839	31.1	31.1 ± 5.7	0.4	0.4 ± 0.21	0.65 U	0.65 U ± 0.29	0.4
CW-SW-04F	6/17/2015	Background	4045556.747	655368.538	5.3	5.3 ± 1.7	0.69	0.69 ± 0.33	0.73	0.73 ± 0.35	1.42
CW-SW-05F	6/18/2015	Historical Sample - Area 1 - Dam Surface Sample - Cove Wash Middle	4045700.298	658683.857	45	45 ± 8.3	1.69	1.69 ± 0.56	0.52 U	0.52 U ± 0.27	1.69
CW-SW-49F	6/18/2015	Duplicate of SW-05	4045700.372	658683.674	37.7	37.7 ± 7.1	2.11	2.11 ± 0.66	0.48 U	0.48 U ± 0.25	2.11
CW-SW-07F	6/17/2015	Historical Sample - W07 - Cove Wash Middle	4047111.161	659124.125	49.2	49.2 ± 8.1	1.93	1.93 ± 0.61	0.52 U	0.52 U ± 0.24	1.93
CW-SW-10F	6/17/2015	Cottonwood Spring	4049594.294	660201.047	12.5	12.5 ± 2.7	0.33	0.33 ± 0.19	0.52 U	0.52 U ± 0.26	0.33
CW-SW-11F	6/19/2015	Cove Wash North	4046369.715	657266.457	21.6	21.6 ± 4.8	0.4	0.4 ± 0.21	0.56 U	0.56 U ± 0.28	0.4
CW-SW-12F	6/18/2015	Cove Wash Middle 3	4044603.441	658812.815	35.7	35.7 ± 7.2	3.7	3.7 ± 1.1	0.58 U	0.58 U ± 0.31	3.7
CW-SW-13F	6/18/2015	Cove Wash Middle 3	4043160.908	658957.686	24	24 ± 4.9	2.61	2.61 ± 0.78	0.57 U	0.57 U ± 0.31	2.61
CW-SW-14F	6/18/2015	Cove Wash Middle 3E	4042934	659222	15.1	15.1 ± 3.3	1.66	1.66 ± 0.55	0.55 U	0.55 U ± 0.25	1.66
CW-SW-18F	6/19/2015	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	2.8	2.8 ± 1.4	0.21 U	0.21 U ± 0.11	0.59 U	0.59 U ± 0.29	0.59 U
CW-SW-21F	6/20/2015	Background - Mesa IV Springs	4043108	655931	3.4	3.4 ± 1.5	0.08 U	0.08 U ± 0.11	0.54 U	0.54 U ± 0.24	0.54 U
CW-SW-22F	6/20/2015	Duplicate of SW-21	4043108	655931	1.6 U	1.6 U ± 1.1	0.19 U	0.19 U ± 0.12	0.48 U	0.48 U ± 0.22	0.48 U
CW-SW-26F	6/17/2015	Historical Sample - W006 - Cove Wash Middle 2	4042501.621	657146.877	127	127 ± 21	5.5	5.5 ± 1.5	0.53 U	0.53 U ± 0.29	**5.5**
CW-SW-36F	6/23/2015	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	61	61 ± 11	3.5	3.5 ± 1	0.52 U	0.52 U ± 0.26	3.5
CW-SW-37F	6/23/2015	Historical Sample - W004 - Middle 2	4044377.806	657955.461	41.6	41.6 ± 7.9	2.62	2.62 ± 0.79	0.52	0.52 ± 0.28	3.14
CW-SW-38F	6/23/2015	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	57	57 ± 10	4	4 ± 1.2	0.56 U	0.56 U ± 0.27	4
CW-SW-39F	6/23/2015	Cove Wash Middle 2	4045453.339	658432.518	64	64 ± 11	2.48	2.48 ± 0.76	0.58 U	0.58 U ± 0.28	2.48
CW-SW-40F	6/23/2015	Duplicated of SW-39	4045453.339	658432.518	73	73 ± 12	2.44	2.44 ± 0.75	0.55 U	0.55 U ± 0.24	2.44
CW-SW-46F	6/23/2015	Pine Water Springs	4043788.61	661352.387	3.6	3.6 ± 1.8	0.20 U	0.20 U ± 0.11	0.50 U	0.50 U ± 0.26	0.50 U
CW-SW-48F	6/24/2015	Cove Wash Middle 3	4044751.928	656807.090	82	82 ± 14	1.74	1.74 ± 0.57	0.53	0.53 ± 0.28	2.27
CW-SW-50F	6/25/2015	Cove Wash Middle 1	4044856.247	657463.154	80	80 ± 14	4.5	4.5 ± 1.3	0.51 U	0.51 U ± 0.22	4.5
CW-SW-51F	6/25/2015	Cove Wash Middle 1A	4044944.041	657035.048	200	58 ± 33	15	15 ± 3.9	0.48 U	0.48 U ± 0.22	**15**
CW-SW-53F	6/25/2015	Cove Wash Middle 1	4044478	656787	58	168 ± 11	5	5 ± 1.4	0.49 U	0.49 U ± 0.24	**5**
CW-SW-54F	6/25/2015	Cove Wash Middle 1B	4044751.928	656807.09	168	168 ± 28	8.4	8.4 ± 2.2	0.50 U	0.50 U ± 0.26	**8.4**

Notes:
EPA = Environmental Protection Ager
NCNS = No Current Numeric Standard
NA = Not Applicable
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
pCi/L = picocurie per Liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels
± = plus or minus

Cove Wash Watershed Assessment
2015 Low Flow Sampling Event
Water - Uranium Isotope Results

Sample Location	U-233/U-234 (pCi/L)	U-233/U-234 with Total Uncertainty (pCi/L)	U-235/U-236 (pCi/L)	U-235/U-236 with Total Uncertainty (pCi/L)	U-238 (pCi/L)	U-238 with Total Uncertainty (pCi/L)	U total isotope activity (pCi/L)
CW-GW-01	5.14	5.14 ± 0.96	0.148	0.148 ± 0.084	2.25	2.25 ± 0.48	7.538
CW-GW-01F	4.82	4.82 ± 0.9	0.071 U	0.071 U ± 0.064	1.77	1.77 ± 0.39	6.59
CW-GW-03F	27.4	27.4 ± 4.6	0.95	0.95 ± 0.25	19.2	19.2 ± 3.3	46.6
CW-SW-01	49	49 ± 8	2.93	2.93 ± 0.57	46.7	46.7 ± 7.6	95.7
CW-SW-01F	50.4	50.4 ± 8.3	2.43	2.43 ± 0.5	45.9	45.9 ± 7.6	96.3
CW-SW-02	28.1	28.1 ± 4.7	0.94	0.94 ± 0.24	20.5	20.5 ± 3.5	48.6
CW-SW-02F	29.2	29.2 ± 4.9	1.2	1.2 ± 0.29	21.5	21.5 ± 3.6	50.7
CW-SW-04	1.05	1.05 ± 0.27	0 U	0 U ± 0.036	0.83	0.83 ± 0.23	1.88
CW-SW-04F	0.42	0.42 ± 0.14	0.066	0.066 ± 0.053	0.28	0.28 ± 0.11	0.766
CW-SW-05	34.3	34.3 ± 5.7	1.93	1.93 ± 0.41	33.7	33.7 ± 5.6	68
CW-SW-05F	33.8	33.8 ± 5.6	1.77	1.77 ± 0.38	33.8	33.8 ± 5.6	67.6
CW-SW-49	34.3	34.3 ± 5.8	1.8	1.8 ± 0.4	32.9	32.9 ± 5.5	67.2
CW-SW-49F	33.8	33.8 ± 5.6	1.52	1.52 ± 0.35	32	32 ± 5.3	65.8
CW-SW-07	36.4	36.4 ± 6	1.7	1.7 ± 0.37	35.1	35.1 ± 5.8	71.5
CW-SW-07F	36.5	36.5 ± 6.1	1.85	1.85 ± 0.41	35.7	35.7 ± 6	72.2
CW-SW-10	7.8	7.8 ± 1.4	0.32	0.32 ± 0.13	4.2	4.2 ± 0.81	12
CW-SW-10F	9.9	9.9 ± 1.8	0.45	0.45 ± 0.16	5.8	5.8 ± 1.1	15.7
CW-SW-11	19.9	19.9 ± 3.3	0.85	0.85 ± 0.22	14.7	14.7 ± 2.5	34.6
CW-SW-11F	20.2	20.2 ± 3.4	0.49	0.49 ± 0.16	14.4	14.4 ± 2.5	34.6
CW-SW-12	20.2	20.2 ± 3.5	1.01	1.01 ± 0.27	19.5	19.5 ± 3.4	39.7
CW-SW-12F	19.6	19.6 ± 3.3	1.05	1.05 ± 0.27	18.7	18.7 ± 3.2	38.3
CW-SW-13	19.3	19.3 ± 3.3	0.71	0.71 ± 0.21	18.4	18.4 ± 3.1	37.7
CW-SW-13F	20.6	20.6 ± 3.5	0.98	0.98 ± 0.26	19.1	19.1 ± 3.3	39.7
CW-SW-14	9.1	9.1 ± 1.6	0.4	0.4 ± 0.14	7.7	7.7 ± 1.4	16.8
CW-SW-14F	7.7	7.7 ± 1.4	0.35	0.35 ± 0.13	7.2	7.2 ± 1.3	14.9
CW-SW-18	1.88	1.88 ± 0.42	0.032	0.032 ± 0.04	1.16	1.16 ± 0.3	3.072
CW-SW-18F	1.88	1.88 ± 0.44	0.064 U	0.064 U ± 0.062	1.4	1.4 ± 0.35	3.28
CW-SW-21	2.43	2.43 ± 0.49	0.127	0.127 ± 0.069	1.17	1.17 ± 0.28	3.727
CW-SW-21F	2.43	2.43 ± 0.49	0.09	0.09 ± 0.06	1.03	1.03 ± 0.25	3.55
CW-SW-22	2.24	2.24 ± 0.46	0.054 U	0.054 U ± 0.047	1.19	1.19 ± 0.28	3.43
CW-SW-22F	2.54	2.54 ± 0.52	0.042 U	0.042 U ± 0.044	1.06	1.06 ± 0.26	3.6
CW-SW-26	66	66 ± 11	3.14	3.14 ± 0.63	63	63 ± 10	129
CW-SW-26F	61	61 ± 10	2.72	2.72 ± 0.58	56.8	56.8 ± 9.5	117.8
CW-SW-36	48.8	48.8 ± 8	2.29	2.29 ± 0.47	47.3	47.3 ± 7.8	96.1
CW-SW-36F	50.3	50.3 ± 8.4	2.47	2.47 ± 0.51	49.3	49.3 ± 8.2	99.6
CW-SW-37	35.7	35.7 ± 5.9	1.82	1.82 ± 0.4	35.4	35.4 ± 5.9	71.1
CW-SW-37F	37.4	37.4 ± 6.3	1.88	1.88 ± 0.41	36.3	36.3 ± 6.1	73.7
CW-SW-38	40.6	40.6 ± 6.7	2.29	2.29 ± 0.47	41.3	41.3 ± 6.8	81.9
CW-SW-38F	45.3	45.3 ± 7.5	2.5	2.5 ± 0.51	43.7	43.7 ± 7.2	89
CW-SW-39	62	62 ± 10	3.34	3.34 ± 0.66	63	63 ± 11	125
CW-SW-39F	65	65 ± 11	2.9	2.9 ± 0.68	63	63 ± 10	128
CW-SW-40	60	60 ± 10	3.38	3.38 ± 0.67	62	62 ± 10	122
CW-SW-40F	61	61 ± 10	3.38	3.38 ± 0.7	61	61 ± 10	122
CW-SW-46	3.01	3.01 ± 0.6	0.135	0.135 ± 0.077	1.63	1.63 ± 0.37	4.775
CW-SW-46F	2.6	2.6 ± 0.52	0.115	0.115 ± 0.068	1.86	1.86 ± 0.39	4.575
CW-SW-48	72	72 ± 12	3.52	3.52 ± 0.69	69	69 ± 11	141
CW-SW-48F	77	77 ± 13	3.96	3.96 ± 0.77	73	73 ± 12	150
CW-SW-50	66	66 ± 11	3.91	3.91 ± 0.77	66	66 ± 11	132
CW-SW-50F	62	62 ± 10	3	3 ± 0.61	64	64 ± 11	126
CW-SW-51	170	170 ± 28	11.2	11.2 ± 2.1	181	181 ± 30	351
CW-SW-51F	161	161 ± 27	8.6	8.6 ± 1.6	173	173 ± 29	334
CW-SW-53	47.7	47.7 ± 7.9	2.35	2.35 ± 0.49	46.1	46.1 ± 7.6	93.8
CW-SW-53F	46.2	46.2 ± 7.6	2.42	2.42 ± 0.49	46.7	46.7 ± 7.7	92.9
CW-SW-54	144	144 ± 25	6.5	6.5 ± 1.3	142	142 ± 25	286
CW-SW-54F	138	138 ± 25	7.3	7.3 ± 1.5	144	144 ± 26	282

Notes:
Coordinates
U = The analyte
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Bold, Underlined and Highlighted = Analytical result exceeds screening levels
± = plus or minus

Cove Wash Watershed Assessment
2015 Low Flow Sampling Event
Water -Stable Isotope Results

Sample Location	Date Collected	Sample Information	Northing	Easting	δD H_2O (%)	$\delta^{18}O$ H_2O (%)
CW-GW-01	6/17/2015	Red Point Dug Well	4050237.040	657330.869	-92.4	-12.25
CW-GW-03	6/17/2015	Ellison Well	4049637.733	658749.123	-95.0	-12.52
CW-SW-05	6/18/2015	Historical Sample - W07 - Cove Wash Middle	4045700.298	658683.857	-91.9	-12.29
CW-SW-49	6/18/2015	Duplicate of CW-05	4045700.372	658683.674	-92.3	-12.31
CW-SW-07	6/17/2015	Cottonwood Spring	4047111.161	659124.125	-90.9	-11.90
CW-SW-10	6/17/2015	Cove Wash North	4049594.294	660201.047	-95.4	-12.61
CW-SW-11	6/19/2015	Cove Wash Middle 3	4046369.715	657266.457	-93.6	-12.58
CW-SW-12	6/18/2015	Cove Wash Middle 3	4044603.441	658812.815	-94.9	-12.80
CW-SW-13	6/18/2015	Cove Wash Middle 3E	4043160.908	658957.686	-96.0	-13.10
CW-SW-14	6/18/2015	Background - Cove Wash Middle 1 BKG	4042934	659222	-95.5	-12.94
CW-SW-21	6/20/2015	Duplicate of SW-21	4043108	655931	-100.0	-13.73
CW-SW-22	6/20/2015	Historical Sample - W006 - Cove Wash Middle 2	4043108	655931	-100.1	-13.70
CW-SW-26	6/16/2015	Historical Sample - W005 - Cove Wash Middle 2	4042501.621	657146.877	-97.1	-13.08
CW-SW-37	6/23/2015	Historical Sample Area 4 - Cove Wash Middle	4044377.806	657955.461	-95.4	-12.84
CW-SW-39	6/23/2015	Duplicate of SW-39	4045453.339	658432.518	-90.8	-11.99
CW-SW-46	6/23/2015	Cove Wash Middle 3	4043788.61	661352.387	-101.5	-14.02
CW-SW-48	6/24/2015	Cove Wash Middle 3	4044751.928	656807.090	-95.8	-13.07
CW-SW-50	6/25/2015	Cove Wash Middle 1A	4044856.247	657463.154	-94.1	-12.52
CW-SW-51	6/25/2015	Cove Wash Middle 1	4044944.041	657035.048	-88.0	-11.92
CW-SW-53	6/25/2015	Cove Wash Middle 1B	4044478	656787	-94.4	-12.65
CW-SW-54	6/25/2015	Cove Wash Middle 1B	4044751.928	656807.09	-88.1	-11.43

Cove Wash Watershed Assessment
2016 Spring Snowmelt Sampling Event
Water - Total Metal Results

Navajo Nation Surface Water Quality Standards - Primary Human Contact Standard (µg/L)					NCNS	747	30	98,000	1,870	126,000	470	NA	NCNS	NCNS	9,330	NA	15	NA	NA	18,667	280	NCNS	18,670	NA	NA	4,670	4,670	NA	NA	75	2,800	NCNS	280,000
Navajo Nation Surface Water Quality Standards - Secondary Human Contact Standard (µg/L)					NCNS	747	280	98,000	1,870	126,000	470	NA	NCNS	NCNS	9,330	NA	15	NA	NA	18,667	280	NCNS	18,670	NA	NA	4,670	4,670	NA	NA	75	2,800	NCNS	280,000
Navajo Nation Surface Water Quality Standards - Fish Consumption (µg/L)					NCNS	640	80	NCNS	85	NCNS	8	NA	NCNS	NCNS	NCNS	NA	NCNS	NA	NA	NCNS	0.15	NCNS	4,600	NA	NA	670	8,000	NA	NA	1	NCNS	NCNS	5,100
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Total Metals					750	NA	NA	NCNS	NCNS	NCNS	NA	NA	NCNS	NCNS	NA	NA	NA	NA	NA	NCNS	2.4	NCNS	NA	NA	NA	33	NA	NA	NA	NA	NCNS	NCNS	NA
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)) - Total Metals					87	NA	NA	NCNS	NCNS	NCNS	NA	NA	NCNS	NCNS	NA	NA	NA	NA	NA	NCNS	0.012	NCNS	NA	NA	NA	2	NCNS	NA	NA	NA	NCNS	NCNS	NA
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) - Total Metals					NCNS	NCNS	200	NCNS	NCNS	2,000	50	NA	1,000	1,000	500	NA	100	NA	NA	NCNS	10	NCNS	NCNS	NA	NA	50	NCNS	NA	NA	NCNS	NCNS	100	25,000
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Total Metals					NCNS	NCNS	2,000	500	NCNS	2,000	50	NA	1,000	5,000	5,000	NA	10,000	NA	NA	10,000	NCNS	50	2,000	NA	NA	20	NCNS	NA	NA	NCNS	NCNS	1,000	10,000
EPA Maximum Contaminant Level - Drinking Water (µg/L)					NA	6	10	2,000	4	NA	5	NA	100	NA	1,300	NA	15	NA	NA	NA	2	NA	NA	NA	NA	50	NA	NA	NA	2	30	NA	NA
Sample ID	Sample Date	Sample Information	Northing	Easting	Aluminium (µg/L)	Antimony (µg/L)	Arsenic (µg/L)	Barium (µg/L)	Beryllium (µg/L)	Boron (µg/L)	Cadmium (µg/L)	Calcium (µg/L)	Chromium (µg/L)	Cobalt (µg/L)	Copper (µg/L)	Iron (µg/L)	Lead (µg/L)	Lithium (µg/L)	Magnesium (µg/L)	Manganese (µg/L)	Mercury (µg/L)	Molybdenum (µg/L)	Nickel (µg/L)	Phosphorus (µg/L)	Potassium (µg/L)	Selenium (µg/L)	Silver (µg/L)	Sodium (µg/L)	Strontium (µg/L)	Thallium (µg/L)	Uranium (µg/L)	Vandium (µg/L)	Zinc (µg/L)
CW-GW-01	3/28/2016	Red Point Dug Well	4050237.04	657330.869	32 U	5.1 U	8.3 J	380	0.48 U	170	0.77 U	45000	1.4 U	1.3 U	37	210	2.2 U	51	15000	1.4 J	0.06 U	1.4	1.9 U	16 U	1200	4.5 U	1.9 U	99000	1200	5.4 U	6.8	80	46
CW-SW-01	3/28/2016	Cove Wash	4051637.55	663372.902	**840**	5.1 U	8.7 J	160	0.48 U	340	0.77 U	19000	1.4 U	1.3 U	1.9 U	230	2.2 U	110	11000	14	0.06 U	5.9	1.9 U	58 J	3900	4.5 U	1.9 U	250000	820	5.4 U	**110 J**	31	4.4 U
CW-SW-02	3/26/2016	Cove Wash	4053607.153	666731.839	**270**	5.1 U	**19**	120	0.48 U	360	0.77 U	18000	1.4 U	1.3 U	1.9 U	70 J	2.2 U	82	7200	12	0.06 U	8.5	1.9 U	50 J	2700	4.5 U	1.9 U	260000	700	5.4 U	**63**	57	4.4 U
CW-SW-03	3/30/2016	Cove Wash South	4047985.628	659997.097	**110000**	5.1 U	**20**	**4700**	**6.7**	400	0.89 J	870000	42	37	21	18000	**76**	340	89000	4500	0.06 U	2.7	84	7000	42000	4.5 U	1.9 U	300000	5900	5.4 U	**33**	**140**	76
CW-SW-04	4/27/2016	Background	4045556.747	655368.538	**480**	5.1 U	9.6 J	300	0.48 U	20 J	0.77 U	150000	1.4 U	1.3 U	1.9 U	330	2.2 U	48	29000	130	0.06 U	1.8	1.9 U	140 J	5700	**8.5**	1.9 U	23000	2400	5.4 U	**37**	13	5.1 J
CW-SW-05a	3/30/2016	rical Sample - Area 1 - Dam Surface Sample - Cove Wash Mi	4045700.298	658683.857	**190 J**	5.1 U	3.9 U	280	0.48 U	25 J	0.77 U	77000	1.4 U	1.3 U	1.9 U	140	2.2 U	36	15000	36	0.06 U	4.6	1.9 U	50 J	2600	4.5 U	1.9 U	23000	1200	5.4 U	**85**	12	4.4 U
CW-SW-07a	3/30/2016	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	**93 J**	5.1 U	3.9 U	250	0.48 U	36 J	0.77 U	71000	1.4 U	1.3 U	1.9 U	62 J	2.2 U	37	15000	28	0.06 U	5	1.9 U	38 J	2400	4.5 U	1.9 U	29000	1200	5.4 U	**96**	12	4.4 U
CW-SW-09	3/30/2016	Cove Wash North	4049315.64	658120.219	**140000**	5.1 U	**22**	**2200**	**5.9**	650	0.77 U	160000	64	33	17	30000	**44**	310	64000	1200	0.06 U	0.76 J	81	3400	41000	**6.8**	1.9 U	250000	3300	5.4 U	**31**	**290**	89
CW-SW-10	3/30/2016	Cottonwood Spring	4049586.881	660202.988	**2800**	5.1 U	3.9 U	160	0.48 U	140	0.77 U	74000	1.4 U	1.3 U	2.8 J	1700	2.2 U	73	26000	69	0.06 U	1.3	2.4 J	170 J	3000	**13**	1.9 U	160000	1200	5.4 U	15	31	12 J
CW-SW-11	3/30/2016	Cove Wash North	4046369.715	657266.457	**150 J**	5.1 U	3.9 U	130	0.48 U	23 J	0.77 U	60000	1.4 U	1.3 U	1.9 U	89 J	2.2 U	62	12000	15	0.06 U	1.6	1.9 U	40 J	3100	4.5 U	1.9 U	42000	1300	5.4 U	**42**	4.8	4.4 U
CW-SW-12	3/30/2016	Cove Wash Middle 3	4044603.441	658812.815	**540**	5.1 U	3.9 U	340	0.48 U	24 J	0.77 U	83000	1.4 U	1.3 U	1.9 U	300	2.2 U	30	12000	64	0.06 U	3.2	1.9 U	110 J	2700	**4.7 J**	1.9 U	16000	1200	5.4 U	**49**	12	4.4 U
CW-SW-13	5/2/2016	Cove Wash Middle 3	4043160.908	658957.686	**310**	5.1 U	3.9 U	360	0.48 U	18 J	0.77 U	81000	1.4 U	1.3 U	1.9 U	220	2.2 U	26	9700	38	0.06 U	2.9	1.9 U	0.1 J	2800	4.5 U	1.9 U	11000	1100	5.4 U	**38**	8.5	7 J
CW-SW-14	5/2/2016	Cove Wash Middle 3E	4042934	659222	**310**	5.1 U	3.9 U	380	0.48 U	17 J	0.77 U	81000	1.4 U	1.3 U	1.9 U	200	2.2 U	24	9300	20	0.06 U	0.38 U	1.9 U	0.094 J	2700	4.5 U	1.9 U	7800	1100	5.4 U	17	7.7	5.5 J
CW-SW-18	3/26/2016	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	32 U	5.1 U	3.9 U	270	0.48 U	14 J	0.77 U	99000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	20	28000	3.8 J	0.06 U	0.85 J	1.9 U	16 U	1100	4.5 U	1.9 U	16000	1100	5.4 U	6.2	3.9 J	4.4 U
CW-SW-21	4/29/2016	Background - Mesa IV Springs	4043108	655931	32 U	5.1 U	3.9 U	320	0.48 U	12 J	0.77 U	77000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	14	7200	0.87 U	0.06 U	0.39 J	1.9 U	100 J	1100	4.5 U	1.9 U	5700	350	5.4 U	3.2	3.3 J	8.7 J
CW-SW-26	4/28/2016	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	**260**	5.1 U	**70**	98 J	0.48 U	170	0.77 U	110000	1.4 U	1.3 U	2 J	220	2.2 U	190	18000	150	0.06 U	**670**	1.9 U	75 J	13000	**590**	1.9 U	140000	4300	5.4 U	**170**	**3000**	8.1 J
CW-SW-36	3/26/2016	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	32 U	5.1 U	3.9 U	220	0.48 U	25 J	0.77 U	80000	1.4 U	1.3 U	1.9 U	21 J	2.2 U	70	18000	14	0.06 U	19	1.9 U	29 J	4000	4.5 U	1.9 U	49000	1600	5.4 U	**160**	12	4.4 U
CW-SW-37	3/26/2016	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	32 U	5.1 U	3.9 U	240	0.48 U	26 J	0.77 U	80000	1.4 U	1.3 U	1.9 U	72 J	2.2 U	63	18000	31	0.06 U	17	1.9 U	38 J	4100	4.5 U	1.9 U	48000	1700	5.4 U	**120**	9 J	4.4 U
CW-SW-38	3/26/2016	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	32 U	5.1 U	3.9 U	230	0.48 U	27 J	0.77 U	85000	1.4 U	1.3 U	1.9 U	79 J	2.2 U	61	18000	94	0.06 U	22	1.9 U	36 J	3900	4.5 U	1.9 U	49000	1700	5.4 U	**140**	9.2 J	4.4 U
CW-SW-39	3/25/2016	Cove Wash Middle 2	4045453.339	658432.518	36 J	5.1 U	3.9 U	250	0.48 U	24 J	0.77 U	98000	1.4 U	1.3 U	1.9 U	60 J	2.2 U	68	22000	49 J	0.06 U	12 J	1.9 U	38 J	3500	4.5 U	1.9 U	50000	1700	5.4 U	**140 J**	6.3 J	4.4 U
CW-SW-41	3/25/2016	Cove Wash Middle 1	4045552	658464	**97 J**	5.1 U	3.9 U	240	0.48 U	22 J	0.77 U	99000	1.4 U	1.3 U	1.9 U	110	2.2 U	65	22000	35	0.06 U	4.5	1.9 U	43 J	3200	4.5 U	1.9 U	46000	1700	5.4 U	**99**	19	4.4 U
CW-SW-46	5/3/2016	Pine Water Springs	4043788.61	661352.387	**380**	5.1 U	3.9 U	25 J	0.48 U	12 J	0.77 U	41000	1.4 U	1.3 U	34	1600	2.2 U	6.6 J	8000	29	0.06 U	0.38 U	1.9 U	0.14 J	1400	4.5 U	1.9 U	5200	180	5.4 U	5.7	2.9 J	120
CW-SW-47	5/3/2016	Cove Wash Middle 3F	4043727.086	659295.82	**440**	5.1 U	3.9 U	180	0.48 U	37 J	0.77 U	150000	1.4 U	1.3 U	1.9 U	240	2.2 U	59	31000	30	0.06 U	3.4	1.9 U	0.069 J	3500	**130**	1.9 U	22000	2400	5.4 U	**540**	51	4.6 J
CW-SW-48	3/26/2016	Cove Wash Middle 3F	4044751.928	656807.090	**310**	5.1 U	8.4 J	260	0.48 U	55 J	0.77 U	57000	1.4 U	1.3 U	1.9 U	140	2.2 U	25	18000	16	0.06 U	0.49 J	1.9 U	26 J	2300	4.5 U	1.9 U	31000	1200	5.4 U	7.5	16	4.4 U
CW-SW-49	3/26/2016	Duplicate of CW-18	4049586.881	660202.988	32 U	5.1 U	3.9 U	280	0.48 U	11 J	0.77 U	100000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	21	29000	3.7 J	0.06 U	0.85 J	1.9 U	16 U	1300	4.5 U	1.9 U	16000	1100	5.4 U	6.4	3.8 J	4.4 U
CW-SW-50	3/29/2016	Cove Wash Middle 1	4044856.247	657463.154	32 U	5.1 U	8 J	230	0.48 U	14 J	0.77 U	96000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	36	12000	7.3 J	0.06 U	5.7	1.9 U	38 J	2400	**8.2**	1.9 U	23000	1200	5.4 U	**250**	32	4.4 U
CW-SW-51	3/29/2016	Cove Wash Middle 1A	4044944.041	657035.048	**520**	5.1 U	8.9 J	160	0.48 U	14 J	0.77 U	100000	1.4 U	1.3 U	2.5 J	260	2.2 U	23	14000	28	0.06 U	**65**	1.9 U	63 J	4200	**7**	1.9 U	11000	1800	5.4 U	**700**	**150**	4.4 U
CW-SW-53A	5/2/2016	Cove Wash Middle 1	4044478	656787	**110 J**	5.1 U	3.9 U	190	0.48 U	13 J	0.77 U	78000	1.4 U	1.3 U	1.9 U	70 J	2.2 U	18	9100	17	0.06 U	2.3	1.9 U	0.079 J	1900	**6.3**	1.9 U	12000	830	5.4 U	**110**	17	4.4 U
CW-SW-54	5/2/2016	Cove Wash Middle 1B	4044751.928	656807.09	49 J	5.1 U	4.6 J	200	0.48 U	25 J	0.77 U	100000	1.4 U	1.3 U	1.9 U	27 J	2.2 U	59	22000	10	0.06 U	30	1.9 U	0.055 J	3200	**23**	1.9 U	45000	2000	5.4 U	**580**	**230**	4.4 U
CW-SW-55	3/25/2016	Duplicate of CW-39	4044480.534	656337.545	32 U	5.1 U	3.9 U	210	0.48 U	20 J	0.77 U	95000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	60	20000 J	3.2 J	0.06 U	8.2 J	1.9 U	18 J	2700	4.5 U	1.9 U	41000	1600	5.4 U	**310 J**	27 J	4.4 U
CW-SW-56A	5/2/2016	Cove Wash Middle 3A	4043135	658979	**240**	5.1 U	3.9 U	260	0.48 U	75 J	0.77 U	100000	1.4 U	1.3 U	1.9 U	160	2.2 U	83	18000	55	0.06 U	**65**	1.9 U	0.08 J	7000	**12**	1.9 U	83000	2300	5.4 U	**470**	8.8 J	4.4 U
CW-SW-57	3/26/2016	Duplicate of CW-02	4053607.153	666731.839	**340**	5.1 U	**18**	120	0.48 U	350	0.77 U	18000	1.4 U	1.3 U	1.9 U	140	2.2 U	83	7200	13	0.06 U	7.2	1.9 U	37 J	2900	4.5 U	1.9 U	240000	700	5.4 U	**66**	57	4.4 U
CW-SW-58	3/29/2016	Cove Wash Middle 1	4044856.247	657463.154	32 U	5.1 U	3.9 U	230	0.48 U	12 J	0.77 U	96000	1.4 U	1.3 U	1.9 U	30 J	2.2 U	36	12000	7.3 J	0.06 U	5.8	1.9 U	46 J	2400	**7.4**	1.9 U	23000	1200	5.4 U	**250**	31	4.4 U
CW-SW-59	3/30/2016	Background - Cove Wash Tributary 1	4051574	664210	**13000**	5.1 U	9.9 J	270	0.52 J	230	0.77 U	27000	8.5 J	2.5 J	3.8 J	5500	5.2	62	10000	100	0.06 U	3.3	5.5 J	230	8700	4.5 U	1.9 U	120000	790	5.4 U	17	96	9.2 J
CW-SW-60	3/30/2016	Cove Wash between 01 and 02	4051659	664274	**10000**	5.1 U	**12**	200	0.48 U	370	0.77 U	23000	6 J	1.9 J	3.4 J	4000	4.1	130	11000	110	0.06 U	5	5.2 J	200 J	9000	4.5 U	1.9 U	270000	720	5.4 U	**86**	50	6.9 J
CW-SW-62	5/3/2016	Downstream of Dam	4046378	658785	**930**	5.1 U	3.9 U	330	0.48 U	28 J	0.77 U	85000	1.4 U	1.3 U	1.9 U	460	2.2 U	37	16000	43	0.06 U	5	1.9 U	0.086 J	3800	**4.8 J**	1.9 U	23000	1300	5.4 U	**83**	16	4.4 U
CW-SW-64	4/29/2016	Cove Wash North between CW-15 and CW-16	4045877	656444	32 U	5.1 U	9.1 J	150	0.48 U	37 J	0.77 U	110000	1.4 U	1.3 U	2 J	23 J	2.2 U	73	22000	3.0 J	0.06 U	9.6	1.9 U	40 J	4900	**10**	1.9 U	55000	2800	5.4 U	**250**	33	4.4 U
CW-SW-65	4/30/2016	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	**420**	5.1 U	6.1 J	200	0.48 U	150	0.77 U	160000	1.4 U	1.3 U	1.9 U	310	2.2 U	190	35000	290	0.06 U	**240**	1.9 U	60 J	16000	**89**	1.9 U	160000	4500	5.4 U	**1600**	19	4.4 U
CW-SW-66	4/30/2016	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	**650**	5.1 U	9.5 J	220	0.48 U	160	0.77 U	160000	1.4 U	1.4 J	1.9 U	430	2.2 U	200	37000	570	0.06 U	**280**	1.9 U	74 J	20000	**130**	1.9 U	180000	4700	**5.7 J**	**1400**	18	4.4 U
CW-SW-67	5/2/2016	Cove Wash Middle 3	4044603.441	658812.815	**490**	5.1 U	3.9 U	320	0.48 U	22 J	0.77 U	77000	1.4 U	1.3 U	1.9 U	330	2.2 U	28	12000	40	0.06 U	3.1	1.9 U	0.089 J	2900	4.5 U	1.9 U	16000	1200	5.4 U	**45**	14	8.9 J
CW-SW-68	5/2/2016	Duplicate of CW-67	4044603.441	658812.815	**570**	5.1 U	3.9 U	320	0.48 U	24 J	0.77 U	79000	1.4 U	1.3 U	1.9 U	370	2.2 U	28	12000	53	0.06 U	3.2	1.9 U	0.097 J	3000	4.5 U	1.9 U	16000	1200	5.4 U	**48**	15	4.4 U

NRWQC = Navajo Recommended Water Quality Criteria
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Cove Wash Watershed Assessment
2016 Spring Snowmelt Sampling Event
Water - Dissolved Metal - Results

Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Dissolved Metals					NA	88	340	NA	NA	NA	0.34-7.7*	NA	NA	NA	2.4-50*	NA	8.4-281*	NA	NA	NA	2.4	NA	99-1512*	NA	NA	NA	0.18-64*	NA	NA	700	NA	NA	25-380*
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)- Dissolved Metals					NA	30	150	NA	NA	NA	0.07-0.64*	NA	NA	NA	1.9-29*	NA	0.33-11*	NA	NA	NA	0.012	25-2017*	11-168*	NA	NA	NA	NA	NA	NA	150	NA	NA	25-382*
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) -Dissolved Metals					NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Dissolved Metals					NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sample ID	Sample Date	Sample Information	Northing	Easting	Aluminium (µg/L)	Antimony (µg/L)	Arsenic (µg/L)	Barium (µg/L)	Beryllium (µg/L)	Boron (µg/L)	Cadmium (µg/L)	Calcium (µg/L)	Chromium (µg/L)	Cobalt (µg/L)	Copper (µg/L)	Iron (µg/L)	Lead (µg/L)	Lithium (µg/L)	Magnesium (µg/L)	Manganese (µg/L)	Mercury (µg/L)	Molybdenum (µg/L)	Nickel (µg/L)	Phosphorus (µg/L)	Potassium (µg/L)	Selenium (µg/L)	Silver (µg/L)	Sodium (µg/L)	Strontium (µg/L)	Thallium (µg/L)	Uranium (µg/L)	Vandium (µg/L)	Zinc (µg/L)
CW-GW-01F	3/28/2016	Red Point Dug Well	4050237.04	657330.869	32 U	5.1 U	7.5 J	380	0.48 U	170	0.77 U	45000	1.4 U	1.3 U	13	14 U	2.2 U	52	16000	4.9 J	0.06 UJ	1.1	1.9 U	16 U	1200	4.5 U	1.9 U	100000	1200	5.4 U	6.8	78	29
CW-SW-01F	3/28/2016	Cove Wash	4051637.55	663372.902	32 U	5.1 U	11	150	0.48 U	330	0.77 U	18000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	110	10000	5.5 J	0.06 UJ	7.1	1.9 U	25 J	3600	4.5 U	1.9 U	250000	800	5.4 U	97	29	4.4 U
CW-SW-02F	3/26/2016	Cove Wash	4053607.153	666731.839	32 U	5.1 U	19	110	0.48 U	350	0.77 U	17000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	80	6900	8.3 J	0.06 UJ	9.8	1.9 U	35 J	2600	4.5 U	1.9 U	240000	680	5.4 U	69	57	4.4 U
CW-SW-03F	3/30/2016	Cove Wash South	4047985.628	659997.097	7100	5.1 U	8.3 J	430	0.48 U	310	0.77 U	71000	2.8 J	1.6 J	2.6 J	1900	2.5 J	130	12000	200	0.06 UJ	11	4 J	260	7200	4.5 U	1.9 U	270000	1600	5.4 U	26	63	5 J
CW-SW-04F	4/27/2016	Background	4045556.747	655368.538	68 J	5.1 U	7.9 J	290	0.48 U	20 J	0.77 U	150000	1.4 U	1.3 U	2 J	46 J	2.2 U	47	28000	22	0.06 UJ	2.2	1.9 U	110 J	6300	8	1.9 U	23000	2300	5.4 U	38	8.1 J	4.4 U
CW-SW-05F	3/25/2016	rical Sample - Area 1 - Dam Surface Sample - Cove Wash Mi	4045700.298	658683.857	32 U	5.1 U	3.9 U	300	0.48 U	28 J	0.77 U	78000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	35	14000	32	0.06 UJ	7	1.9 U	50 J	2800	4.5 U	1.9 U	22000	1200	5.4 U	82	11	4.4 U
CW-SW-07F	3/25/2016	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	32 U	5.1 U	5.6 J	300	0.48 U	47 J	0.77 U	77000	1.4 U	1.3 U	1.9 U	34 J	2.2 U	40	16000	28	0.06 UJ	7.6	1.9 U	49 J	3100	4.8 J	1.9 U	32000	1300	5.4 U	94	14	13 J
CW-SW-07Fa	3/30/2016	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	32 U	5.1 U	4.4 J	270	0.48 U	37 J	0.77 U	73000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	38	16000	25	0.06 UJ	5.1	1.9 U	28 J	2600	4.5 U	1.9 U	30000	1200	5.4 U	97	12	4.4 U
CW-SW-09F	3/30/2016	Cove Wash North	4049315.64	658120.219	94 J	5.1 U	14	100	0.48 U	510	0.77 U	4300	1.4 U	1.3 U	1.9 U	14 U	2.2 U	96	1300	5.3 J	0.06 UJ	3.2	1.9 U	31 J	1600	4.5 U	1.9 U	200000	240	5.4 U	26	230	4.4 U
CW-SW-10F	3/30/2016	Cottonwood Spring	4049586.881	660202.988	32 U	5.1 U	3.9 U	82 J	0.48 U	130	0.77 U	58000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	65	22000	13	0.06 UJ	0.73 J	1.9 U	16 U	1800	12	1.9 U	160000	1100	5.4 U	14	26	4.4 U
CW-SW-11F	3/30/2016	Cove Wash North	4046369.715	657266.457	32 U	5.1 U	5.9 J	130	0.48 U	22 J	0.77 U	60000	1.4 U	1.3 U	3 J	20 J	2.2 U	61	11000	21	0.06 UJ	1.5	1.9 U	41 J	3000	4.5 U	1.9 U	41000	1300	5.4 U	38	3.9 J	4.4 U
CW-SW-12F	3/30/2016	Cove Wash Middle 3	4044603.441	658812.815	32 U	5.1 U	3.9 U	310	0.48 U	20 J	0.77 U	75000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	27	11000	7.3 J	0.06 UJ	4.2	1.9 U	62 J	2500	4.5 U	1.9 U	15000	1100	5.4 U	45	7.4 J	4.4 U
CW-SW-13F	5/2/2016	Cove Wash Middle 3	4043160.908	658957.686	190 J	5.1 U	3.9 U	370	0.48 U	19 J	0.77 U	82000	1.4 U	1.3 U	1.9 U	120	2.2 U	27	9800	22	0.06 UJ	3.3	1.9 U	97 J	2800	4.5 U	1.9 U	11000	1100	5.4 U	40	8 J	4.4 U
CW-SW-14F	5/2/2016	Cove Wash Middle 3E	4042934	659222	32 U	5.1 U	3.9 U	380	0.48 U	15 J	0.77 U	81000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	24	9300	2.4 J	0.06 UJ	0.38 U	1.9 U	82 J	2600	4.5 U	1.9 U	7900	1100	5.4 U	17	6.5 J	4.4 U
CW-SW-18F	3/26/2016	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	32 U	5.1 U	3.9 U	270	0.48 U	12 J	0.77 U	100000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	20	28000	4 J	0.06 UJ	1.4 J	1.9 U	16 U	1100	4.5 U	1.9 U	16000	1100	5.4 U	6.6	3.2 J	4.4 U
CW-SW-21F	4/29/2016	Background - Mesa IV Springs	4043108	655931	32 U	5.1 U	5.7 J	320	0.48 U	12 J	0.77 U	78000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	14	7300	0.87 U	0.06 UJ	0.38 U	1.9 U	100 J	1100	4.5 U	1.9 U	5800	360	5.4 U	3.3	3.5 J	5.1 J
CW-SW-26F	4/28/2016	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	32 U	5.1 U	75	79 J	0.48 U	170	0.77 U	110000	1.4 U	1.3 U	1.9 U	29 J	2.2 U	200	18000	83	0.06 UJ	770	1.9 U	45 J	1300	0.7	1.9 U	140000	4500	5.4 U	170	3.3	4.4 U
CW-SW-36F	3/26/2016	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	32 U	5.1 U	6.7 J	220	0.48 U	24 J	0.77 U	81000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	70	18000	15	0.06 UJ	19	1.9 U	36 J	3900	4.5 U	1.9 U	51000	1600	5.4 U	170	12	4.4 U
CW-SW-37F	3/26/2016	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	32 U	5.1 U	3.9 U	240	0.48 U	25 J	0.77 U	80000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	62	18000	31	0.06 UJ	18	1.9 U	28 J	4000	4.5 U	1.9 U	50000	1700	5.4 U	130	9.1 J	4.4 U
CW-SW-38F	3/26/2016	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	32 U	5.1 U	3.9 U	230	0.48 U	27 J	0.77 U	84000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	59	17000	94	0.06 UJ	23	1.9 U	33 J	3700	4.5 U	1.9 U	50000	1700	5.4 U	150	9.5 J	4.4 U
CW-SW-39F	3/25/2016	Cove Wash Middle 2	4045453.339	658432.518	32 U	5.1 U	5.2 J	260	0.48 U	24 J	0.77 U	100000	1.4 U	1.3 U	1.9 U	14 U	**11**	70	23000	48	0.06 UJ	11	1.9 U	33 J	3600	4.5 U	1.9 U	51000	1800	5.4 U	140 J	6 J	4.4 U
CW-SW-41F	3/25/2016	Cove Wash Middle 1	4045552	658464	62 J	5.1 U	4.6 J	240	0.48 U	20 J	0.77 U	99000	1.4 U	1.3 U	1.9 U	80 J	2.2 U	66	22000	31	0.06 UJ	10	1.9 U	38 J	3300	5.5	1.9 U	46000	1700	5.4 U	240	18	4.4 U
CW-SW-46F	5/3/2016	Pine Water Springs	4043788.61	661352.387	320	5.1 U	3.9 U	23 J	0.48 U	11 J	0.77 U	41000	1.4 U	1.3 U	29	1300	2.2 U	6.6 J	8000	26	0.06 UJ	0.38 U	1.9 U	110 J	1400	4.5 U	1.9 U	5300	180	5.4 U	5.9	2.8 J	96
CW-SW-47F	5/3/2016	Cove Wash Middle 3F	4043727.086	659295.82	32 U	5.1 U	6.4 J	170	0.48 U	35 J	0.77 U	140000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	57	30000	15	0.06 UJ	3.4	1.9 U	51 J	3300	0.13	1.9 U	21000	2300	5.4 U	530	47	4.4 U
CW-SW-48F	3/26/2016	Cove Wash Middle 3F	4044751.928	656807.090	180 J	5.1 U	3.9 U	260	0.48 U	57 J	0.77 U	56000	1.4 U	1.3 U	1.9 U	63 J	2.2 U	25	17000	5.4 J	0.06 UJ	1.1	1.9 U	21 J	2200	4.5 U	1.9 U	32000	1200	5.4 U	7.8	17	4.4 U
CW-SW-49F	3/26/2016	Duplicate of CW-18	4049586.881	660202.988	32 U	5.1 U	3.9 U	270	0.48 U	14 J	0.77 U	100000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	20	29000	3.8 J	0.06 UJ	0.9 J	1.9 U	16 U	1200	4.5 U	1.9 U	16000	1100	5.4 U	6.5	4.1 J	4.4 U
CW-SW-50F	3/29/2016	Cove Wash Middle 1	4044856.247	657463.154	32 U	5.1 U	3.9 U	240	0.48 U	13 J	0.77 U	98000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	37	12000	6.8 J	0.06 UJ	6.2	1.9 U	44 J	2400	4.9 J	1.9 U	24000	1200	5.4 U	260	32	4.4 U
CW-SW-51F	3/29/2016	Cove Wash Middle 1A	4044944.041	657035.048	32 U	5.1 U	7.9 J	150	0.48 U	13 J	0.77 U	100000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	22	14000	19	0.06 UJ	50	1.9 U	45 J	4100	5.5	1.9 U	11000	1800	5.4 U	530	140	4.4 U
CW-SW-53AF	5/2/2016	Cove Wash Middle 1	4044478	656787	32 U	5.1 U	3.9 U	190	0.48 U	12 J	0.77 U	79000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	19	9200	13	0.06 UJ	2.4	1.9 U	65 J	1900	4.5 U	1.9 U	12000	860	5.4 U	110	17	4.4 U
CW-SW-54F	5/2/2016	Cove Wash Middle 1B	4044751.928	656807.09	32 U	5.1 U	5.7 J	190	0.48 U	24 J	0.77 U	100000	1.4 U	1.3 U	2 J	14 U	2.2 U	57	22000	9.3 J	0.06 UJ	29	1.9 U	48 J	3100	21	1.9 U	43000	1900	5.4 U	560	220	4.4 U
CW-SW-55F	3/25/2016	Duplicate of CW-39	4044480.534	656337.545	32 U	5.1 U	6.9 J	210	0.48 U	17 J	0.77 U	96000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	62	20000	10	0.06 UJ	8.5	1.9 U	16 U	2900	4.5 U	1.9 U	40000	1600	5.4 U	310 J	27	4.4 U
CW-SW-56AF	5/2/2016	Cove Wash Middle 3A	4043135	658979	32 U	5.1 U	3.9 U	250	0.48 U	76 J	0.77 U	99000	1.4 U	1.3 U	1.9 U	67 J	2.2 U	82	18000	27	0.06 UJ	67	1.9 U	49 J	6800	16	1.9 U	82000	2200	5.4 U	460	8.3 J	4.4 U
CW-SW-57F	3/26/2016	Duplicate of CW-02	4053607.153	666731.839	49 J	5.1 U	14	110	0.48 U	340	0.77 U	17000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	79	6900	8.8 J	0.06 UJ	7.2	1.9 U	30 J	2600	4.5 U	1.9 U	240000	670	5.4 U	66	56	4.4 U
CW-SW-58F	3/29/2016	Cove Wash Middle 1	4044856.247	657463.154	32 U	5.1 U	5.9 J	240	0.48 U	12 J	0.77 U	98000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	37	12000	6.8 J	0.06 UJ	5.9	1.9 U	30 J	2400	7.5 J	1.9 U	24000	1200	5.4 U	250	32	4.4 U
CW-SW-59F	3/30/2016	Background - Cove Wash Tributary 1	4051574	664210	920	5.1 U	6.9 J	160	0.48 U	210	0.77 U	15000	1.4 U	1.3 U	2.3 J	380	2.2 U	52	5600	5.5 J	0.06 UJ	3.4	1.9 U	30 J	3700	4.5 U	1.9 U	120000	660	5.4 U	16	82	4.4 U
CW-SW-60F	3/30/2016	Cove Wash between 01 and 02	4051659	664274	380	5.1 U	11	120	0.48 U	360	0.77 U	9800	1.4 U	1.3 U	2.2 J	150	2.2 U	140	6000	5.7 J	0.06 UJ	11	1.9 U	26 J	3900	4.5 U	1.9 U	320000	560	5.4 U	130	50	4.4 U
CW-SW-62F	5/3/2016	Downstream of Dam	4046378	658785	32 U	5.1 U	3.9 U	310	0.48 U	26 J	0.77 U	80000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	36	15000	7.9 J	0.06 UJ	4.7	1.9 U	45 J	3500	4.5 U	1.9 U	23000	1300	5.4 U	79	14	4.4 U
CW-SW-64F	4/29/2016	Cove Wash North between CW-15 and CW-16	4045877	656444	32 U	5.1 U	9.6 J	160	0.48 U	37 J	0.77 U	110000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	75	22000	2.4 J	0.06 UJ	8	1.9 U	32 J	5000	7.5	1.9 U	56000	2900	5.4 U	250	30	4.4 U
CW-SW-65F	4/30/2016	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	32 U	5.1 U	12	190	0.48 U	140	0.77 U	150000	1.4 U	1.3 U	1.9 U	18 J	2.2 U	180	34000	260	0.06 UJ	240	1.9 U	36 J	16000	89	1.9 U	160000	4400	5.4 U	1600	17	4.4 U
CW-SW-66F	4/30/2016	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	32 U	5.1 U	7.5 J	210	0.48 U	170	0.77 U	160000	1.4 U	1.3 U	1.9 U	34 J	2.2 U	210	37000	590	0.06 UJ	300	1.9 U	25 J	21000	150	1.9 U	190000	4800	5.4 U	1500	18	4.4 U
CW-SW-67F	5/2/2016	Cove Wash Middle 3	4044603.441	658812.815	32 U	5.1 U	3.9 U	300	0.48 U	24 J	0.77 U	74000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	26	12000	6.1 J	0.06 UJ	3.2	1.9 U	55 J	2700	4.5 U	1.9 U	15000	1100	5.4 U	44	11	24 J
CW-SW-68F	5/2/2016	Duplicate of CW-67	4044603.441	658812.815	32 U	5.1 U	3.9 U	300	0.48 U	25 J	0.77 U	75000	1.4 U	1.3 U	1.9 U	19 J	2.2 U	27	12000	8.3 J	0.06 UJ	3	1.9 U	62 J	2800	4.5 U	1.9 U	16000	1100	5.4 U	44	11	16 J

Notes:
NCNS = No Current Numeric Standard
NA = Not Applicable
NRWQC = Navajo Recommended Water Quality Criteria
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels
* = The value is hardness dependent. Individual exceedances based on the hardness of the water samples are highlighted, bolded, and underlined.

Cove Wash Watershed Assessment
2016 Spring Snowmelt Sampling Event
Water - Hardness Results

Sample ID	Sample Date	Sample Information	Northing	Easting	Calcium (µg/L)	Magnesium (µg/L)	Hardness as CaCO3 (µg/L)	Hardness as CaCO3 (mg/L)
CW-GW-01F	3/28/2016	Red Point Dug Well	4050237.04	657330.869	45000	16000	180000	180
CW-SW-01F	3/28/2016	Cove Wash	4051637.55	663372.902	18000	10000	87000	87
CW-SW-02F	3/26/2016	Cove Wash	4053607.153	666731.839	17000	6900	71000	71
CW-SW-03F	3/30/2016	Cove Wash South	4047985.628	659997.097	71000	12000	230000	230
CW-SW-04F	4/27/2016	Background	4045556.747	655368.538	150000	28000	490000	490
CW-SW-05aF	3/30/2016	Historical Sample - Area 1 - Dam Surface Sample - Cove Wash Middle	4045700.298	658683.857	78000	14000	250000	250
CW-SW-07aF	3/30/2016	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	73000	16000	250000	250
CW-SW-07F	3/25/2016	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	77000	16000	260000	260
CW-SW-09F	3/30/2016	Cove Wash North	4049315.64	658120.219	4300	1300	16000	16
CW-SW-10F	3/30/2016	Cottonwood Spring	4049586.881	660202.988	58000	22000	240000	240
CW-SW-11F	3/30/2016	Cove Wash North	4046369.715	657266.457	60000	11000	200000	200
CW-SW-12F	3/30/2016	Cove Wash Middle 3	4044603.441	658812.815	75000	11000	230000	230
CW-SW-13F	5/2/2016	Cove Wash Middle 3	4043160.908	658957.686	82000	9800	250000	250
CW-SW-14F	5/2/2016	Cove Wash Middle 3E	4042934	659222	81000	9300	240000	240
CW-SW-18F	3/26/2016	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	100000	28000	370000	370
CW-SW-21F	4/29/2016	Background - Mesa IV Springs	4043108	655931	78000	7300	230000	230
CW-SW-26F	4/28/2016	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	110000	18000	360000	360
CW-SW-36F	3/26/2016	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	81000	18000	280000	280
CW-SW-37F	3/26/2016	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	80000	18000	270000	270
CW-SW-38F	3/26/2016	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	84000	17000	280000	280
CW-SW-39F	3/25/2016	Cove Wash Middle 2	4045453.339	658432.518	100000	23000	340000	340
CW-SW-41F	3/25/2016	Cove Wash Middle 1	4045552	658464	99000	22000	340000	340
CW-SW-46F	5/3/2016	Pine Water Springs	4043788.61	661352.387	41000	8000	140000	140
CW-SW-47F	5/3/2016	Cove Wash Middle 3F	4043727.086	659295.82	140000	30000	470000	470
CW-SW-48F	3/26/2016	Cove Wash Middle 3F	4044751.928	656807.090	56000	17000	210000	210
CW-SW-49F	3/26/2016	Duplicate of CW-18	4049586.881	660202.988	100000	29000	370000	370
CW-SW-50F	3/29/2016	Cove Wash Middle 1	4044856.247	657463.154	98000	12000	290000	290
CW-SW-51F	3/29/2016	Cove Wash Middle 1A	4044944.041	657035.048	100000	14000	310000	310
CW-SW-53AF	5/2/2016	Cove Wash Middle 1	4044478	656787	79000	9200	240000	240
CW-SW-54F	5/2/2016	Cove Wash Middle 1B	4044751.928	656807.09	100000	22000	340000	340
CW-SW-55F	3/25/2016	Duplicate of CW-39	4044480.534	656337.545	96000	20000	320000	320
CW-SW-56AF	5/2/2016	Cove Wash Middle 3A	4043135	658979	99000	18000	320000	320
CW-SW-57F	3/26/2016	Duplicate of CW-02	4053607.153	666731.839	17000	6900	71000	71
CW-SW-58F	3/29/2016	Cove Wash Middle 1	4044856.247	657463.154	98000	12000	290000	290
CW-SW-59F	3/30/2016	Background - Cove Wash Tributary 1	4051574	664210	15000	5600	60000	60
CW-SW-60F	3/30/2016	Cove Wash between 01 and 02	4051659	664274	9800	6000	49000	49
CW-SW-62F	5/3/2016	Downstream of Dam	4046378	658785	80000	15000	260000	260
CW-SW-64F	4/29/2016	Cove Wash North between CW-15 and CW-16	4045877	656444	110000	22000	370000	370
CW-SW-65F	4/30/2016	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	150000	34000	520000	520
CW-SW-66F	4/30/2016	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	160000	37000	550000	550
CW-SW-67F	5/2/2016	Cove Wash Middle 3	4044603.441	658812.815	74000	12000	230000	230
CW-SW-68F	5/2/2016	Duplicate of CW-67	4044603.441	658812.815	75000	12000	240000	240

Navajo Nation Surface Water Quality Standards - Secondary Human Contact Standard (µg/L)					NA	NA	NA	NA	NA	NA	NA	NCNS	NA
Navajo Nation Surface Water Quality Standards - Fish Consumption (µg/L)					NA	NA	NA	NA	NCNS	NA	NA	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Dissolved Metals					NA	NA	NA	NA	NCNS	NA	NA	pH and wildlife dependent	NCNS
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)- Dissolved Metals					NA	NA	NA	NA	NCNS	NA	NA	pH and wildlife dependent	NCNS
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) -Dissolved Metals					NA	NA	NA	NA	NCNS	NA	NA	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Dissolved Metals					NA	NA	NA	NA	NCNS	NA	NA	NCNS	NCNS
EPA Maximum Contaminant Level - Drinking Water (µg/L)					NA	NA	NA	NA	4,000	NA	NA	NA	10,000
Sample ID	Sample Date	Sample Information	Northing	Easting	Bicarbonate as CaCO3 (µg/L)	Bromide (µg/L)	Carbonate as CaCO3 (µg/L)	Chloride (µg/L)	Fluoride (µg/L)	Total Alkalinity as CaCO3 (µg/L)	Sulfate (µg/L)	Ammonia as N (µg/L)	Nitrate as N (µg/L)
CW-GW-01F	3/28/2016	Red Point Dug Well	4050237.04	657330.869	380000	200 U	50000 U	5600	190 J	380000	14000	100 U	0.15 J
CW-SW-01F	3/28/2016	Cove Wash	4051637.55	663372.902	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	100 U	Not Analyzed
CW-SW-02F	3/26/2016	Cove Wash	4053607.153	666731.839	540000	270	50000 U	28000	380	540000	74000	100 U	170 J
CW-SW-57F	3/26/2016	Duplicate of CW-02	4053607.153	666731.839	550000	Not Analyzed	50000 U	Not Analyzed	Not Analyzed	550000	Not Analyzed	100 U	Not Analyzed
CW-SW-03F	3/30/2016	Cove Wash South	4047985.628	659997.097	380000	200 U	50000 U	19000	210	380000	210000	100 U	46000
CW-SW-04F	4/27/2016	Background	4045556.747	655368.538	440000	200 U	20000 U	200 U	780	440000	44000	100 U	200 UJ
CW-SW-05bF	3/30/2016	Historical Sample - Area 1 - Dam Surface Sample - Cove Wash Middle	4045700.298	658683.857	240000	Not Analyzed	50000 U	Not Analyzed	Not Analyzed	240000	Not Analyzed	100 U	Not Analyzed
CW-SW-07F	3/25/2016	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	290000	200 U	20000 U	11000	280	290000	24000	100 U	200 UJ
CW-SW-09F	3/30/2016	Cove Wash North	4049315.64	658120.219	530000	200 U	50000 U	10000	610	530000	50000	100 U	460 J
CW-SW-10F	3/30/2016	Cottonwood Spring	4049586.881	660202.988	380000	900	50000 U	75000	110	380000	100000	80 J	250 J
CW-SW-11F	3/30/2016	Cove Wash North	4046369.715	657266.457	14000	200 U	5000 U	18000	300	14000	36000	100 U	62000
CW-SW-12F	3/30/2016	Cove Wash Middle 3	4044603.441	658812.815	240000	200 U	50000 U	5700	210	240000	15000	100 U	72 J
CW-SW-13F	5/2/2016	Cove Wash Middle 3	4043160.908	658957.686	240000	800 U	20000 U	4200	220 J	240000	11000	31 J	800 UJ
CW-SW-14F	5/2/2016	Cove Wash Middle 3E	4042934	659222	240000	800 U	20000 U	3800	220 J	240000	5000	100 U	800 UJ
CW-SW-18F	3/30/2016	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	390000	200 U	50000 U	6400	220	390000	10000	100 U	200 UJ
CW-SW-49F	3/26/2016	Duplicate of CW-18	4049586.881	660202.988	380000	200 U	50000 U	6400	210	380000	10000	100 U	76 J
CW-SW-21F	4/29/2016	Background - Mesa IV Springs	4043108	655931	210000	63 J	20000 U	6900	210	210000	7600	61 J	66 J
CW-SW-26F	4/28/2016	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	180000	400 U	20000 U	20000	260	180000	460000	100 U	140 J
CW-SW-36F	3/26/2016	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	320000	200 U	50000 U	20000	360	320000	38000	100 U	200 UJ
CW-SW-37F	3/26/2016	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	330000	110 J	50000 U	19000	360	330000	37000	100 U	200 UJ
CW-SW-38F	3/26/2016	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	340000	93 J	50000 U	19000	380	340000	36000	100 U	80 J
CW-SW-39F	3/25/2016	Cove Wash Middle 2	4045453.339	658432.518	380000	100 J	50000 U	22000	460	380000	47000	100 U	71 J
CW-SW-55F	3/25/2016	Duplicate of CW-39	4044480.534	656337.545	330000	200 U	50000 U	27000	410	330000	53000	100 U	80 J
CW-SW-56AF	5/2/2016	Cove Wash Middle 3A	4043135	658979	310000	800 U	20000 U	15000	320 J	310000	170000	100 U	800 UJ
CW-SW-41F	3/25/2016	Cove Wash Middle 1	4045552	658464	350000	130 J	50000 U	25000	440	350000	51000	100 U	91 J
CW-SW-46F	5/3/2016	Pine Water Springs	4043788.61	661352.387	140000	800 U	20000 U	3000	150 J	140000	4200	33 J	800 UJ
CW-SW-47F	5/3/2016	Cove Wash Middle 3F	4043727.086	659295.82	400000	800 U	20000 U	22000	300 J	400000	88000	100 U	800 UJ
CW-SW-48F	3/26/2016	Cove Wash Middle 3F	4044751.928	656807.090	260000	200 U	50000 U	4600	180	260000	9100	100 U	200 UJ
CW-SW-50F	3/29/2016	Cove Wash Middle 1	4044856.247	657463.154	270000	140 J	50000 U	20000	330	270000	39000	50 J	200 UJ
CW-SW-51F	3/29/2016	Cove Wash Middle 1A	4044944.041	657035.048	240000	200 U	50000 U	9900	310	240000	57000	100 U	78 J
CW-SW-53AF	5/2/2016	Cove Wash Middle 1	4044478	656787	210000	800 U	20000 U	11000	220 J	210000	20000	100 U	800 UJ
CW-SW-54F	5/2/2016	Cove Wash Middle 1B	4044751.928	656807.09	320000	800 U	20000 U	36000	370 J	320000	63000	42 J	800 UJ
CW-SW-58F	3/29/2016	Cove Wash Middle 1	4044856.247	657463.154	260000	140 J	50000 U	20000	300	260000	38000	100 U	75 J
CW-SW-59F	3/30/2016	Background - Cove Wash Tributary 1	4051574	664210	250000	130 J	50000 U	15000	280	250000	49000	100 U	160 J
CW-SW-60F	3/30/2016	Cove Wash between 01 and 02	4051659	664274	510000	390	50000 U	52000	270	510000	130000	100 U	190 J
CW-SW-62F	5/3/2016	Downstream of Dam	4046378	658785	270000	800 U	20000 U	8400	240 J	270000	19000	100 U	800 UJ
CW-SW-64F	4/29/2016	Cove Wash North between CW-15 and CW-16	4045877	656444	380000	80 J	20000 U	16000	650	380000	70000	100 U	91 J
CW-SW-65F	4/30/2016	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	410000	800 U	20000 U	20000	530	410000	350000	100 U	800 UJ
CW-SW-66F	4/30/2016	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	500000	800 U	20000 U	19000	500	500000	390000	140	800 UJ
CW-SW-67F	5/2/2016	Cove Wash Middle 3	4044603.441	658812.815	250000	800 U	20000 U	4800	210 J	250000	12000	100 U	800 UJ
CW-SW-68F	5/2/2016	Duplicate of CW-67	4044603.441	658812.815	250000	800 U	20000 U	4800	200 J	250000	13000	100 U	800 UJ

Notes:
EPA = Environmental Protection
NCNS = No Current Numeric Standard
NA = Not Applicable
NRWQC = Navajo Recommended Water Quality Criteria
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
µg/L = microgram per liter
<u>Bold, Underlined and Highlighted</u> = Analytical result exceeds screening levels
* = The NRWQC assumes a hardness of 100 mg/L

Cove Wash Watershed Assessment
2016 Spring Snowmelt
Sampling Event
Water - Total Gross Alpha Radiation and Total Radium Results

Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (pCi/L)					NA	NA	15	5	5	5	5	5
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (pCi/L)					NCNS	NCNS	NCNS	NCNS	NCNS	NCNS	NCNS	5
EPA Maximum Contaminant Level - Drinking Water (pCi/L)					NA	NA	15	5	5	5	5	5
Sample ID	Date	Sample Information	Northing	Easting	Gross Alpha Radiation (pCi/L)	GAR with Total Uncertainty (pCi/L)	Total Adjusted GAR (pCi/L)	Radium 226 (pCi/L)	Radium 226 with Total Uncertainty (pCi/L)	Radium 228 (pCi/L)	Radium 228 with Total Uncertainty (pCi/L)	Combined Radium (Radium 226 + Radium 228) (pCi/L)
CW-GW-01	3/28/2016	Red Point Dug Well	4050237.04	657330.869	3.8	3.8 ± 1.5	-3.696	0.31 J	0.31 J ± 0.19	0.23 U	0.23 U ± 0.26	0.31 J
CW-SW-01	3/28/2016	Cove Wash	4051637.55	663372.902	23	23 ± 4.8	-58.66	0.17 U	0.17 U ± 0.15	0.74 J	0.74 J ± 0.34	0.74 J
CW-SW-02	3/26/2016	Cove Wash	4053607.153	666731.839	13.6	13.6 ± 3.3	-42.8	0.08 U	0.08 U ± 0.11	0.46 U	0.46 U ± 0.28	0.46 U
CW-SW-03	3/30/2016	Cove Wash South	4047985.628	659997.097	14.2	14.2 ± 3.9	-14	1.03	1.03 ± 0.43	0.97 J	0.97 J ± 0.38	2.00 J
CW-SW-04	4/27/2016	Background	4045556.747	655368.538	32.7	32.7 ± 6.4	-13.06	0.2 U	0.2 U ± 0.15	0.76 J	0.76 J ± 0.37	0.76 J
CW-SW-05	3/25/2016	Historical Sample - Area 1 - Dam Surface Sample - Cove Wash Middle	4045700.298	658683.857	28.9	28.9 ± 5.7	-29.71	2.2	2.2 ± 0.7	0.32 U	0.32 U ± 0.26	2.2
CW-SW-07	3/25/2016	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	33.8	33.8 ± 6.5	-36.06	1.58	1.58 ± 0.53	0.38 U	0.38 U ± 0.27	1.58
CW-SW-09	3/30/2016	Cove Wash North	4049315.64	658120.219	26.3	26.3 ± 5.8	-4.32	1.78	1.78 ± 0.64	1.89	1.89 ± 0.62	3.67
CW-SW-10	3/30/2016	Cottonwood Spring	4049586.881	660202.988	7	7 ± 2.1	-6.88	0.11 U	0.11 U ± 0.12	0.25 U	0.25 U ± 0.25	0.25 U
CW-SW-11	3/30/2016	Cove Wash North	4046369.715	657266.457	29.7	29.7 ± 5.8	-5.81	0.4 J	0.4 J ± 0.22	0.19 U	0.19 U ± 0.3	0.4 J
CW-SW-12	3/30/2016	Cove Wash Middle 3	4044603.441	658812.815	22.3	22.3 ± 4.7	-13.38	1.75	1.75 ± 0.57	0.92 J	0.92 J ± 0.35	2.67 J
CW-SW-13	5/2/2016	Cove Wash Middle 3	4043160.908	658957.686	15.5	15.5 ± 3.5	-13.95	0.93 J	0.93 J ± 0.35	-0.06 U	-0.06 U ± 0.25	0.93 J
CW-SW-14	5/2/2016	Cove Wash Middle 3E	4042934	659222	7.2	7.2 ± 2.1	-6.3	0.53 J	0.53 J ± 0.26	-0.12 U	-0.12 U ± 0.24	0.53 J
CW-SW-18	3/30/2016	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	7.8	7.8 ± 2.2	1.569	0.24 J	0.24 J ± 0.16	0.54 U	0.54 U ± 0.36	0.24 J
CW-SW-21	4/29/2016	Background - Mesa IV Springs	4043108	655931	3.4	3.4 ± 1.4	-0.398	0.1 U	0.1 U ± 0.12	0.4 U	0.4 U ± 0.32	0.4 U
CW-SW-26	4/28/2016	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	134	134 ± 22	-2.8	5.4	5.4 ± 1.5	0.31 UJ	0.31 UJ ± 0.29	**5.4**
CW-SW-36	3/26/2016	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	61	61 ± 11	-58.11	3.08	3.08 ± 0.91	0.34 UJ	0.34 UJ ± 0.32	3.08
CW-SW-37	3/26/2016	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	52.3	52.3 ± 9.4	-39.37	4	4 ± 1.2	0.25 UJ	0.25 UJ ± 0.3	4
CW-SW-38	3/26/2016	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	80	80 ± 14	-26.99	4.4	4.4 ± 1.2	0.37 U	0.37 U ± 0.31	4.4
CW-SW-39	3/25/2016	Cove Wash Middle 2	4045453.339	658432.518	51.4	51.4 ± 9.3	-54.22	2.43	2.43 ± 0.75	0.29 U	0.29 U ± 0.31	2.43
CW-SW-41	3/25/2016	Cove Wash Middle 1	4045552	658464	64	64 ± 11	-80.01	2.51	2.51 ± 0.77	0.38 U	0.38 U ± 0.49	2.51
CW-SW-46	5/3/2016	Pine Water Springs	4043788.61	661352.387	2.9 J	2.9 J ± 1.3	-2.332	0.09 U	0.09 U ± 0.11	-0.28 U	-0.28 U ± 0.28	0.09 U
CW-SW-47	5/3/2016	Cove Wash Middle 3F	4043727.086	659295.82	190	190 ± 31	-168.7	2.49	2.49 ± 0.75	-0.25 U	-0.25 U ± 0.26	2.49
CW-SW-48	3/26/2016	Cove Wash Middle 3F	4044751.928	656807.09	7.5	7.5 ± 2.2	-3.01	0.2 U	0.2 U ± 0.17	0.34 U	0.34 U ± 0.33	0.34 U
CW-SW-49	3/26/2016	Duplicate of CW-18	4049586.881	660202.988	4.8	4.8 ± 1.5	-1.352	0.1 U	0.1 U ± 0.12	0.33 U	0.33 U ± 0.28	0.33 U
CW-SW-50	3/29/2016	Cove Wash Middle 1	4044856.247	657463.154	149	149 ± 25	-37.71	6.6	6.6 ± 1.8	0.47 U	0.47 U ± 0.31	**6.6**
CW-SW-51	3/29/2016	Cove Wash Middle 1A	4044944.041	657035.048	268	268 ± 44	-95.9	11.2	11.2 ± 2.9	0.07 U	0.07 U ± 0.26	**11.2**
CW-SW-53A	5/2/2016	Cove Wash Middle 1	4044478	656787	47.4	47.4 ± 8.7	-30.74	4.6	4.6 ± 1.3	0.11 U	0.11 U ± 0.26	4.6
CW-SW-54	5/2/2016	Cove Wash Middle 1B	4044751.928	656807.09	160	160 ± 27	-219.4	9.2	9.2 ± 2.4	0.59 U	0.59 U ± 0.34	**9.2**
CW-SW-55	3/25/2016	Duplicate of CW-39	4044480.534	656337.545	157	157 ± 26	-50.52	2.59	2.59 ± 0.78	0.11 U	0.11 U ± 0.23	2.59
CW-SW-56A	5/2/2016	Cove Wash Middle 3A	4043135	658979	227	227 ± 37	-85.4	0.88 J	0.88 J ± 0.33	0.27 UJ	0.27 UJ ± 0.26	0.88 J
CW-SW-57	3/26/2016	Duplicate of CW-02	4053607.153	666731.839	50.2	50.2 ± 9.1	-6.54	0.16 U	0.16 U ± 0.14	0.2 U	0.2 U ± 0.28	0.2 U
CW-SW-58	3/29/2016	Cove Wash Middle 1	4044856.247	657463.154	146	146 ± 24	-49.21	5.5	5.5 ± 1.5	0.35 U	0.35 U ± 0.27	**5.5**
CW-SW-59	3/30/2016	Background - Cove Wash Tributary 1	4051574	664210	13.7	13.7 ± 3.3	-1.681	0.3 J	0.3 J ± 0.19	0.37 U	0.37 U ± 0.26	0.3 J
CW-SW-60	3/30/2016	Cove Wash between 01 and 02	4051659	664274	76	76 ± 13	-14.83	0.56 J	0.56 J ± 0.36	0.27 U	0.27 U ± 0.29	0.56 J
CW-SW-62	5/3/2016	Downstream of Dam	4046378	658785	27.5	27.5 ± 5.5	-33.27	1.1	1.1 ± 0.39	0.37 U	0.37 U ± 0.28	1.1
CW-SW-64	4/29/2016	Cove Wash North between CW-15 and CW-16	4045877	656444	133	133 ± 22	-73.28	0.74 J	0.74 J ± 0.31	0.6 U	0.6 U ± 0.36	0.74 J
CW-SW-65	4/30/2016	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	562	562 ± 91	-583.3	2.41	2.41 ± 0.73	0.64 U	0.64 U ± 0.38	2.41
CW-SW-66	4/30/2016	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	555	555 ± 90	-468.8	1.65	1.65 ± 0.55	0.76 J	0.76 J ± 0.35	2.51 J
CW-SW-67	5/2/2016	Cove Wash Middle 3	4044603.441	658812.815	22.3	22.3 ± 4.6	-11.15	2.12	2.12 ± 0.66	0.03 U	0.03 U ± 0.31	2.12
CW-SW-68	5/2/2016	Duplicate of CW-67	4044603.441	658812.815	25	25 ± 5.1	-8.23	3.5	3.5 ± 1.2	0.2 U	0.2 U ± 0.33	3.5

Notes:
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Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
pCi/L = picocurie per Liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels
± = plus or minus

Cove Wash Watershed Assessment
2016 Spring Snowmelt Sampling Event
Water - Dissolved Gross Alpha Radiation and Dissolved Radium Results

Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (pCi/L)					NA	NA	NA	NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (pCi/L)					NCNS	NCNS	NCNS	NCNS	NCNS	NCNS	NCNS
EPA Maximum Contaminant Level - Drinking Water (pCi/L)					NA	NA	NA	NA	NA	NA	NA
Sample ID	Date	Sample Information	Northing	Easting	Gross Alpha Radiation (pCi/L)	GAR with Total Uncertainty (pCi/L)	Radium 226 (pCi/L)	Radium 226 with Total Uncertainty (pCi/L)	Radium 228 (pCi/L)	Radium 228 with Total Uncertainty (pCi/L)	Combined Radium (Radium 226 + Radium 228) (pCi/L)
CW-GW-01F	3/28/2016	Red Point Dug Well	4050237.04	657330.869	4.6	4.6 ± 1.6	0.08 U	0.08 U ± 0.11	0.17 U	0.17 U ± 0.29	0.17 U
CW-SW-01F	3/28/2016	Cove Wash	4051637.55	663372.902	35	35 ± 6.7	0.15 U	0.15 U ± 0.13	0.19 U	0.19 U ± 0.26	0.19 U
CW-SW-02F	3/26/2016	Cove Wash	4053607.153	666731.839	24.5	24.5 ± 5	0.17 U	0.17 U ± 0.15	0.24 U	0.24 U ± 0.25	0.24 U
CW-SW-03F	3/30/2016	Cove Wash South	4047985.628	659997.097	19.2	19.2 ± 4.4	0.33 U	0.33 U ± 0.29	0.01 U	0.01 U ± 0.28	0.33 U
CW-SW-04F	4/27/2016	Background	4045556.747	655368.538	35	35 ± 6.7	0.28 J	0.28 J ± 0.18	0.68 J	0.68 J ± 0.33	0.96 J
CW-SW-05F	3/25/2016	Historical Sample - Area 1 - Dam Surface Sample - Cove Wash Middle	4045700.298	658683.857	47.3	47.3 ± 8.7	1.87	1.87 ± 0.6	0.6 J	0.6 J ± 0.3	2.5 J
CW-SW-07F	3/25/2016	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	43	43 ± 7.9	1.68	1.68 ± 0.55	0.85 J	0.85 J ± 0.35	2.5 J
CW-SW-09F	3/30/2016	Cove Wash North	4049315.64	658120.219	25.7	25.7 ± 5.3	0.23 U	0.23 U ± 0.19	0.27 U	0.27 U ± 0.33	0.27 U
CW-SW-10F	3/30/2016	Cottonwood Spring	4049586.881	660202.988	6.5	6.5 ± 1.9	0.14 U	0.14 U ± 0.12	0.03 U	0.03 U ± 0.23	0.14 U
CW-SW-11F	3/30/2016	Cove Wash North	4046369.715	657266.457	32.1	32.1 ± 6.1	0.42 J	0.42 J ± 0.23	0.15 U	0.15 U ± 0.28	0.42 J
CW-SW-12F	3/30/2016	Cove Wash Middle 3	4044603.441	658812.815	22.6	22.6 ± 4.6	2.1	2.1 ± 0.66	0.35 U	0.35 U ± 0.29	2.1
CW-SW-13F	5/2/2016	Cove Wash Middle 3	4043160.908	658957.686	15.8	15.8 ± 3.5	0.96 J	0.96 J ± 0.37	0.38 U	0.38 U ± 0.28	0.96 J
CW-SW-14F	5/2/2016	Cove Wash Middle 3E	4042934	659222	7.7	7.7 ± 2.2	0.4 J	0.4 J ± 0.2	0.26 U	0.26 U ± 0.25	0.4 J
CW-SW-18F	3/30/2016	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	5.4	5.4 ± 1.7	0.22 U	0.22 U ± 0.16	0.26 U	0.26 U ± 0.33	0.26 U
CW-SW-21F	4/29/2016	Background - Mesa IV Springs	4043108	655931	2.3 J	2.3 J ± 1.1	0.019 UJ	0.019 UJ ± 0.076	0.67 J	0.67 J ± 0.35	0.67 J
CW-SW-26F	4/28/2016	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	139	139 ± 23	3.11	3.11 ± 0.91	0.15 U	0.15 U ± 0.31	3.11
CW-SW-36F	3/26/2016	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	83	83 ± 14	2.96	2.96 ± 0.88	0.36 U	0.36 U ± 0.32	2.96
CW-SW-37F	3/26/2016	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	60	60 ± 11	3.32	3.32 ± 0.98	0.24 U	0.24 U ± 0.3	3.32
CW-SW-38F	3/26/2016	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	99	99 ± 17	4.7	4.7 ± 1.3	0.29 U	0.29 U ± 0.29	4.7
CW-SW-39F	3/25/2016	Cove Wash Middle 2	4045453.339	658432.518	48.1	48.1 ± 8.8	2.19	2.19 ± 0.69	-0.16 U	-0.16 U ± 0.43	2.19
CW-SW-41F	3/25/2016	Cove Wash Middle 1	4045552	658464	92	92 ± 16	2.26	2.26 ± 0.7	0.41 U	0.41 U ± 0.34	2.26
CW-SW-46F	5/3/2016	Pine Water Springs	4043788.61	661352.387	4.4	4.4 ± 1.7	0.05 U	0.05 U ± 0.1	0.01 U	0.01 U ± 0.27	0.05 U
CW-SW-47F	5/3/2016	Cove Wash Middle 3F	4043727.086	659295.82	278	278 ± 45	2.15	2.15 ± 0.67	0.26 U	0.26 U ± 0.46	2.15
CW-SW-48F	3/26/2016	Cove Wash Middle 3F	4044751.928	656807.09	5.3	5.3 ± 1.7	0.14 U	0.14 U ± 0.13	0.19 U	0.19 U ± 0.3	0.19 U
CW-SW-49F	3/26/2016	Duplicate of CW-18	4049586.881	660202.988	4.8	4 .8 ± 1.6	0.15 U	0.15 U ± 0.13	0.18 U	0.18 U ± 0.26	0.18 U
CW-SW-50F	3/29/2016	Cove Wash Middle 1	4044856.247	657463.154	177	177 ± 29	5.9	5.9 ± 1.6	0.35 U	0.35 U ± 0.3	5.9
CW-SW-51F	3/29/2016	Cove Wash Middle 1A	4044944.041	657035.048	295	295 ± 48	11.7	11.7 ± 3.1	0.76 J	0.76 J ± 0.35	13 J
CW-SW-53AF	5/2/2016	Cove Wash Middle 1	4044478	656787	57	57 ± 10	3.7	3.7 ± 1.1	0.05 U	0.05 U ± 0.24	3.7
CW-SW-54F	5/2/2016	Cove Wash Middle 1B	4044751.928	656807.09	251	251 ± 41	9.4	9.4 ± 2.5	0.68 U	0.68 U ± 0.45	9.4
CW-SW-55F	3/25/2016	Duplicate of CW-39	4044480.534	656337.545	179	179 ± 30	1.61	1.61 ± 0.53	0.23 U	0.23 U ± 0.29	1.61
CW-SW-56AF	5/2/2016	Cove Wash Middle 3A	4043135	658979	233	233 ± 38	0.98 J	0.98 J ± 0.36	-0.38 U	-0.38 U ± 0.38	0.98 J
CW-SW-57F	3/26/2016	Duplicate of CW-02	4053607.153	666731.839	40.6	40.6 ± 7.6	0.002 U	0.002 U ± 0.079	0.58 U	0.58 U ± 0.34	0.58 U
CW-SW-58F	3/29/2016	Cove Wash Middle 1	4044856.247	657463.154	144	144 ± 24	5.4	5.4 ± 1.5	0.4 U	0.4 U ± 0.29	5.4
CW-SW-59F	3/30/2016	Background - Cove Wash Tributary 1	4051574	664210	15.3	15.3 ± 3.5	0.19 U	0.19 U ± 0.15	0.05 U	0.05 U ± 0.28	0.19 U
CW-SW-60F	3/30/2016	Cove Wash between 01 and 02	4051659	664274	65	65 ± 12	0.14 U	0.14 U ± 0.13	0.27 U	0.27 U ± 0.29	0.27 U
CW-SW-62F	5/3/2016	Downstream of Dam	4046378	658785	29.1	29.1 ± 5.8	1.02	1.02 ± 0.37	0.27 U	0.27 U ± 0.28	1.02
CW-SW-64F	4/29/2016	Cove Wash North between CW-15 and CW-16	4045877	656444	113	113 ± 19	0.88 J	0.88 J ± 0.34	0.63 U	0.63 U ± 0.39	0.88 J
CW-SW-65F	4/30/2016	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	593	593 ± 96	2.33	2.33 ± 0.71	0.46 U	0.46 U ± 0.33	2.33
CW-SW-66F	4/30/2016	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	542	542 ± 87	1.25	1.25 ± 0.44	0.81 J	0.81 J ± 0.43	2.1 J
CW-SW-67F	5/2/2016	Cove Wash Middle 3	4044603.441	658812.815	20	20 ± 4.3	1.57	1.57 ± 0.52	-0.06 U	-0.06 U ± 0.28	1.57
CW-SW-68F	5/2/2016	Duplicate of CW-67	4044603.441	658812.815	23.6	23.6 ± 4.9	1.72	1.72 ± 0.55	0.44 U	0.44 U ± 0.34	1.72

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J = Compound detected, but result value is approximate.
pCi/L = picocurie per Liter
<u>Bold, Underlined and Highlighted</u> = Analytical result exceeds screening levels
± = plus or minus

Sample ID	Sample Date	Sample Information	Northing	Easting	U-233/U-234 (pCi/L)	U-233/U-234 with Total Uncertainty (pCi/L)	U-235/U-236 (pCi/L)	U-235/U-236 with Total Uncertainty (pCi/L)	U-238 (pCi/L)	U-238 with Total Uncertainty (pCi/L)	U total isotope activity without uncertainty (pCi/L)
CW-GW-01	3/28/2016	Red Point Dug Well	4050237.04	657330.869	5.04	5.04 ± 0.94	0.176 J	0.176 J ± 0.094	2.28	2.28 ± 0.48	7.5 J
CW-GW-01F	3/28/2016	Red Point Dug Well	4050237.04	657330.869	5.34	5.34 ± 0.99	0.21	0.21 ± 0.1	2.59	2.59 ± 0.54	8.14
CW-SW-01	3/28/2016	Cove Wash	4051637.55	663372.902	43.2	43.2 ± 7.1	1.36	1.36 ± 0.32	37.1	37.1 ± 6.1	81.66
CW-SW-01F	3/28/2016	Cove Wash	4051637.55	663372.902	42.5	42.5 ± 7.1	2.07	2.07 ± 0.46	37.4	37.4 ± 6.3	81.97
CW-SW-02	3/26/2016	Cove Wash	4053607.153	666731.839	32.8	32.8 ± 5.4	1	1 ± 0.26	22.6	22.6 ± 3.8	56.4
CW-SW-02F	3/26/2016	Cove Wash	4053607.153	666731.839	35.9	35.9 ± 6	1.2	1.2 ± 0.3	25.1	25.1 ± 4.2	62.2
CW-SW-03	3/30/2016	Cove Wash South	4047985.628	659997.097	18.2	18.2 ± 3.1	0.6	0.6 ± 0.19	9.4	9.4 ± 1.7	28.2
CW-SW-03F	3/30/2016	Cove Wash South	4047985.628	659997.097	17.6	17.6 ± 3.2	0.37	0.37 ± 0.2	8.9	8.9 ± 1.7	26.87
CW-SW-04	4/27/2016	Background	4045556.747	655368.538	31.6	31.6 ± 5.2	0.66	0.66 ± 0.19	13.5	13.5 ± 2.3	45.76
CW-SW-04F	4/27/2016	Background	4045556.747	655368.538	34.3	34.3 ± 5.7	0.8	0.8 ± 0.22	14.4	14.4 ± 2.5	49.5
CW-SW-05	3/25/2016	Historical Sample - Area 1 - Dam Surface Sample - Cove Wash Middle	4045700.298	658683.857	29.3	29.3 ± 4.8	1.21	1.21 ± 0.29	28.1	28.1 ± 4.6	58.61
CW-SW-05F	3/25/2016	Historical Sample - Area 1 - Dam Surface Sample - Cove Wash Middle	4045700.298	658683.857	29.1	29.1 ± 4.8	1.14	1.14 ± 0.28	28	28 ± 4.7	58.24
CW-SW-07	3/25/2016	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	35.4	35.4 ± 5.9	1.46	1.46 ± 0.35	33	33 ± 5.5	69.86
CW-SW-07F	3/25/2016	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	35.2	35.2 ± 5.8	1.43	1.43 ± 0.33	33.4	33.4 ± 5.5	70.03
CW-SW-09	3/30/2016	Cove Wash North	4049315.64	658120.219	20.4	20.4 ± 3.4	0.42	0.42 ± 0.15	9.8	9.8 ± 1.7	30.62
CW-SW-09F	3/30/2016	Cove Wash North	4049315.64	658120.219	19.2	19.2 ± 3.5	0.63	0.63 ± 0.25	9.4	9.4 ± 1.8	29.23
CW-SW-10	3/30/2016	Cottonwood Spring	4049586.881	660202.988	8.6	8.6 ± 1.5	0.35	0.35 ± 0.13	4.93	4.93 ± 0.91	13.88
CW-SW-10F	3/30/2016	Cottonwood Spring	4049586.881	660202.988	9.1	9.1 ± 1.6	0.26	0.26 ± 0.11	4.71	4.71 ± 0.88	14.07
CW-SW-11	3/30/2016	Cove Wash North	4046369.715	657266.457	19.7	19.7 ± 3.3	0.71	0.71 ± 0.2	15.1	15.1 ± 2.6	35.51
CW-SW-11F	3/30/2016	Cove Wash North	4046369.715	657266.457	20	20 ± 3.4	0.7	0.7 ± 0.2	15.3	15.3 ± 2.6	36
CW-SW-12	3/30/2016	Cove Wash Middle 3	4044603.441	658812.815	18.2	18.2 ± 3.1	0.88	0.88 ± 0.23	16.6	16.6 ± 2.8	35.68
CW-SW-12F	3/30/2016	Cove Wash Middle 3	4044603.441	658812.815	18.5	18.5 ± 3.3	0.72	0.72 ± 0.24	15.8	15.8 ± 2.8	35.02
CW-SW-13	5/2/2016	Cove Wash Middle 3	4043160.908	658957.686	15.1	15.1 ± 2.6	0.55	0.55 ± 0.17	13.8	13.8 ± 2.4	29.45
CW-SW-13F	5/2/2016	Cove Wash Middle 3	4043160.908	658957.686	15.9	15.9 ± 2.7	0.6	0.6 ± 0.18	13	13 ± 2.2	29.5
CW-SW-14	5/2/2016	Cove Wash Middle 3E	4042934	659222	7.5	7.5 ± 1.4	0.3	0.3 ± 0.13	5.7	5.7 ± 1.1	13.5
CW-SW-14F	5/2/2016	Cove Wash Middle 3E	4042934	659222	6.9	6.9 ± 1.3	0.26	0.26 ± 0.13	5.1	5.1 ± 1	12.26
CW-SW-18	3/30/2016	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	3.64	3.64 ± 0.72	0.131 J	0.131 J ± 0.078	2.46	2.46 ± 0.52	6.23 J
CW-SW-18F	3/30/2016	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	4.07	4.07 ± 0.78	0.125 J	0.125 J ± 0.078	2.45	2.45 ± 0.52	6.65 J
CW-SW-21	4/29/2016	Background - Mesa IV Springs	4043108	655931	2.63	2.63 ± 0.54	0.088 J	0.088 J ± 0.063	1.08	1.08 ± 0.27	3.8 J
CW-SW-21F	4/29/2016	Background - Mesa IV Springs	4043108	655931	2.67	2.67 ± 0.53	0.072 J	0.072 J ± 0.055	0.99	0.99 ± 0.25	3.73 J
CW-SW-26	4/28/2016	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	69	69 ± 11	2.8	2.8 ± 0.75	65	65 ± 11	136.8
CW-SW-26F	4/28/2016	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	72	72 ± 12	3.42	3.42 ± 0.68	68	68 ± 11	143.42
CW-SW-36	3/26/2016	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	57.5	57.5 ± 9.4	2.51	2.51 ± 0.51	59.1	59.1 ± 9.7	119.11
CW-SW-36F	3/26/2016	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	63	63 ± 11	2.57	2.57 ± 0.6	61	61 ± 11	126.57
CW-SW-37	3/26/2016	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	44.9	44.9 ± 7.4	2.07	2.07 ± 0.44	44.7	44.7 ± 7.4	91.67
CW-SW-37F	3/26/2016	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	45.4	45.4 ± 7.6	2.2	2.2 ± 0.48	45.2	45.2 ± 7.5	92.8
CW-SW-38	3/26/2016	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	52.3	52.3 ± 8.6	2.49	2.49 ± 0.51	52.2	52.2 ± 8.6	106.99
CW-SW-38F	3/26/2016	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	48.1	48.1 ± 8.1	2.2	2.2 ± 0.49	50.7	50.7 ± 8.5	101
CW-SW-39	3/25/2016	Cove Wash Middle 2	4045453.339	658432.518	51	51 ± 8.5	2.32	2.32 ± 0.5	49	49 ± 8.2	102.32
CW-SW-39F	3/25/2016	Cove Wash Middle 2	4045453.339	658432.518	49.2	49.2 ± 8.1	2.32	2.32 ± 0.49	48.5	48.5 ± 8	100.02
CW-SW-41	3/25/2016	Cove Wash Middle 1	4045552	658464	84	84 ± 14	4.01	4.01 ± 0.78	84	84 ± 14	172.01
CW-SW-41F	3/25/2016	Cove Wash Middle 1	4045552	658464	89	89 ± 15	3.8	3.8 ± 0.76	90	90 ± 15	182.8
CW-SW-46	5/3/2016	Pine Water Springs	4043788.61	661352.387	3.27	3.27 ± 0.65	0.102 J	0.102 J ± 0.07	1.86	1.86 ± 0.41	5.2 J
CW-SW-46F	5/3/2016	Pine Water Springs	4043788.61	661352.387	3.55	3.55 ± 0.69	0.14 J	0.14 J ± 0.08	1.76	1.76 ± 0.39	5.45 J
CW-SW-47	5/3/2016	Cove Wash Middle 3F	4043727.086	659295.82	183	183 ± 30	6.7	6.7 ± 1.6	169	169 ± 28	358.7
CW-SW-47F	5/3/2016	Cove Wash Middle 3F	4043727.086	659295.82	195	195 ± 35	8.1	8.1 ± 1.7	185	185 ± 33	388.1
CW-SW-48	3/26/2016	Cove Wash Middle 3F	4044751.928	656807.09	5.6	5.6 ± 1	0.11 J	0.11 J ± 0.069	2.6	2.6 ± 0.53	8.31 J
CW-SW-48F	3/26/2016	Cove Wash Middle 3F	4044751.928	656807.09	5.04	5.04 ± 0.93	0.15 J	0.15 J ± 0.083	2.52	2.52 ± 0.52	7.71 J
CW-SW-49	3/26/2016	Duplicate of CW-18	4049586.881	660202.988	3.94	3.94 ± 0.76	0.052 J	0.052 J ± 0.048	2.16	2.16 ± 0.46	6.152
CW-SW-49F	3/26/2016	Duplicate of CW-18	4049586.881	660202.988	3.46	3.46 ± 0.67	0.135 J	0.135 J ± 0.076	2.35	2.35 ± 0.48	5.95 J
CW-SW-50	3/29/2016	Cove Wash Middle 1	4044856.247	657463.154	91	91 ± 15	3.71	3.71 ± 0.78	92	92 ± 16	186.71
CW-SW-50F	3/29/2016	Cove Wash Middle 1	4044856.247	657463.154	92	92 ± 16	4.64	4.64 ± 0.94	94	94 ± 16	190.64
CW-SW-51	3/29/2016	Cove Wash Middle 1A	4044944.041	657035.048	171	171 ± 31	7.9	7.9 ± 1.7	185	185 ± 33	363.9
CW-SW-51F	3/29/2016	Cove Wash Middle 1A	4044944.041	657035.048	165	165 ± 30	8.1	8.1 ± 1.7	181	181 ± 33	354.1
CW-SW-53A	5/2/2016	Cove Wash Middle 1	4044478	656787	37.9	37.9 ± 6.3	1.94	1.94 ± 0.42	38.3	38.3 ± 6.3	78.14
CW-SW-53AF	5/2/2016	Cove Wash Middle 1	4044478	656787	38.1	38.1 ± 6.3	1.94	1.94 ± 0.42	38.1	38.1 ± 6.3	78.14
CW-SW-54	5/2/2016	Cove Wash Middle 1B	4044751.928	656807.09	186	186 ± 34	9.4	9.4 ± 1.9	184	184 ± 33	379.4
CW-SW-54F	5/2/2016	Cove Wash Middle 1B	4044751.928	656807.09	201 J	201 J ± 38	8.8 J	8.8 J ± 1.9	197 J	197 J ± 37	406.8 J
CW-SW-55	3/25/2016	Duplicate of CW-39	4044480.534	656337.545	102	102 ± 17	4.52	4.52 ± 0.89	101	101 ± 17	207.52
CW-SW-55F	3/25/2016	Duplicate of CW-39	4044480.534	656337.545	110	110 ± 19	4.6	4.6 ± 0.94	110	110 ± 19	224.6
CW-SW-56A	5/2/2016	Cove Wash Middle 3A	4043135	658979	156	156 ± 26	7.4	7.4 ± 1.7	149	149 ± 25	312.4
CW-SW-56AF	5/2/2016	Cove Wash Middle 3A	4043135	658979	147	147 ± 26	6.5	6.5 ± 1.4	141	141 ± 25	294.5
CW-SW-57	3/26/2016	Duplicate of CW-02	4053607.153	666731.839	32.8	32.8 ± 5.4	1.14	1.14 ± 0.28	22.8	22.8 ± 3.8	56.74
CW-SW-57F	3/26/2016	Duplicate of CW-02	4053607.153	666731.839	34.2	34.2 ± 5.7	1.2	1.2 ± 0.3	23.9	23.9 ± 4	59.3
CW-SW-58	3/29/2016	Cove Wash Middle 1	4044856.247	657463.154	96	96 ± 16	4.21	4.21 ± 0.83	95	95 ± 16	195.21
CW-SW-58F	3/29/2016	Cove Wash Middle 1	4044856.247	657463.154	94	94 ± 16	3.55	3.55 ± 0.73	94	94 ± 16	191.55
CW-SW-59	3/30/2016	Background - Cove Wash Tributary 1	4051574	664210	9.8	9.8 ± 1.7	0.181 J	0.181 J ± 0.09	5.4	5.4 ± 1	15.4 J
CW-SW-59F	3/30/2016	Background - Cove Wash Tributary 1	4051574	664210	9.6	9.6 ± 1.7	0.19 J	0.19 J ± 0.097	5.9	5.9 ± 1.1	15.7 J
CW-SW-60	3/30/2016	Cove Wash between 01 and 02	4051659	664274	49.9	49.9 ± 8.3	1.73	1.73 ± 0.46	39.2	39.2 ± 6.6	90.83
CW-SW-60F	3/30/2016	Cove Wash between 01 and 02	4051659	664274	45.5	45.5 ± 7.5	1.57	1.57 ± 0.36	36.1	36.1 ± 6	83.17
CW-SW-62	5/3/2016	Downstream of Dam	4046378	658785	30.7	30.7 ± 5.1	1.27	1.27 ± 0.32	28.8	28.8 ± 4.8	60.77
CW-SW-62F	5/3/2016	Downstream of Dam	4046378	658785	28	28 ± 4.7	1.17	1.17 ± 0.3	26.6	26.6 ± 4.5	55.77
CW-SW-64	4/29/2016	Cove Wash North between CW-15 and CW-16	4045877	656444	110	110 ± 18	4.28	4.28 ± 0.85	92	92 ± 15	206.28
CW-SW-64F	4/29/2016	Cove Wash North between CW-15 and CW-16	4045877	656444	112	112 ± 19	4.54	4.54 ± 0.91	99	99 ± 17	215.54
CW-SW-65	4/30/2016	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	571	571 ± 96	24.3	24.3 ± 4.8	550	550 ± 92	1145.3
CW-SW-65F	4/30/2016	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	660 J	660 J ± 150	29.7 J	29.7 J ± 7.3	630 J	630 J ± 140	1319.7 J
CW-SW-66	4/30/2016	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	506	506 ± 83	20.8	20.8 ± 4.3	497	497 ± 82	1023.8
CW-SW-66F	4/30/2016	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	510 J	510 J ± 110	23.1 J	23.1 J ± 5.3	476 J	476 J ± 99	1009.1 J
CW-SW-67	5/2/2016	Cove Wash Middle 3	4044603.441	658812.815	17.4	17.4 ± 2.9	0.85	0.85 ± 0.23	15.2	15.2 ± 2.6	33.45
CW-SW-67F	5/2/2016	Cove Wash Middle 3	4044603.441	658812.815	17.1	17.1 ± 2.9	0.63	0.63 ± 0.19	15.5	15.5 ± 2.6	33.23
CW-SW-68	5/2/2016	Duplicate of CW-67	4044603.441	658812.815	16.8	16.8 ± 2.9	0.63	0.63 ± 0.2	15.8	15.8 ± 2.7	33.23
CW-SW-68F	5/2/2016	Duplicate of CW-67	4044603.441	658812.815	17	17 ± 3.1	0.6	0.6 ± 0.23	15.6	15.6 ± 2.9	33.2

Notes:
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
pCi/L = picocurie per Liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels
± = plus or minus

Sample ID	Sample Date	Sample Information	Northing	Easting	Aluminium (µg/L)	Antimony (µg/L)	Arsenic (µg/L)	Barium (µg/L)	Beryllium (µg/L)	Boron (µg/L)	Cadmium (µg/L)	Calcium (µg/L)	Chromium (µg/L)	Cobalt (µg/L)	Copper (µg/L)	Iron (µg/L)	Lead (µg/L)	Lithium (µg/L)
Navajo Nation Surface Water Quality Standards - Primary Human Contact Standard (µg/L)					NCNS	747	30	98,000	1,870	126,000	470	NA	NCNS	NCNS	9,330	NA	15	NA
Navajo Nation Surface Water Quality Standards - Secondary Human Contact Standard (µg/L)					NCNS	747	280	98,000	1,870	126,000	470	NA	NCNS	NCNS	9,330	NA	15	NA
Navajo Nation Surface Water Quality Standards - Fish Consumption (µg/L)					NCNS	640	80	NCNS	85	NCNS	8	NA	NCNS	NCNS	NCNS	NA	NCNS	NA
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Total Metals					750	NA	NA	NCNS	NCNS	NCNS	NA	NA	NCNS	NCNS	NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)) - Total Metals					87	NA	NA	NCNS	NCNS	NCNS	NA	NA	NCNS	NCNS	NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) - Total Metals					NCNS	NCNS	200	NCNS	NCNS	2000	50	NA	1,000	1000	500	NA	100	NA
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Total Metals					NCNS	NCNS	2,000	500	NCNS	2000	50	NA	1,000	5000	5000	NA	10,000	NA
EPA Maximum Contaminant Level - Drinking Water (µg/L)					NA	6	10	2,000	4	NA	5	NA	100	NA	1,300	NA	15	NA
CW-GW-01G-160628	28-Jun-16	Red Point Dug Well	4050274.524	657301.4036	32 U	5.1 U	4.9 J	370	0.48 U	190	0.77 U	41000	1.4 U	1.3 U	2.3 J	14 U	2.2 U	52
CW-SW-01-160627	27-Jun-16	Cove Wash (Downstream)	4051637.55	663372.9034	**790**	5.1 U	**14**	150	0.48 U	400	0.77 U	18000	1.4 U	1.3 U	1.9 U	230	2.2 U	150
CW-SW-02-160627	27-Jun-16	Cove Wash (Downstream)	4053607.153	666731.839	**1800**	5.1 U	**20**	120	0.48 U	460	0.77 U	23000	1.9 J	1.3 U	1.9 U	520	2.2 U	86
CW-SW-04-160618	18-Jun-16	Background (Upstream)	4045547.649	655393.8806	**490 J**	5.1 U	5.6 J	300	0.48 U	26 J	0.77 U	160000	1.4 U	1.3 U	5.2 J	290 J	2.2 U	49
CW-SW-05-160627	27-Jun-16	Dam (Historical)	4045709.002	658675.5894	32 U	5.1 U	**11**	260	0.48 U	49 J	0.77 U	71000	1.5 J	1.3 U	1.9 U	240	2.2 U	41
CW-SW-07-160628	28-Jun-16	Cove Wash Middle (Historical)	4047101.942	659123.9337	32 U	5.1 U	3.9 U	320	0.48 U	110	0.77 U	66000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	55
CW-SW-10-160628	28-Jun-16	Cottonwood Spring (Seeping capped well)	4049594.436	660198.1416	**22000**	5.1 U	**16**	**1100**	1.4 J	170	0.77 U	290000	18	9.3 J	21	14000	**18**	120
CW-SW-11-160621	21-Jun-16	Cove Wash North	4046373.007	657265.4893	32 U	5.1 U	4.4 J	160	0.48 U	26 J	0.77 U	66000	1.4 U	1.3 U	1.9 U	38 J	2.2 U	76
CW-SW-12-160627	27-Jun-16	Cove Wash Middle 3	4044603.441	658812.8183	76 J	5.1 U	5.2 J	340	0.48 U	28 J	0.77 U	72000	1.4 U	1.3 U	1.9 U	73 J	2.2 U	35
CW-SW-13-160623	23-Jun-16	Cove Wash Middle 3	4043160.908	658957.6858	**160 J**	5.1 U	3.9 U	390	0.48 U	18 J	0.77 U	79000	1.4 U	1.3 U	1.9 U	130	2.2 U	33
CW-SW-14-160623	23-Jun-16	Cove Wash Middle 3E	4042934	659222.0031	**140 J**	5.1 U	3.9 U	430	0.48 U	11 J	0.77 U	73000	1.4 U	1.3 U	1.9 U	100	2.2 U	26
CW-SW-15-160625	25-Jun-16	Cove Wash North	4046035	656751.9991	**260**	5.1 U	3.9 U	180	0.48 U	28 J	0.77 U	68000	1.4 U	1.3 U	1.9 U	220	2.2 U	95
CW-SW-21-160620	20-Jun-16	Background (Mesa IV Springs)	4043108	655931.0041	32 U	5.1 U	3.9 U	310	0.48 U	9.9 U	0.77 U	73000	1.4 U	1.3 U	1.9 U	100	2.2 U	13
CW-SW-26-160620	20-Jun-16	Cove Wash Middle 2 (Historical)	4042501.621	657146.8765	**14000**	5.1 U	**98**	310	4.8 U	200	0.77 U	160000	6.3 J	8.4 J	27	12000	**17**	250
CW-SW-36-160618	18-Jun-16	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	**120 J**	5.1 U	3.9 U	200	0.48 U	27 J	0.77 U	67000	1.4 U	1.3 U	1.9 U	150	2.2 U	78
CW-SW-37-160618	18-Jun-16	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	32 U	5.1 U	3.9 U	220	0.48 U	28 J	0.77 U	62000	1.4 U	1.3 U	1.9 U	75 J	2.2 U	68
CW-SW-38-160618	18-Jun-16	Cove Wash Middle (Historical)	4044173	657897.9975	39 J	5.1 U	3.9 U	250	0.48 U	32 J	0.77 U	69000	1.4 U	1.3 U	1.9 U	31 J	2.2 U	67
CW-SW-39-160627	27-Jun-16	Cove Wash Middle 2	4045453.338	658432.5145	41 J	5.1 U	6.3 J	270	0.48 U	28 J	0.77 U	91000	1.4 U	1.3 U	1.9 U	150	2.2 U	73
CW-SW-46-160621	21-Jun-16	Pine Water Springs	4043788.61	661352.387	32 U	5.1 U	3.9 U	11 J	0.48 U	9.9 U	0.77 U	62000	1.4 U	1.3 U	11	28 J	2.2 U	6.7 J
CW-SW-47-160617	17-Jun-16	Cove Wash Middle 3F	4043774.185	659297.1492	32 U	5.1 U	7.4 J	170	0.48 U	43 J	0.77 U	140000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	61
CW-SW-50-160624	24-Jun-16	Cove Wash Middle 1	4044856.248	657463.1536	32 U	5.1 U	3.9 U	260	0.48 U	11 J	0.77 U	89000	1.4 U	1.3 U	1.9 U	54 J	2.2 U	42
CW-SW-53a-160624	24-Jun-16	Cove Wash Middle 1 (Near original location)	4044567	656816	**900**	5.1 U	3.9 U	310	0.48 U	18 J	0.77 U	110000	1.4 U	1.3 U	2 J	550	2.2 U	33
CW-SW-54-160624	24-Jun-16	Cove Wash Middle 1B	4044752.579	656806.108	**470**	5.1 U	**16**	220	0.48 U	57 J	0.77 U	70000	1.4 U	2.3 J	5 J	490	2.2 U	48
CW-SW-56a-160623	23-Jun-16	Cove Wash Middle 3A (Near original location)	4043135	658979	38 J	5.1 U	6.9 J	260	0.48 U	76 J	0.77 U	96000	1.4 U	1.3 U	2.2 J	43 J	2.2 U	82
CW-SW-64-160621	21-Jun-16	Cove Wash North	4045877	656444	**270**	5.1 U	8.9 J	200	0.48 U	56 J	0.77 U	120000	1.4 U	1.3 U	1.9 U	160	2.2 U	81
CW-SW-65-160622	22-Jun-16	Cove Wash Middle 3A	4042362.589	658661.6744	**4400**	5.1 U	**11**	300	0.48 U	170	0.77 U	170000	1.8 J	2.5 J	6.7 J	2800	3.5	190
CW-SW-66-160622	22-Jun-16	Cove Wash Middle 3A	4042362.589	658661.6744	**320**	5.1 U	**19**	170	0.48 U	230	0.77 U	120000	1.4 U	1.3 U	2.2 J	210	2.2 U	280
CW-SW-69-160618	18-Jun-16	Duplicate of CW-04	4045547.649	655393.8806	**750 J**	5.1 U	8.5 J	310	0.48 U	22 J	0.77 U	160000	1.4 U	1.3 U	1.9 U	510	2.2 U	45
CW-SW-70-160617	17-Jun-16	Cove Wash Middle 3F	4044525.919	659043.2268	**360**	5.1 U	5.5 J	280	0.48 U	56 J	0.77 U	72000	1.4 U	1.3 U	1.9 U	150	2.2 U	31
CW-SW-71-160618	18-Jun-16	Duplicate of CW-37	4046373.007	657265.4893	**170 J**	5.1 U	3.9 U	200	0.48 U	25 J	0.77 U	68000	1.4 U	1.3 U	1.9 U	88 J	2.2 U	80
CW-SW-72-160621	21-Jun-16	Duplicate of CW-11	4046373.007	657265.4893	59 J	5.1 U	4.5 J	170	0.48 U	35 J	0.77 U	64000	1.4 U	1.3 U	1.9 U	44 J	2.2 U	74
CW-SW-75-160622	22-Jun-16	Cove Wash Middle 3D	4041201.219	658764.5801	**670**	5.1 U	7.4 J	270	0.48 U	110	0.77 U	120000	1.4 U	1.3 U	1.9 U	500	2.2 U	85
CW-SW-81-160629	29-Jun-16	Cove Wash North	4049882.052	658891.9138	**1800**	5.1 U	8.2 J	270	0.48 U	410	0.77 U	24000	1.4 U	1.3 U	1.9 U	570	2.2 U	110

Sample ID	Magnesium (µg/L)	Manganese (µg/L)	Mercury (µg/L)	Molybdenum (µg/L)	Nickel (µg/L)	Phosphorus (µg/L)	Potassium (µg/L)	Selenium (µg/L)	Silver (µg/L)	Sodium (µg/L)	Strontium (µg/L)	Thallium (µg/L)	Uranium (µg/L)	Vandium (µg/L)	Zinc (µg/L)
Navajo Nation Surface Water Quality Standards - Primary Human Contact Standard (µg/L)	NA	18,667	280	NCNS	18,670	NA	NA	4,670	4,670	NA	NA	75	2,800	NCNS	280,000
Navajo Nation Surface Water Quality Standards - Secondary Human Contact Standard (µg/L)	NA	18,667	280	NCNS	18,670	NA	NA	4,670	4,670	NA	NA	75	2,800	NCNS	280,000
Navajo Nation Surface Water Quality Standards - Fish Consumption (µg/L)	NA	NCNS	0.15	NCNS	4,600	NA	NA	670	8,000	NA	NA	1	NCNS	NCNS	5,100
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Total Metals	NA	NCNS	2.4	NCNS	NA	NA	NA	33	NA	NA	NA	NA	NCNS	NCNS	NA
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)) - Total Metals	NA	NCNS	0.012	NCNS	NA	NA	NA	2	NCNS	NA	NA	NA	NCNS	NCNS	NA
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) - Total Metals	NA	NCNS	10	NCNS	NCNS	NA	NA	50	NCNS	NA	NA	NCNS	NCNS	100	25,000
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Total Metals	NA	10000	NCNS	50	2000	NA	NA	20	NCNS	NA	NA	NCNS	NCNS	1000	10,000
EPA Maximum Contaminant Level - Drinking Water (µg/L)	NA	NA	2	NA	NA	NA	NA	50	NA	NA	NA	2	30	NA	NA
CW-GW-01G-160628	15000	0.87 U	0.06 UJ	0.76 J	1.9 U	16 U	1400	4.5 U	1.9 U	98000	1100	5.4 U	6.6	81	12 J
CW-SW-01-160627	8400	53	0.06 UJ	8.6	1.9 U	84 J	4500	4.5 U	1.9 U	280000	670	5.4 U	**270**	17	4.4 U
CW-SW-02-160627	7500	87	0.06 UJ	7.1	3.6 J	170 J	5200	4.5 U	1.9 U	290000	580	5.4 U	**58**	53	4.4 U
CW-SW-04-160618	31000	60 J	0.06 UJ	1.4	1.9 U	110 J	6600	4.5 U	1.9 U	22000	2800	5.4 U	**34**	3 J	4.4 U
CW-SW-05-160627	18000	77	0.06 UJ	6.2	2.3 J	48 J	3500	4.5 U	1.9 U	29000	1200	5.4 U	**120**	6.2 J	4.4 U
CW-SW-07-160628	20000	9.2 J	0.06 UJ	4.1	1.9 U	16 U	3400	4.5 U	1.9 U	73000	1300	5.4 U	**76**	14	4.4 U
CW-SW-10-160628	61000	790	0.06 UJ	0.64 J	23	2000	14000	**13**	1.9 U	150000	3000	5.4 U	19	77	120
CW-SW-11-160621	14000	49	0.06 UJ	1.8	1.9 U	48 J	4300	**6.6**	1.9 U	52000	1500	5.4 U	**33**	5.4 J	4.4 U
CW-SW-12-160627	13000	35	0.06 UJ	6.6	1.9 U	59 J	3900	4.5 U	1.9 U	20000	1200	5.4 U	**70**	10	4.4 U
CW-SW-13-160623	11000	31	0.06 UJ	6.4	1.9 U	110 J	3500	4.5 U	1.9 U	16000	1300	5.4 U	**67**	9.7 J	4.4 U
CW-SW-14-160623	9800	23	0.06 UJ	0.38 U	1.9 U	91 J	2900	4.5 U	1.9 U	7900	1200	5.4 U	23	7.3 J	4.4 U
CW-SW-15-160625	24000	200	0.06 UJ	0.9 J	1.9 U	64 J	6500	4.5 U	1.9 U	47000	2800	5.4 U	**37**	1.4 J	4.4 U
CW-SW-21-160620	6900	2.2 J	0.06 UJ	0.38 U	1.9 U	90 J	940 J	4.5 U	1.9 U	5700	350	5.4 U	3	3.4 J	12 J
CW-SW-26-160620	30000	560	0.06 UJ	**590**	13 J	1300	26000	**570**	1.9 U	150000	5100	54 U	**220**	**5300**	61
CW-SW-36-160618	19000	25	0.06 UJ	27	1.9 U	40 J	5600	4.5 U	1.9 U	55000	1600	5.4 U	**210**	12	4.4 U
CW-SW-37-160618	18000	28	0.06 UJ	16	1.9 U	16 U	5200	4.5 U	1.9 U	52000	1500	5.4 U	**100**	4.3 J	4.4 U
CW-SW-38-160618	19000	16	0.06 UJ	16	1.9 U	39 J	5500	4.5 U	1.9 U	53000	1800	5.4 U	**110**	6.8 J	4.4 U
CW-SW-39-160627	22000	50	0.06 UJ	13	1.9 U	56 J	4800	4.5 U	1.9 U	53000	1600	5.4 U	**200**	15	4.4 U
CW-SW-46-160621	8500	0.87 U	0.06 UJ	1.5	1.9 U	180 J	1000	4.5 U	1.9 U	5200	210	5.4 U	5.6	2.7 J	7.9 J
CW-SW-47-160617	30000	1.3 J	0.06 UJ	3.2	1.9 U	53 J	4000	**120**	1.9 U	22000	2300	5.4 U	**510**	53	4.4 U
CW-SW-50-160624	12000	80	0.06 UJ	5.4	1.9 U	34 J	3000	4.5 U	1.9 U	26000	1300	5.4 U	**180**	8.5 J	4.4 U
CW-SW-53a-160624	15000	230	0.06 UJ	4.2	3.4 J	240	4700	4.5 U	1.9 U	20000	1200	5.4 U	**230**	29	4.4 U
CW-SW-54-160624	17000	350	0.06 UJ	25	3.1 J	1200	11000	**13**	1.9 U	32000	1200	5.4 U	**80**	**100**	6.4 J
CW-SW-56a-160623	18000	38	0.06 UJ	**61**	1.9 U	120 J	7600	**8.2**	1.9 U	82000	2100	5.4 U	**400**	7.8 J	4.4 U
CW-SW-64-160621	23000	52	0.06 UJ	5.7	1.9 U	73 J	6700	4.5 U	1.9 U	61000	3000	5.4 U	**210**	27	4.4 U
CW-SW-65-160622	35000	710	0.06 UJ	**220**	3.4 J	600	19000	**43**	1.9 U	160000	4300	5.4 U	**1600**	35	16 J
CW-SW-66-160622	40000	230	0.06 UJ	**420**	1.9 U	150 J	26000	**85**	1.9 U	250000	4700	5.4 U	**2000**	32	4.4 U
CW-SW-69-160618	31000	61	0.06 UJ	1.4	1.9 U	140 J	6400	4.5 U	1.9 U	20000	2600	5.4 U	**37**	4.3 J	4.4 U
CW-SW-70-160617	21000	16	0.06 UJ	1	1.9 U	34 J	3500	4.5 U	1.9 U	29000	1300	5.4 U	**73**	20	4.4 U
CW-SW-71-160618	20000	35	0.06 UJ	27	1.9 U	54 J	5800	4.5 U	1.9 U	56000	1600	5.4 U	**220**	13	4.4 U
CW-SW-72-160621	13000	48	0.06 UJ	2.9	1.9 U	40 J	4500	4.5 U	1.9 U	52000	1400	5.4 U	**36**	5.8 J	4.4 U
CW-SW-75-160622	23000	190	0.06 UJ	8.6	1.9 U	170 J	11000	4.5 U	1.9 U	64000	2600	5.4 U	**540**	5.3 J	4.4 U
CW-SW-81-160629	15000	33	0.06 UJ	2	1.9 U	77 J	4500	4.5 U	1.9 U	240000	1100	5.4 U	16	78	4.4 U

Notes:
NCNS = No Current Numeric Standard
NA = Not Applicable
NRWQC = Navajo Recommended Water Quality Criteria
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Dissolved Metals					NA	88	340	NA	NA	NA	1.2-7.7*	NA	NA	NA	8.3-50*	NA	37-280*	NA	NA	NA	2.4	NA	304-1513*	NA	NA	NA	2-64*	NA	NA	700	NA	NA	76-380*
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)- Dissolved Metals					NA	30	150	NA	NA	NA	0.17-0.64*	NA	NA	NA	5.8-29*	NA	1.44-11*	NA	NA	NA	0.012	NA	34-168*	NA	NA	NA	NA	NA	NA	150	NA	NA	77-382*
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) -Dissolved Metals					NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Dissolved Metals					NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sample ID	Sample Date	Sample Information	Northing	Easting	Aluminium (µg/L)	Antimony (µg/L)	Arsenic (µg/L)	Barium (µg/L)	Beryllium (µg/L)	Boron (µg/L)	Cadmium (µg/L)	Calcium (µg/L)	Chromium (µg/L)	Cobalt (µg/L)	Copper (µg/L)	Iron (µg/L)	Lead (µg/L)	Lithium (µg/L)	Magnesium (µg/L)	Manganese (µg/L)	Mercury (µg/L)	Molybdenum (µg/L)	Nickel (µg/L)	Phosphorus (µg/L)	Potassium (µg/L)	Selenium (µg/L)	Silver (µg/L)	Sodium (µg/L)	Strontium (µg/L)	Thallium (µg/L)	Uranium (µg/L)	Vandium (µg/L)	Zinc (µg/L)
CW-GW-01G-160628F	28-Jun-16	Red Point Dug Well	4050274.524	657301.4036	32 U	5.1 U	5.7 J	370	0.48 U	190	0.77 U	40000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	51	15000	0.87 U	0.06 UJ	0.82 J	1.9 U	16 U	1400	4.5 U	1.9 U	97000	1100	5.4 U	6.7	81	9.6 J
CW-SW-01-160627F	27-Jun-16	Cove Wash (Downstream)	4051637.55	663372.9034	920	5.1 U	14	130	0.48 U	410	0.77 U	16000	1.4 U	1.3 U	1.9 U	220	2.2 U	150	8300	13	0.06 UJ	8.6	1.9 U	74 J	4600	4.5 U	1.9 U	270000	680	5.4 U	270	21	4.4 U
CW-SW-02-160627F	27-Jun-16	Cove Wash (Downstream)	4053607.153	666731.839	420	5.1 U	25	90 J	0.48 U	470	**0.94 J**	15000	1.8 J	1.3 U	1.9 U	130	2.2 U	83	6500	20	0.06 UJ	8.2	2.7 J	45 J	4500	4.5 U	1.9 U	300000	520	5.4 U	61	53	4.4 U
CW-SW-04-160618F	18-Jun-16	Background (Upstream)	4045547.649	655393.8806	64 J	5.1 U	6.5 J	290	0.48 U	25 J	0.77 U	160000	1.4 U	1.3 U	1.9 U	22 J	2.2 U	45	30000	56	0.06 UJ	1.6	1.9 U	110 J	6000	4.5 U	1.9 U	20000	2600	5.4 U	45	3.5 J	6.6 J
CW-SW-05-160627F	27-Jun-16	Dam (Historical)	4045709.002	658675.5894	32 U	5.1 U	13	250	0.48 U	47 J	0.77 U	71000	1.4 U	1.3 U	1.9 U	57 J	2.2 U	40	18000	47	0.06 UJ	6.3	1.9 U	26 J	3500	4.5 U	1.9 U	29000	1200	5.4 U	120	5.9 J	4.4 U
CW-SW-07-160628F	28-Jun-16	Cove Wash Middle (Historical)	4047101.942	659123.9337	32 U	5.1 U	6.3 J	310	0.48 U	110	0.77 U	66000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	55	20000	7.3 J	0.06 UJ	5.9	1.9 U	16 U	3400	4.5 U	1.9 U	72000	1300	5.4 U	76	14	4.4 U
CW-SW-10-160628F	28-Jun-16	Cottonwood Spring (Seeping capped well)	4049594.436	660198.1416	2100	5.1 U	5 J	190	0.48 U	140	0.77 U	63000	1.4 U	1.3 U	1.9 U	1100	2.2 U	69	24000	63	0.06 UJ	0.94 J	1.9 U	160 J	8200	15	1.9 U	150000	1100	5.4 U	14	30	4.8 J
CW-SW-11-160621F	21-Jun-16	Cove Wash North	4046373.007	657265.4893	32 U	5.1 U	3.9 U	160	0.48 U	24 J	0.77 U	65000	1.4 U	1.3 U	1.9 U	14	2.2 U	74	13000	9.5 J	0.06 UJ	1.5	1.9 U	27 J	4200	4.5 U	1.9 U	50000	1500	5.4 U	33	5.2 J	4.4 U
CW-SW-12-160627F	27-Jun-16	Cove Wash Middle 3	4044603.441	658812.8183	32 U	5.1 U	4.7 J	330	0.48 U	27 J	0.77 U	71000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	34	13000	12	0.06 UJ	6.8	1.9 U	54 J	3900	4.5 U	1.9 U	20000	1200	5.4 U	69	10	4.4 U
CW-SW-13-160623F	23-Jun-16	Cove Wash Middle 3	4043160.908	658957.6858	32 U	5.1 U	3.9 U	380	0.48 U	18 J	0.77 U	77000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	32	11000	8.4 J	0.06 UJ	6.8	1.9 U	80 J	3400	4.5 U	1.9 U	16000	1300	5.4 U	70	8.5 J	4.4 U
CW-SW-14-160623F	23-Jun-16	Cove Wash Middle 3E	4042934	659222.0031	32 U	5.1 U	3.9 U	430	0.48 U	10 J	0.77 U	74000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	27	9900	0.87 U	0.06 UJ	0.38 U	1.9 U	82 J	3000	4.5 U	1.9 U	8100	1200	5.4 U	23	6.7 J	4.4 U
CW-SW-15-160625F	25-Jun-16	Cove Wash North	4046035	656751.9991	42 J	5.1 U	3.9 U	180	0.48 U	29 J	0.77 U	67000	1.4 U	1.3 U	1.9 U	41 J	2.2 U	95	24000	170	0.06 UJ	0.88 J	1.9 U	43 J	6400	4.5 U	1.9 U	47000	2800	5.4 U	38	1.2 U	4.4 U
CW-SW-21-160620F	20-Jun-16	Background (Mesa IV Springs)	4043108	655931.0041	32 U	5.1 U	3.9 U	320	0.48 U	9.9 U	0.77 U	75000	1.4 U	1.3 U	1.9 U	15 J	2.2 U	13	7100	2 J	0.06 UJ	0.38 U	1.9 U	76 J	960 J	4.5 U	1.9 U	5700	350	5.4 U	3.4	2.6 J	7.3 J
CW-SW-26-160620F	20-Jun-16	Cove Wash Middle 2 (Historical)	4042501.621	657146.8765	32 U	5.1 U	80	110	0.48 U	190	0.77 U	120000	1.4 U	1.3 U	1.9 U	89 J	2.2 U	220	20000	220	0.06 UJ	640	1.9 U	260	21000	300	1.9 U	150000	4600	5.4 U	190	2800	4.4 U
CW-SW-36-160618F	18-Jun-16	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	32 U	5.1 U	4.2 J	200	0.48 U	28 J	0.77 U	67000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	78	19000	5.5 J	0.06 UJ	27	1.9 U	16 U	5600	4.5 U	1.9 U	55000	1600	5.4 U	210	12	4.4 U
CW-SW-37-160618F	18-Jun-16	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	32 U	5.1 U	3.9 U	210	0.48 U	26 J	0.77 U	59000	1.4 U	1.3 U	1.9 U	23 J	2.2 U	67	17000	17 J	0.06 UJ	16	1.9 U	16 U	5100	4.5 U	1.9 U	51000	1500	5.4 U	97	4.5 J	4.4 U
CW-SW-38-160618F	18-Jun-16	Cove Wash Middle (Historical)	4044173	657897.9975	32 U	5.1 U	3.9 U	240	0.48 U	31 J	0.77 U	68000	1.4 U	1.3 U	1.9 U	22 J	2.2 U	66	19000	11	0.06 UJ	18	1.9 U	28 J	5400	4.5 U	1.9 U	53000	1800	5.4 U	110	6.8 J	4.4 U
CW-SW-39-160627F	27-Jun-16	Cove Wash Middle 2	4045453.338	658432.5145	32 U	5.1 U	7.4 J	260	0.48 U	29 J	0.77 U	89000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	72	22000	16	0.06 UJ	14	1.9 U	25 J	4700	4.5 U	1.9 U	52000	1600	5.4 U	200	13	4.4 U
CW-SW-46-160621F	21-Jun-16	Pine Water Springs	4043788.61	661352.387	32 U	5.1 U	3.9 U	11 J	0.48 U	9.9 U	0.77 U	62000	1.4 U	1.3 U	5.9 J	14 U	2.2 U	6.7 J	8500	0.87 U	0.06 UJ	0.38 U	1.9 U	170 J	1000	4.5 U	1.9 U	5200	210	5.4 U	5.4	2 J	6.2 J
CW-SW-47-160617F	17-Jun-16	Cove Wash Middle 3F	4043774.185	659297.1492	32 U	5.1 U	4.7 J	160	0.48 U	39 J	0.77 U	140000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	61	30000	0.9 J	0.06 UJ	3.3	1.9 U	44 J	3900	120	1.9 U	22000	2300	5.4 U	500	52	4.4 U
CW-SW-50-160624F	24-Jun-16	Cove Wash Middle 1	4044856.248	657463.1536	32 U	5.1 U	5.2 J	260	0.48 U	11 J	0.77 U	89000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	41	12000	62	0.06 UJ	5.4	1.9 U	22 J	3000	4.5 U	1.9 U	26000	1300	5.4 U	180	8.9 J	4.4 U
CW-SW-53a-160624F	24-Jun-16	Cove Wash Middle 1 (Near original location)	4044567	656816	300	5.1 U	3.9 U	290	0.48 U	16 J	0.77 U	110000	1.4 U	1.3 U	1.9 U	180	2.2 U	31	14000	150	0.06 UJ	4.1	1.9 U	160 J	4400	4.5 U	1.9 U	20000	1200	5.4 U	220	20	4.4 U
CW-SW-54-160624F	24-Jun-16	Cove Wash Middle 1B	4044752.579	656806.108	34 J	5.1 U	16	190	0.48 U	57 J	0.77 U	70000	1.4 U	2 J	2.8 J	170	2.2 U	48	17000	340	0.06 UJ	26	2.7 J	730	11000	11	1.9 U	32000	1200	5.4 U	72	68	4.4 U
CW-SW-56a-160623F	23-Jun-16	Cove Wash Middle 3A (Near original location)	4043135	658979	32 U	5.1 U	3.9 U	250	0.48 U	78 J	0.77 U	94000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	82	18000	22	0.06 UJ	65	1.9 U	54 J	7400	9.9	1.9 U	82000	2100	5.4 U	420	8.5 J	4.4 U
CW-SW-64-160621F	21-Jun-16	Cove Wash North	4045877	656444	32 U	5.1 U	9.5 J	190	0.48 U	54 J	0.77 U	110000	1.4 U	1.3 U	2.4 J	14 U	2.2 U	79	22000	14	0.06 UJ	5.7	1.9 U	31 J	6500	4.5 U	1.9 U	60000	3000	5.4 U	200	26	4.4 U
CW-SW-65-160622F	22-Jun-16	Cove Wash Middle 3A	4042362.589	658661.6744	32 U	5.1 U	11	190	0.48 U	170	0.77 U	130000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	170	31000	74	0.06 UJ	230	1.9 U	47 J	16000	38	1.9 U	160000	3900	5.4 U	1600	17	4.4 U
CW-SW-66-160622F	22-Jun-16	Cove Wash Middle 3A	4042362.589	658661.6744	32 U	5.1 U	21	140	0.48 U	250	0.77 U	100000	1.4 U	1.3 U	1.9 U	15 J	2.2 U	280	39000	45	0.06 UJ	450	1.9 U	32 J	29000	85	1.9 U	250000	4300	5.4 U	2000	34	4.4 U
CW-SW-69-160618F	18-Jun-16	Duplicate of CW-04	4045547.649	655393.8806	32 U	5.1 U	6.8 J	290	0.48 U	22 J	0.77 U	160000	1.4 U	1.3 U	1.9 U	22 J	2.2 U	43	30000	40	0.06 UJ	1.4	1.9 U	120 J	6000	4.5 U	1.9 U	20000	2600	5.4 U	36	3.3 J	4.4 U
CW-SW-70-160617F	17-Jun-16	Cove Wash Middle 3F	4044525.919	659043.2268	32 U	5.1 U	6.2 J	260	0.48 U	55 J	0.77 U	69000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	30	20000	1.8 J	0.06 UJ	0.83 J	1.9 U	16 U	3300	4.5 U	1.9 U	28000	1200	5.4 U	71	19	4.4 U
CW-SW-71-160618F	18-Jun-16	Duplicate of CW-37	4046373.007	657265.4893	32 U	5.1 U	3.9 U	200	0.48 U	25 J	0.77 U	68000	1.4 U	1.3 U	1.9 U	29 J	2.2 U	81	20000	5.4 J	0.06 UJ	27	1.9 U	16 U	5700	4.5 U	1.9 U	56000	1700	5.4 U	220	12	4.4 U
CW-SW-72-160621F	21-Jun-16	Duplicate of CW-11	4046373.007	657265.4893	32 U	5.1 U	3.9 U	160	0.48 U	35 J	0.77 U	64000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	73	13000	1.7 J	0.06 UJ	1.7	1.9 U	19 J	4500	4.5 U	1.9 U	52000	1400	5.4 U	34	5.7 J	4.4 U
CW-SW-75-160622F	22-Jun-16	Cove Wash Middle 3D	4041201.219	658764.5801	32 U	5.1 U	8 J	240	0.48 U	100	0.77 U	110000	1.4 U	1.3 U	1.9 U	14 U	2.2 U	81	22000	31	0.06 UJ	9.3	1.9 U	56 J	9900	4.5 U	1.9 U	62000	2500	5.4 U	550	4.2 J	4.4 U
CW-SW-81-160629F	29-Jun-16	Cove Wash North	4049882.052	658891.9138	780	5.1 U	7.5 J	240	0.48 U	410	0.77 U	21000	1.4 U	1.3 U	1.9 U	280	2.2 U	110	15000	13	0.06 UJ	2.5	1.9 U	28 J	4000	4.5 U	1.9 U	240000	1000	5.4 U	16	77	4.4 U

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J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Cove Wash Watershed Assessment
2016 Low Flow Sampling Event
Water - Hardness Results

Sample ID	Sample Date	Sample Information	Northing	Easting	Calcium (µg/L)	Magnesium (µg/L)	Hardness as CaCO3 (µg/L)	Hardness as CaCO3 (mg/L)
CW-GW-01G-160628F	28-Jun-16	Red Point Dug Well	4050274.524	657301.4036	40000	15000	160000	160
CW-SW-01-160627F	27-Jun-16	Cove Wash (Downstream)	4051637.55	663372.9034	16000	8300	74000	74
CW-SW-02-160627F	27-Jun-16	Cove Wash (Downstream)	4053607.153	666731.839	15000	6500	60000	60
CW-SW-04-160618F	18-Jun-16	Background (Upstream)	4045547.649	655393.8806	160000	30000	520000	520
CW-SW-05-160627F	27-Jun-16	Dam (Historical)	4045709.002	658675.5894	71000	18000	250000	250
CW-SW-07-160628F	28-Jun-16	Cove Wash Middle (Historical)	4047101.942	659123.9337	66000	20000	250000	250
CW-SW-10-160628F	28-Jun-16	Cottonwood Spring (Seeping capped well)	4049594.436	660198.1416	63000	24000	260000	260
CW-SW-11-160621F	21-Jun-16	Cove Wash North	4046373.007	657265.4893	65000	13000	220000	220
CW-SW-12-160627F	27-Jun-16	Cove Wash Middle 3	4044603.441	658812.8183	71000	13000	230000	230
CW-SW-13-160623F	23-Jun-16	Cove Wash Middle 3	4043160.908	658957.6858	77000	11000	240000	240
CW-SW-14-160623F	23-Jun-16	Cove Wash Middle 3E	4042934	659222.0031	74000	9900	230000	230
CW-SW-15-160625F	25-Jun-16	Cove Wash North	4046035	656751.9991	67000	24000	270000	270
CW-SW-21-160620F	20-Jun-16	Background (Mesa IV Springs)	4043108	655931.0041	75000	7100	220000	220
CW-SW-26-160620F	20-Jun-16	Cove Wash Middle 2 (Historical)	4042501.621	657146.8765	120000	20000	380000	380
CW-SW-36-160618F	18-Jun-16	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	67000	19000	250000	250
CW-SW-37-160618F	18-Jun-16	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	59000	17000	220000	220
CW-SW-38-160618F	18-Jun-16	Cove Wash Middle (Historical)	4044173	657897.9975	68000	19000	250000	250
CW-SW-39-160627F	27-Jun-16	Cove Wash Middle 2	4045453.338	658432.5145	89000	22000	310000	310
CW-SW-46-160621F	21-Jun-16	Pine Water Springs	4043788.61	661352.387	62000	8500	190000	190
CW-SW-47-160617F	17-Jun-16	Cove Wash Middle 3F	4043774.185	659297.1492	140000	30000	470000	470
CW-SW-50-160624F	24-Jun-16	Cove Wash Middle 1	4044856.248	657463.1536	89000	12000	270000	270
CW-SW-53a-160624F	24-Jun-16	Cove Wash Middle 1 (Near original location)	4044567	656816	110000	14000	330000	330
CW-SW-54-160624F	24-Jun-16	Cove Wash Middle 1B	4044752.579	656806.108	70000	17000	240000	240
CW-SW-56a-160623F	23-Jun-16	Cove Wash Middle 3A (Near original location)	4043135	658979	94000	18000	310000	310
CW-SW-64-160621F	21-Jun-16	Cove Wash North	4045877	656444	110000	22000	370000	370
CW-SW-65-160622F	22-Jun-16	Cove Wash Middle 3A	4042362.589	658661.6744	130000	31000	450000	450
CW-SW-66-160622F	22-Jun-16	Cove Wash Middle 3A	4042362.589	658661.6744	100000	39000	410000	410
CW-SW-69-160618F	18-Jun-16	Duplicate of CW-04	4045547.649	655393.8806	160000	30000	520000	520
CW-SW-70-160617F	17-Jun-16	Cove Wash Middle 3F	4044525.919	659043.2268	69000	20000	250000	250
CW-SW-71-160618F	18-Jun-16	Duplicate of CW-37	4046373.007	657265.4893	68000	20000	250000	250
CW-SW-72-160621F	21-Jun-16	Duplicate of CW-11	4046373.007	657265.4893	64000	13000	210000	210
CW-SW-75-160622F	22-Jun-16	Cove Wash Middle 3D	4041201.219	658764.5801	110000	22000	370000	370
CW-SW-81-160629F	29-Jun-16	Cove Wash North	4049882.052	658891.9138	21000	15000	110000	110

Sample ID	Sample Date	Sample Information	Northing	Easting	Bicarbonate as CaCO3 (µg/L)	Bromide (µg/L)	Carbonate as CaCO3 (µg/L)	Chloride (µg/L)	Fluoride (µg/L)	Total Alkalinity as CaCO3 (µg/L)	Sulfate (µg/L)	Ammonia as N (µg/L)	Nitrate as N (µg/L)
Navajo Nation Surface Water Quality Standards - Secondary Human Contact Standard (µg/L)					NA	NA	NA	NA	NA	NA	NA	NCNS	NA
Navajo Nation Surface Water Quality Standards - Fish Consumption (µg/L)					NA	NA	NA	NA	NCNS	NA	NA	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Dissolved Metals					NA	NA	NA	NA	NCNS	NA	NA	wildlife dependen	NCNS
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)- Dissolved Metals					NA	NA	NA	NA	NCNS	NA	NA	wildlife dependen	NCNS
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) -Dissolved Metals					NA	NA	NA	NA	NCNS	NA	NA	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Dissolved Metals					NA	NA	NA	NA	NCNS	NA	NA	NCNS	NCNS
EPA Maximum Contaminant Level - Drinking Water (µg/L)					NA	NA	NA	NA	4,000	NA	NA	NA	10,000
CW-GW-01G-160628F	28-Jun-16	Red Point Dug Well	4050274.524	657301.4036	370000	200 U	20000 U	4900	180	370000	15000	100 UJ	120 J
CW-SW-01-160627F	27-Jun-16	Cove Wash (Downstream)	4051637.55	663372.9034	630000	100 J	20000 U	74000	440	630000	200000	100 UJ	200 UJ
CW-SW-02-160627F	27-Jun-16	Cove Wash (Downstream)	4053607.153	666731.839	590000	150 J	20000 U	26000	580	590000	72000	270J	200 UJ
CW-SW-04-160618F	18-Jun-16	Background (Upstream)	4045547.649	655393.8806	500000	74	20000 U	15000	600	500000	36000	100 U	200 UJ
CW-SW-05-160627F	27-Jun-16	Dam (Historical)	4045709.002	658675.5894	320000	200 U	20000 U	14000	330	320000	28000	100 U	200 UJ
CW-SW-07-160628F	28-Jun-16	Cove Wash Middle (Historical)	4047101.942	659123.9337	350000	200 U	20000 U	19000	300	350000	42000	100 UJ	200 UJ
CW-SW-10-160628F	28-Jun-16	Cottonwood Spring (Seeping capped well)	4049594.436	660198.1416	380000	710	20000 U	73000	170	380000	110000	100 UJ	880 J
CW-SW-11-160621F	21-Jun-16	Cove Wash North	4046373.007	657265.4893	280000	77 J	20000 U	22000 J	300 J	280000	37000 J	100 U	200 UJ
CW-SW-12-160627F	27-Jun-16	Cove Wash Middle 3	4044603.441	658812.8183	260000	200 U	20000 U	7000	220	260000	24000	100 UJ	200 UJ
CW-SW-13-160623F	23-Jun-16	Cove Wash Middle 3	4043160.908	658957.6858	240000	200 U	20000 U	6000	210	240000	24000	100 U	200 UJ
CW-SW-14-160623F	23-Jun-16	Cove Wash Middle 3E	4042934	659222.0031	230000	200 U	20000 U	3500	120	230000	4900	100 U	200 UJ
CW-SW-15-160625F	25-Jun-16	Cove Wash North	4046035	656751.9991	290000	86 J	20000 U	25000	190	290000	46000	100 U	200 UJ
CW-SW-21-160620F	20-Jun-16	Background (Mesa IV Springs)	4043108	655931.0041	210000	200 U	20000 U	210	100 U	210000	52000	100 U	200 UJ
CW-SW-26-160620F	20-Jun-16	Cove Wash Middle 2 (Historical)	4042501.621	657146.8765	210000	200 U	20000 U	2000	100 U	210000	45000	900	92 J
CW-SW-36-160618F	18-Jun-16	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	310000	200 U	20000 U	23000	330	310000	39000	100 U	890 J
CW-SW-37-160618F	18-Jun-16	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	280000	200 U	20000 U	19000	280	280000	37000	100 U	200 UJ
CW-SW-38-160618F	18-Jun-16	Cove Wash Middle (Historical)	4044173	657897.9975	320000	200 U	20000 U	20000	350	320000	35000	100 U	200 UJ
CW-SW-39-160627F	27-Jun-16	Cove Wash Middle 2	4045453.338	658432.5145	350000	200 U	20000 U	24000	420	350000	50000	100 UJ	200 UJ
CW-SW-46-160621F	21-Jun-16	Pine Water Springs	4043788.61	661352.387	190000	200 U	20000 U	3100	100	190000	6800	100 U	340
CW-SW-47-160617F	17-Jun-16	Cove Wash Middle 3F	4043774.185	659297.1492	400000	92 J	20000 U	22000	290	400000	89000	100 U	200 UJ
CW-SW-50-160624F	24-Jun-16	Cove Wash Middle 1	4044856.248	657463.1536	270000	200 U	20000 U	1400	100 U	270000	2500	100 U	200 UJ
CW-SW-53a-160624F	24-Jun-16	Cove Wash Middle 1 (Near original location)	4044567	656816	290000	200 U	20000 U	1200	100 U	290000	2600	430	200 UJ
CW-SW-54-160624F	24-Jun-16	Cove Wash Middle 1B	4044752.579	656806.108	180000	2700	20000 U	3100	860 J	180000	14000	59 J	2800 J
CW-SW-56a-160623F	23-Jun-16	Cove Wash Middle 3A (Near original location)	4043135	658979	290000	200 U	20000 U	440	100 U	290000	4400	100 U	200 U
CW-SW-64-160621F	21-Jun-16	Cove Wash North	4045877	656444	410000	200 U	20000 U	1200	100 U	410000	7800	100 J	200 UJ
CW-SW-65-160622F	22-Jun-16	Cove Wash Middle 3A	4042362.589	658661.6744	490000	200 U	20000 U	1300	100 U	490000	24000	51 J	200 UJ
CW-SW-66-160622F	22-Jun-16	Cove Wash Middle 3A	4042362.589	658661.6744	460000	200 U	20000 U	4400	58 J	460000	140000	30 J	200 UJ
CW-SW-69-160618F	18-Jun-16	Duplicate of CW-04	4045547.649	655393.8806	490000	83 J	20000 U	15000	590	490000	37000	34 J	200 UJ
CW-SW-70-160617F	17-Jun-16	Cove Wash Middle 3F	4044525.919	659043.2268	290000	200 U	20000 U	7500	210	290000	16000	100 U	200 UJ
CW-SW-71-160618F	18-Jun-16	Duplicate of CW-37	4046373.007	657265.4893	320000	200 U	20000 U	22000	340	320000	40000	100 U	500 J
CW-SW-72-160621F	21-Jun-16	Duplicate of CW-11	4046373.007	657265.4893	270000	200 U	20000 U	1600 J	100 U	270000	2600 J	100 UJ	200 UJ
CW-SW-75-160622F	22-Jun-16	Cove Wash Middle 3D	4041201.219	658764.5801	450000	200 U	20000 U	10000	440	450000	60000	31 J	200 U
CW-SW-81-160629F	29-Jun-16	Cove Wash North	4049882.052	658891.9138	540000	70 J	20000 U	30000	350	540000	60000	100 UJ	200 UJ

Notes:
EPA = Environmental Protection
NCNS = No Current Numeric Standard
NA = Not Applicable
NRWQC = Navajo Recommended Water Quality Criteria
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels
* = The NRWQC assumes a hardness of 100 mg/L

Cove Wash Watershed Assessment
2016 Low Flow Sampling Event
Water - Total Adjusted Gross Alpha Radiation and Radium Results

Sample ID	Date	Sample Information	Northing	Easting	Gross Alpha Radiation (pCi/L)	GAR with Total Uncertainty (pCi/L)	Adjusted Total GAR (pCi/L)	Radium 226 (pCi/L)	Radium 226 with Total Uncertainty (pCi/L)	Radium 228 (pCi/L)	Radium 228 with Total Uncertainty (pCi/L)	Combined Radium (Radium 226 + Radium 228) (pCi/L)
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (pCi/L)					NA	NA	15	5	5	5	5	5
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (pCi/L)					NCNS	NCNS	NCNS	5	5	5	5	5
EPA Maximum Contaminant Level - Drinking Water (pCi/L)					NA	NA	15	5	5	5	5	5
CW-GW-01G-160628	28-Jun-16	Red Point Dug Well	4050274.524	657301.4036	5.7	5.7 ± 2	1.95 J	0.015 UJ	0.015 UJ ± 0.08	0.61 J	0.61 J ± 0.31	0.61 J
CW-SW-01-160627	27-Jun-16	Cove Wash (Downstream)	4051637.55	663372.9034	**53**	**53 ± 10**	-56.66	1.26	1.26 ± 0.45	1.09	1.09 ± 0.39	2.35
CW-SW-02-160627	27-Jun-16	Cove Wash (Downstream)	4053607.153	666731.839	**23.9**	**23.9 ± 5.1**	1.63	0.11 UJ	0.11 UJ ± 0.12	0.26 U	0.26 U ± 0.27	0.26 U
CW-SW-04-160618	18-Jun-16	Background (Upstream)	4045547.649	655393.8806	**18.5**	**18.5 ± 4.2**	-21.53	0.35 J	0.35 J ± 0.19	0.55 UJ	0.55 UJ ± 0.34	0.35 J
CW-SW-05-160627	27-Jun-16	Dam (Historical)	4045709.002	658675.5894	**66**	**66 ± 12**	**23.15**	1.43	1.43 ± 0.49	0.46 U	0.46 U ± 0.3	1.43
CW-SW-07-160628	28-Jun-16	Cove Wash Middle (Historical)	4047101.942	659123.9337	**37.3**	**37.3 ± 7.2**	11.33	1.23	1.23 ± 0.43	0.56 U	0.56 U ± 0.32	1.23
CW-SW-10-160628	28-Jun-16	Cottonwood Spring (Seeping capped well)	4049594.436	660198.1416	7.4	7.4 ± 2.5	2.0 J	1.06	1.06 ± 0.42	1.22	1.22 ± 0.42	2.28
CW-SW-11-160621	21-Jun-16	Cove Wash North	4046373.007	657265.4893	**19.7**	**19.7 ± 4.3**	-3.7 J	0.33 J	0.33 J ± 0.18	0.34 U	0.34 U ± 0.3	0.33 J
CW-SW-12-160627	27-Jun-16	Cove Wash Middle 3	4044603.441	658812.8183	**31.9**	**31.9 ± 6.3**	8.81	1.94	1.94 ± 0.61	0.63 J	0.63 J ± 0.32	2.6 J
CW-SW-13-160623	23-Jun-16	Cove Wash Middle 3	4043160.908	658957.6858	**42.9**	**42.9 ± 8.2**	-7.8	1.57	1.57 ± 0.52	0.45 U	0.45 U ± 0.3	1.57
CW-SW-14-160623	23-Jun-16	Cove Wash Middle 3E	4042934	659222.0031	**15.7**	**15.7 ± 3.7**	-2.74	0.93 J	0.93 J ± 0.37	0.39 U	0.39 U ± 0.34	0.93 J
CW-SW-15-160625	25-Jun-16	Cove Wash North	4046035	656751.9991	**24.4**	**24.4 ± 5.1**	-7.48	0.47 J	0.47 J ± 0.23	0.29 U	0.29 U ± 0.3	0.47 J
CW-SW-21-160620	20-Jun-16	Background (Mesa IV Springs)	4043108	655931.0041	3.8	3.8 ± 1.6	0.2 J	0.23 U	0.23 U ± 0.16	0.42 U	0.42 U ± 0.31	0.42 U
CW-SW-26-160620	20-Jun-16	Cove Wash Middle 2 (Historical)	4042501.621	657146.8765	**103**	**103 ± 18**	-33.32	12.9	12.9 ± 3.4	0.51 U	0.51 U ± 0.34	**12.9**
CW-SW-36-160618	18-Jun-16	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	**94**	**94 ± 16**	-52	2.15	2.15 ± 0.67	0.3 U	0.3 U ± 0.32	2.15
CW-SW-37-160618	18-Jun-16	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	**41.6 J**	**41.6 J ± 7.9**	-26.4 J	2.59	2.59 ± 0.78	0.3 U	0.3 U ± 0.3	2.59
CW-SW-38-160618	18-Jun-16	Cove Wash Middle (Historical)	4044173	657897.9975	**56**	**56 ± 10**	-16.43	2.74	2.74 ± 0.82	0.38 U	0.38 U ± 0.29	2.74
CW-SW-39-160627	27-Jun-16	Cove Wash Middle 2	4045453.338	658432.5145	**89**	**89 ± 16**	23.74	2.08	2.08 ± 0.66	0.73 J	0.73 J ± 0.33	2.81 J
CW-SW-46-160621	21-Jun-16	Pine Water Springs	4043788.61	661352.387	5.2	5.2 ± 1.8	0.8 J	0.12 UJ	0.12 UJ ± 0.11	0.43 U	0.43 U ± 0.32	0.43 U
CW-SW-47-160617	17-Jun-16	Cove Wash Middle 3F	4043774.185	659297.1492	**184**	**184 ± 31**	-167.6	2.52	2.52 ± 0.76	0.55 J	0.55 J ± 0.3	3.07 J
CW-SW-50-160624	24-Jun-16	Cove Wash Middle 1	4044856.248	657463.1536	**90**	**90 ± 16**	-36.17	5.7	5.7 ± 1.6	0.08 U	0.08 U ± 0.29	**5.7**
CW-SW-53a-160624	24-Jun-16	Cove Wash Middle 1 (Near original location)	4044567	656816	**113**	**113 ± 19**	-22.88	11.8	11.8 ± 3.1	0.07 U	0.07 U ± 0.33	**11.8**
CW-SW-54-160624	24-Jun-16	Cove Wash Middle 1B	4044752.579	656806.108	**50.6**	**50.6 ± 9.3**	-5.56	9.5	9.5 ± 2.7	0.45 U	0.45 U ± 0.42	**9.5**
CW-SW-56a-160623	23-Jun-16	Cove Wash Middle 3A (Near original location)	4043135	658979	**172**	**172 ± 29**	-137.9	0.66 J	0.66 J ± 0.28	0.79 U	0.79 U ± 0.44	0.66 J
CW-SW-64-160621	21-Jun-16	Cove Wash North	4045877	656444	**130**	**130 ± 22**	-22.11	0.92 J	0.92 J ± 0.37	0.39 U	0.39 U ± 0.37	0.92 J
CW-SW-65-160622	22-Jun-16	Cove Wash Middle 3A	4042362.589	658661.6744	**526**	**526 ± 85**	-480.1	2.81	2.81 ± 0.85	0.35 U	0.35 U ± 0.33	2.81
CW-SW-66-160622	22-Jun-16	Cove Wash Middle 3A	4042362.589	658661.6744	**730**	**730 ± 120**	-565.6	1.02	1.02 ± 0.38	0.38 U	0.38 U ± 0.3	1.02
CW-SW-69-160618	18-Jun-16	Duplicate of CW-04	4045547.649	655393.8806	**23.4**	**23.4 ± 5**	-17.47	0.31 J	0.31 J ± 0.18	0.23 U	0.23 U ± 0.28	0.31 J
CW-SW-70-160617	17-Jun-16	Cove Wash Middle 3F	4044525.919	659043.2268	**45.8**	**45.8 ± 8.6**	-4.72	0.92 J	0.92 J ± 0.35	0.03 U	0.03 U ± 0.26	0.92 J
CW-SW-71-160618	18-Jun-16	Duplicate of CW-37	4046373.007	657265.4893	**84 J**	**84 J ± 15**	-63.3 J	2.68	2.68 ± 0.8	0.19 U	0.19 U ± 0.31	2.68
CW-SW-72-160621	21-Jun-16	Duplicate of CW-11	4046373.007	657265.4893	**22.9**	**22.9 ± 4.8**	-239 J	0.27 J	0.27 J ± 0.18	0.68 J	0.68 J ± 0.37	0.95 J
CW-SW-75-160622	22-Jun-16	Cove Wash Middle 3D	4041201.219	658764.5801	**194**	**194 ± 32**	-190.6	2.12	2.12 ± 0.67	0.68 J	0.68 J ± 0.36	2.8 J
CW-SW-81-160629	29-Jun-16	Cove Wash North	4049882.052	658891.9138	9.5	9.5 ± 2.6	2.4 J	0.15 U	0.15 U ± 0.13	0.66 U	0.66 U ± 0.38	0.66 U

Notes:
EPA = Environmental Protection Age
NCNS = No Current Numeric Standard
NA = Not Applicable
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
pCi/L = picocurie per Liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels
± = plus or minus

Sample ID	Date	Sample Information	Northing	Easting	Gross Alpha Radiation (pCi/L)	GAR with Total Uncertainty (pCi/L)	Radium 226 (pCi/L)	Radium 226 with Total Uncertainty (pCi/L)	Radium 228 (pCi/L)	Radium 228 with Total Uncertainty (pCi/L)	Combined Radium (Radium 226 + Radium 228) (pCi/L)
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (pCi/L)					NA	NA	NA	NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (pCi/L)					NCNS	NCNS	NCNS	NCNS	NCNS	NCNS	NCNS
EPA Maximum Contaminant Level - Drinking Water (pCi/L)					NA	NA	NA	NA	NA	NA	NA
CW-GW-01G-160628F	28-Jun-16	Red Point Dug Well	4050274.524	657301.4036	5	5 ± 1.7	0.1 U	0.1 U ± 0.12	0.29 U	0.29 U ± 0.25	0.29 U
CW-SW-01-160627F	27-Jun-16	Cove Wash (Downstream)	4051637.55	663372.9034	67	67 ± 12	0.13 U	0.13 U ± 0.13	0.26 U	0.26 U ± 0.27	0.26 U
CW-SW-02-160627F	27-Jun-16	Cove Wash (Downstream)	4053607.153	666731.839	21.3	21.3 ± 4.6	0.07 U	0.07 U ± 0.11	0.22 U	0.22 U ± 0.25	0.22 U
CW-SW-04-160618F	18-Jun-16	Background (Upstream)	4045547.649	655393.8806	21.2	21.2 ± 4.7	0.39 J	0.39 J ± 0.21	0.5 U	0.5 U ± 0.35	0.39 J
CW-SW-05-160627F	27-Jun-16	Dam (Historical)	4045709.002	658675.5894	50.1	50.1 ± 9.3	0.88 J	0.88 J ± 0.34	0.46 U	0.46 U ± 0.3	0.88 J
CW-SW-07-160628F	28-Jun-16	Cove Wash Middle (Historical)	4047101.942	659123.9337	32	32 ± 6.4	1.28	1.28 ± 0.45	0.24 U	0.24 U ± 0.26	1.28
CW-SW-10-160628F	28-Jun-16	Cottonwood Spring (Seeping capped well)	4049594.436	660198.1416	11.1	11.1 ± 3	0.34 J	0.34 J ± 0.2	0.51 U	0.51 U ± 0.31	0.34 J
CW-SW-11-160621F	21-Jun-16	Cove Wash North	4046373.007	657265.4893	22	22 ± 4.7	0.23 J	0.23 J ± 0.16	0.28 U	0.28 U ± 0.29	0.23 J
CW-SW-12-160627F	27-Jun-16	Cove Wash Middle 3	4044603.441	658812.8183	40.2	40.2 ± 7.7	1.54	1.54 ± 0.51	0.3 U	0.3 U ± 0.27	1.54
CW-SW-13-160623F	23-Jun-16	Cove Wash Middle 3	4043160.908	658957.6858	45.3	45.3 ± 8.6	1.35 J	1.35 J ± 0.46	0.19 U	0.19 U ± 0.28	1.35 J
CW-SW-14-160623F	23-Jun-16	Cove Wash Middle 3E	4042934	659222.0031	15	15 ± 3.6	0.87 J	0.87 J ± 0.33	0.28 U	0.28 U ± 0.31	0.87 J
CW-SW-15-160625F	25-Jun-16	Cove Wash North	4046035	656751.9991	33.3	33.3 ± 6.5	0.35 J	0.35 J ± 0.19	0.26 U	0.26 U ± 0.31	0.35 J
CW-SW-21-160620F	20-Jun-16	Background (Mesa IV Springs)	4043108	655931.0041	4	4 ± 1.5	0.15 U	0.15 U ± 0.13	0.47 U	0.47 U ± 0.32	0.47 U
CW-SW-26-160620F	20-Jun-16	Cove Wash Middle 2 (Historical)	4042501.621	657146.8765	116	116 ± 20	4.3	4.3 ± 1.2	-0.18 U	-0.18 U ± 0.3	4.3
CW-SW-36-160618F	18-Jun-16	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	119	119 ± 20	2	2 ± 0.62	-0.21 U	-0.21 U ± 0.3	2
CW-SW-37-160618F	18-Jun-16	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	60 J	60 J ± 11	2.01	2.01 ± 0.64	0.35 U	0.35 U ± 0.28	2.01
CW-SW-38-160618F	18-Jun-16	Cove Wash Middle (Historical)	4044173	657897.9975	59	59 ± 11	2.73	2.73 ± 0.82	0.55 U	0.55 U ± 0.3	2.73
CW-SW-39-160627F	27-Jun-16	Cove Wash Middle 2	4045453.338	658432.5145	89	89 ± 16	2.16	2.16 ± 0.67	0.43 U	0.43 U ± 0.34	2.16
CW-SW-46-160621F	21-Jun-16	Pine Water Springs	4043788.61	661352.387	3.9	3.9 ± 1.6	0.17 U	0.17 U ± 0.14	0.3 U	0.3 U ± 0.3	0.3 U
CW-SW-47-160617F	17-Jun-16	Cove Wash Middle 3F	4043774.185	659297.1492	186	186 ± 31	3.1	3.1 ± 0.9	0.41 U	0.41 U ± 0.32	3.1
CW-SW-50-160624F	24-Jun-16	Cove Wash Middle 1	4044856.248	657463.1536	116	116 ± 20	5.6	5.6 ± 1.5	0.64 U	0.64 U ± 0.41	5.6
CW-SW-53a-160624F	24-Jun-16	Cove Wash Middle 1 (Near original location)	4044567	656816	140	140 ± 24	8.7	8.7 ± 2.3	-0.06 U	-0.06 U ± 0.34	8.7
CW-SW-54-160624F	24-Jun-16	Cove Wash Middle 1B	4044752.579	656806.108	45.1	45.1 ± 8.4	5.7	5.7 ± 1.6	0.31 U	0.31 U ± 0.37	5.7
CW-SW-56a-160623F	23-Jun-16	Cove Wash Middle 3A (Near original location)	4043135	658979	267	267 ± 44	0.79 J	0.79 J ± 0.32	0.48 U	0.48 U ± 0.37	0.79 J
CW-SW-64-160621F	21-Jun-16	Cove Wash North	4045877	656444	145	145 ± 25	0.81 J	0.81 J ± 0.32	0.3 U	0.3 U ± 0.36	0.81 J
CW-SW-65-160622F	22-Jun-16	Cove Wash Middle 3A	4042362.589	658661.6744	1030	1030 ± 160	2.55	2.55 ± 0.78	0.18 U	0.18 U ± 0.33	2.55
CW-SW-66-160622F	22-Jun-16	Cove Wash Middle 3A	4042362.589	658661.6744	790	790 ± 130	1.04	1.04 ± 0.39	0.37 U	0.37 U ± 0.31	1.04
CW-SW-69-160618F	18-Jun-16	Duplicate of CW-04	4045547.649	655393.8806	22.5	22.5 ± 4.9	0.37 J	0.37 J ± 0.2	0.38 U	0.38 U ± 0.29	0.37 J
CW-SW-70-160617F	17-Jun-16	Cove Wash Middle 3F	4044525.919	659043.2268	45	45 ± 8.4	0.69 J	0.69 J ± 0.29	0.05 U	0.05 U ± 0.26	0.69 J
CW-SW-71-160618F	18-Jun-16	Duplicate of CW-37	4046373.007	657265.4893	119 J	119 J ± 20	1.89	1.89 ± 0.6	0.32 U	0.32 U ± 0.28	1.89
CW-SW-72-160621F	21-Jun-16	Duplicate of CW-11	4046373.007	657265.4893	24.8	24.8 ± 5.2	0.44 J	0.44 J ± 0.23	0.25 U	0.25 U ± 0.29	0.44 J
CW-SW-75-160622F	22-Jun-16	Cove Wash Middle 3D	4041201.219	658764.5801	343	343 ± 56	1.79	1.79 ± 0.58	0.2 U	0.2 U ± 0.3	1.79
CW-SW-81-160629F	29-Jun-16	Cove Wash North	4049882.052	658891.9138	10.6	10.6 ± 2.8	0.07 U	0.07 U ± 0.1	0.31 U	0.31 U ± 0.29	0.31 U

Notes:
EPA = Environmental Protection Age
NCNS = No Current Numeric Standard
NA = Not Applicable
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
pCi/L = picocurie per Liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels
± = plus or minus

Cove Wash Watershed Assessment
2016 Low Flow Sampling Event
Water - Uranium Isotope Results

Sample ID	Sample Date	Sample Information	Northing	Easting	U-233/U-234 (pCi/L)	U-233/U-234 with Total Uncertainty (pCi/L)	U-235/U-236 (pCi/L)	U-235/U-236 with Total Uncertainty (pCi/L)	U-238 (pCi/L)	U-238 with Total Uncertainty (pCi/L)	U total isotope activity without uncertainty (pCi/L)
CW-GW-01G-160628	28-Jun-16	Red Point Dug Well	4050274.524	657301.4036	2.64	2.64 ± 0.49	0.04 J	0.04 J ± 0.029	1.07	1.07 ± 0.23	3.75 J
CW-GW-01G-160628F	28-Jun-16	Red Point Dug Well	4050274.524	657301.4036	2.76	2.76 ± 0.51	0.083 J	0.083 J ± 0.044	1.08	1.08 ± 0.23	3.87 J
CW-SW-01-160627	27-Jun-16	Cove Wash (Downstream)	4051637.55	663372.9034	56.1	56.1 ± 9.4	2.36	2.36 ± 0.46	51.2	51.2 ± 8.6	109.7
CW-SW-01-160627F	27-Jun-16	Cove Wash (Downstream)	4051637.55	663372.9034	47.6	47.6 ± 7.8	1.79	1.79 ± 0.36	42.7	42.7 ± 7	92.1
CW-SW-02-160627	27-Jun-16	Cove Wash (Downstream)	4053607.153	666731.839	13	13 ± 2.2	0.37	0.37 ± 0.1	8.9	8.9 ± 1.5	22.3
CW-SW-02-160627F	27-Jun-16	Cove Wash (Downstream)	4053607.153	666731.839	12.5	12.5 ± 2.1	0.44	0.44 ± 0.11	8.5	8.5 ± 1.4	21.4
CW-SW-04-160618	18-Jun-16	Background (Upstream)	4045547.649	655393.8806	26.9	26.9 ± 4.5	0.93	0.93 ± 0.24	12.2	12.2 ± 2.1	40.0
CW-SW-04-160618F	18-Jun-16	Background (Upstream)	4045547.649	655393.8806	28.8	28.8 ± 4.8	0.61	0.61 ± 0.19	12	12 ± 2.1	41.4
CW-SW-05-160627	27-Jun-16	Dam (Historical)	4045709.002	658675.5894	21.4	21.4 ± 3.6	0.95	0.95 ± 0.21	20.5	20.5 ± 3.4	42.9
CW-SW-05-160627F	27-Jun-16	Dam (Historical)	4045709.002	658675.5894	19.8	19.8 ± 3.3	0.93	0.93 ± 0.21	19.2	19.2 ± 3.2	39.9
CW-SW-07-160628	28-Jun-16	Cove Wash Middle (Historical)	4047101.942	659123.9337	13.2	13.2 ± 2.2	0.57	0.57 ± 0.14	12.2	12.2 ± 2	26.0
CW-SW-07-160628F	28-Jun-16	Cove Wash Middle (Historical)	4047101.942	659123.9337	13.5	13.5 ± 2.2	0.62	0.62 ± 0.15	12.5	12.5 ± 2.1	26.6
CW-SW-10-160628	28-Jun-16	Cottonwood Spring (Seeping capped well)	4049594.436	660198.1416	3.37	3.37 ± 0.6	0.108 J	0.108 J ± 0.049	1.91	1.91 ± 0.36	5.388 J
CW-SW-10-160628F	28-Jun-16	Cottonwood Spring (Seeping capped well)	4049594.436	660198.1416	3.49	3.49 ± 0.66	0.103 J	0.103 J ± 0.056	1.83	1.83 ± 0.38	5.423 J
CW-SW-11-160621	21-Jun-16	Cove Wash North	4046373.007	657265.4893	13.5 J	13.5 J ± 2.3	0.54 J	0.54 J ± 0.16	9.4 J	9.4 J ± 1.6	23.4 J
CW-SW-11-160621F	21-Jun-16	Cove Wash North	4046373.007	657265.4893	13.8	13.8 ± 2.3	0.65	0.65 ± 0.18	10.1	10.1 ± 1.7	24.6
CW-SW-12-160627	27-Jun-16	Cove Wash Middle 3	4044603.441	658812.8183	11.7	11.7 ± 1.9	0.39	0.39 ± 0.11	11	11 ± 1.8	23.1
CW-SW-12-160627F	27-Jun-16	Cove Wash Middle 3	4044603.441	658812.8183	12.3	12.3 ± 2.1	0.6	0.6 ± 0.15	11.6	11.6 ± 2	24.5
CW-SW-13-160623	23-Jun-16	Cove Wash Middle 3	4043160.908	658957.6858	25.6	25.6 ± 4.2	1.2	1.2 ± 0.28	23.9	23.9 ± 4	50.7
CW-SW-13-160623F	23-Jun-16	Cove Wash Middle 3	4043160.908	658957.6858	25.5	25.5 ± 4.2	1.11	1.11 ± 0.28	23.6	23.6 ± 3.9	50.2
CW-SW-14-160623	23-Jun-16	Cove Wash Middle 3E	4042934	659222.0031	9.5	9.5 ± 1.7	0.34	0.34 ± 0.13	8.6	8.6 ± 1.5	18.4
CW-SW-14-160623F	23-Jun-16	Cove Wash Middle 3E	4042934	659222.0031	10.2	10.2 ± 1.8	0.59	0.59 ± 0.18	8.5	8.5 ± 1.5	19.3
CW-SW-15-160625	25-Jun-16	Cove Wash North	4046035	656751.9991	18.5	18.5 ± 3.2	0.58	0.58 ± 0.18	12.8	12.8 ± 2.2	31.9
CW-SW-15-160625F	25-Jun-16	Cove Wash North	4046035	656751.9991	20.7	20.7 ± 3.5	0.61	0.61 ± 0.19	13.5	13.5 ± 2.3	34.8
CW-SW-21-160620	20-Jun-16	Background (Mesa IV Springs)	4043108	655931.0041	2.41	2.41 ± 0.5	0.039 J	0.039 J ± 0.039	1.2	1.2 ± 0.29	3.6 J
CW-SW-21-160620F	20-Jun-16	Background (Mesa IV Springs)	4043108	655931.0041	2.64	2.64 ± 0.54	0.068 U	0.068 U ± 0.062	0.9	0.9 ± 0.24	3.5
CW-SW-26-160620	20-Jun-16	Cove Wash Middle 2 (Historical)	4042501.621	657146.8765	68	68 ± 11	3.32	3.32 ± 0.66	65	65 ± 11	136.3
CW-SW-26-160620F	20-Jun-16	Cove Wash Middle 2 (Historical)	4042501.621	657146.8765	71	71 ± 12	3.71	3.71 ± 0.73	65	65 ± 11	139.7
CW-SW-36-160618	18-Jun-16	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	72	72 ± 12	3	3 ± 0.6	71	71 ± 12	146.0
CW-SW-36-160618F	18-Jun-16	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	76	76 ± 12	3.36	3.36 ± 0.66	73	73 ± 12	152.4
CW-SW-37-160618	18-Jun-16	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	33.9 J	33.9 J ± 5.6	1.5 J	1.5 J ± 0.34	32.6 J	32.6 J ± 5.4	68 J
CW-SW-37-160618F	18-Jun-16	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	37 J	37 J ± 6.2	1.47 J	1.47 J ± 0.35	34.9 J	34.9 J ± 5.8	73.3 J
CW-SW-38-160618	18-Jun-16	Cove Wash Middle (Historical)	4044173	657897.9975	35.5	35.5 ± 5.9	1.73	1.73 ± 0.38	35.2	35.2 ± 5.8	72.4
CW-SW-38-160618F	18-Jun-16	Cove Wash Middle (Historical)	4044173	657897.9975	35.5	35.5 ± 5.9	1.69	1.69 ± 0.38	35.6	35.6 ± 5.9	72.8
CW-SW-39-160627	27-Jun-16	Cove Wash Middle 2	4045453.338	658432.5145	32.9	32.9 ± 5.4	1.26	1.26 ± 0.26	31.1	31.1 ± 5.1	65.3
CW-SW-39-160627F	27-Jun-16	Cove Wash Middle 2	4045453.338	658432.5145	34.9	34.9 ± 5.7	1.92	1.92 ± 0.37	34.5	34.5 ± 5.7	71.3
CW-SW-46-160621	21-Jun-16	Pine Water Springs	4043788.61	661352.387	2.71	2.71 ± 0.56	0.102 J	0.102 J ± 0.069	1.63	1.63 ± 0.37	4.4 J
CW-SW-46-160621F	21-Jun-16	Pine Water Springs	4043788.61	661352.387	2.84	2.84 ± 0.58	0.08 J	0.08 J ± 0.061	1.89	1.89 ± 0.42	4.8 J
CW-SW-47-160617	17-Jun-16	Cove Wash Middle 3F	4043774.185	659297.1492	176	176 ± 31	7.6	7.6 ± 1.5	168	168 ± 30	351.6
CW-SW-47-160617F	17-Jun-16	Cove Wash Middle 3F	4043774.185	659297.1492	170	170 ± 30	7.4	7.4 ± 1.5	163	163 ± 28	340.4
CW-SW-50-160624	24-Jun-16	Cove Wash Middle 1	4044856.248	657463.1536	61	61 ± 10	3.17	3.17 ± 0.63	62	62 ± 10	126.2
CW-SW-50-160624F	24-Jun-16	Cove Wash Middle 1	4044856.248	657463.1536	63	63 ± 10	3	3 ± 0.61	63	63 ± 10	129.0
CW-SW-53a-160624	24-Jun-16	Cove Wash Middle 1 (Near original location)	4044567	656816	66	66 ± 11	3.88	3.88 ± 0.73	66	66 ± 11	135.9
CW-SW-53a-160624F	24-Jun-16	Cove Wash Middle 1 (Near original location)	4044567	656816	79	79 ± 13	3.67	3.67 ± 0.72	79	79 ± 13	161.7
CW-SW-54-160624	24-Jun-16	Cove Wash Middle 1B	4044752.579	656806.108	26.8	26.8 ± 4.6	1.26	1.26 ± 0.32	28.1	28.1 ± 4.8	56.2
CW-SW-54-160624F	24-Jun-16	Cove Wash Middle 1B	4044752.579	656806.108	19.7	19.7 ± 3.3	0.93	0.93 ± 0.24	18.8	18.8 ± 3.2	39.4
CW-SW-56a-160623	23-Jun-16	Cove Wash Middle 3A (Near original location)	4043135	658979	154	154 ± 27	8.9	8.9 ± 1.7	147	147 ± 25	309.9
CW-SW-56a-160623F	23-Jun-16	Cove Wash Middle 3A (Near original location)	4043135	658979	156	156 ± 27	9	9 ± 1.7	148	148 ± 26	313.0
CW-SW-64-160621	21-Jun-16	Cove Wash North	4045877	656444	79	79 ± 13	4.11	4.11 ± 0.78	69	69 ± 11	152.1
CW-SW-64-160621F	21-Jun-16	Cove Wash North	4045877	656444	84	84 ± 14	4.9	4.9 ± 0.91	73	73 ± 12	161.9
CW-SW-65-160622	22-Jun-16	Cove Wash Middle 3A	4042362.589	658661.6744	501	501 ± 83	26.1	26.1 ± 5.4	479	479 ± 79	1006.1
CW-SW-65-160622F	22-Jun-16	Cove Wash Middle 3A	4042362.589	658661.6744	556	556 ± 92	24.5	24.5 ± 5.1	512	512 ± 85	1092.5
CW-SW-66-160622	22-Jun-16	Cove Wash Middle 3A	4042362.589	658661.6744	640	640 ± 110	35.6	35.6 ± 6.8	620	620 ± 100	1295.6
CW-SW-66-160622F	22-Jun-16	Cove Wash Middle 3A	4042362.589	658661.6744	680	680 ± 110	34.3	34.3 ± 6.7	670	670 ± 110	1384.3
CW-SW-69-160618	18-Jun-16	Duplicate of CW-04	4045547.649	655393.8806	28.2	28.2 ± 4.7	1.07	1.07 ± 0.27	11.6	11.6 ± 2	40.9
CW-SW-69-160618F	18-Jun-16	Duplicate of CW-04	4045547.649	655393.8806	25.9	25.9 ± 4.3	0.54	0.54 ± 0.16	10.5	10.5 ± 1.8	36.9
CW-SW-70-160617	17-Jun-16	Cove Wash Middle 3F	4044525.919	659043.2268	26.5	26.5 ± 4.4	1.12	1.12 ± 0.27	22.9	22.9 ± 3.8	50.5
CW-SW-70-160617F	17-Jun-16	Cove Wash Middle 3F	4044525.919	659043.2268	26.7	26.7 ± 4.4	0.98	0.98 ± 0.25	23.8	23.8 ± 4	51.5
CW-SW-71-160618	18-Jun-16	Duplicate of CW-37	4046373.007	657265.4893	72 J	72 J ± 12	3.3 J	3.3 J ± 0.65	72 J	72 J ± 12	147.3 J
CW-SW-71-160618F	18-Jun-16	Duplicate of CW-37	4046373.007	657265.4893	72 J	72 J ± 12	3.27 J	3.27 J ± 0.65	71 J	71 J ± 12	146 J
CW-SW-72-160621	21-Jun-16	Duplicate of CW-11	4046373.007	657265.4893	153 J	153 J ± 26	6.2 J	6.2 J ± 1.8	103 J	103 J ± 18	262 J
CW-SW-72-160621F	21-Jun-16	Duplicate of CW-11	4046373.007	657265.4893	15.2	15.2 ± 2.6	0.84	0.84 ± 0.23	12	12 ± 2.1	28.0
CW-SW-75-160622	22-Jun-16	Cove Wash Middle 3D	4041201.219	658764.5801	200	200 ± 35	7.6	7.6 ± 1.6	177	177 ± 31	384.6
CW-SW-75-160622F	22-Jun-16	Cove Wash Middle 3D	4041201.219	658764.5801	196	196 ± 34	8.3	8.3 ± 1.7	174	174 ± 31	378.3
CW-SW-81-160629	29-Jun-16	Cove Wash North	4049882.052	658891.9138	4.92	4.92 ± 0.84	0.196 J	0.196 J ± 0.066	2.3	2.3 ± 0.42	7.1 J
CW-SW-81-160629F	29-Jun-16	Cove Wash North	4049882.052	658891.9138	5.13	5.13 ± 0.9	0.183 J	0.183 J ± 0.069	2.4	2.4 ± 0.45	7.7 J

Notes:
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
pCi/L = picocurie per Liter
<u>Bold, Underlined and Highlighted</u> = Analytical result exceeds screening levels
± = plus or minus

Cove Wash Watershed Assessment
2017 Spring Snowmelt Sampling Event
Water - Total Metal Results

Sample ID	Sample Date	Sample Information	Northing	Easting	Aluminium (µg/L)	Antimony (µg/L)	Arsenic (µg/L)	Barium (µg/L)	Beryllium (µg/L)	Boron (µg/L)	Cadmium (µg/L)	Calcium (µg/L)	Chromium (µg/L)	Cobalt (µg/L)	Copper (µg/L)	Iron (µg/L)	Lead (µg/L)	Lithium (µg/L)	Magnesium (µg/L)	Manganese (µg/L)	Mercury (µg/L)	Molybdenum (µg/L)	Nickel (µg/L)	Phosphorus (µg/L)	Potassium (µg/L)	Selenium (µg/L)	Silver (µg/L)	Sodium (µg/L)	Strontium (µg/L)	Thallium (µg/L)	Uranium (µg/L)	Vandium (µg/L)	Zinc (µg/L)
Navajo Nation Surface Water Quality Standards - Primary Human Contact Standard (µg/L)					NCNS	747	30	98,000	1,870	126,000	470	NA	NCNS	NCNS	9,330	NA	15	NA	NA	18,667	280	NCNS	18,670	NA	NA	4,670	4,670	NA	NA	75	2,800	NCNS	280,000
Navajo Nation Surface Water Quality Standards - Secondary Human Contact Standard (µg/L)					NCNS	747	280	98,000	1,870	126,000	470	NA	NCNS	NCNS	9,330	NA	15	NA	NA	18,667	280	NCNS	18,670	NA	NA	4,670	4,670	NA	NA	75	2,800	NCNS	280,000
Navajo Nation Surface Water Quality Standards - Fish Consumption (µg/L)					NCNS	640	80	NCNS	85	NCNS	8	NA	NCNS	NCNS	NCNS	NA	NCNS	NA	NA	NCNS	0.15	NCNS	4,600	NA	NA	670	8,000	NA	NA	1	NCNS	NCNS	5,100
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Total Metals					750	NA	NA	NCNS	NCNS	NCNS	NA	NA	NCNS	NCNS	NA	NA	NA	NA	NA	NCNS	2.4	NCNS	NA	NA	NA	33	NA	NA	NA	NA	NCNS	NCNS	NA
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)) - Total Metals					87	NA	NA	NCNS	NCNS	NCNS	NA	NA	NCNS	NCNS	NA	NA	NA	NA	NA	NCNS	0.012	NCNS	NA	NA	NA	2	NCNS	NA	NA	NA	NCNS	NCNS	NA
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) - Total Metals					NCNS	NCNS	200	NCNS	NCNS	2,000	50	NA	1,000	1,000	500	NA	100	NA	NA	NCNS	10	NCNS	NCNS	NA	NA	50	NCNS	NA	NA	NCNS	NCNS	100	25,000
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Total Metals					NCNS	NCNS	2,000	500	NCNS	2,000	50	NA	1,000	5,000	5,000	NA	10,000	NA	NA	10,000	NCNS	50	2,000	NA	NA	20	NCNS	NA	NA	NCNS	NCNS	1,000	10,000
EPA Maximum Contaminant Level - Drinking Water (µg/L)					NA	6	10	2,000	4	NA	5	NA	100	NA	1,300	NA	15	NA	NA	NA	2	NA	NA	NA	NA	50	NA	NA	NA	2	30	NA	NA
CW-GW-01G-170426	04/26/2017	Red Point Dug Well	4050274.524	657301.4036	60 U	6 U	7.9 J	410	1.5 U	180	1.5 U	47,000	3 U	3 U	7.7 J	36 J	0.9 U	53	17,000	3 U	0.06 U	0.67 J	6 U	60 U	1,400	1.5 U	3 U	100,000	1,300	3 U	8.1 J	84	23
CW-SW-01-170426	04/26/2017	Cove Wash (Downstream)	4051637.55	663372.9034	**1,200**	6 U	**11**	150	1.5 U	370	1.5 U	14,000	3 U	3 U	3 U	410	0.9 U	110	7,500	25	0.06 U	5.7	6 U	90 J	5,200	1.5 U	3 U	220,000	590	3 U	**120**	58	6 U
CW-SW-02-170419	04/19/2017	Cove Wash (Downstream)	4053607.153	666731.839	**170 J**	6 U	**16**	130	1.5 U	380	1.5 U	16,000	3 U	3 U	3 U	55 J	13	84	6,600	26	0.06 U J	7	6 U	60 U	3,500	1.6 J	3 U	250,000	710	**3.9 J**	**60 J**	58	6 U
CW-SW-04-170424	04/24/2017	Background (Upstream)	4045547.649	655393.8806	60 U	6 U	4.5 J	280	1.5 U	30 U	1.5 U	150,000	3 U	3 U	3 U	30 U	0.9 U	30	25,000	3 U	0.06 U	1.2	6 U	110 J	4,600	**5.3**	3 U	14,000	1,900	3 U	25	3 U	6 U
CW-SW-05-170418	04/18/2017	Dam (Historical)	4045709.002	658675.5894	60 U	6 U	3 U	310	1.5 U	34 J	1.5 U	79,000	3 U	3 U	3 U	65 J	1 J	37	15,000	30	0.06 U J	4.9	6 U	60 U	3,600	**2.7 J**	3 U	24,000	1,300	**11**	**74**	13	6 U
CW-SW-06-170426	04/26/2017	Cove Wash (Downstream)	4050970.463	659839.728	**150 J**	6 U	5.6 J	230	1.5 U	78 J	1.5 U	56,000	3 U	3 U	3 U	71 J	0.9 U	61	20,000	10	0.06 U	7	6 U	60 U	4,100	**2.4 J**	3 U	65,000	1,300	3 U	**150**	16	6 U
CW-SW-07-170426	04/26/2017	Cove Wash Middle (Historical)	4047101.942	659123.9337	60 U	6 U	4.9 J	290	1.5 U	37 J	1.5 U	78,000	3 U	3 U	3 U	59 J	0.9 U	40	16,000	31	0.06 U	4.4	6 U	130 J	3,200	1.5 U	3 U	31,000	1,300	3 U	**79**	12	6 U
CW-SW-10-170426	04/26/2017	Cottonwood Springs	4049594.436	660198.1416	**15,000**	6 U	10 J	460	1.5 U	170	1.5 U	110,000	11	5 J	12	9,700	12	94	35,000	360	0.06 U	0.8 J	14 J	800	13,000	**11**	3 U	170,000	1,400	3 U	16	60	45
CW-SW-11-170421	04/21/2017	Cove Wash North	4046373.007	657265.4893	**1600 J**	6 U	7 J	200	1.5 U	30 U	1.5 U	73,000	3 U	3 U	3 U	780 J	15	70	15,000	210 J	0.06 U J	1.4	6 U	160 J	3,900	1.9 J	3 U	49,000	1,500	3 U	**38**	8.7 J	12 J
CW-SW-12-170419	04/19/2017	Cove Wash Middle 3	4044603.441	658812.8183	**110 J**	6 U	4.1 J	330	1.5 U	30 U	1.5 U	79,000	3 U	3 U	3 U	94 J	0.9 U	29	13,000	53	0.06 U J	2.7	6 U	60 U	3,100	1.5 U	3 U	17,000	1,200	3 U	**38**	8.8 J	6 U
CW-SW-18-170418	04/19/2017	Background (Cove Wash Middle 1)	4045597.485	658407.8511	85 J	6 U	5.3 J	300	1.5 U	30 U	1.5 U	91,000	3 U	3 U	3 U	38 J	0.9 U	27	33,000	10	0.06 U J	1.6	6 U	60 U	1,800	1.7 J	3 U	27,000	1,100	**3.6 J**	8	7 J	6 U
CW-SW-21-170421	04/21/2017	Background (Mesa IV Springs)	4043108	655931.0041	60 U	6 U	6.6 J	320	1.5 U	30 U	1.5 U	74,000	3 U	3 U	3 U	30 U	0.9 U	13	7,100	7.8 J	0.06 U J	0.3 U	6 U	130 J	1,100	**2.5 J**	3 U	5,600	350	3 U	3.2	3.1 J	6 U
CW-SW-26-170420	04/20/2017	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.8765	**20,000**	6 U	**120**	350	15 U	200	1.5 U	320,000	6.1 J	15	36	17,000	**26**	280	36,000	1,400	**0.064 J**	**270**	20	2,800	21,000	**980**	3 U	160,000	6,400	30 U	**200**	**11000**	84
CW-SW-36-170420	04/20/2017	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.5333	60 U	6 U	3 U	220	1.5 U	30 U	1.5 U	80,000	3 U	3 U	3 U	30 U	0.9 U	71	18,000	19	0.06 U J	22	6 U	60 U	4,400	1.5 U	3 U	51,000	1,600	3 U	**140**	9.7 J	6 U
CW-SW-37-170420	04/20/2017	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.4587	60 U	6 U	3 U	240	1.5 U	30 U	1.5 U	82,000	3 U	3 U	3 U	48 J	0.9 U	64	18,000	28	0.06 U J	19	6 U	60 U	4,600	1.5 U	3 U	51,000	1,700	3 U	**110**	9.2 J	6 U
CW-SW-38-170420	04/20/2017	Historical Sample Area 4 - Cove Wash Middle	4044173	657897.9975	60 U	6 U	3 U	240	1.5 U	30 U	1.5 U	83,000	3 U	3 U	3 U	71 J	0.9 U	61	17,000	75	0.06 U J	24	6 U	60 U	4,300	1.5 U	3 U	51,000	1,700	3 U	**140**	11	6 U
CW-SW-39-170418	04/18/2017	Cove Wash Middle 2	4045453.338	658432.5145	60 U	6 U	6.2 J	240	1.5 U	30 U	1.5 U	93,000	3 U	3 U	3 U	62 J	0.9 U	68	21,000	24	0.06 U J	12	6 U	60 U	3,900	**3.7 J**	3 U	49,000	1,600	**3.8 J**	**210**	20	6 U
CW-SW-46-170419	04/19/2017	Pine Water Springs	4043788.61	661352.387	60 U	6 U	3 U	30 U	1.5 U	30 U	1.5 U	59,000	3 U	3 U	32	170	2.6 J	7 J	9,100	3.4 J	0.06 U J	0.3 U	6 U	60 U	1,300	1.5 U	3 U	5,600	210	3 U	5.4	3	82
CW-SW-47-170419	04/19/2017	Cove Wash Middle 3F	4043774.185	659297.1492	**110 J**	6 U	6.9 J	170	1.5 U	30 U	1.5 U	140,000	3 U	3 U	3 U	77 J	0.9 U	58	30,000	13	0.06 U	3.9	6 U	60 U	3,400	**130**	3 U	21,000	2,300	3 U	**600**	48	6 U
CW-SW-48-170419	04/19/2017	Cove Wash Middle 3	4044446.562	659271.0138	**98 J**	6 U	3 U	270	1.5 U	59 J	1.5 U	61,000	3 U	3 U	3 U	44 J	0.9 U	26	18,000	7 J	0.06 U	0.57 J	6 U	60 U	2,600	1.5 U	3 U	30,000	1,200	3 U	**32**	19	6 U
CW-SW-50-170421	04/21/2017	Cove Wash Middle 1	4044856.248	657463.1536	60 U	6 U	3 U	260	1.5 U	30 U	1.5 U	100,000	3 U	3 U	3 U	30 U	0.9 U	40	13,000	13	0.06 U	5.4	6 U	60 U	2,800	**3 J**	3 U	27,000	1,300	3 U	**230**	26	6 U
CW-SW-51-170421	04/21/2017	Cove Wash Middle 1A	4044944.041	657035.0523	60 U	6 U	5.5 J	190	1.5 U	30 U	1.5 U	120,000	3 U	3 U	3 U	190	0.9 U	25	15,000	5 J	0.06 U	41	6 U	60 U	4,500	1.8 J	3 U	15,000	2,000	3 U	**540**	**140**	6 U
CW-SW-53a-170421	04/21/2017	Cove Wash Middle 1	4044567	656816	60 U	6 U	3 U	300	1.5 U	30 U	1.5 U	120,000	3 U	3 U	3 U	57 J	0.9 U	33	14,000	21	0.06 U	4.3	6 U	160 J	2,800	**4.7 J**	3 U	21,000	1,300	3 U	**190**	18	6 U
CW-SW-54-170421	04/21/2017	Cove Wash Middle 1B	4044752.579	656806.108	60 U	6 U	9.8 J	230	1.5 U	30 U	1.5 U	120,000	3 U	3 U	3 U	170	0.9 U	70	26,000	24	0.06 U	35	6 U	100 J	3,900	**14**	3 U	51,000	2,200	3 U	**640**	**240**	6 U
CW-SW-59-170426	04/26/2017	Background - Cove Wash Tributary 1 (Downstream)	4051574.576	664210.2048	**6,200**	6 U	**15**	160	1.5 U	300	1.5 U	14,000	3.9 J	3 U	3 J	2,900	3.5	67	6,300	45	0.06 U	1.8	6 U	69 J	6,400	1.5 U	3 U	140,000	520	3 U	15	**130**	10
CW-SW-64-170425	04/25/2017	Cove Wash North	4045877	656444	**990**	6 U	**12**	170	1.5 U	36 J	1.5 U	100,000	3 U	3 U	3 U	560	0.9 U	65	20,000	40	0.06 U	6.9	6 U	69 J	5,300	**3.5 J**	3 U	50,000	2,500	3 U	**180**	23	6 U
CW-SW-65-170422	04/22/2017	Cove Wash Middle 3A	4042362.589	658661.6744	**2,700**	6 U	**12**	250	1.5 U	140	1.5 U	150,000	3 U	3 U	4.3 J	1,700	1.6 J	170	32,000	510	0.06 U	**170**	6 U	410	14,000	**94**	3 U	150,000	3,900	**3.5 J**	**1,200**	43	9 J
CW-SW-66-170422	04/22/2017	Cove Wash Middle 3A	4042362.589	658661.6744	67 J	6 U	**11**	180	1.5 U	130	1.5 U	120,000	3 U	3 U	3 U	160	0.9 U	160	29,000	150	0.06 U	**190**	6 U	60 U	13,000	**120**	3 U	140,000	3,600	3 U	**950**	27	6 U
CW-SW-69-170424	04/24/2017	Duplicate of CW-04	4045547.649	655393.8806	60 U	6 U	9.1 J	270	1.5 U	30 U	1.5 U	140,000	3 U	3 U	3 U	30 U	0.9 U	29	24,000	3 U	0.06 U	1.9	6 U	110 J	4,400	**6.7**	3 U	13,000	1,800	**3.2 J**	27	3 U	6 U
CW-SW-70-170419	04/19/2017	Cove Wash Middle 3F	4044525.919	659043.2268	60 U	6 U	5.9 J	250	1.5 U	51 J	1.5 U	62,000	3 U	3 U	3 U	65 J	0.9 U	25	19,000	3 U	0.06 U	0.69 J	6 U	60 U	2,500	2 J	3 U	28,000	1,200	**6.2 J**	**39**	18	6 U
CW-SW-71-170420	04/20/2017	Duplicate of CW-37	4044377.806	657955.4587	60 U	6 U	3 U	250	1.5 U	30 U	1.5 U	82,000	3 U	3 U	3 U	320 J	0.9 U	64	18,000	28	0.06 U	18	6 U	150 J	4,700	1.5 U	3 U	52,000	1,700	3 U	**120**	9 J	6 U
CW-SW-72-170421	04/21/2017	Duplicate of CW-11	4046373.007	657265.4893	60 U	6 U	3 U	150	1.5 U	30 U	1.5 U	68,000	3 U	3 U	3 U	110 J	1.9 J	65	13,000	20 J	0.06 U	1.4	6 U	60 U	3,400	1.5 U	3 U	47,000	1,500	3 U	**39**	4.2 J	6 U
CW-SW-73-170422	04/22/2017	Cove Wash Middle 3D	4042208.541	658769.5923	**15,000**	6 U	10	**530**	1.5 U	52 J	1.5 U	190,000	7.7 J	5.8 J	15	7,900	9.9	88	29,000	400	0.06 U	1.9	10 J	880	12,000	**2.2 J**	3 U	50,000	3,100	**3.4 J**	**110**	36	40
CW-SW-75-170422	04/22/2017	Cove Wash Middle 3D	4041201.219	658764.5801	**290**	6 U	7.9 J	240	1.5 U	76 J	1.5 U	120,000	3 U	3 U	3 U	610	0.9 U	71	21,000	130	0.06 U	14	6 U	130 J	7,100	1.5 U	3 U	53,000	2,300	3 U	**790**	4.6 J	6 U
CW-SW-79-170426	04/26/2017	Duplicate of CW-01G	4050274.524	657301.4036	60 U	6 U	5.3 J	400	1.5 U	170	1.5 U	46,000	3 U	3 U	9.5 J	30 U	2.2 J	52	16,000	3 U	0.06 U	0.66 J	6 U	60 U	1,300	1.5 U	3 U	100,000	1,300	**3.7 J**	7	83	20 J
CW-SW-81-170424	04/24/2017	Cove Wash North	4049882.052	658891.9138	**840**	6 U	8.8 J	320	1.5 U	320	1.5 U	27,000	3 U	3 U	3 U	270	0.9 U	130	11,000	35	0.06 U	4.4	6 U	60 U	4,100	1.5 U	3 U	260,000	1,300	3 U	**37**	44	6 U
CW-SW-82-170424	04/24/2017	Cove Wash Middle 2A	4044047.322	657766.4468	**92 J**	6 U	5.3 J	240	1.5 U	35 J	1.5 U	95,000	3 U	3 U	3 U	54 J	0.9 U	56	16,000	21	0.06 U	1.9	6 U	60 U	4,500	1.5 U	3 U	48,000	1,700	3 U	**64**	7.9 J	6 U
CW-SW-83-170424	04/24/2017	Cove Wash Middle 2A	4044045.08	657643.9635	**240**	6 U	4.5 J	250	1.5 U	31 J	1.5 U	95,000	3 U	3 U	3 U	170	0.9 U	47	14,000	40	0.06 U	1.1	6 U	120 J	4,400	2 J	3 U	37,000	1,600	3 U	**36**	6.1 J	6 U
CW-SW-84-170424	04/24/2017	Cove Wash Middle 2B	4043793.108	657816.7814	60 U	6 U	3 U	240	1.5 U	30 U	1.5 U	100,000	3 U	3 U	3 U	330	0.9 U	40	14,000	380	0.06 U	19	6 U	450	4,500	**4.5 J**	3 U	34,000	1,600	3 U	**250**	47	6 U
CW-SW-85-170424	04/24/2017	Cove Wash Middle 2A	4043732.792	657461.944	**820**	6 U	5 J	370	1.5 U	38 J	1.5 U	120,000	3 U	3 U	3 U	400	0.9 U	43	13,000	130	0.06 U	3	6 U	620	6,000	**2.8 J**	3 U	32,000	1,700	3 U	**65**	5.4 J	6 U
CW-SW-86-170419	04/19/2017	Background - Cove Wash Middle 3 - Unnamed Tributary	4044482.433	659284.4116	60 U	6 U	3 U	280	1.5 U	66 J	1.5 U	57,000	3 U	3 U	3 U	40 J	0.9 U	25	18,000	3 U	0.06 U	0.42 J	6 U	60 U	2,800	1.5 U	3 U	32,000	1,300	3 U	7.4	20	6 U
CW-SW-87-170419	04/19/2017	Background - Cove Wash Middle 3 - Unnamed Tributary	4044365.372	659573.3554	60 U	6 U	3 U	260	1.5 U	55 J	1.5 U	55,000	3 U	3 U	3 U	130	0.9 U	26	17,000	3 U	0.06 U	0.42 J	6 U	60 U	2,200	1.5 U	3 U	33,000	1,100	3 U	6	17	6 U
CW-SW-88-170422	04/22/2017	Background - Cove Wash Middle 3 - Unnamed Tributary	4041663.506	658834.4595	**18,000**	6 U	6.7 J	350	1.5 U	110	1.5 U	110,000	12	5.1 J	8.5 J	5,400	4.5	150	32,000	200	0.06 U	6.9	7.7 J	370	16,000	**15**	3 U	100,000	3,700	3 U	**180**	33	32
CW-SW-89-170422	04/22/2017	Duplicate of CW-66	4042362.589	658661.6744	**130 J**	6 U	8.8 J	180	1.5 U	130	1.5 U	120,000	3 U	3 U	3 U	170	0.9 U	160	29,000	150	0.06 U	**180**	6 U	60 U	14,000	**120**	3 U	140,000	3,600	3 U	**950**	28	6 U
CW-SW-90-170426	04/26/2017	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	**3,200**	6 U	3 U	380	1.5 U	30 U	1.5 U	86,000	3 U	3 U	3 U	1,700	1.8	32	12,000	120	0.06 U	3.1	6 U	110	3,900	**4**	3 U	13,000	1,200	**3.2**	**43**	18	6 U

Notes:
EPA = Environmental Protection Agency
NCNS = No Current Numeric Standard
NA = Not Applicable
NRWQC = Navajo Recommended Water Quality Criteria
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Sample ID	Sample Date	Sample Information	Northing	Easting	Aluminium (µg/L)	Antimony (µg/L)	Arsenic (µg/L)	Barium (µg/L)	Beryllium (µg/L)	Boron (µg/L)	Cadmium (µg/L)	Calcium (µg/L)	Chromium (µg/L)	Cobalt (µg/L)	Copper (µg/L)
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Dissolved Metals					NA	88	340	NA	NA	NA	0.87-7.7*	NA	NA	NA	5.9-50*
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)- Dissolved Metals					NA	30	150	NA	NA	NA	0.13-0.64*	NA	NA	NA	4.3-29*
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) -Dissolved Metals					NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Dissolved Metals					NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CW-GW-01GF-170426	04/26/2017	Red Point Dug Well	4050274.524	657301.4036	60 U	6 U	8 J	400	1.5 U	170	1.5 U	46,000	3 U	3 U	3.3 J
CW-SW-01F-170426	04/26/2017	Cove Wash (Downstream)	4051637.55	663372.9034	280	6 U	9.9 J	140	1.5 U	360	1.5 U	11,000	3 U	3 U	3 U
CW-SW-02F-170419	04/19/2017	Cove Wash (Downstream)	4053607.153	666731.839	60 U	6 U	16	130	1.5 U	370	1.5 U	16,000	3 U	3 U	3 U
CW-SW-04F-170424	04/24/2017	Background (Upstream)	4045547.649	655393.8806	60 U	6 U	8.1 J	270	1.5 U	30 U	1.5 U	140,000	3 U	3 U	3 U
CW-SW-05F-170418	04/18/2017	Dam (Historical)	4045709.002	658675.5894	60 U	6 U	3.1 J	320	1.5 U	30 U	1.5 U	80,000	3 U	3 U	3 U
CW-SW-06F-170426	04/26/2017	Cove Wash (Downstream)	4050970.463	659839.728	60 U	6 U	7.2 J	230	1.5 U	78 J	1.5 U	56,000	3 U	3 U	3 U
CW-SW-07F-170426	04/26/2017	Cove Wash Middle (Historical)	4047101.942	659123.9337	60 U	6 U	6 J	290	1.5 U	38 J	1.5 U	77,000	3 U	3 U	3 U
CW-SW-10F-170426	04/26/2017	Cottonwood Springs	4049594.436	660198.1416	1,300	6 U	12	170	1.5 U	160	1.5 U	50,000	3 U	3 U	4.1 J
CW-SW-11F-170421	04/21/2017	Cove Wash North	4046373.007	657265.4893	60 U	6 U	3 U	150	1.5 U	30 U	1.5 U	68,000	3 U	3 U	3 U
CW-SW-12F-170419	04/19/2017	Cove Wash Middle 3	4044603.441	658812.8183	60 U	6 U	3 U	330	1.5 U	30 U	1.5 U	77,000	3 U	3 U	3 U
CW-SW-18F-170418	04/19/2017	Background (Cove Wash Middle 1)	4045597.485	658407.8511	60 U	6 U	3 U	290	1.5 U	30 U	1.5 U	91,000	3 U	3 U	3 U
CW-SW-21F-170421	04/21/2017	Background (Mesa IV Springs)	4043108	655931.0041	60 U	6 U	3 U	310	1.5 U	30 U	1.5 U	73,000	3 U	3 U	3 U
CW-SW-26F-170420	04/20/2017	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.8765	60 U	6 U	83	150	1.5 U	180	1.5 U	110,000	3 U	3 U	3 U
CW-SW-36F-170420	04/20/2017	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.5333	60 U	6 U	5.4 J	220	1.5 U	30 U	1.5 U	80,000	3 U	3 U	3 U
CW-SW-37F-170420	04/20/2017	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.4587	60 U	6 U	3 U	240	1.5 U	30 U	1.5 U	82,000	3 U	3 U	3 U
CW-SW-38F-170420	04/20/2017	Historical Sample Area 4 - Cove Wash Middle	4044173	657897.9975	60 U	6 U	3 U	230	1.5 U	30 U	1.5 U	82,000	3 U	3 U	3 U
CW-SW-39F-170418	04/18/2017	Cove Wash Middle 2	4045453.338	658432.5145	60 U	6 U	3 U	240	1.5 U	30 U	1.5 U	92,000	3 U	3 U	3 U
CW-SW-46F-170419	04/19/2017	Pine Water Springs	4043788.61	661352.387	60 U	6 U	3 U	30 U	1.5 U	30 U	1.5 U	58,000	3 U	3 U	**30**
CW-SW-47F-170419	04/19/2017	Cove Wash Middle 3F	4043774.185	659297.1492	60 U	6 U	3 U	170	1.5 U	32 J	1.5 U	140,000	3 U	3 U	3 U
CW-SW-48F-170419	04/19/2017	Cove Wash Middle 3	4044446.562	659271.0138	60 U	6 U	3 U	260	1.5 U	57 J	1.5 U	59,000	3 U	3 U	3 U
CW-SW-50F-170421	04/21/2017	Cove Wash Middle 1	4044856.248	657463.1536	60 U	6 U	3 U	260	1.5 U	30 U	1.5 U	99,000	3 U	3 U	3 U
CW-SW-51F-170421	04/21/2017	Cove Wash Middle 1A	4044944.041	657035.0523	60 U	6 U	5.9 J	190	1.5 U	30 U	1.5 U	120,000	3 U	3 U	3 U
CW-SW-53aF-170421	04/21/2017	Cove Wash Middle 1	4044567	656816	60 U	6 U	4.2 J	290	1.5 U	30 U	1.5 U	120,000	3 U	3 U	3 U
CW-SW-54F-170421	04/21/2017	Cove Wash Middle 1B	4044752.579	656806.108	60 U	6 U	5.6 J	220	1.5 U	30 U	1.5 U	120,000	3 U	3 U	3 U
CW-SW-59F-170426	04/26/2017	Background - Cove Wash Tributary 1 (Downstream)	4051574.576	664210.2048	85 J	6 U	12	120	1.5 U	300	1.5 U	10,000	3 U	3 U	3 U
CW-SW-64F-170425	04/25/2017	Cove Wash North	4045877	656444	60 U	6 U	13	160	1.5 U	37 J	1.5 U	98,000	3 U	3 U	3 U
CW-SW-65F-170422	04/22/2017	Cove Wash Middle 3A	4042362.589	658661.6744	60 U	6 U	5.4 J	160	1.5 U	130	1.5 U	120,000	3 U	3 U	3 U
CW-SW-66F-170422	04/22/2017	Cove Wash Middle 3A	4042362.589	658661.6744	60 U	6 U	11	180	1.5 U	130	1.5 U	120,000	3 U	3 U	3 U
CW-SW-69F-170424	04/24/2017	Duplicate of CW-04	4045547.649	655393.8806	60 U	6 U	7.3 J	270	1.5 U	30 U	1.5 U	140,000	3 U	3 U	3 U
CW-SW-70F-170419	04/19/2017	Cove Wash Middle 3F	4044525.919	659043.2268	60 U	6 U	4.7 J	250	1.5 U	51 J	1.5 U	61,000	3 U	3 U	3 U
CW-SW-71F-170420	04/20/2017	Duplicate of CW-37	4044377.806	657955.4587	60 U	6 U	3 U	250	1.5 U	30 U	1.5 U	82,000	3 U	3 U	3 U
CW-SW-72F-170421	04/21/2017	Duplicate of CW-11	4046373.007	657265.4893	60 U	6 U	3.1 J	150	1.5 U	30 U	1.5 U	68,000	3 U	3 U	3 U
CW-SW-73F-170422	04/22/2017	Cove Wash Middle 3D	4042208.541	658769.5923	60 U	6 U	7.4 J	290	1.5 U	41 J	1.5 U	110,000	3 U	3 U	3 U
CW-SW-75F-170422	04/22/2017	Cove Wash Middle 3D	4041201.219	658764.5801	60 U	6 U	5.9 J	220	1.5 U	72 J	1.5 U	110,000	3 U	3 U	3 U
CW-SW-79F-170426	04/26/2017	Duplicate of CW-01G	4050274.524	657301.4036	60 U	6 U	5.8 J	400	1.5 U	170	1.5 U	46,000	3 U	3 U	6.6 J
CW-SW-81F-170424	04/24/2017	Cove Wash North	4049882.052	658891.9138	60 U	6 U	12	300	1.5 U	310	1.5 U	22,000	3 U	3 U	3 U
CW-SW-82F-170424	04/24/2017	Cove Wash Middle 2A	4044047.322	657766.4468	60 U	6 U	3 U	240	1.5 U	33 J	1.5 U	93,000	3 U	3 U	3 U
CW-SW-83F-170424	04/24/2017	Cove Wash Middle 2A	4044045.08	657643.9635	60 U	6 U	3 U	230	1.5 U	30 U	1.5 U	90,000	3 U	3 U	3 U
CW-SW-84F-170424	04/24/2017	Cove Wash Middle 2B	4043793.108	657816.7814	60 U	6 U	3 U	230	1.5 U	30 U	1.5 U	100,000	3 U	3 U	3 U
CW-SW-85F-170424	04/24/2017	Cove Wash Middle 2A	4043732.792	657461.944	60 U	6 U	3 U	320	1.5 U	31 J	1.5 U	110,000	3 U	3 U	3 U
CW-SW-86F-170419	04/19/2017	Background - Cove Wash Middle 3 - Unnamed Tributary	4044482.433	659284.4116	60 U	6 U	5 J	280	1.5 U	66 J	1.5 U	57,000	3 U	3 U	3 U
CW-SW-87F-170419	04/19/2017	Background - Cove Wash Middle 3 - Unnamed Tributary	4044365.372	659573.3554	60 U	6 U	3 U	260	1.5 U	55 J	1.5 U	55,000	3 U	3 U	3 U
CW-SW-88F-170422	04/22/2017	Background - Cove Wash Middle 3 - Unnamed Tributary	4041663.506	658834.4595	60 U	6 U	5.3 J	180	1.5 U	100	1.5 U	77,000	3 U	3 U	3 U
CW-SW-89F-170422	04/22/2017	Duplicate of CW-66	4042362.589	658661.6744	60 U	6 U	8.5 J	180	1.5 U	130	1.5 U	120,000	3 U	3 U	3 U
CW-SW-90F-170426	04/26/2017	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	60 U	6 U	4.9	340	1.5 U	30 U	1.5 U	81,000	3 U	3 U	3 U

Sample ID	Iron (µg/L)	Lead (µg/L)	Lithium (µg/L)	Magnesium (µg/L)	Manganese (µg/L)	Mercury (µg/L)	Molybdenum (µg/L)	Nickel (µg/L)	Phosphorus (µg/L)	Potassium (µg/L)	Selenium (µg/L)	Silver (µg/L)	Sodium (µg/L)	Strontium (µg/L)	Thallium (µg/L)	Uranium (µg/L)	Vandium (µg/L)	Zinc (µg/L)
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Dissolved Metals	NA	25-280*	NA	NA	NA	2.4	NA	225-1513*	NA	NA	NA	1-64*	NA	NA	700	NA	NA	56-380*
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)- Dissolved Metals	NA	0.97-11*	NA	NA	NA	0.012	NA	25-168*	NA	NA	NA	NA	NA	NA	150	NA	NA	57-382*
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) -Dissolved Metals	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Dissolved Metals	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CW-GW-01GF-170426	30 U	0.9 U	52	16,000	3 U	0.06 U	0.55 J	6 U	60 U	1,300	1.7 J	3 U	100,000	1,200	3 U	6.3	81	13
CW-SW-01F-170426	130	0.9 U	110	6,900	6.2 J	0.06 U	5.9	6 U	60 U	4,800	1.5 U	3 U	220,000	570	3 U	120	57	6U
CW-SW-02F-170419	30 U	0.9 U	82	6,500	3.2 J	0.06 U J	100	6 U	60 U	3,300	1.5 U	3 U	250,000	700	3 U	72	58	6U
CW-SW-04F-170424	30 U	0.9 U	30	24,000	3 U	0.06 U	1.2	6 U	110 J	4,600	6.2	3 U	13,000	1,900	5.1 J	24	3U	6U
CW-SW-05F-170418	85 J	0.9 U	37	15,000	37	0.06 U J	4.5	6 U	60 U	3,600	1.5 U	3 U	24,000	1,300	3 U	73	13	6U
CW-SW-06F-170426	30 U	0.9 U	65	21,000	4.6 J	0.06 U	7	6 U	60 U	4,300	1.5 U	3 U	69,000	1,300	3 U	140	17	6U
CW-SW-07F-170426	30 U	0.9 U	39	16,000	26	0.06 U	4.6	6 U	90 J	3,200	1.5 U	3 U	31,000	1,200	6.6 J	80	12	6U
CW-SW-10F-170426	670	1.2 J	73	24,000	55	0.06 U	1.1	6 U	60 U	7,200	10	3 U	170,000	990	3 U	16	33	6U
CW-SW-11F-170421	30 U	2 J	66	13,000	31 J	0.06 U J	1.5	6 U	60 U	3,400	1.5 U	3 U	47,000	1,500	3 U	38	4.4	6U
CW-SW-12F-170419	33 J	0.9 U	29	12,000	40	0.06 U J	2.8	6 U	60 U	3,000	1.5 U	3 U	17,000	1,200	3 U	39	8.2	6U
CW-SW-18F-170418	30 U	0.9 U	27	33,000	5.9 J	0.06 U J	1.5	6 U	60 U	1,800	1.5 U	3 U	26,000	1,100	3 U	8	6.9	6U
CW-SW-21F-170421	30 U	0.9 U	13	6,800	3 U	0.06 U J	0.3 U	6 U	60 U	1,000	1.5 U	3 U	5,500	340	3 U	3.2	3U	6U
CW-SW-26F-170420	87 J	0.9 U	210	18,000	340	0.06 U J	830	6 U	160 J	14,000	890	3 U	150,000	4,300	3 U	180	3700	6U
CW-SW-36F-170420	30 U	0.9 U	69	18,000	15	0.06 U J	20	6 U	110 J	4,400	1.5 U	3 U	50,000	1,600	3 U	150	11	6U
CW-SW-37F-170420	30 U	1.9 J	65	18,000	26	0.06 U J	19	6 U	60 U	4,600	1.5 U	3 U	51,000	1,700	3 U	110	8.4 J	6U
CW-SW-38F-170420	30 U	0.9 U	61	17,000	70	0.06 U J	25	6 U	60 U	4,300	1.5 U	3 U	50,000	1,700	3 U	140	11	6U
CW-SW-39F-170418	42 J	0.9 U	67	21,000	21	0.06 U J	12	6 U	60 U	3,800	1.5 U	3 U	48,000	1,600	3 U	210	18	6U
CW-SW-46F-170419	150	0.9 U	6.9 J	9,000	3.1 J	0.06 U J	0.3 U	6 U	110 J	1,200	1.5 U	3 U	5,600	210	3 U	5.1	3U	73
CW-SW-47F-170419	450	0.9 U	60	30,000	13	0.06 U	3.8	6 U	60 U	3,400	140	3 U	22,000	2,300	4.7 J	600	48	6U
CW-SW-48F-170419	30 U	0.9 U	26	18,000	3.3 J	0.06 U	0.56 J	6 U	60 U	2,600	1.5 U	3 U	30,000	1,200	3 U	31	19	6U
CW-SW-50F-170421	85 J	0.9 U	40	13,000	12	0.06 U	5.4	6 U	60 U	2,700	1.5 U	3 U	26,000	1,300	3 U	230	25	6U
CW-SW-51F-170421	30 U	0.9 U	25	15,000	3.4 J	0.06 U	42	6 U	60 U	4,500	1.5 U	3 U	15,000	2,000	3 U	540	140	6U
CW-SW-53aF-170421	30 U	0.9 U	33	14,000	8.5 J	0.06 U	4	6 U	60 U	2,700	4.4 J	3 U	21,000	1,300	3 U	190	17	6U
CW-SW-54F-170421	240	1.6 J	68	25,000	21	0.06 U	36	6 U	100 J	3,800	21	3 U	50,000	2,200	3 U	640	240	6U
CW-SW-59F-170426	57 J	0.9 U	65	4,200	3 U	0.06 U	2	6 U	60 U	3,900	1.5 U	3 U	140,000	490	3.7 J	15	120	6U
CW-SW-64F-170425	49 J	1 J	63	19,000	16	0.06 U	7.3	6 U	69 J	4,900	2.4 J	3 U	49,000	2,500	4.1 J	180	20	6U
CW-SW-65F-170422	41 J	0.9 U	160	29,000	53	0.06 U	200	6 U	60 U	13,000	95	3 U	140,000	3,600	10	1,300	23	6U
CW-SW-66F-170422	35 J	1.3 J	160	29,000	120	0.06 U	190	6 U	60 U	14,000	120	3 U	140,000	3,600	3 U	950	27	6U
CW-SW-69F-170424	30 U	1.7 J	29	24,000	3 U	0.06 U	1.3	6 U	110 J	4,500	6.2	3 U	13,000	1,800	3 U	24	3U	6U
CW-SW-70F-170419	53 J	0.9 U	25	18,000	3 U	0.06 U	0.6 J	6 U	60 U	2,500	1.5 U	3 U	28,000	1,200	3 U	38	17	6U
CW-SW-71F-170420	150 J	0.9 U	67	18,000	26	0.06 U	19	6 U	60 U	4,800	1.5 U	3 U	52,000	1,700	3 U	120	9 J	6U
CW-SW-72F-170421	36 J	0.9 U	65	13,000	13 J	0.06 U	1.4	6 U	60 U	3,400	1.6 J	3 U	47,000	1,500	3 U	39	4.5 J	6U
CW-SW-73F-170422	30 U	0.9 U	60	19,000	3 U	0.06 U	2.7	6 U	90 J	6,600	4.3 J	3 U	47,000	2,600	3 U	100	4.7 J	6U
CW-SW-75F-170422	30 U	0.9 U	68	20,000	36	0.06 U	14	6 U	60 U	6,800	2.4 J	3 U	51,000	2,200	3 U	780	3U	6U
CW-SW-79F-170426	30 U	0.9 U	52	16,000	3 U	0.06 U	0.67 J	6 U	60 U	1,300	1.5 U	3 U	100,000	1,300	3 U	6.5	80	41
CW-SW-81F-170424	30 U	0.9 U	120	10,000	4.7 J	0.06 U	4.4	6 U	60 U	3,700	1.5 U	3 U	250,000	1,300	4 J	35	42	6U
CW-SW-82F-170424	30 U	0.9 U	55	15,000	11	0.06 U	2	6 U	60 U	4,400	1.5 U	3 U	47,000	1,700	3 U	63	6.5 J	6U
CW-SW-83F-170424	30 U	0.9 U	46	14,000	5.9 J	0.06 U	1.2	6 U	84 J	4,200	3.8 J	3 U	36,000	1,600	3 U	36	4.9 J	6U
CW-SW-84F-170424	110	0.9 U	42	14,000	300	0.06 U	19	6 U	290	4,600	5.7	3 U	36,000	1,600	3.2 J	250	38	6U
CW-SW-85F-170424	30 U	0.9 U	39	12,000	11	0.06 U	1.1	6 U	60 U	5,200	1.5 U	3 U	31,000	1,600	3 U	33	3U	6U
CW-SW-86F-170419	30 U	0.9 U	25	18,000	3 U	0.06 U	0.43 J	6 U	60 U	2,800	1.5 U	3 U	33,000	1,300	3 U	7.7	20	6U
CW-SW-87F-170419	65 J	0.9 U	26	17,000	3 U	0.06 U	0.41 J	6 U	60 U	2,200	1.5 U	3 U	33,000	1,100	3 U	6.2	17	6U
CW-SW-88F-170422	30 U	0.9 U	120	19,000	3 U	0.06 U	8.6	6 U	60 U	12,000	18	3 U	100,000	3,100	4.4 J	180	11	6U
CW-SW-89F-170422	110 J	0.9 U	160	29,000	130	0.06 U	190	6 U	60 U	14,000	120	3 U	140,000	3,600	3 U	960	26	6U
CW-SW-90F-170426	48	0.9 U	29	11,000	50	0.06 U	3.5	6 U	110	2,800	1.5 U	3 U	13,000	1,200	3 U	41	7.5 J	6U

Notes:
NCNS = No Current Numeric Standard
NA = Not Applicable
NRWQC = Navajo Recommended Water Quality Criteria
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
µg/L = microgram per liter
<u>Bold, Underlined and Highlighted</u> = Analytical result exceeds screening levels
* = The value is hardness dependent. Individual exceedances based on the hardness of the water samples are highlighted, bolded, and underlined.

Sample ID	Sample Date	Sample Information	Northing	Easting	Bicarbonate as CaCO3 (µg/L)	Bromide (µg/L)	Carbonate as CaCO3 (µg/L)	Chloride (µg/L)	Fluoride (µg/L)	Total Alkalinity as CaCO3 (µg/L)	Sulfate (µg/L)	Hardness as CaCO3 (µg/L)	Ammonia as N (µg/L)	Nitrate as N (µg/L)
Navajo Nation Surface Water Quality Standards - Secondary Human Contact Standard (µg/L)					NA	NA	NA	NA	NA	NA	NA	NA	NCNS	NA
Navajo Nation Surface Water Quality Standards - Fish Consumption (µg/L)					NA	NA	NA	NA	NCNS	NA	NA	NA	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Dissolved Metals					NA	NA	NA	NA	NCNS	NA	NA	NA	pH and wildlife dependen	NCNS
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)- Dissolved Metals					NA	NA	NA	NA	NCNS	NA	NA	NA	pH and wildlife dependen	NCNS
NRWQC - Aquatic Habitat -Acute (µg/L)- Dissolved Metals					NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NRWQC - Aquatic Habitat -Chronic (µg/L)- Dissolved Metals					NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) -Dissolved Metals					NA	NA	NA	NA	NCNS	NA	NA	NA	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Dissolved Metals					NA	NA	NA	NA	NCNS	NA	NA	NA	NCNS	NCNS
EPA Maximum Contaminant Level - Drinking Water (µg/L)					NA	NA	NA	NA	4,000	NA	NA	NA	NA	10,000
CW-GW-01GF-170426	04/26/2017	Red Point Dug Well	4050274.524	657301.4036	380,000	62 J	20000 U	5,200	210	380,000	14,000	180,000	9 U	150 J
CW-SW-01F-170426	04/26/2017	Cove Wash (Downstream)	4051637.55	663372.9034	460,000	200 J	20000 U	28,000	470	460,000	70,000	56,000	9 U	120 J
CW-SW-02F-170419	04/19/2017	Cove Wash (Downstream)	4053607.153	666731.839	530,000	230	20000 U	24,000	470	530,000	66,000	66,000	10 J	180 J
CW-SW-04F-170424	04/24/2017	Background (Upstream)	4045547.649	655393.8806	400,000	200 U	20000 U	14,000	460	400,000	35,000	460,000	9 U	200 U J
CW-SW-05F-170418	04/18/2017	Dam (Historical)	4045709.002	658675.5894	270,000	200 U	20000 U	9,300	250	270,000	20,000	260,000	9 U	200 U J
CW-SW-06F-170426	04/26/2017	Cove Wash (Downstream)	4050970.463	659839.728	280,000	130 J	20000 U	21,000	340	280,000	53,000	230,000	9 U	200 U
CW-SW-07F-170426	04/26/2017	Cove Wash Middle (Historical)	4047101.942	659123.9337	280,000	80 J	20000 U	10,000	260	280,000	21,000	260,000	9U	110 J
CW-SW-10F-170426	04/26/2017	Cottonwood Springs	4049594.436	660198.1416	370,000	920	20000 U	74,000	170	370,000	100,000	230,000	15 J	170 J
CW-SW-11F-170421	04/21/2017	Cove Wash North	4046373.007	657265.4893	260,000	120 J	20000 U	18,000	250	260,000	36,000	220,000	9 U	200 U J
CW-SW-12F-170419	04/19/2017	Cove Wash Middle 3	4044603.441	658812.8183	250,000	200 U	20000 U	5,800	200	250,000	13,000	240,000	134	200 U J
CW-SW-18F-170418	04/19/2017	Background (Cove Wash Middle 1)	4045597.485	658407.8511	360,000	64 J	20000 U	9,700	240	360,000	16,000	360,000	48 J	110 J
CW-SW-21F-170421	04/21/2017	Background (Mesa IV Springs)	4043108	655931.0041	200,000	89 J	20000 U	6,500	200	200,000	7,200	210,000	9 U	100 J
CW-SW-26F-170420	04/20/2017	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.8765	170,000	110 J	20000 U	19,000	230	170,000	500,000	360,000	288	270 J
CW-SW-36F-170420	04/20/2017	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.5333	310,000	96 J	20000 U	18,000	310	310,000	35,000	270,000	9 U	110 J
CW-SW-37F-170420	04/20/2017	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.4587	320,000	110 J	20000 U	18,000	340	320,000	35,000	280,000	9 U	200 U J
CW-SW-38F-170420	04/20/2017	Historical Sample Area 4 - Cove Wash Middle	4044173	657897.9975	320,000	120 J	20000 U	18,000	360	320,000	34,000	270,000	9 U	200 U J
CW-SW-39F-170418	04/18/2017	Cove Wash Middle 2	4045453.338	658432.5145	330,000	130 J	20000 U	24,000	400	330,000	47,000	310,000	9 U	200 U J
CW-SW-46F-170419	04/19/2017	Pine Water Springs	4043788.61	661352.387	190,000	200 U	20000 U	3,500	100	190,000	4,500	180,000	9 U	120 J
CW-SW-47F-170419	04/19/2017	Cove Wash Middle 3F	4043774.185	659297.1492	370,000	190 J	20000 U	25,000	330	370,000	89,000	480,000	9 U	200 U J
CW-SW-48F-170419	04/19/2017	Cove Wash Middle 3	4044446.562	659271.0138	270,000	200 U	20000 U	5,300	180	270,000	10,000	220,000	9 U	200 U J
CW-SW-50F-170421	04/21/2017	Cove Wash Middle 1	4044856.248	657463.1536	280,000	170 J	20000 U	21,000	290	280,000	40,000	300,000	9 U	110 J
CW-SW-51F-170421	04/21/2017	Cove Wash Middle 1A	4044944.041	657035.0523	290,000	91 J	20000 U	13,000	280	290,000	60,000	350,000	9 J	200 U J
CW-SW-53aF-170421	04/21/2017	Cove Wash Middle 1	4044567	656816	320,000	190 J	20000 U	21,000	330	320,000	47,000	360,000	19 J	150 J
CW-SW-54F-170421	04/21/2017	Cove Wash Middle 1B	4044752.579	656806.108	350,000	340	20000 U	44,000	420	350,000	72,000	400,000	24 J	200 U J
CW-SW-59F-170426	04/26/2017	Background - Cove Wash Tributary 1 (Downstream)	4051574.576	664210.2048	320,000	90 J	20000 U	10,000	430	320,000	30,000	42,000	9 U	160 J
CW-SW-64F-170425	04/25/2017	Cove Wash North	4045877	656444	330,000	87 J	20000 U	16,000	610	330,000	64,000	330,000	9 U	110 J
CW-SW-65F-170422	04/22/2017	Cove Wash Middle 3A	4042362.589	658661.6744	390,000	95 J	20000 U	20,000	460	390,000	320,000	410,000	9 U	120 J
CW-SW-66F-170422	04/22/2017	Cove Wash Middle 3A	4042362.589	658661.6744	400,000	120 J	20000 U	20,000	450	400,000	290,000	410,000	25 J	110 J
CW-SW-69F-170424	04/24/2017	Duplicate of CW-04	4045547.649	655393.8806	380,000	200 U	20000 U	14,000	490	380,000	35,000	450,000	12 J	200 U J
CW-SW-70F-170419	04/19/2017	Cove Wash Middle 3F	4044525.919	659043.2268	260,000	200 U	20000 U	5,400	190	260,000	11,000	230,000	16 J	200 U J
CW-SW-71F-170420	04/20/2017	Duplicate of CW-37	4044377.806	657955.4587	330,000	94 J	20000 U	18,000	340	330,000	35,000	280,000	17 J	110 J
CW-SW-72F-170421	04/21/2017	Duplicate of CW-11	4046373.007	657265.4893	260,000	130 J	20000 U	18,000	260	260,000	35,000	220,000	12 J	200 U J
CW-SW-73F-170422	04/22/2017	Cove Wash Middle 3D	4042208.541	658769.5923	350,000	73 J	20000 U	13,000	410	350,000	62,000	350,000	9 U	150 J
CW-SW-75F-170422	04/22/2017	Cove Wash Middle 3D	4041201.219	658764.5801	390,000	200 U	20000 U	7,500	550	390,000	57,000	370,000	9 U	200 U J
CW-SW-79F-170426	04/26/2017	Duplicate of CW-01G	4050274.524	657301.4036	380,000	200 U	20000 U	5,200	200	380,000	14,000	180,000	9 U	150 J
CW-SW-81F-170424	04/24/2017	Cove Wash North	4049882.052	658891.9138	560,000	210	20000 U	42,000	360	560,000	87,000	96,000	9 U	110 J
CW-SW-82F-170424	04/24/2017	Cove Wash Middle 2A	4044047.322	657766.4468	320,000	110 J	20000 U	20,000	380	320,000	37,000	300,000	9 U	120 J
CW-SW-83F-170424	04/24/2017	Cove Wash Middle 2A	4044045.08	657643.9635	300,000	96 J	20000 U	16,000	370	300,000	31,000	280,000	9 U	200 U
CW-SW-84F-170424	04/24/2017	Cove Wash Middle 2B	4043793.108	657816.7814	320,000	82 J	20000 U	13,000	190	320,000	20,000	310,000	9 U	200 U
CW-SW-85F-170424	04/24/2017	Cove Wash Middle 2A	4043732.792	657461.944	320,000	110 J	20000 U	17,000	300	320,000	34,000	320,000	9 U	200 U
CW-SW-86F-170419	04/19/2017	Background - Cove Wash Middle 3 - Unnamed Tributary	4044482.433	659284.4116	270,000	200 U	20000 U	4,700	170	270,000	8,500	220,000	16 J	200 U J
CW-SW-87F-170419	04/19/2017	Background - Cove Wash Middle 3 - Unnamed Tributary	4044365.372	659573.3554	260,000	200 U	20000 U	5,500	170	260,000	8,800	210,000	324	110 J
CW-SW-88F-170422	04/22/2017	Background - Cove Wash Middle 3 - Unnamed Tributary	4041663.506	658834.4595	360,000	200 U	20000 U	19,000	590	360,000	92,000	270,000	18 J	120 J
CW-SW-89F-170422	04/22/2017	Duplicate of CW-66	4042362.589	658661.6744	380,000	130 J	20000 U	20,000	460	380,000	290,000	410,000	36 J	200 U
CW-SW-90F-170426	04/26/2017	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	240,000	200 U	20000 U	5,700	210	240,000	14,000	250,000	9 U	200 U

Notes:
EPA = Environmental Protection Agency
NCNS = No Current Numeric Standard
NA = Not Applicable
NRWQC = Navajo Recommended Water Quality Criteria
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels
* = The NRWQC assumes a hardness of 100 mg/L

Sample ID	Date	Sample Information	Northing	Easting	Gross Alpha Radiation (pCi/L)	GAR with Total Uncertainty (pCi/L)	Adjusted Total Gross Alpha Radiation (pCi/L)	Radium 226 (pCi/L)	Radium 226 with Total Uncertainty (pCi/L)	Radium 228 (pCi/L)	Radium 228 with Total Uncertainty (pCi/L)	Combined Radium (Radium 226 + Radium 228) (pCi/L)
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (pCi/L)					NA	NA	15	NA	NA	NA	NA	5
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (pCi/L)					NCNS	NCNS	NCNS	NA	NA	NA	NA	5
EPA Maximum Contaminant Level - Drinking Water (pCi/L)					NA	NA	15	NA	NA	NA	NA	5
CW-GW-01G-170426	04/26/2017	Red Point Dug Well	4050274.524	657301.4036	5.4	5.4 ± 1.8	-3.5	0.28 J	0.28 J ± 0.18	0.5 U	0.5 U ± 0.31	0.28 J
CW-SW-01-170426	04/26/2017	Cove Wash (Downstream)	4051637.55	663372.9034	61	61 ± 11	-30.8	0.02 U	0.02 U ± 0.15	0.22 U	0.22 U ± 0.32	0.22 U
CW-SW-02-170419	04/19/2017	Cove Wash (Downstream)	4053607.153	666731.839	19.7	19.7 ± 4.4	-38.4	0.06 U	0.06 U ± 0.11	0.16 U J	0.16 U J ± 0.24	0.16 U J
CW-SW-04-170424	04/24/2017	Background (Upstream)	4045547.649	655393.8806	24.2	24.2 ± 5	-4.9	0.37 J	0.37 J ± 0.23	0.22 U	0.22 U ± 0.3	0.37 J
CW-SW-05-170418	04/18/2017	Dam (Historical)	4045709.002	658675.5894	34	34 ± 6.7	-22.9	1.51	1.51 ± 0.53	0.27 U	0.27 U ± 0.27	1.51
CW-SW-06-170426	04/26/2017	Cove Wash (Downstream)	4050970.463	659839.728	84	84 ± 15	-25.2	0.83 J	0.83 J ± 0.35	0.33 U	0.33 U ± 0.33	0.83 J
CW-SW-07-170426	04/26/2017	Cove Wash Middle (Historical)	4047101.942	659123.9337	45.1	45.1 ± 8.4	-13.5	1.74	1.74 ± 0.61	0.35 U	0.35 U ± 0.29	1.74
CW-SW-10-170426	04/26/2017	Cottonwood Springs	4049594.436	660198.1416	11.5	11.5 ± 3.2	-2.1	1.19	1.19 ± 0.62	0.87 J	0.87 J ± 0.35	2.1 J
CW-SW-11-170421	04/21/2017	Cove Wash North	4046373.007	657265.4893	19.8	19.8 ± 4.4	-11.2	0.62 J	0.62 J ± 0.3	0.11 U	0.11 U ± 0.27	0.62 J
CW-SW-12-170419	04/19/2017	Cove Wash Middle 3	4044603.441	658812.8183	18.3	18.3 ± 4	-12.4	2.11	2.11 ± 0.7	-0.23 U	0.56 U ± 0.23	2.11
CW-SW-18-170418	04/19/2017	Background (Cove Wash Middle 1)	4045597.485	658407.8511	6.4	6.4 ± 2	-1.3	0.39 J	0.39 J ± 0.22	-0.02 UJ	0.54 U J ± 0.23	0.39 J
CW-SW-21-170421	04/21/2017	Background (Mesa IV Springs)	4043108	655931.0041	3.8	3.8 ± 1.5	0.2	0.27 J	0.27 J ± 0.18	0.19 U	0.19 U ± 0.29	0.27 J
CW-SW-26-170420	04/20/2017	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.8765	84	84 ± 15	-63.4	11.6	11.6 ± 3.1	1.4	1.4 ± 0.69	**13**
CW-SW-36-170420	04/20/2017	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.5333	63	63 ± 11	-46.5	3.04	3.04 ± 0.92	0.3 U	0.3 U ± 0.31	3.04
CW-SW-37-170420	04/20/2017	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.4587	52.2	52.2 ± 9.5	-38.2	3.6	3.6 ± 1.1	0.22 U	0.22 U ± 0.3	3.6
CW-SW-38-170420	04/20/2017	Historical Sample Area 4 - Cove Wash Middle	4044173	657897.9975	59	59 ± 11	-40.5	5.3	5.3 ± 1.5	0.5 U	0.5 U ± 0.33	**5.3**
CW-SW-39-170418	04/18/2017	Cove Wash Middle 2	4045453.338	658432.5145	77	77 ± 14	-60.4	2.74	2.74 ± 0.85	0.09 U	0.09 U ± 0.27	2.74
CW-SW-46-170419	04/19/2017	Pine Water Springs	4043788.61	661352.387	5.9	5.9 ± 1.9	1.1	0.25 U	0.25 U ± 0.19	0 U	0.77 U ± 0.33	0.25 U
CW-SW-47-170419	04/19/2017	Cove Wash Middle 3F	4043774.185	659297.1492	248	248 ± 41	-201.5	3.09	3.09 ± 0.93	0.04 U	0.04 U ± 0.59	3.09
CW-SW-48-170419	04/19/2017	Cove Wash Middle 3	4044446.562	659271.0138	16.8	16.8 ± 3.7	-7.2	0.6 J	0.6 J ± 0.29	0.04 U	0.04 U ± 0.27	0.6 J
CW-SW-50-170421	04/21/2017	Cove Wash Middle 1	4044856.248	657463.1536	133	133 ± 23	-25.7	6.1	6.1 ± 1.7	0.16 U	0.16 U ± 0.3	**6.1**
CW-SW-51-170421	04/21/2017	Cove Wash Middle 1A	4044944.041	657035.0523	213	213 ± 35	-174.6	16.5	16.5 ± 4.3	0.24 U	0.24 U ± 0.29	**16.5**
CW-SW-53a-170421	04/21/2017	Cove Wash Middle 1	4044567	656816	63	63 ± 13	-82.2	8.2	8.2 ± 2.2	0.23 U	0.23 U ± 0.29	**8.2**
CW-SW-54-170421	04/21/2017	Cove Wash Middle 1B	4044752.579	656806.108	232	232 ± 38	-168.5	15.8	15.8 ± 4.1	0.23 U	0.23 U ± 0.32	**15.8**
CW-SW-59-170426	04/26/2017	Background - Cove Wash Tributary 1 (Downstream)	4051574.576	664210.2048	14.4	14.4 ± 3.6	-1.7	0.29 U J	0.29 U J ± 0.28	0.53 U	0.53 U ± 0.31	0.53 U
CW-SW-64-170425	04/25/2017	Cove Wash North	4045877	656444	91	91 ± 16	-54.2	0.74 J	0.74 J ± 0.33	0.34 U	0.34 ± 0.28	0.74 J
CW-SW-65-170422	04/22/2017	Cove Wash Middle 3A	4042362.589	658661.6744	770	770 ± 120	-289.9	3.9	3.9 ± 1.2	0.76 J	0.76 J ± 0.33	4.7 J
CW-SW-66-170422	04/22/2017	Cove Wash Middle 3A	4042362.589	658661.6744	507	507 ± 82	-162.5	1.78	1.78 ± 0.61	0.44 U J	0.44 U J ± 0.28	1.78
CW-SW-69-170424	04/24/2017	Duplicate of CW-04	4045547.649	655393.8806	29.2	29.2 ± 5.9	-0.9	0.69 J	0.69 J ± 0.32	-0.06 U	0.66 U ± 0.29	0.69 J
CW-SW-70-170419	04/19/2017	Cove Wash Middle 3F	4044525.919	659043.2268	15.4	15.4 ± 3.5	-46.6	0.89 J	0.89 J ± 0.36	0.06 U	0.06 U ± 0.27	0.89 J
CW-SW-71-170420	04/20/2017	Duplicate of CW-37	4044377.806	657955.4587	53.6	53.6 ± 9.8	-30.8	3.7	3.7 ± 1.1	0.37 U	0.37 U ± 0.31	3.7
CW-SW-72-170421	04/21/2017	Duplicate of CW-11	4046373.007	657265.4893	20.7	20.7 ± 4.4	-10.6	0.37 J	0.37 J ± 0.23	0.47 U	0.47 U ± 0.38	0.37 J
CW-SW-73-170422	04/22/2017	Cove Wash Middle 3D	4042208.541	658769.5923	55	55 ± 11	-496.3	2.35	2.35 ± 0.78	1.09	1.09 ± 0.45	3.44
CW-SW-75-170422	04/22/2017	Cove Wash Middle 3D	4041201.219	658764.5801	458	458 ± 74	-93	3.06	3.06 ± 0.95	0.31 U	0.31 U ± 0.32	3.06
CW-SW-79-170426	04/26/2017	Duplicate of CW-01G	4050274.524	657301.4036	7.4	7.4 ± 2.3	-1.1	0.28 J	0.28 J ± 0.18	0.5 U	0.5 U ± 0.3	0.28 J
CW-SW-81-170424	04/24/2017	Cove Wash North	4049882.052	658891.9138	15.6	15.6 ± 3.7	-29.3	0.33 J	0.33 J ± 0.2	0.36 U	0.36 U ± 0.29	0.33 J
CW-SW-82-170424	04/24/2017	Cove Wash Middle 2A	4044047.322	657766.4468	52.4	52.4 ± 9.7	23.6	4	4 ± 1.2	0.59 U	0.59 U ± 0.39	4
CW-SW-83-170424	04/24/2017	Cove Wash Middle 2A	4044045.08	657643.9635	22.7	22.7 ± 4.7	-131.1	1	1 ± 0.4	0.31 U	0.31 U ± 0.28	1
CW-SW-84-170424	04/24/2017	Cove Wash Middle 2B	4043793.108	657816.7814	116	116 ± 20	-38.0	7.6	7.6 ± 2.1	0.39 U	0.39 U ± 0.34	**7.6**
CW-SW-85-170424	04/24/2017	Cove Wash Middle 2A	4043732.792	657461.944	19.5	19.5 ± 4.3	11.2	0.42 J	0.42 J ± 0.23	0.44 U	0.44 U ± 0.28	0.42 J
CW-SW-86-170419	04/19/2017	Background - Cove Wash Middle 3 - Unnamed Tributary	4044482.433	659284.4116	5.1	5.1 ± 1.8	-2.5	0.25 J	0.25 J ± 0.18	0.03 U	0.03 U ± 0.35	0.25 J
CW-SW-87-170419	04/19/2017	Background - Cove Wash Middle 3 - Unnamed Tributary	4044365.372	659573.3554	4.1	4.1 ± 1.6	-144.9	0.19 U	0.19 U ± 0.16	0.5 U	0.5 U ± 0.33	0.5 U
CW-SW-88-170422	04/22/2017	Background - Cove Wash Middle 3 - Unnamed Tributary	4041663.506	658834.4595	104	104 ± 18	-578.2	0.52 J	0.52 J ± 0.26	0.48 U	0.48 U ± 0.29	0.52 J
CW-SW-89-170422	04/22/2017	Duplicate of CW-66	4042362.589	658661.6744	498	498 ± 81	-184.0	1.75	1.75 ± 0.59	0.6 J	0.6 J ± 0.31	2.35 J
CW-SW-90-170426	04/26/2017	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	44.1	44.1 ± 9	12.6	2.16	2.16 ± 0.69	0.47 U	0.47 U ± 0.3	2.16

Notes:
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NCNS = No Current Numeric Standard
NA = Not Applicable
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
pCi/L = picocurie per Liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels
± = plus or minus

Cove Wash Watershed Assessment
2017 Spring Snowmelt Sampling Event
Water - Dissolved Gross Alpha Radiation and Dissolved Radium Results

Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (pCi/L)					NA	NA	NA	NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (pCi/L)					NCNS	NCNS	NCNS	NCNS	NCNS	NCNS	NCNS
EPA Maximum Contaminant Level - Drinking Water (pCi/L)					NA	NA	NA	NA	NA	NA	NA
Sample ID	Date	Sample Information	Northing	Easting	Gross Alpha Radiation (pCi/L)	GAR with Total Uncertainty (pCi/L)	Radium 226 (pCi/L)	Radium 226 with Total Uncertainty (pCi/L)	Radium 228 (pCi/L)	Radium 228 with Total Uncertainty (pCi/L)	Combined Radium (Radium 226 + Radium 228) (pCi/L)
CW-GW-01GF-170426	04/26/2017	Red Point Dug Well	4050274.524	657301.4036	8.1	8.1 ± 2.4	0.12 U	0.12 U ± 0.13	0.26 U	0.26 U ± 0.31	0.26 U
CW-SW-01F-170426	04/26/2017	Cove Wash (Downstream)	4051637.55	663372.9034	64	64 ± 11	0.23 U	0.23 U ± 0.19	0.29 U	0.29 U ± 0.3	0.29 U
CW-SW-02F-170419	04/19/2017	Cove Wash (Downstream)	4053607.153	666731.839	21.4	21.4 ± 4.6	0.046 U	0.046 U ± 0.099	0.4 U	0.4 U ± 0.29	0.4 U
CW-SW-04F-170424	04/24/2017	Background (Upstream)	4045547.649	655393.8806	29.8	29.8 ± 6	0.23 U	0.23 U ± 0.17	0.67 J	0.67 J ± 0.34	0.67 J
CW-SW-05F-170418	04/18/2017	Dam (Historical)	4045709.002	658675.5894	45.3	45.3 ± 8.4	2.12	2.12 ± 0.69	0.28 U	0.28 U ± 0.27	2.12
CW-SW-06F-170426	04/26/2017	Cove Wash (Downstream)	4050970.463	659839.728	91	91 ± 16	0.56 J	0.56 J ± 0.28	0.5 U	0.5 U ± 0.33	0.56 J
CW-SW-07F-170426	04/26/2017	Cove Wash Middle (Historical)	4047101.942	659123.9337	43.1	43.1 ± 8.1	1.85	1.85 ± 0.65	0.65 J	0.65 J ± 0.33	2.5 J
CW-SW-10F-170426	04/26/2017	Cottonwood Springs	4049594.436	660198.1416	12.5	12.5 ± 3.1	0.21 U	0.21 U ± 0.16	0.53 U	0.53 U ± 0.31	0.53 U
CW-SW-11F-170421	04/21/2017	Cove Wash North	4046373.007	657265.4893	26.6	26.6 ± 5.5	0.41 J	0.41 J ± 0.23	-0.12 UJ	0.2 U ± 0.27	0.41 J
CW-SW-12F-170419	04/19/2017	Cove Wash Middle 3	4044603.441	658812.8183	22.6	22.6 ± 4.8	1.65	1.65 ± 0.56	0.57 U	0.57 U ± 0.23	1.65
CW-SW-18F-170418	04/19/2017	Background (Cove Wash Middle 1)	4045597.485	658407.8511	6.2	6.2 ± 1.9	0.36 J	0.36 J ± 0.21	0.6 U	0.6 U ± 0.25	0.36 J
CW-SW-21F-170421	04/21/2017	Background (Mesa IV Springs)	4043108	655931.0041	3.2	3.2 ± 1.4	0.18 U	0.18 U ± 0.16	0.11 U	0.11 U ± 0.26	0.18 U
CW-SW-26F-170420	04/20/2017	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.8765	110	110 ± 19	5.3	5.3 ± 1.5	0.55 U	0.55 U ± 0.35	5.3
CW-SW-36F-170420	04/20/2017	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.5333	65	65 ± 12	2.97	2.97 ± 0.91	0.57 U	0.57 U ± 0.34	2.97
CW-SW-37F-170420	04/20/2017	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.4587	50	50 ± 9.2	4	4 ± 1.2	0.46 U	0.46 U ± 0.33	4
CW-SW-38F-170420	04/20/2017	Historical Sample Area 4 - Cove Wash Middle	4044173	657897.9975	58	58 ± 11	4.4	4.4 ± 1.3	0.37 U	0.37 U ± 0.3	4.4
CW-SW-39F-170418	04/18/2017	Cove Wash Middle 2	4045453.338	658432.5145	88	88 ± 15	2.38	2.38 ± 0.76	0.13 U	0.13 U ± 0.28	2.38
CW-SW-46F-170419	04/19/2017	Pine Water Springs	4043788.61	661352.387	4.9	4.9 ± 1.7	0.19 U	0.19 U ± 0.17	0.22 U	0.22 U ± 0.29	0.22 U
CW-SW-47F-170419	04/19/2017	Cove Wash Middle 3F	4043774.185	659297.1492	293	293 ± 48	3.4	3.4 ± 1	0.01 U J	0.01 U J ± 0.26	3.4
CW-SW-48F-170419	04/19/2017	Cove Wash Middle 3	4044446.562	659271.0138	17.7	17.7 ± 3.9	0.67 J	0.67 J ± 0.31	0.7 U	0.7 U ± 0.3	0.67 J
CW-SW-50F-170421	04/21/2017	Cove Wash Middle 1	4044856.248	657463.1536	104	104 ± 18	6.1	6.1 ± 1.7	0.22 U	0.22 U ± 0.32	6.1
CW-SW-51F-170421	04/21/2017	Cove Wash Middle 1A	4044944.041	657035.0523	234	234 ± 39	17	17 ± 4.4	0.17 U	0.17 U ± 0.27	17
CW-SW-53aF-170421	04/21/2017	Cove Wash Middle 1	4044567	656816	91	91 ± 16	9	9 ± 2.4	-0.27 U	0.78 U ± 0.32	9
CW-SW-54F-170421	04/21/2017	Cove Wash Middle 1B	4044752.579	656806.108	115	115 ± 20	16.1	16.1 ± 4.2	0.41 U	0.41 U ± 0.37	16.1
CW-SW-59F-170426	04/26/2017	Background - Cove Wash Tributary 1 (Downstream)	4051574.576	664210.2048	Insufficient volume available in drainage for analysis	Insufficient volume available in drainage for analysis	Insufficient volume available in drainage for analysis	Insufficient volume available in drainage for analysis	Insufficient volume available in drainage for analysis	Insufficient volume available in drainage for analysis	Insufficient volume available in drainage for analysis
CW-SW-64F-170426	04/25/2017	Cove Wash North	4045877	656444	100	100 ± 17	0.8 J	0.8 J ±0.34	0.59 J	0.59 J ±0.31	1.4 J
CW-SW-65F-170422	04/22/2017	Cove Wash Middle 3A	4042362.589	658661.6744	850	850 ± 140	1.09	1.09 ± 0.42	0.59 J	0.59 J ± 0.29	1.7 J
CW-SW-66F-170422	04/22/2017	Cove Wash Middle 3A	4042362.589	658661.6744	455	455 ± 74	1.42	1.42 ± 0.51	0.49 U	0.49 U ± 0.28	1.42
CW-SW-69F-170424	04/24/2017	Duplicate of CW-04	4045547.649	655393.8806	25.6	25.6 ± 5.3	0.3 J	0.3 J ± 0.2	0.55 U	0.55 U ± 0.32	0.3 J
CW-SW-70F-170419	04/19/2017	Cove Wash Middle 3F	4044525.919	659043.2268	22.3	22.3 ± 4.7	0.97 J	0.97 J ± 0.38	-0.06 U	0.64 U ± 0.27	0.97 J
CW-SW-71F-170420	04/20/2017	Duplicate of CW-37	4044377.806	657955.4587	52.1	52.1 ± 9.5	3	3 ± 0.92	-0.2 U	0.64 U ± 0.26	3
CW-SW-72F-170421	04/21/2017	Duplicate of CW-11	4046373.007	657265.4893	24.6	24.6 ± 5.1	0.28 J	0.28 J ± 0.2	0.27 U	0.27 U ± 0.3	0.28 J
CW-SW-73F-170422	04/22/2017	Cove Wash Middle 3D	4042208.541	658769.5923	50.4	50.4 ± 9.3	0.73 J	0.73 J ± 0.32	0.21 U	0.21 U ± 0.33	0.73 J
CW-SW-75F-170422	04/22/2017	Cove Wash Middle 3D	4041201.219	658764.5801	496	496 ± 80	1.51	1.51 ± 0.54	0.44 U	0.44 U ± 0.33	1.51
CW-SW-79F-170426	04/26/2017	Duplicate of CW-01G	4050274.524	657301.4036	4.1	4.1 ± 1.5	0.19 U	0.19 U ± 0.16	0.44 U	0.44 U ± 0.31	0.44 U
CW-SW-81F-170424	04/24/2017	Cove Wash North	4049882.052	658891.9138	29.2	29.2 ± 5.8	0.05 U	0.05 U ± 0.15	0.3 U	0.3 U ± 0.29	0.3 U
CW-SW-82F-170424	04/24/2017	Cove Wash Middle 2A	4044047.322	657766.4468	47.7	47.7 ± 8.8	4.6	4.6 ± 1.3	0.16 U	0.16 U ± 0.35	4.6
CW-SW-83F-170424	04/24/2017	Cove Wash Middle 2A	4044045.08	657643.9635	20.9	20.9 ± 4.5	0.61 J	0.61 J ± 0.28	0.4 U	0.4 U ± 0.3	0.61 J
CW-SW-84F-170424	04/24/2017	Cove Wash Middle 2B	4043793.108	657816.7814	131	131 ± 22	5.8	5.8 ± 1.6	-0.07 U	0.81 U ± 0.34	5.8
CW-SW-85F-170424	04/24/2017	Cove Wash Middle 2A	4043732.792	657461.944	17.3	17.3 ± 3.9	0.7 J	0.7 J ± 0.32	0.36 U	0.36 U ± 0.28	0.7 J
CW-SW-86F-170419	04/19/2017	Background - Cove Wash Middle 3 - Unnamed Tributary	4044482.433	659284.4116	6.4	6.4 ± 2	0.34 J	0.34 J ± 0.2	0.33 U	0.33 U ± 0.34	0.34 J
CW-SW-87F-170419	04/19/2017	Background - Cove Wash Middle 3 - Unnamed Tributary	4044365.372	659573.3554	5.2	5.2 ± 1.8	0.23 U	0.23 U ± 0.17	0.26 U	0.26 U ± 0.3	0.26 U
CW-SW-88F-170422	04/22/2017	Background - Cove Wash Middle 3 - Unnamed Tributary	4041663.506	658834.4595	92	92 ± 16	0.45 J	0.45 J ± 0.24	0.5 U	0.5 U ± 0.3	0.45 J
CW-SW-89F-170422	04/22/2017	Duplicate of CW-66	4042362.589	658661.6744	615	615 ± 99	1.37	1.37 ± 0.5	0.13 U	0.13 U ± 0.24	1.37
CW-SW-90F-170426	04/26/2017	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	27	27 ± 5.5	1.56	1.56 ± 0.55	0.48 U	0.48 U ± 0.34	1.56

Notes:
EPA = Environmental Protection Agency
NCNS = No Current Numeric Standard
NA = Not Applicable
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
pCi/L = picocurie per Liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels
± = plus or minus

Sample ID	Sample Date	Sample Information	Northing	Easting	U-233/U-234 (pCi/L)	U-233/U-234 with Total Uncertainty (pCi/L)	U-235/U-236 (pCi/L)	U-235/U-236 with Total Uncertainty (pCi/L)	U-238 (pCi/L)	U-238 with Total Uncertainty (pCi/L)	U total isotope activity without uncertainty (pCi/L)
CW-GW-01G-170426	04/26/2017	Red Point Dug Well	4050274.524	657301.4036	6.2	6.2 ± 1.1	0.095 J	0.095 J ± 0.07	2.56	2.56 ± 0.53	8.855 J
CW-GW-01GF-170426	04/26/2017	Red Point Dug Well	4050274.524	657301.4036	5.5	5.5 ± 1	0.105 J	0.105 J ± 0.07	2.32	2.32 ± 0.49	7.925 J
CW-SW-01-170426	04/26/2017	Cove Wash (Downstream)	4051637.55	663372.9034	48	48 ± 7.9	2.02	2.02 ± 0.44	41.8	41.8 ± 6.9	91.82
CW-SW-01F-170426	04/26/2017	Cove Wash (Downstream)	4051637.55	663372.9034	52.7	52.7 ± 8.8	2.15	2.15 ± 0.47	44.6	44.6 ± 7.4	99.5
CW-SW-02-170419	04/19/2017	Cove Wash (Downstream)	4053607.153	666731.839	33.3	33.3 ± 5.6	1.39	1.39 ± 0.34	23.4	23.4 ± 4	58.1
CW-SW-02F-170419	04/19/2017	Cove Wash (Downstream)	4053607.153	666731.839	32.1	32.1 ± 5.3	1.29	1.29 ± 0.31	21.2	21.2 ± 3.6	54.6
CW-SW-04-170424	04/24/2017	Background (Upstream)	4045547.649	655393.8806	20.3	20.3 ± 3.4	0.51	0.51 ± 0.17	8.3	8.3 ± 1.5	29.1
CW-SW-04F-170424	04/24/2017	Background (Upstream)	4045547.649	655393.8806	20.1	20.1 ± 3.4	0.63	0.63 ± 0.19	8.1	8.1 ± 1.5	28.8
CW-SW-05-170418	04/18/2017	Dam (Historical)	4045709.002	658675.5894	28	28 ± 4.7	1.47	1.47 ± 0.34	27.4	27.4 ± 4.6	56.9
CW-SW-05F-170418	04/18/2017	Dam (Historical)	4045709.002	658675.5894	29.3	29.3 ± 5	1.2	1.2 ± 0.31	27.2	27.2 ± 4.6	57.7
CW-SW-06-170426	04/26/2017	Cove Wash (Downstream)	4050970.463	659839.728	53.9	53.9 ± 8.9	2.34	2.34 ± 0.49	53	53 ± 8.7	109
CW-SW-06F-170426	04/26/2017	Cove Wash (Downstream)	4050970.463	659839.728	54.4	54.4 ± 12	2.33	2.33 ± 0.74	50.6	50.6 ± 8.4	107
CW-SW-07-170426	04/26/2017	Cove Wash Middle (Historical)	4047101.942	659123.9337	29.6	29.6 ± 4.9	1.3	1.3 ± 0.31	27.7	27.7 ± 4.6	59
CW-SW-07F-170426	04/26/2017	Cove Wash Middle (Historical)	4047101.942	659123.9337	29.3	29.3 ± 4.9	1.44	1.44 ± 0.34	28.1	28.1 ± 4.7	59
CW-SW-10-170426	04/26/2017	Cottonwood Springs	4049594.436	660198.1416	8.7	8.7 ± 1.5	0.26	0.26 ± 0.11	4.63	4.63 ± 0.86	14
CW-SW-10F-170426	04/26/2017	Cottonwood Springs	4049594.436	660198.1416	9.6	9.6 ± 1.7	0.25	0.25 ± 0.11	5.6	5.6 ± 1	15
CW-SW-11-170421	04/21/2017	Cove Wash North	4046373.007	657265.4893	17	17 ± 2.9	0.63	0.63 ± 0.19	13.4	13.4 ± 2.3	31
CW-SW-11F-170421	04/21/2017	Cove Wash North	4046373.007	657265.4893	19.2	19.2 ± 3.2	0.74	0.74 ± 0.21	13.5	13.5 ± 2.3	33
CW-SW-12-170419	04/19/2017	Cove Wash Middle 3	4044603.441	658812.8183	15.6	15.6 ± 2.6	0.66	0.66 ± 0.19	14.4	14.4 ± 2.4	31
CW-SW-12F-170419	04/19/2017	Cove Wash Middle 3	4044603.441	658812.8183	14.7	14.7 ± 2.5	0.48	0.48 ± 0.13	13	13 ± 2.2	28
CW-SW-18-170418	04/19/2017	Background (Cove Wash Middle 1)	4045597.485	658407.8511	4.6	4.6 ± 0.86	0.206	0.206 ± 0.097	2.9	2.9 ± 0.58	7.7
CW-SW-18F-170418	04/19/2017	Background (Cove Wash Middle 1)	4045597.485	658407.8511	4.64	4.64 ± 0.87	0.114 J	0.114 J ± 0.073	2.94	2.94 ± 0.59	7.69 J
CW-SW-21-170421	04/21/2017	Background (Mesa IV Springs)	4043108	655931.0041	2.57	2.57 ± 0.53	0.055 U	0.055 U ± 0.052	1.17	1 ± 0.27	3.74
CW-SW-21F-170421	04/21/2017	Background (Mesa IV Springs)	4043108	655931.0041	2.73	2.73 ± 0.56	0.048 U	0.048 U ± 0.047	1.22	1.22 ± 0.3	3.95
CW-SW-26-170420	04/20/2017	cal Sample-W0006-Cove Wash Mid	4042501.621	657146.8765	75	75 ± 12	3.43	3.43 ± 0.68	69	69 ± 11	150
CW-SW-26F-170420	04/20/2017	cal Sample - W005 - Cove Wash M	4042501.621	657146.8765	77	77 ± 13	3.28	3.28 ± 0.71	74	74 ± 13	150
CW-SW-36-170420	04/20/2017	cal Sample - W004 - Cove Wash M	4044602.301	658113.5333	53.7	53.7 ± 8.8	2.87	2.87 ± 0.57	52.9	52.9 ± 8.7	109
CW-SW-36F-170420	04/20/2017	ical Sample Area 4 - Cove Wash M	4044602.301	658113.5333	52.4	52.4 ± 8.6	2.24	2.24 ± 0.47	52.3	52.3 ± 8.6	107
CW-SW-37-170420	04/20/2017	cal Sample-W0006-Cove Wash Mid	4044377.806	657955.4587	44.8	44.8 ± 7.4	2.06	2.06 ± 0.44	43.5	43.5 ± 72	90.4
CW-SW-37F-170420	04/20/2017	cal Sample - W005 - Cove Wash M	4044377.806	657955.4587	41.1	41.1 ± 6.7	2.27	2.27 ± 0.46	39.8	39.8 ± 6.5	83.2
CW-SW-38-170420	04/20/2017	cal Sample - W004 - Cove Wash M	4044173	657897.9975	49.2	49.2 ± 8.1	2.51	2.51 ± 0.51	47.8	47.8 ± 7.8	99.5
CW-SW-38F-170420	04/20/2017	ical Sample Area 4 - Cove Wash M	4044173	657897.9975	49.4	49.4 ± 8.5	2.55	2.55 ± 0.58	50.9	50.9 ± 8.8	103
CW-SW-39-170418	04/18/2017	Cove Wash Middle 2	4045453.338	658432.5145	68	68 ± 12	3.4	3.4 ± 0.72	66	66 ± 11	140
CW-SW-39F-170418	04/18/2017	Cove Wash Middle 2	4045453.338	658432.5145	73	73 ± 12	3.31	3.31 ± 0.68	75	75 ± 13	150
CW-SW-46-170419	04/19/2017	Pine Water Springs	4043788.61	661352.387	3.09	3.09 ± 0.63	0.19 J	0.19 J ± 0.1	1.53	1.53 ± 0.37	4.81 J
CW-SW-46F-170419	04/19/2017	Pine Water Springs	4043788.61	661352.387	3.03	3.03 ± 0.63	0.055 U	0.055 U ± 0.054	1.95	1.95 ± 0.44	4.98
CW-SW-47-170419	04/19/2017	Cove Wash Middle 3F	4043774.185	659297.1492	224 J	224 J ± 42	11.5 J	11.5 J ± 2.4	214 J	214 J ± 40	450 J
CW-SW-47F-170419	04/19/2017	Cove Wash Middle 3F	4043774.185	659297.1492	197	197 ± 35	9.7	9.7 ± 1.9	187	187 ± 33	390
CW-SW-48-170419	04/19/2017	Cove Wash Middle 3	4044446.562	659271.0138	12.7	12.7 ± 2.2	0.55	0.55 ± 0.19	10.7	10.7 ± 1.9	24
CW-SW-48F-170419	04/19/2017	Cove Wash Middle 3	4044446.562	659271.0138	13.5	13.5 ± 2.3	0.45	0.45 ± 0.15	10.1	10.1 ± 1.8	24
CW-SW-50-170421	04/21/2017	Cove Wash Middle 1	4044856.248	657463.1536	78	78 ± 13	3.71	3.71 ± 0.73	77	77 ± 13	160
CW-SW-50F-170421	04/21/2017	Cove Wash Middle 1	4044856.248	657463.1536	79	79 ± 13	4.04	4.04 ± 0.79	80	80 ± 13	160
CW-SW-51-170421	04/21/2017	Cove Wash Middle 1A	4044944.041	657035.0523	182	182 ± 33	8.6	8.6 ± 1.8	197	197 ± 36	390
CW-SW-51F-170421	04/21/2017	Cove Wash Middle 1A	4044944.041	657035.0523	168	168 ± 30	8	8 ± 1.3	174	174 ± 31	350
CW-SW-53a-170421	04/21/2017	Cove Wash Middle 1	4044567	656816	71	71 ± 12	3.24	3.24 ± 0.66	71	71 ± 12	150
CW-SW-53aF-170421	04/21/2017	Cove Wash Middle 1	4044567	656816	65	65 ± 11	2.97	2.97 ± 0.6	66	66 ± 11	130
CW-SW-54-170421	04/21/2017	Cove Wash Middle 1	4044752.579	656806.108	193	193 ± 35	9.5	9.5 ± 1.9	198	198 ± 36	400
CW-SW-54F-170421	04/21/2017	Cove Wash Middle 1	4044752.579	656806.108	218	218 ± 40	11.3	11.3 ± 2.3	216	216 ± 39	450
CW-SW-59-170426	04/26/2017	ind - Cove Wash Tributary 1 (Dow	4051574.576	664210.2048	10.4	10.4 ± 1.9	0.24	0.24 ± 0.12	5.5	5.5 ± 1.1	16
CW-SW-64-170425	04/25/2017	Cove Wash North	4045877	656444	77	77 ± 13	3.17	3.17 ± 0.68	65	65 ± 11	450
CW-SW-64F-170425	04/25/2017	Cove Wash North	4045877	656444	76	76 ± 12	3.64	3.64 ± 0.7	64	64 ± 10	140
CW-SW-65-170422	04/22/2017	Cove Wash Middle 3A	4042362.589	658661.6744	490 J	490 J ± 100	20.9 J	20.9 J ± 4.8	459 J	459 J ± 96	1060 J
CW-SW-65F-170422	04/22/2017	Cove Wash Middle 3A	4042362.589	658661.6744	500 J	500 J ± 110	25.6 J	25.6 J ± 5.8	480 J	480 J ± 100	1010 J
CW-SW-66-170422	04/22/2017	Cove Wash Middle 3A	4042362.589	658661.6744	334 J	334 J ± 64	17.5 J	17.5 J ± 3.7	318 J	318 J ± 61	670 J
CW-SW-66F-170422	04/22/2017	Cove Wash Middle 3A	4042362.589	658661.6744	331 J	331 J ± 64	16.9 J	16.9 J ± 3.6	306 J	306 J ± 59	650 J
CW-SW-69-170424	04/24/2017	Duplicate of CW-04	4045547.649	655393.8806	21.7	21.7 ± 3.6	0.5	0.5 ± 0.16	7.9	7.9 ± 1.4	30
CW-SW-69F-170424	04/24/2017	Duplicate of CW-04	4045547.649	655393.8806	20.3	20.3 ± 3.4	0.57	0.57 ± 0.18	8.1	8.1 ± 1.4	29
CW-SW-70-170419	04/19/2017	Cove Wash Middle 3F	4044525.919	659043.2268	15.5	15.5 ± 2.6	0.43	0.43 ± 0.15	12.9	12.9 ± 2.2	29
CW-SW-70F-170419	04/19/2017	Cove Wash Middle 3F	4044525.919	659043.2268	16.9	16.9 ± 2.9	0.67	0.67 ± 0.2	14.2	14.2 ± 2.4	32
CW-SW-71-170420	04/20/2017	Duplicate of CW-37	4044377.806	657955.4587	41.9	41.9 ± 7	2.16	2.16 ± 0.46	40.3	40.3 ± 6.7	84.4
CW-SW-71F-170420	04/20/2017	Duplicate of CW-37	4044377.806	657955.4587	38.9	38.9 ± 6.4	2.08	2.08 ± 0.43	38.8	38.8 ± 6.3	79.8
CW-SW-72-170421	04/21/2017	Duplicate of CW-11	4046373.007	657265.4893	18.2	18.2 ± 3.1	0.38	0.38 ± 0.14	12.7	12.7 ± 2.2	31
CW-SW-72F-170421	04/21/2017	Duplicate of CW-11	4046373.007	657265.4893	18.2	18.2 ± 3.1	0.72	0.72 ± 0.21	13.5	13.5 ± 2.3	32
CW-SW-73-170422	04/22/2017	Cove Wash Middle 3D	4042208.541	658769.5923	33.1	33.1 ± 5.5	1.26	1.26 ± 0.31	27.6	27.6 ± 4.6	62.0
CW-SW-73F-170422	04/22/2017	Cove Wash Middle 3D	4042208.541	658769.5923	43.8	43.8 ± 7.2	2.07	2.07 ± 0.44	34.5	34.5 ± 5.7	80.4
CW-SW-75-170422	04/22/2017	Cove Wash Middle 3D	4041201.219	658764.5801	285	285 ± 51	12.3	12.3 ± 2.5	254	254 ± 46	551
CW-SW-75F-170422	04/22/2017	Cove Wash Middle 3D	4041201.219	658764.5801	297 J	297 J ± 55	14.7 J	14.7 J ± 3	262 J	262 J ± 49	574 J
CW-SW-79-170426	04/26/2017	Duplicate of CW-01G	4050274.524	657301.4036	5.9	5.9 ± 1.1	0.125 J	0.125 J ± 0.075	2.44	2.44 ± 0.51	8.5 J
CW-SW-79F-170426	04/26/2017	Duplicate of CW-01G	4050274.524	657301.4036	5.13	5.13 ± 0.93	0.132 J	0.132 J ± 0.075	2.42	2.42 ± 0.49	7.68 J
CW-SW-81-170424	04/24/2017	Cove Wash North	4049882.052	658891.9138	22.2	22.2 ± 3.7	0.49	0.49 ± 0.16	12.8	12.8 ± 2.2	44.9
CW-SW-81F-170424	04/24/2017	Cove Wash North	4049882.052	658891.9138	21.5	21.5 ± 3.6	0.47	0.47 ± 0.16	12.4	12.4 ± 2.1	49
CW-SW-82-170424	04/24/2017	Cove Wash Middle 2A	4044047.322	657766.4468	23.9	23.9 ± 4	1.02	1.02 ± 0.26	20	20 ± 3.4	45
CW-SW-82F-170424	04/24/2017	Cove Wash Middle 2A	4044047.322	657766.4468	25	25 ± 4.2	0.93	0.93 ± 0.26	22.8	22.8 ± 3.9	49
CW-SW-83-170424	04/24/2017	Cove Wash Middle 2A	4044045.08	657643.9635	16.2	16.2 ± 2.7	0.58	0.58 ± 0.18	12	12 ± 2.1	29
CW-SW-83F-170424	04/24/2017	Cove Wash Middle 2A	4044045.08	657643.9635	16.9	16.9 ± 2.9	0.71	0.71 ± 0.21	13.6	13.6 ± 2.3	31
CW-SW-84-170424	04/24/2017	Cove Wash Middle 2B	4043793.108	657816.7814	75	75 ± 12	3.78	3.78 ± 0.74	75	75 ± 12	150
CW-SW-84F-170424	04/24/2017	Cove Wash Middle 2B	4043793.108	657816.7814	83	83 ± 14	3.63	3.63 ± 0.75	80	80 ± 14	170
CW-SW-85-170424	04/24/2017	Cove Wash Middle 2A	4043732.792	657461.944	12.6	12.6 ± 2.2	0.56	0.56 ± 0.18	11.1	11.1 ± 1.9	24.3 J
CW-SW-85F-170424	04/24/2017	Cove Wash Middle 2A	4043732.792	657461.944	13.2	13.2 ± 2.2	0.61	0.61 ± 0.18	11.1	11.1 ± 1.9	25
CW-SW-86-170419	04/19/2017	Background - Cove Wash Middle	4044482.433	659284.4116	5.7	5.7 ± 1	0.143 J	0.143 J ± 0.081	2.49	2.49 ± 0.51	8.3 J
CW-SW-86F-170419	04/19/2017	Background - Cove Wash Middle	4044482.433	659284.4116	5.43	5.43 ± 0.98	0.058 U	0.058 U ± 0.055	2.42	2.42 ± 0.49	7.85
CW-SW-87-170419	04/19/2017	Background - Cove Wash Middle	4044365.372	659573.3554	5.28	5.28 ± 0.99	0.144 J	0.144 J ± 0.085	2.13	2.13 ± 0.46	7.55 J
CW-SW-87F-170419	04/19/2017	Background - Cove Wash Middle	4044365.372	659573.3554	5.19	5.19 ± 0.96	0.132 J	0.132 J ± 0.076	2.1	2.1 ± 0.45	7.4 J
CW-SW-88-170422	04/22/2017	Background - Cove Wash Middle	4041663.506	658834.4595	84	84 ± 14	3.02	3.02 ± 0.6	62	62 ± 10	150
CW-SW-88F-170422	04/22/2017	Background - Cove Wash Middle	4041663.506	658834.4595	92	92 ± 15	2.89	2.89 ± 0.63	66	66 ± 11	160
CW-SW-89-170422	04/22/2017	Duplicate of CW-66	4042362.589	658661.6744	340 J	340 J ± 65	14.2 J	14.2 J ± 3	328 J	328 J ± 63	682 J
CW-SW-89F-170422	04/22/2017	Duplicate of CW-66	4042362.589	658661.6744	385 J	385 J ± 80	16.6 J	16.6 J ± 3.9	362 J	362 J ± 75	764 J
CW-SW-90-170426	04/26/2017	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	16.3	16.3 ± 2.8	0.75	0.75 ± 0.21	14.5	14.5 ± 2.5	32
CW-SW-90F-170426	04/26/2017	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	16.7	16.7 ± 2.8	0.72	0.72 ± 0.21	15.5	15.5 ± 2.6	33

Notes:

Coordinates System for Northing/Easting is UTM Zone 12 NAD 83

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J = Compound detected, but result value is approximate.

pCi/L = picocurie per Liter

Bold, Underlined and Highlighted = Analytical result exceeds screening levels

± = plus or minus

APPENDIX D:

WATER SAMPLES – SUMMARY OF RESULTS FOR ANALYTES EXCEEDING SCREENING LEVELS

Navajo Nation Surface Water Quality Standards - Primary Human Contact Standard (µg/L)				2,800	2,800	2,800	2,800
Navajo Nation Surface Water Quality Standards - Secondary Human Contact Standard (µg/L)				2,800	2,800	2,800	2,800
Navajo Nation Surface Water Quality Standards - Fish Consumption (µg/L)				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Total Metals				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)) - Total Metals				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) - Total Metals				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Total Metals				NCNS	NCNS	NCNS	NCNS
EPA Maximum Contaminant Level - Drinking Water (µg/L)				30	30	30	30
Sample ID	Sample Information	Northing	Easting	2015 Low Flow Sampling Event	2016 Spring Snowmelt Sampling Event	2016 Low Flow Sampling Event	2017 Spring Snowmelt Sampling Event
CW-GW-01	Red Point Dug Well	4050237.04	657330.869	7.3	6.8	6.6	8.1 J
CW-01	Cove Wash	4051637.55	663372.902	**130**	**110 J**	**270**	**120**
CW-02	Cove Wash	4053607.153	666731.839	**57**	**63**	**58**	**60 J**
CW-03	Cove Wash South	4047985.628	659997.097	NC	**33**	NC	NC
CW-04	Background	4045556.747	655368.538	1.5	**37**	**34**	25
CW-05	Historical Sample - Area 1 - Dam Surface Sample - Cove Wash Middle	4045700.298	658683.857	**96**	**85**	**120**	**74**
CW-06	Cove Wash (Downstream)	4050970.463	659839.728	NC	NC	NC	**150**
CW-07	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	**110**	**96**	**76**	**79**
CW-09	Cove Wash North	4049315.64	658120.219	NC	**31**	NC	NC
CW-10	Cottonwood Spring	4049586.881	660202.988	20	15	19	16
CW-11	Cove Wash North	4046369.715	657266.457	**43**	**42**	**33**	**38**
CW-12	Cove Wash Middle 3	4044603.441	658812.815	**57**	**49**	**70**	**38**
CW-13	Cove Wash Middle 3	4043160.908	658957.686	**57**	**38**	**67**	NC
CW-14	Cove Wash Middle 3E	4042934	659222	24	17	23	NC
CW-15	Cove Wash North	4046035	656751.9991	NC	NC	**37**	NC
CW-18	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	4.4	6.2	NC	8
CW-21	Background - Mesa IV Springs	4043108	655931	3.7	3.2	3	3.2
CW-22	Duplicate of SW-21	4043108	655931	3.5	NC	NC	NC
CW-26	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	**170**	**170**	**220**	**200**
CW-36	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	**150**	**160**	**210**	**140**
CW-37	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	**110**	**120**	**100**	**110**
CW-38	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	**130**	**140**	**110**	**140**
CW-39	Cove Wash Middle 2	4045453.339	658432.518	**180**	**140 J**	**200**	**210**
CW-40	Duplicated of SW-39	4045453.339	658432.518	**180**	NC	NC	NC
CW-41	Cove Wash Middle 1	4045552	658464	NC	**99**	NC	NC
CW-46	Pine Water Springs	4043788.61	661352.387	5.4	5.7	5.6	5.4
CW-47	Cove Wash Middle 3F	4043727.086	659295.82	NC	**540**	**510**	**600**
CW-48	Cove Wash Middle 3F	4044751.928	656807.090	**210**	7.5	NC	**32**
CW-50	Cove Wash Middle 1	4044856.247	657463.154	**180**	**250**	**180**	**230**
CW-51	Cove Wash Middle 1A	4044944.041	657035.048	**500**	**700**	NC	**540**
CW-53a	Cove Wash Middle 1	4044478	656787	**130**	**110**	**230**	**190**
CW-54	Cove Wash Middle 1B	4044751.928	656807.09	**380**	**580**	**80**	NC
CW-55	Duplicate of CW-39	4044480.534	656337.545	NC	**310 J**	NC	NC
CW-56a	Cove Wash Middle 3A	4043135	658979	NC	**470**	**400**	NC
CW-57	Duplicate of CW-02	4053607.153	666731.839	NC	**66**	NC	NC
CW-58	Cove Wash Middle 1	4044856.247	657463.154	NC	**250**	NC	NC
CW-59	Background - Cove Wash Tributary 1	4051574	664210	NC	17	NC	15
CW-60	Cove Wash between 01 and 02	4051659	664274	NC	**86**	NC	NC
CW-62	Downstream of Dam	4046378	658785	NC	**83**	NC	NC
CW-64	Cove Wash North between CW-15 and CW-16	4045877	656444	NC	**250**	**210**	**180**
CW-65	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	NC	**1600**	**1600**	**1,200**
CW-66	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	NC	**1400**	**2000**	**950**
CW-67	Cove Wash Middle 3	4044603.441	658812.815	NC	**45**	NC	NC
CW-68	Duplicate of CW-67	4044603.441	658812.815	NC	**48**	NC	NC
CW-69	Duplicate of CW-04	4045547.649	655393.8806	NC	NC	**37**	27
CW-70	Cove Wash Middle 3F	4044525.919	659043.2268	NC	NC	**73**	**39**
CW-71	Duplicate of CW-37	4044377.806	657955.4587	NC	NC	**220**	**120**
CW-72	Duplicate of CW-11	4046373.007	657265.4893	NC	NC	**36**	**39**
CW-73	Cove Wash Middle 3D	4042208.541	658769.5923	NC	NC	NC	**110**
CW-75	Cove Wash Middle 3D	4041201.219	658764.5801	NC	NC	**540**	**790**
CW-79	Duplicate of CW-01G	4050274.524	657301.4036	NC	NC	NC	7
CW-81	Cove Wash North	4049882.052	658891.9138	NC	NC	16	**37**
CW-82	Cove Wash Middle 2A	4044047.322	657766.4468	NC	NC	NC	**64**
CW-83	Cove Wash Middle 2A	4044045.08	657643.9635	NC	NC	NC	**36**
CW-84	Cove Wash Middle 2B	4043793.108	657816.7814	NC	NC	NC	**250**
CW-85	Cove Wash Middle 2A	4043732.792	657461.944	NC	NC	NC	**65**
CW-86	Background - Cove Wash Middle 3 - Unnamed Tributary	4044482.433	659284.4116	NC	NC	NC	7.4
CW-87	Background - Cove Wash Middle 3 - Unnamed Tributary	4044365.372	659573.3554	NC	NC	NC	6
CW-88	Background - Cove Wash Middle 3 - Unnamed Tributary	4041663.506	658834.4595	NC	NC	NC	**180**
CW-89	Duplicate of CW-66	4042362.589	658661.6744	NC	NC	NC	**950**
CW-90	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	NC	NC	NC	**43**

Cove Wash Watershed Assessment
Appendix D-2
Total Aluminum Results

Sample ID	Sample Information	Northing	Easting	2015 Low Flow Sampling Event	2016 Spring Snowmelt Sampling Event	2016 Low Flow Sampling Event	2017 Spring Snowmelt Sampling Event
Navajo Nation Surface Water Quality Standards - Primary Human Contact Standard (µg/L)				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Secondary Human Contact Standard (µg/L)				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Fish Consumption (µg/L)				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Total Metals				750	750	750	750
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)) - Total Metals				87	87	87	87
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) - Total Metals				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Total Metals				NCNS	NCNS	NCNS	NCNS
EPA Maximum Contaminant Level - Drinking Water (µg/L)				NA	NA	NA	NA
CW-GW-01	Red Point Dug Well	4050237.04	657330.869	NC	32 U	32 U	60 U
CW-01	Cove Wash	4051637.55	663372.902	NC	**840**	**790**	**1,200**
CW-02	Cove Wash	4053607.153	666731.839	NC	**270**	**1800**	**170 J**
CW-03	Cove Wash South	4047985.628	659997.097	NC	**110000**	NC	NC
CW-04	Background	4045556.747	655368.538	NC	**480**	**490 J**	60 U
CW-05	Historical Sample - Area 1 - Dam Surface Sample - Cove Wash Middle	4045700.298	658683.857	NC	**190 J**	32 U	60 U
CW-06	Cove Wash (Downstream)	4050970.463	659839.728	NC	NC	NC	**150 J**
CW-07	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	NC	**93 J**	32 U	60 U
CW-09	Cove Wash North	4049315.64	658120.219	NC	**140000**	NC	NC
CW-10	Cottonwood Spring	4049586.881	660202.988	NC	**2800**	**22000**	**15,000**
CW-11	Cove Wash North	4046369.715	657266.457	NC	**150 J**	32 U	**1600 J**
CW-12	Cove Wash Middle 3	4044603.441	658812.815	NC	**540**	76 J	**110 J**
CW-13	Cove Wash Middle 3	4043160.908	658957.686	NC	**310**	**160 J**	NC
CW-14	Cove Wash Middle 3E	4042934	659222	NC	**310**	**140 J**	NC
CW-15	Cove Wash North	4046035	656751.9991	NC	NC	**260**	NC
CW-18	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	NC	32 U	NC	85 J
CW-21	Background - Mesa IV Springs	4043108	655931	NC	32 U	32 U	60 U
CW-22	Duplicate of SW-21	4043108	655931	NC	NC	NC	NC
CW-26	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	NC	**260**	**14000**	**20,000**
CW-36	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	NC	32 U	**120 J**	60 U
CW-37	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	NC	32 U	32 U	60 U
CW-38	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	NC	32 U	39 J	60 U
CW-39	Cove Wash Middle 2	4045453.339	658432.518	NC	36 J	41 J	60 U
CW-40	Duplicated of SW-39	4045453.339	658432.518	NC	NC	NC	NC
CW-41	Cove Wash Middle 1	4045552	658464	NC	**97 J**	NC	NC
CW-46	Pine Water Springs	4043788.61	661352.387	NC	**380**	32 U	60 U
CW-47	Cove Wash Middle 3F	4043727.086	659295.82	NC	**440**	32 U	**110 J**
CW-48	Cove Wash Middle 3F	4044751.928	656807.090	NC	**310**	NC	**98 J**
CW-50	Cove Wash Middle 1	4044856.247	657463.154	NC	32 U	32 U	60 U
CW-51	Cove Wash Middle 1A	4044944.041	657035.048	NC	**520**	NC	60 U
CW-53a	Cove Wash Middle 1	4044478	656787	NC	**110 J**	**900**	60 U
CW-54	Cove Wash Middle 1B	4044751.928	656807.09	NC	49 J	**470**	60 U
CW-55	Duplicate of CW-39	4044480.534	656337.545	NC	32 U	NC	NC
CW-56a	Cove Wash Middle 3A	4043135	658979	NC	**240**	38 J	NC
CW-57	Duplicate of CW-02	4053607.153	666731.839	NC	**340**	NC	NC
CW-58	Cove Wash Middle 1	4044856.247	657463.154	NC	32 U	NC	NC
CW-59	Background - Cove Wash Tributary 1	4051574	664210	NC	**13000**	NC	**6,200**
CW-60	Cove Wash between 01 and 02	4051659	664274	NC	**10000**	NC	NC
CW-62	Downstream of Dam	4046378	658785	NC	**930**	NC	NC
CW-64	Cove Wash North between CW-15 and CW-16	4045877	656444	NC	32 U	**270**	**990**
CW-65	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	NC	**420**	**4400**	**2,700**
CW-66	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	NC	**650**	**320**	67 J
CW-67	Cove Wash Middle 3	4044603.441	658812.815	NC	**490**	NC	NC
CW-68	Duplicate of CW-67	4044603.441	658812.815	NC	**570**	NC	NC
CW-69	Duplicate of CW-04	4045547.649	655393.8806	NC	NC	**750 J**	60 U
CW-70	Cove Wash Middle 3F	4044525.919	659043.2268	NC	NC	**360**	60 U
CW-71	Duplicate of CW-37	4044377.806	657955.4587	NC	NC	**170 J**	60 U
CW-72	Duplicate of CW-11	4046373.007	657265.4893	NC	NC	59 J	60 U
CW-73	Cove Wash Middle 3D	4042208.541	658769.5923	NC	NC	NC	**15,000**
CW-75	Cove Wash Middle 3D	4041201.219	658764.5801	NC	NC	**670**	**290**
CW-79	Duplicate of CW-01G	4050274.524	657301.4036	NC	NC	NC	60 U
CW-81	Cove Wash North	4049882.052	658891.9138	NC	NC	**1800**	**840**
CW-82	Cove Wash Middle 2A	4044047.322	657766.4468	NC	NC	NC	**92 J**
CW-83	Cove Wash Middle 2A	4044045.08	657643.9635	NC	NC	NC	**240**
CW-84	Cove Wash Middle 2B	4043793.108	657816.7814	NC	NC	NC	60 U
CW-85	Cove Wash Middle 2A	4043732.792	657461.944	NC	NC	NC	**820**
CW-86	Background - Cove Wash Middle 3 - Unnamed Tributary	4044482.433	659284.4116	NC	NC	NC	60 U
CW-87	Background - Cove Wash Middle 3 - Unnamed Tributary	4044365.372	659573.3554	NC	NC	NC	60 U
CW-88	Background - Cove Wash Middle 3 - Unnamed Tributary	4041663.506	658834.4595	NC	NC	NC	**18,000**
CW-89	Duplicate of CW-66	4042362.589	658661.6744	NC	NC	NC	**130 J**
CW-90	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	NC	NC	NC	**3,200**

Notes:
EPA = Environmental Protection Agency
NA = Not Applicable
NC = Not Collected
NRWQC = Navajo Recommended Water Quality Criteria
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Cove Wash Watershed Assessment
Appendix D-3
Total Adjusted Gross Alpha Radiation

Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (pCi/L)				15	15	15	15
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (pCi/L)				NCNS	NCNS	NCNS	NCNS
EPA Maximum Contaminant Level - Drinking Water (pCi/L)				15	15	15	15
Sample ID	Sample Information	Northing	Easting	2015 Low Flow Sampling Event	2016 Spring Snowmelt Sampling Event	2016 Low Flow Sampling Event	2017 Spring Snowmelt Sampling Event
CW-GW-01	Red Point Dug Well	4050237.04	657330.869	-4.438	-3.696	1.95 J	-3.5
CW-01	Cove Wash	4051637.55	663372.902	4.37	-58.66	-56.66	-30.8
CW-02	Cove Wash	4053607.153	666731.839	-12.24	-42.8	1.63	-38.4
CW-03	Cove Wash South	4047985.628	659997.097	NC	-14	NC	NC
CW-04	Background	4045556.747	655368.538	**21.22**	-13.06	-21.53	-4.9
CW-05	orical Sample - Area 1 - Dam Surface Sample - Cove Wash M	4045700.298	658683.857	-25.53	-29.71	**23.15**	-22.9
CW-06	Cove Wash (Downstream)	4050970.463	659839.728	NC	NC	NC	-25.2
CW-07	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	-28.4	-36.06	11.33	-13.5
CW-09	Cove Wash North	4049315.64	658120.219	NC	-4.32	NC	NC
CW-10	Cottonwood Spring	4049586.881	660202.988	-2	-6.88	2.0 J	-2.1
CW-11	Cove Wash North	4046369.715	657266.457	-10.15	-5.81	-3.7 J	-11.2
CW-12	Cove Wash Middle 3	4044603.441	658812.815	4.19	-13.38	8.81	-12.4
CW-13	Cove Wash Middle 3	4043160.908	658957.686	-5.41	-13.95	-7.8	NC
CW-14	Cove Wash Middle 3E	4042934	659222	-3.5	-6.3	-2.74	NC
CW-15	Cove Wash North	4046035	656751.9991	NC	NC	-7.48	NC
CW-18	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	-3.072	1.569	NC	-1.3
CW-21	Background - Mesa IV Springs	4043108	655931	-0.427	-0.398	0.2 J	0.2
CW-22	Duplicate of SW-21	4043108	655931	-3.43	NC	NC	NC
CW-26	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	-28.14	-2.8	-33.32	-63.4
CW-36	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	-26.39	-58.11	-52	-46.5
CW-37	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	-14.92	-39.37	-26.4 J	-38.2
CW-38	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	-28.19	-26.99	-16.43	-40.5
CW-39	Cove Wash Middle 2	4045453.339	658432.518	-58.34	-54.22	23.74	-60.4
CW-40	Duplicated of SW-39	4045453.339	658432.518	-49.38	NC	NC	NC
CW-41	Cove Wash Middle 1	4045552	658464	NC	-80.01	NC	NC
CW-46	Pine Water Springs	4043788.61	661352.387	-1.475	-2.332	0.8 J	1.1
CW-47	Cove Wash Middle 3F	4043727.086	659295.82	NC	-168.7	-167.6	-201.5
CW-48	Cove Wash Middle 3F	4044751.928	656807.090	-53.52	-3.01	NC	-7.2
CW-50	Cove Wash Middle 1	4044856.247	657463.154	-59.91	-37.71	-36.17	-25.7
CW-51	Cove Wash Middle 1A	4044944.041	657035.048	-58.2	-95.9	NC	-174.6
CW-53a	Cove Wash Middle 1	4044478	656787	-43.15	-30.74	-22.88	-82.2
CW-54	Cove Wash Middle 1B	4044751.928	656807.09	-126.5	-219.4	-5.56	-168.5
CW-55	Duplicate of CW-39	4044480.534	656337.545	NC	-50.52	NC	NC
CW-56a	Cove Wash Middle 3A	4043135	658979	NC	-85.4	-137.9	NC
CW-57	Duplicate of CW-02	4053607.153	666731.839	NC	-6.54	NC	NC
CW-58	Cove Wash Middle 1	4044856.247	657463.154	NC	-49.21	NC	NC
CW-59	Background - Cove Wash Tributary 1	4051574	664210	NC	-1.681	NC	-1.7
CW-60	Cove Wash between 01 and 02	4051659	664274	NC	-14.83	NC	NC
CW-62	Downstream of Dam	4046378	658785	NC	-33.27	NC	NC
CW-64	Cove Wash North between CW-15 and CW-16	4045877	656444	NC	-73.28	-22.11	-54.2
CW-65	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	NC	-583.3	-480.1	-289.9
CW-66	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	NC	-468.8	-565.6	-162.5
CW-67	Cove Wash Middle 3	4044603.441	658812.815	NC	-11.15	NC	NC
CW-68	Duplicate of CW-67	4044603.441	658812.815	NC	-8.23	NC	NC
CW-69	Duplicate of CW-04	4045547.649	655393.8806	NC	NC	-17.47	-0.9
CW-70	Cove Wash Middle 3F	4044525.919	659043.2268	NC	NC	-4.72	-46.6
CW-71	Duplicate of CW-37	4044377.806	657955.4587	NC	NC	-63.3 J	-30.8
CW-72	Duplicate of CW-11	4046373.007	657265.4893	NC	NC	-239 J	-10.6
CW-73	Cove Wash Middle 3D	4042208.541	658769.5923	NC	NC	NC	-496.3
CW-75	Cove Wash Middle 3D	4041201.219	658764.5801	NC	NC	-190.6	-93
CW-79	Duplicate of CW-01G	4050274.524	657301.4036	NC	NC	NC	-1.1
CW-81	Cove Wash North	4049882.052	658891.9138	NC	NC	2.4 J	-29.3
CW-82	Cove Wash Middle 2A	4044047.322	657766.4468	NC	NC	NC	23.6
CW-83	Cove Wash Middle 2A	4044045.08	657643.9635	NC	NC	NC	-131.1
CW-84	Cove Wash Middle 2B	4043793.108	657816.7814	NC	NC	NC	-38.0
CW-85	Cove Wash Middle 2A	4043732.792	657461.944	NC	NC	NC	11.2
CW-86	Background - Cove Wash Middle 3 - Unnamed Tributary	4044482.433	659284.4116	NC	NC	NC	-2.5
CW-87	Background - Cove Wash Middle 3 - Unnamed Tributary	4044365.372	659573.3554	NC	NC	NC	-144.9
CW-88	Background - Cove Wash Middle 3 - Unnamed Tributary	4041663.506	658834.4595	NC	NC	NC	-578.2
CW-89	Duplicate of CW-66	4042362.589	658661.6744	NC	NC	NC	-184.0
CW-90	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	NC	NC	NC	12.6

Notes:
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J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Navajo Nation Surface Water Quality Standards - Primary Human Contact Standard (µg/L)				30	30	30	30
Navajo Nation Surface Water Quality Standards - Secondary Human Contact Standard (µg/L)				280	280	280	280
Navajo Nation Surface Water Quality Standards - Fish Consumption (µg/L)				80	80	80	80
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Total Metals				NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)) - Total Metals				NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) - Total Metals				200	200	200	200
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Total Metals				2,000	2,000	2,000	2,000
EPA Maximum Contaminant Level - Drinking Water (µg/L)				10	10	10	10
Sample ID	Sample Information	Northing	Easting	2015 Low Flow Sampling Event	2016 Spring Snowmelt Sampling Event	2016 Low Flow Sampling Event	2017 Spring Snowmelt Sampling Event
CW-GW-01	Red Point Dug Well	4050237.04	657330.869	9.3 J	8.3 J	4.9 J	7.9 J
CW-01	Cove Wash	4051637.55	663372.902	**19**	8.7 J	**14**	**11**
CW-02	Cove Wash	4053607.153	666731.839	**15**	**19**	**20**	**16**
CW-03	Cove Wash South	4047985.628	659997.097	NC	**20**	NC	NC
CW-04	Background	4045556.747	655368.538	**18**	9.6 J	5.6 J	4.5 J
CW-05	orical Sample - Area 1 - Dam Surface Sample - Cove Wash Mi	4045700.298	658683.857	7 J	3.9 U	**11**	3 U
CW-06	Cove Wash (Downstream)	4050970.463	659839.728	NC	NC	NC	5.6 J
CW-07	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	9.3 J	3.9 U	3.9 U	4.9 J
CW-09	Cove Wash North	4049315.64	658120.219	NC	**22**	NC	NC
CW-10	Cottonwood Spring	4049586.881	660202.988	**18**	3.9 U	**16**	10 J
CW-11	Cove Wash North	4046369.715	657266.457	6.6 J	3.9 U	4.4 J	7 J
CW-12	Cove Wash Middle 3	4044603.441	658812.815	8.3 J	3.9 U	5.2 J	4.1 J
CW-13	Cove Wash Middle 3	4043160.908	658957.686	5.4 U	3.9 U	3.9 U	NC
CW-14	Cove Wash Middle 3E	4042934	659222	9.4 J	3.9 U	3.9 U	NC
CW-15	Cove Wash North	4046035	656751.9991	NC	NC	3.9 U	NC
CW-18	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	5.4 U	3.9 U	NC	5.3 J
CW-21	Background - Mesa IV Springs	4043108	655931	5.4 U	3.9 U	3.9 U	6.6 J
CW-22	Duplicate of SW-21	4043108	655931	5.4 U	NC	NC	NC
CW-26	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	**89**	**70**	**98**	**120**
CW-36	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	9 J	3.9 U	3.9 U	3 U
CW-37	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	7.4 J	3.9 U	3.9 U	3 U
CW-38	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	5.4 U	3.9 U	3.9 U	3 U
CW-39	Cove Wash Middle 2	4045453.339	658432.518	8 J	3.9 U	6.3 J	6.2 J
CW-40	Duplicated of SW-39	4045453.339	658432.518	6.7 J	NC	NC	NC
CW-41	Cove Wash Middle 1	4045552	658464	NC	3.9 U	NC	NC
CW-46	Pine Water Springs	4043788.61	661352.387	5.4 U	3.9 U	3.9 U	3 U
CW-47	Cove Wash Middle 3F	4043727.086	659295.82	NC	3.9 U	7.4 J	6.9 J
CW-48	Cove Wash Middle 3F	4044751.928	656807.090	**14**	8.4 J	NC	3 U
CW-50	Cove Wash Middle 1	4044856.247	657463.154	5.4 U	8 J	3.9 U	3 U
CW-51	Cove Wash Middle 1A	4044944.041	657035.048	**15**	8.9 J	NC	5.5 J
CW-53a	Cove Wash Middle 1	4044478	656787	8.5 J	3.9 U	3.9 U	3 U
CW-54	Cove Wash Middle 1B	4044751.928	656807.09	**12**	4.6 J	**16**	9.8 J
CW-55	Duplicate of CW-39	4044480.534	656337.545	NC	3.9 U	NC	NC
CW-56a	Cove Wash Middle 3A	4043135	658979	NC	3.9 U	6.9 J	NC
CW-57	Duplicate of CW-02	4053607.153	666731.839	NC	**18**	NC	NC
CW-58	Cove Wash Middle 1	4044856.247	657463.154	NC	3.9 U	NC	NC
CW-59	Background - Cove Wash Tributary 1	4051574	664210	NC	9.9 J	NC	**15**
CW-60	Cove Wash between 01 and 02	4051659	664274	NC	**12**	NC	NC
CW-62	Downstream of Dam	4046378	658785	NC	3.9 U	NC	NC
CW-64	Cove Wash North between CW-15 and CW-16	4045877	656444	NC	9.1 J	8.9 J	**12**
CW-65	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	NC	6.1 J	**11**	**12**
CW-66	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	NC	9.5 J	**19**	**11**
CW-67	Cove Wash Middle 3	4044603.441	658812.815	NC	3.9 U	NC	NC
CW-68	Duplicate of CW-67	4044603.441	658812.815	NC	3.9 U	NC	NC
CW-69	Duplicate of CW-04	4045547.649	655393.8806	NC	NC	8.5 J	9.1 J
CW-70	Cove Wash Middle 3F	4044525.919	659043.2268	NC	NC	5.5 J	5.9 J
CW-71	Duplicate of CW-37	4044377.806	657955.4587	NC	NC	3.9 U	3 U
CW-72	Duplicate of CW-11	4046373.007	657265.4893	NC	NC	4.5 J	3 U
CW-73	Cove Wash Middle 3D	4042208.541	658769.5923	NC	NC	NC	10
CW-75	Cove Wash Middle 3D	4041201.219	658764.5801	NC	NC	7.4 J	7.9 J
CW-79	Duplicate of CW-01G	4050274.524	657301.4036	NC	NC	NC	5.3 J
CW-81	Cove Wash North	4049882.052	658891.9138	NC	NC	8.2 J	8.8 J
CW-82	Cove Wash Middle 2A	4044047.322	657766.4468	NC	NC	NC	5.3 J
CW-83	Cove Wash Middle 2A	4044045.08	657643.9635	NC	NC	NC	4.5 J
CW-84	Cove Wash Middle 2B	4043793.108	657816.7814	NC	NC	NC	3 U
CW-85	Cove Wash Middle 2A	4043732.792	657461.944	NC	NC	NC	5 J
CW-86	Background - Cove Wash Middle 3 - Unnamed Tributary	4044482.433	659284.4116	NC	NC	NC	3 U
CW-87	Background - Cove Wash Middle 3 - Unnamed Tributary	4044365.372	659573.3554	NC	NC	NC	3 U
CW-88	Background - Cove Wash Middle 3 - Unnamed Tributary	4041663.506	658834.4595	NC	NC	NC	6.7 J
CW-89	Duplicate of CW-66	4042362.589	658661.6744	NC	NC	NC	8.8 J
CW-90	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	NC	NC	NC	3 U

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Navajo Nation Surface Water Quality Standards - Primary Human Contact Standard (µg/L)				98,000	98,000	98,000	98,000
Navajo Nation Surface Water Quality Standards - Secondary Human Contact Standard (µg/L)				98,000	98,000	98,000	98,000
Navajo Nation Surface Water Quality Standards - Fish Consumption (µg/L)				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Total Metals				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)) - Total Metals				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) - Total Metals				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Total Metals				500	500	500	500
EPA Maximum Contaminant Level - Drinking Water (µg/L)				2,000	2,000	2,000	2,000
Sample ID	Sample Information	Northing	Easting	2015 Low Flow Sampling Event	2016 Spring Snowmelt Sampling Event	2016 Low Flow Sampling Event	2017 Spring Snowmelt Sampling Event
CW-GW-01	Red Point Dug Well	4050237.04	657330.869	370	380	370	410
CW-01	Cove Wash	4051637.55	663372.902	280	160	150	150
CW-02	Cove Wash	4053607.153	666731.839	140	120	120	130
CW-03	Cove Wash South	4047985.628	659997.097	NC	**4700**	NC	NC
CW-04	Background	4045556.747	655368.538	210	300	300	280
CW-05	orical Sample - Area 1 - Dam Surface Sample - Cove Wash Mi	4045700.298	658683.857	290	280	260	310
CW-06	Cove Wash (Downstream)	4050970.463	659839.728	NC	NC	NC	230
CW-07	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	290	250	320	290
CW-09	Cove Wash North	4049315.64	658120.219	NC	**2200**	NC	NC
CW-10	Cottonwood Spring	4049586.881	660202.988	**1300**	160	**1100**	460
CW-11	Cove Wash North	4046369.715	657266.457	180	130	160	200
CW-12	Cove Wash Middle 3	4044603.441	658812.815	340	340	340	330
CW-13	Cove Wash Middle 3	4043160.908	658957.686	430	360	390	NC
CW-14	Cove Wash Middle 3E	4042934	659222	460	380	430	NC
CW-15	Cove Wash North	4046035	656751.9991	NC	NC	180	NC
CW-18	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	310	270	NC	300
CW-21	Background - Mesa IV Springs	4043108	655931	310	320	310	320
CW-22	Duplicate of SW-21	4043108	655931	310	NC	NC	NC
CW-26	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	110	98 J	310	350
CW-36	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	260	220	200	220
CW-37	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	270	240	220	240
CW-38	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	260	230	250	240
CW-39	Cove Wash Middle 2	4045453.339	658432.518	280	250	270	240
CW-40	Duplicated of SW-39	4045453.339	658432.518	290	NC	NC	NC
CW-41	Cove Wash Middle 1	4045552	658464	NC	240	NC	NC
CW-46	Pine Water Springs	4043788.61	661352.387	9.8 J	25 J	11 J	30 U
CW-47	Cove Wash Middle 3F	4043727.086	659295.82	NC	180	170	170
CW-48	Cove Wash Middle 3F	4044751.928	656807.090	190	260	NC	270
CW-50	Cove Wash Middle 1	4044856.247	657463.154	280	230	260	260
CW-51	Cove Wash Middle 1A	4044944.041	657035.048	190	160	NC	190
CW-53a	Cove Wash Middle 1	4044478	656787	290	190	310	300
CW-54	Cove Wash Middle 1B	4044751.928	656807.09	200	200	220	230
CW-55	Duplicate of CW-39	4044480.534	656337.545	NC	210	NC	NC
CW-56a	Cove Wash Middle 3A	4043135	658979	NC	260	260	NC
CW-57	Duplicate of CW-02	4053607.153	666731.839	NC	120	NC	NC
CW-58	Cove Wash Middle 1	4044856.247	657463.154	NC	230	NC	NC
CW-59	Background - Cove Wash Tributary 1	4051574	664210	NC	270	NC	160
CW-60	Cove Wash between 01 and 02	4051659	664274	NC	200	NC	NC
CW-62	Downstream of Dam	4046378	658785	NC	330	NC	NC
CW-64	Cove Wash North between CW-15 and CW-16	4045877	656444	NC	150	200	170
CW-65	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	NC	200	300	250
CW-66	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	NC	220	170	180
CW-67	Cove Wash Middle 3	4044603.441	658812.815	NC	320	NC	NC
CW-68	Duplicate of CW-67	4044603.441	658812.815	NC	320	NC	NC
CW-69	Duplicate of CW-04	4045547.649	655393.8806	NC	NC	310	270
CW-70	Cove Wash Middle 3F	4044525.919	659043.2268	NC	NC	280	250
CW-71	Duplicate of CW-37	4044377.806	657955.4587	NC	NC	200	250
CW-72	Duplicate of CW-11	4046373.007	657265.4893	NC	NC	170	150
CW-73	Cove Wash Middle 3D	4042208.541	658769.5923	NC	NC	NC	**530**
CW-75	Cove Wash Middle 3D	4041201.219	658764.5801	NC	NC	270	240
CW-79	Duplicate of CW-01G	4050274.524	657301.4036	NC	NC	NC	400
CW-81	Cove Wash North	4049882.052	658891.9138	NC	NC	270	320
CW-82	Cove Wash Middle 2A	4044047.322	657766.4468	NC	NC	NC	240
CW-83	Cove Wash Middle 2A	4044045.08	657643.9635	NC	NC	NC	250
CW-84	Cove Wash Middle 2B	4043793.108	657816.7814	NC	NC	NC	240
CW-85	Cove Wash Middle 2A	4043732.792	657461.944	NC	NC	NC	370
CW-86	Background - Cove Wash Middle 3 - Unnamed Tributary	4044482.433	659284.4116	NC	NC	NC	280
CW-87	Background - Cove Wash Middle 3 - Unnamed Tributary	4044365.372	659573.3554	NC	NC	NC	260
CW-88	Background - Cove Wash Middle 3 - Unnamed Tributary	4041663.506	658834.4595	NC	NC	NC	350
CW-89	Duplicate of CW-66	4042362.589	658661.6744	NC	NC	NC	180
CW-90	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	NC	NC	NC	380
CW-GW-01	Red Point Dug Well	4050237.04	657330.869	370	380	370	410

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J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Sample ID	Sample Information	Northing	Easting	2015 Low Flow Sampling Event	2016 Spring Snowmelt Sampling Event	2016 Low Flow Sampling Event	2017 Spring Snowmelt Sampling Event
Navajo Nation Surface Water Quality Standards - Primary Human Contact Standard (µg/L)				1,870	1,870	1,870	1,870
Navajo Nation Surface Water Quality Standards - Secondary Human Contact Standard (µg/L)				1,870	1,870	1,870	1,870
Navajo Nation Surface Water Quality Standards - Fish Consumption (µg/L)				85	85	85	85
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Total Metals				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)) - Total Metals				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) - Total Metals				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Total Metals				NCNS	NCNS	NCNS	NCNS
EPA Maximum Contaminant Level - Drinking Water (µg/L)				4	4	4	4
CW-GW-01	Red Point Dug Well	4050237.04	657330.869	0.51 U	0.48 U	0.48 U	1.5 U
CW-01	Cove Wash	4051637.55	663372.902	1.4 J	0.48 U	0.48 U	1.5 U
CW-02	Cove Wash	4053607.153	666731.839	1.6 J	0.48 U	0.48 U	1.5 U
CW-03	Cove Wash South	4047985.628	659997.097	NC	**<u>6.7</u>**	NC	NC
CW-04	Background	4045556.747	655368.538	1.2 J	0.48 U	0.48 U	1.5 U
CW-05	orical Sample - Area 1 - Dam Surface Sample - Cove Wash M	4045700.298	658683.857	0.51 U	0.48 U	0.48 U	1.5 U
CW-06	Cove Wash (Downstream)	4050970.463	659839.728	NC	NC	NC	1.5 U
CW-07	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	0.51 U	0.48 U	0.48 U	1.5 U
CW-09	Cove Wash North	4049315.64	658120.219	NC	**<u>5.9</u>**	NC	NC
CW-10	Cottonwood Spring	4049586.881	660202.988	2.2 J	0.48 U	1.4 J	1.5 U
CW-11	Cove Wash North	4046369.715	657266.457	0.51 U	0.48 U	0.48 U	1.5 U
CW-12	Cove Wash Middle 3	4044603.441	658812.815	0.51 U	0.48 U	0.48 U	1.5 U
CW-13	Cove Wash Middle 3	4043160.908	658957.686	0.51 U	0.48 U	0.48 U	NC
CW-14	Cove Wash Middle 3E	4042934	659222	0.51 U	0.48 U	0.48 U	NC
CW-15	Cove Wash North	4046035	656751.9991	NC	NC	0.48 U	NC
CW-18	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	0.51 U	0.48 U	NC	1.5 U
CW-21	Background - Mesa IV Springs	4043108	655931	0.51 U	0.48 U	0.48 U	1.5 U
CW-22	Duplicate of SW-21	4043108	655931	0.51 U	NC	NC	NC
CW-26	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	0.51 U	0.48 U	4.8 U	15 U
CW-36	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	0.51 U	0.48 U	0.48 U	1.5 U
CW-37	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	0.51 U	0.48 U	0.48 U	1.5 U
CW-38	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	0.51 U	0.48 U	0.48 U	1.5 U
CW-39	Cove Wash Middle 2	4045453.339	658432.518	0.51 U	0.48 U	0.48 U	1.5 U
CW-40	Duplicated of SW-39	4045453.339	658432.518	0.51 U	NC	NC	NC
CW-41	Cove Wash Middle 1	4045552	658464	NC	0.48 U	NC	NC
CW-46	Pine Water Springs	4043788.61	661352.387	0.51 U	0.48 U	0.48 U	1.5 U
CW-47	Cove Wash Middle 3F	4043727.086	659295.82	NC	0.48 U	0.48 U	1.5 U
CW-48	Cove Wash Middle 3F	4044751.928	656807.090	0.51 U	0.48 U	NC	1.5 U
CW-50	Cove Wash Middle 1	4044856.247	657463.154	0.51 U	0.48 U	0.48 U	1.5 U
CW-51	Cove Wash Middle 1A	4044944.041	657035.048	0.51 U	0.48 U	NC	1.5 U
CW-53a	Cove Wash Middle 1	4044478	656787	0.51 U	0.48 U	0.48 U	1.5 U
CW-54	Cove Wash Middle 1B	4044751.928	656807.09	0.51 U	0.48 U	0.48 U	1.5 U
CW-55	Duplicate of CW-39	4044480.534	656337.545	NC	0.48 U	NC	NC
CW-56a	Cove Wash Middle 3A	4043135	658979	NC	0.48 U	NC	NC
CW-57	Duplicate of CW-02	4053607.153	666731.839	NC	0.48 U	NC	NC
CW-58	Cove Wash Middle 1	4044856.247	657463.154	NC	0.48 U	NC	NC
CW-59	Background - Cove Wash Tributary 1	4051574	664210	NC	0.52 J	NC	1.5 U
CW-60	Cove Wash between 01 and 02	4051659	664274	NC	0.48 U	NC	NC
CW-62	Downstream of Dam	4046378	658785	NC	0.48 U	NC	NC
CW-64	Cove Wash North between CW-15 and CW-16	4045877	656444	NC	0.48 U	0.48 U	1.5 U
CW-65	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	NC	0.48 U	0.48 U	1.5 U
CW-66	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	NC	0.48 U	0.48 U	1.5 U
CW-67	Cove Wash Middle 3	4044603.441	658812.815	NC	0.48 U	NC	NC
CW-68	Duplicate of CW-67	4044603.441	658812.815	NC	0.48 U	NC	NC
CW-69	Duplicate of CW-04	4045547.649	655393.8806	NC	NC	0.48 U	1.5 U
CW-70	Cove Wash Middle 3F	4044525.919	659043.2268	NC	NC	0.48 U	1.5 U
CW-71	Duplicate of CW-37	4044377.806	657955.4587	NC	NC	0.48 U	1.5 U
CW-72	Duplicate of CW-11	4046373.007	657265.4893	NC	NC	0.48 U	1.5 U
CW-73	Cove Wash Middle 3D	4042208.541	658769.5923	NC	NC	NC	1.5 U
CW-75	Cove Wash Middle 3D	4041201.219	658764.5801	NC	NC	0.48 U	1.5 U
CW-79	Duplicate of CW-01G	4050274.524	657301.4036	NC	NC	NC	1.5 U
CW-81	Cove Wash North	4049882.052	658891.9138	NC	NC	0.48 U	1.5 U
CW-82	Cove Wash Middle 2A	4044047.322	657766.4468	NC	NC	NC	1.5 U
CW-83	Cove Wash Middle 2A	4044045.08	657643.9635	NC	NC	NC	1.5 U
CW-84	Cove Wash Middle 2B	4043793.108	657816.7814	NC	NC	NC	1.5 U
CW-85	Cove Wash Middle 2A	4043732.792	657461.944	NC	NC	NC	1.5 U
CW-86	Background - Cove Wash Middle 3 - Unnamed Tributary	4044482.433	659284.4116	NC	NC	NC	1.5 U
CW-87	Background - Cove Wash Middle 3 - Unnamed Tributary	4044365.372	659573.3554	NC	NC	NC	1.5 U
CW-88	Background - Cove Wash Middle 3 - Unnamed Tributary	4041663.506	658834.4595	NC	NC	NC	1.5 U
CW-89	Duplicate of CW-66	4042362.589	658661.6744	NC	NC	NC	1.5 U
CW-90	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	NC	NC	NC	1.5 U

Notes:
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J = Compound detected, but result value is approximate.
µg/L = microgram per liter
<u>Bold, Underlined and Highlighted</u> = Analytical result exceeds screening levels

Navajo Nation Surface Water Quality Standards - Primary Human Contact Standard (µg/L)				15	15	15	15
Navajo Nation Surface Water Quality Standards - Secondary Human Contact Standard (µg/L)				15	15	15	15
Navajo Nation Surface Water Quality Standards - Fish Consumption (µg/L)				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Total Metals				NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)) - Total Metals				NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) - Total Metals				100	100	100	100
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Total Metals				10,000	10,000	10,000	10,000
EPA Maximum Contaminant Level - Drinking Water (µg/L)				15	15	15	15
Sample ID	Sample Information	Northing	Easting	2015 Low Flow Sampling Event	2016 Spring Snowmelt Sampling Event	2016 Low Flow Sampling Event	2017 Spring Snowmelt Sampling Event
CW-GW-01	Red Point Dug Well	4050237.04	657330.869	2.2 U	2.2 U	2.2 U	0.9 U
CW-01	Cove Wash	4051637.55	663372.902	2.5 J	2.2 U	2.2 U	0.9 U
CW-02	Cove Wash	4053607.153	666731.839	2.2 U	2.2 U	2.2 U	13
CW-03	Cove Wash South	4047985.628	659997.097	NC	**76**	NC	NC
CW-04	Background	4045556.747	655368.538	7.4	2.2 U	2.2 U	0.9 U
CW-05	orical Sample - Area 1 - Dam Surface Sample - Cove Wash Mi	4045700.298	658683.857	2.2 U	2.2 U	2.2 U	1 J
CW-06	Cove Wash (Downstream)	4050970.463	659839.728	NC	NC	NC	0.9 U
CW-07	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	2.2 U	2.2 U	2.2 U	0.9 U
CW-09	Cove Wash North	4049315.64	658120.219	NC	**44**	NC	NC
CW-10	Cottonwood Spring	4049586.881	660202.988	**32**	2.2 U	**18**	12
CW-11	Cove Wash North	4046369.715	657266.457	2.2 U	2.2 U	2.2 U	15
CW-12	Cove Wash Middle 3	4044603.441	658812.815	2.8 J	2.2 U	2.2 U	0.9 U
CW-13	Cove Wash Middle 3	4043160.908	658957.686	2.2 U	2.2 U	2.2 U	NC
CW-14	Cove Wash Middle 3E	4042934	659222	2.2 U	2.2 U	2.2 U	NC
CW-15	Cove Wash North	4046035	656751.9991	NC	NC	2.2 U	NC
CW-18	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	2.2 U	2.2 U	NC	0.9 U
CW-21	Background - Mesa IV Springs	4043108	655931	2.2 U	2.2 U	2.2 U	0.9 U
CW-22	Duplicate of SW-21	4043108	655931	2.2 U	NC	NC	NC
CW-26	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	2.2 U	2.2 U	**17**	**26**
CW-36	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	2.2 U	2.2 U	2.2 U	0.9 U
CW-37	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	2.2 U	2.2 U	2.2 U	0.9 U
CW-38	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	2.2 U	2.2 U	2.2 U	0.9 U
CW-39	Cove Wash Middle 2	4045453.339	658432.518	2.2 U	2.2 U	2.2 U	0.9 U
CW-40	Duplicated of SW-39	4045453.339	658432.518	2.2 U	NC	NC	NC
CW-41	Cove Wash Middle 1	4045552	658464	NC	2.2 U	NC	NC
CW-46	Pine Water Springs	4043788.61	661352.387	2.2 U	2.2 U	2.2 U	2.6 J
CW-47	Cove Wash Middle 3F	4043727.086	659295.82	NC	2.2 U	2.2 U	0.9 U
CW-48	Cove Wash Middle 3F	4044751.928	656807.090	2.2 U	2.2 U	NC	0.9 U
CW-50	Cove Wash Middle 1	4044856.247	657463.154	2.2 U	2.2 U	2.2 U	0.9 U
CW-51	Cove Wash Middle 1A	4044944.041	657035.048	2.2 U	2.2 U	NC	0.9 U
CW-53a	Cove Wash Middle 1	4044478	656787	2.2 U	2.2 U	2.2 U	0.9 U
CW-54	Cove Wash Middle 1B	4044751.928	656807.09	2.2 U	2.2 U	2.2 U	0.9 U
CW-55	Duplicate of CW-39	4044480.534	656337.545	NC	2.2 U	NC	NC
CW-56a	Cove Wash Middle 3A	4043135	658979	NC	2.2 U	2.2 U	NC
CW-57	Duplicate of CW-02	4053607.153	666731.839	NC	2.2 U	NC	NC
CW-58	Cove Wash Middle 1	4044856.247	657463.154	NC	2.2 U	NC	NC
CW-59	Background - Cove Wash Tributary 1	4051574	664210	NC	5.2	NC	3.5
CW-60	Cove Wash between 01 and 02	4051659	664274	NC	4.1	NC	NC
CW-62	Downstream of Dam	4046378	658785	NC	2.2 U	NC	NC
CW-64	Cove Wash North between CW-15 and CW-16	4045877	656444	NC	2.2 U	2.2 U	0.9 U
CW-65	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	NC	2.2 U	3.5	1.6 J
CW-66	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	NC	2.2 U	2.2 U	0.9 U
CW-67	Cove Wash Middle 3	4044603.441	658812.815	NC	2.2 U	NC	NC
CW-68	Duplicate of CW-67	4044603.441	658812.815	NC	2.2 U	NC	NC
CW-69	Duplicate of CW-04	4045547.649	655393.8806	NC	NC	2.2 U	0.9 U
CW-70	Cove Wash Middle 3F	4044525.919	659043.2268	NC	NC	2.2 U	0.9 U
CW-71	Duplicate of CW-37	4044377.806	657955.4587	NC	NC	2.2 U	0.9 U
CW-72	Duplicate of CW-11	4046373.007	657265.4893	NC	NC	2.2 U	1.9 J
CW-73	Cove Wash Middle 3D	4042208.541	658769.5923	NC	NC	NC	9.9
CW-75	Cove Wash Middle 3D	4041201.219	658764.5801	NC	NC	2.2 U	0.9 U
CW-79	Duplicate of CW-01G	4050274.524	657301.4036	NC	NC	NC	2.2 J
CW-81	Cove Wash North	4049882.052	658891.9138	NC	NC	2.2 U	0.9 U
CW-82	Cove Wash Middle 2A	4044047.322	657766.4468	NC	NC	NC	0.9 U
CW-83	Cove Wash Middle 2A	4044045.08	657643.9635	NC	NC	NC	0.9 U
CW-84	Cove Wash Middle 2B	4043793.108	657816.7814	NC	NC	NC	0.9 U
CW-85	Cove Wash Middle 2A	4043732.792	657461.944	NC	NC	NC	0.9 U
CW-86	Background - Cove Wash Middle 3 - Unnamed Tributary	4044482.433	659284.4116	NC	NC	NC	0.9 U
CW-87	Background - Cove Wash Middle 3 - Unnamed Tributary	4044365.372	659573.3554	NC	NC	NC	0.9 U
CW-88	Background - Cove Wash Middle 3 - Unnamed Tributary	4041663.506	658834.4595	NC	NC	NC	4.5
CW-89	Duplicate of CW-66	4042362.589	658661.6744	NC	NC	NC	0.9 U
CW-90	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	NC	NC	NC	1.8

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J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Navajo Nation Surface Water Quality Standards - Primary Human Contact Standard (µg/L)				280	280	280	280
Navajo Nation Surface Water Quality Standards - Secondary Human Contact Standard (µg/L)				280	280	280	280
Navajo Nation Surface Water Quality Standards - Fish Consumption (µg/L)				0.15	0.15	0.15	0.15
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Total Metals				2.4	2.4	2.4	2.4
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)) - Total Metals				0.012	0.012	0.012	0.012
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) - Total Metals				10	10	10	10
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Total Metals				NCNS	NCNS	NCNS	NCNS
EPA Maximum Contaminant Level - Drinking Water (µg/L)				2	2	2	2
Sample ID	Sample Information	Northing	Easting	2015 Low Flow Sampling Event	2016 Spring Snowmelt Sampling Event	2016 Low Flow Sampling Event	2017 Spring Snowmelt Sampling Event
CW-GW-01	Red Point Dug Well	4050237.04	657330.869	0.06 U	0.06 U	0.06 UJ	0.06 U
CW-01	Cove Wash	4051637.55	663372.902	0.06 U	0.06 U	0.06 UJ	0.06 U
CW-02	Cove Wash	4053607.153	666731.839	0.06 U	0.06 U	0.06 UJ	0.06 U J
CW-03	Cove Wash South	4047985.628	659997.097	NC	0.06 U	NC	NC
CW-04	Background	4045556.747	655368.538	0.06 U	0.06 U	0.06 UJ	0.06 U
CW-05	orical Sample - Area 1 - Dam Surface Sample - Cove Wash M	4045700.298	658683.857	0.06 U	0.06 U	0.06 UJ	0.06 U J
CW-06	Cove Wash (Downstream)	4050970.463	659839.728	NC	NC	NC	0.06 U
CW-07	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	0.06 U	0.06 U	0.06 UJ	0.06 U
CW-09	Cove Wash North	4049315.64	658120.219	NC	0.06 U	NC	NC
CW-10	Cottonwood Spring	4049586.881	660202.988	0.06 U	0.06 U	0.06 UJ	0.06 U
CW-11	Cove Wash North	4046369.715	657266.457	0.06 U	0.06 U	0.06 UJ	0.06 U J
CW-12	Cove Wash Middle 3	4044603.441	658812.815	0.06 U	0.06 U	0.06 UJ	0.06 U J
CW-13	Cove Wash Middle 3	4043160.908	658957.686	0.06 U	0.06 U	0.06 UJ	NC
CW-14	Cove Wash Middle 3E	4042934	659222	0.06 U	0.06 U	0.06 UJ	NC
CW-15	Cove Wash North	4046035	656751.9991	NC	NC	0.06 UJ	NC
CW-18	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	0.06 U	0.06 U	NC	0.06 U J
CW-21	Background - Mesa IV Springs	4043108	655931	0.06 U	0.06 U	0.06 UJ	0.06 U J
CW-22	Duplicate of SW-21	4043108	655931	0.06 U	NC	NC	NC
CW-26	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	0.06 U	0.06 U	0.06 UJ	**<u>0.064 J</u>**
CW-36	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	0.06 U	0.06 U	0.06 UJ	0.06 U J
CW-37	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	0.06 U	0.06 U	0.06 UJ	0.06 U J
CW-38	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	0.06 U	0.06 U	0.06 UJ	0.06 U J
CW-39	Cove Wash Middle 2	4045453.339	658432.518	0.06 U	0.06 U	0.06 UJ	0.06 U J
CW-40	Duplicated of SW-39	4045453.339	658432.518	0.06 U	NC	NC	NC
CW-41	Cove Wash Middle 1	4045552	658464	NC	0.06 U	NC	NC
CW-46	Pine Water Springs	4043788.61	661352.387	0.06 U	0.06 U	0.06 UJ	0.06 U J
CW-47	Cove Wash Middle 3F	4043727.086	659295.82	NC	0.06 U	0.06 UJ	0.06 U
CW-48	Cove Wash Middle 3F	4044751.928	656807.090	0.06 U	0.06 U	NC	0.06 U
CW-50	Cove Wash Middle 1	4044856.247	657463.154	0.06 U	0.06 U	0.06 UJ	0.06 U
CW-51	Cove Wash Middle 1A	4044944.041	657035.048	0.06 U	0.06 U	NC	0.06 U
CW-53a	Cove Wash Middle 1	4044478	656787	0.06 U	0.06 U	0.06 UJ	0.06 U
CW-54	Cove Wash Middle 1B	4044751.928	656807.09	0.06 U	0.06 U	0.06 UJ	0.06 U
CW-55	Duplicate of CW-39	4044480.534	656337.545	NC	0.06 U	NC	NC
CW-56a	Cove Wash Middle 3A	4043135	658979	NC	0.06 U	0.06 UJ	NC
CW-57	Duplicate of CW-02	4053607.153	666731.839	NC	0.06 U	NC	NC
CW-58	Cove Wash Middle 1	4044856.247	657463.154	NC	0.06 U	NC	NC
CW-59	Background - Cove Wash Tributary 1	4051574	664210	NC	0.06 U	NC	0.06 U
CW-60	Cove Wash between 01 and 02	4051659	664274	NC	0.06 U	NC	NC
CW-62	Downstream of Dam	4046378	658785	NC	0.06 U	NC	NC
CW-64	Cove Wash North between CW-15 and CW-16	4045877	656444	NC	0.06 U	0.06 UJ	0.06 U
CW-65	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	NC	0.06 U	0.06 UJ	0.06 U
CW-66	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	NC	0.06 U	0.06 UJ	0.06 U
CW-67	Cove Wash Middle 3	4044603.441	658812.815	NC	0.06 U	NC	NC
CW-68	Duplicate of CW-67	4044603.441	658812.815	NC	0.06 U	NC	NC
CW-69	Duplicate of CW-04	4045547.649	655393.8806	NC	NC	0.06 UJ	0.06 U
CW-70	Cove Wash Middle 3F	4044525.919	659043.2268	NC	NC	0.06 UJ	0.06 U
CW-71	Duplicate of CW-37	4044377.806	657955.4587	NC	NC	0.06 UJ	0.06 U
CW-72	Duplicate of CW-11	4046373.007	657265.4893	NC	NC	0.06 UJ	0.06 U
CW-73	Cove Wash Middle 3D	4042208.541	658769.5923	NC	NC	NC	0.06 U
CW-75	Cove Wash Middle 3D	4041201.219	658764.5801	NC	NC	0.06 UJ	0.06 U
CW-79	Duplicate of CW-01G	4050274.524	657301.4036	NC	NC	NC	0.06 U
CW-81	Cove Wash North	4049882.052	658891.9138	NC	NC	0.06 UJ	0.06 U
CW-82	Cove Wash Middle 2A	4044047.322	657766.4468	NC	NC	NC	0.06 U
CW-83	Cove Wash Middle 2A	4044045.08	657643.9635	NC	NC	NC	0.06 U
CW-84	Cove Wash Middle 2B	4043793.108	657816.7814	NC	NC	NC	0.06 U
CW-85	Cove Wash Middle 2A	4043732.792	657461.944	NC	NC	NC	0.06 U
CW-86	Background - Cove Wash Middle 3 - Unnamed Tributary	4044482.433	659284.4116	NC	NC	NC	0.06 U
CW-87	Background - Cove Wash Middle 3 - Unnamed Tributary	4044365.372	659573.3554	NC	NC	NC	0.06 U
CW-88	Background - Cove Wash Middle 3 - Unnamed Tributary	4041663.506	658834.4595	NC	NC	NC	0.06 U
CW-89	Duplicate of CW-66	4042362.589	658661.6744	NC	NC	NC	0.06 U
CW-90	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	NC	NC	NC	0.06 U

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J = Compound detected, but result value is approximate.
µg/L = microgram per liter
<u>Bold, Underlined and Highlighted</u> = Analytical result exceeds screening levels

Navajo Nation Surface Water Quality Standards - Secondary Human Contact Standard (µg/L)				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Fish Consumption (µg/L)				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Total Metals				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)) - Total Metals				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) - Total Metals				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Total Metals				50	50	50	50
EPA Maximum Contaminant Level - Drinking Water (µg/L)				NA	NA	NA	NA
Sample ID	Sample Information	Northing	Easting	2015 Low Flow Sampling Event	2016 Spring Snowmelt Sampling Event	2016 Low Flow Sampling Event	2017 Spring Snowmelt Sampling Event
CW-GW-01	Red Point Dug Well	4050237.04	657330.869	2.9 U	1.4	0.76 J	0.67 J
CW-01	Cove Wash	4051637.55	663372.902	12	5.9	8.6	5.7
CW-02	Cove Wash	4053607.153	666731.839	9.1 J	8.5	7.1	7
CW-03	Cove Wash South	4047985.628	659997.097	NC	2.7	NC	NC
CW-04	Background	4045556.747	655368.538	2.9 U	1.8	1.4	1.2
CW-05	orical Sample - Area 1 - Dam Surface Sample - Cove Wash Mi	4045700.298	658683.857	7.6 J	4.6	6.2	4.9
CW-06	Cove Wash (Downstream)	4050970.463	659839.728	NC	NC	NC	7
CW-07	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	8.5 J	5	4.1	4.4
CW-09	Cove Wash North	4049315.64	658120.219	NC	0.76 J	NC	NC
CW-10	Cottonwood Spring	4049586.881	660202.988	2.9 U	1.3	0.64 J	0.8 J
CW-11	Cove Wash North	4046369.715	657266.457	2.9 U	1.6	1.8	1.4
CW-12	Cove Wash Middle 3	4044603.441	658812.815	7.4 J	3.2	6.6	2.7
CW-13	Cove Wash Middle 3	4043160.908	658957.686	6.5 J	2.9	6.4	NC
CW-14	Cove Wash Middle 3E	4042934	659222	2.9 U	0.38 U	0.38 U	NC
CW-15	Cove Wash North	4046035	656751.9991	NC	NC	0.9 J	NC
CW-18	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	2.9 U	0.85 J	NC	1.6
CW-21	Background - Mesa IV Springs	4043108	655931	2.9 U	0.39 J	0.38 U	0.3 U
CW-22	Duplicate of SW-21	4043108	655931	2.9 U	NC	NC	NC
CW-26	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	**780**	**670**	**590**	**270**
CW-36	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	29	19	27	22
CW-37	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	19	17	16	19
CW-38	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	28	22	16	24
CW-39	Cove Wash Middle 2	4045453.339	658432.518	15	12 J	13	12
CW-40	Duplicated of SW-39	4045453.339	658432.518	16	NC	NC	NC
CW-41	Cove Wash Middle 1	4045552	658464	NC	4.5	NC	NC
CW-46	Pine Water Springs	4043788.61	661352.387	2.9 U	0.38 U	1.5	0.3 U
CW-47	Cove Wash Middle 3F	4043727.086	659295.82	NC	3.4	3.2	3.9
CW-48	Cove Wash Middle 3F	4044751.928	656807.090	2.9 U	0.49 J	NC	0.57 J
CW-50	Cove Wash Middle 1	4044856.247	657463.154	7.4 J	5.7	5.4	5.4
CW-51	Cove Wash Middle 1A	4044944.041	657035.048	42	**65**	NC	41
CW-53a	Cove Wash Middle 1	4044478	656787	4.9 J	2.3	4.2	4.3
CW-54	Cove Wash Middle 1B	4044751.928	656807.09	17	30	25	35
CW-55	Duplicate of CW-39	4044480.534	656337.545	NC	8.2 J	NC	NC
CW-56a	Cove Wash Middle 3A	4043135	658979	NC	**65**	**61**	NC
CW-57	Duplicate of CW-02	4053607.153	666731.839	NC	7.2	NC	NC
CW-58	Cove Wash Middle 1	4044856.247	657463.154	NC	5.8	NC	NC
CW-59	Background - Cove Wash Tributary 1	4051574	664210	NC	3.3	NC	1.8
CW-60	Cove Wash between 01 and 02	4051659	664274	NC	5	NC	NC
CW-62	Downstream of Dam	4046378	658785	NC	5	NC	NC
CW-64	Cove Wash North between CW-15 and CW-16	4045877	656444	NC	9.6	5.7	6.9
CW-65	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	NC	**240**	**220**	**170**
CW-66	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	NC	**280**	**420**	**190**
CW-67	Cove Wash Middle 3	4044603.441	658812.815	NC	3.1	NC	NC
CW-68	Duplicate of CW-67	4044603.441	658812.815	NC	3.2	NC	NC
CW-69	Duplicate of CW-04	4045547.649	655393.8806	NC	NC	1.4	1.9
CW-70	Cove Wash Middle 3F	4044525.919	659043.2268	NC	NC	1	0.69 J
CW-71	Duplicate of CW-37	4044377.806	657955.4587	NC	NC	27	18
CW-72	Duplicate of CW-11	4046373.007	657265.4893	NC	NC	2.9	1.4
CW-73	Cove Wash Middle 3D	4042208.541	658769.5923	NC	NC	NC	1.9
CW-75	Cove Wash Middle 3D	4041201.219	658764.5801	NC	NC	8.6	14
CW-79	Duplicate of CW-01G	4050274.524	657301.4036	NC	NC	NC	0.66 J
CW-81	Cove Wash North	4049882.052	658891.9138	NC	NC	2	4.4
CW-82	Cove Wash Middle 2A	4044047.322	657766.4468	NC	NC	NC	1.9
CW-83	Cove Wash Middle 2A	4044045.08	657643.9635	NC	NC	NC	1.1
CW-84	Cove Wash Middle 2B	4043793.108	657816.7814	NC	NC	NC	19
CW-85	Cove Wash Middle 2A	4043732.792	657461.944	NC	NC	NC	3
CW-86	Background - Cove Wash Middle 3 - Unnamed Tributary	4044482.433	659284.4116	NC	NC	NC	0.42 J
CW-87	Background - Cove Wash Middle 3 - Unnamed Tributary	4044365.372	659573.3554	NC	NC	NC	0.42 J
CW-88	Background - Cove Wash Middle 3 - Unnamed Tributary	4041663.506	658834.4595	NC	NC	NC	6.9
CW-89	Duplicate of CW-66	4042362.589	658661.6744	NC	NC	NC	**180**
CW-90	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	NC	NC	NC	3.1

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J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (pCi/L)				5	5	5	5
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (pCi/L)				5	5	5	5
EPA Maximum Contaminant Level - Drinking Water (pCi/L)				5	5	5	5
Sample ID	Sample Information	Northing	Easting	2015 Low Flow Sampling Event	2016 Spring Snowmelt Sampling Event	2016 Low Flow Sampling Event	2017 Spring Snowmelt Sampling Event
CW-GW-01	Red Point Dug Well	4050237.04	657330.869	0.46 U	0.31 J	0.61 J	0.28 J
CW-01	Cove Wash	4051637.55	663372.902	3.79	0.74 J	2.35	0.22 U
CW-02	Cove Wash	4053607.153	666731.839	0.39	0.46 U	0.26 U	0.16 U J
CW-03	Cove Wash South	4047985.628	659997.097	NC	2.00 J	NC	NC
CW-04	Background	4045556.747	655368.538	2.11	0.76 J	0.35 J	0.37 J
CW-05	orical Sample - Area 1 - Dam Surface Sample - Cove Wash Mi	4045700.298	658683.857	2.35	2.2	1.43	1.51
CW-06	Cove Wash (Downstream)	4050970.463	659839.728	NC	NC	NC	0.83 J
CW-07	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	1.9	1.58	1.23	1.74
CW-09	Cove Wash North	4049315.64	658120.219	NC	3.67	NC	NC
CW-10	Cottonwood Spring	4049586.881	660202.988	2.42	0.25 U	2.28	2.1 J
CW-11	Cove Wash North	4046369.715	657266.457	0.33	0.4 J	0.33 J	0.62 J
CW-12	Cove Wash Middle 3	4044603.441	658812.815	3.7	2.67 J	2.6 J	2.11
CW-13	Cove Wash Middle 3	4043160.908	658957.686	3.07	0.93 J	1.57	NC
CW-14	Cove Wash Middle 3E	4042934	659222	1.8	0.53 J	0.93 J	NC
CW-15	Cove Wash North	4046035	656751.9991	NC	NC	0.47 J	NC
CW-18	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	0.21	0.24 J	NC	0.39 J
CW-21	Background - Mesa IV Springs	4043108	655931	0.56 U	0.4 U	0.42 U	0.27 J
CW-22	Duplicate of SW-21	4043108	655931	0.22	NC	NC	NC
CW-26	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	1.6	**5.4**	**12.9**	**13**
CW-36	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	3.25	3.08	2.15	3.04
CW-37	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	2.27	4	2.59	3.6
CW-38	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	3.6	4.4	2.74	**5.3**
CW-39	Cove Wash Middle 2	4045453.339	658432.518	3.31	2.43	2.81 J	2.74
CW-40	Duplicated of SW-39	4045453.339	658432.518	3.5	NC	NC	NC
CW-41	Cove Wash Middle 1	4045552	658464	NC	2.51	NC	NC
CW-46	Pine Water Springs	4043788.61	661352.387	0.22 U	0.09 U	0.43 U	0.25 U
CW-47	Cove Wash Middle 3F	4043727.086	659295.82	NC	2.49	3.07 J	3.09
CW-48	Cove Wash Middle 3F	4044751.928	656807.090	1.68	0.34 U	NC	0.6 J
CW-50	Cove Wash Middle 1	4044856.247	657463.154	**6.14**	**6.6**	**5.7**	**6.1**
CW-51	Cove Wash Middle 1A	4044944.041	657035.048	**25**	**11.2**	NC	**16.5**
CW-53a	Cove Wash Middle 1	4044478	656787	**5.9**	4.6	**11.8**	**8.2**
CW-54	Cove Wash Middle 1B	4044751.928	656807.09	**8.4**	**9.2**	**9.5**	**15.8**
CW-55	Duplicate of CW-39	4044480.534	656337.545	NC	2.59	NC	NC
CW-56a	Cove Wash Middle 3A	4043135	658979	NC	0.88 J	0.66 J	NC
CW-57	Duplicate of CW-02	4053607.153	666731.839	NC	0.2 U	NC	NC
CW-58	Cove Wash Middle 1	4044856.247	657463.154	NC	**5.5**	NC	NC
CW-59	Background - Cove Wash Tributary 1	4051574	664210	NC	0.3 J	NC	0.53 U
CW-60	Cove Wash between 01 and 02	4051659	664274	NC	0.56 J	NC	NC
CW-62	Downstream of Dam	4046378	658785	NC	1.1	NC	NC
CW-64	Cove Wash North between CW-15 and CW-16	4045877	656444	NC	0.74 J	0.92 J	0.74 J
CW-65	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	NC	2.41	2.81	4.7 J
CW-66	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	NC	2.51 J	1.02	1.78
CW-67	Cove Wash Middle 3	4044603.441	658812.815	NC	2.12	NC	NC
CW-68	Duplicate of CW-67	4044603.441	658812.815	NC	3.5	NC	NC
CW-69	Duplicate of CW-04	4045547.649	655393.8806	NC	NC	0.31 J	0.69 J
CW-70	Cove Wash Middle 3F	4044525.919	659043.2268	NC	NC	0.92 J	0.89 J
CW-71	Duplicate of CW-37	4044377.806	657955.4587	NC	NC	2.68	3.7
CW-72	Duplicate of CW-11	4046373.007	657265.4893	NC	NC	0.95 J	0.37 J
CW-73	Cove Wash Middle 3D	4042208.541	658769.5923	NC	NC	NC	3.44
CW-75	Cove Wash Middle 3D	4041201.219	658764.5801	NC	NC	2.8 J	3.06
CW-79	Duplicate of CW-01G	4050274.524	657301.4036	NC	NC	NC	0.28 J
CW-81	Cove Wash North	4049882.052	658891.9138	NC	NC	0.66 U	0.33 J
CW-82	Cove Wash Middle 2A	4044047.322	657766.4468	NC	NC	NC	4
CW-83	Cove Wash Middle 2A	4044045.08	657643.9635	NC	NC	NC	1
CW-84	Cove Wash Middle 2B	4043793.108	657816.7814	NC	NC	NC	**7.6**
CW-85	Cove Wash Middle 2A	4043732.792	657461.944	NC	NC	NC	0.42 J
CW-86	Background - Cove Wash Middle 3 - Unnamed Tributary	4044482.433	659284.4116	NC	NC	NC	0.25 J
CW-87	Background - Cove Wash Middle 3 - Unnamed Tributary	4044365.372	659573.3554	NC	NC	NC	0.5 U
CW-88	Background - Cove Wash Middle 3 - Unnamed Tributary	4041663.506	658834.4595	NC	NC	NC	0.52 J
CW-89	Duplicate of CW-66	4042362.589	658661.6744	NC	NC	NC	2.35 J
CW-90	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	NC	NC	NC	2.16

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Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Navajo Nation Surface Water Quality Standards - Primary Human Contact Standard (µg/L)				4,670	4,670	4,670	4,670
Navajo Nation Surface Water Quality Standards - Secondary Human Contact Standard (µg/L)				4,670	4,670	4,670	4,670
Navajo Nation Surface Water Quality Standards - Fish Consumption (µg/L)				670	670	670	670
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Total Metals				33	33	33	33
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)) - Total Metals				2	2	2	2
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) - Total Metals				50	50	50	50
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Total Metals				20	20	20	20
EPA Maximum Contaminant Level - Drinking Water (µg/L)				50	50	50	50
Sample ID	Sample Information	Northing	Easting	2015 Low Flow Sampling Event	2016 Spring Snowmelt Sampling Event	2016 Low Flow Sampling Event	2017 Spring Snowmelt Sampling Event
CW-GW-01	Red Point Dug Well	4050237.04	657330.869	4.6 U	4.5 U	4.5 U	1.5 U
CW-01	Cove Wash	4051637.55	663372.902	4.6 U	4.5 U	4.5 U	1.5 U
CW-02	Cove Wash	4053607.153	666731.839	4.6 U	4.5 U	4.5 U	1.6 J
CW-03	Cove Wash South	4047985.628	659997.097	NC	4.5 U	NC	NC
CW-04	Background	4045556.747	655368.538	**4.7 J**	**8.5**	4.5 U	**5.3**
CW-05	orical Sample - Area 1 - Dam Surface Sample - Cove Wash Mi	4045700.298	658683.857	4.6 U	4.5 U	4.5 U	**2.7 J**
CW-06	Cove Wash (Downstream)	4050970.463	659839.728	NC	NC	NC	**2.4 J**
CW-07	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	4.6 U	4.5 U	4.5 U	1.5 U
CW-09	Cove Wash North	4049315.64	658120.219	NC	**6.8**	NC	NC
CW-10	Cottonwood Spring	4049586.881	660202.988	**15**	**13**	**13**	**11**
CW-11	Cove Wash North	4046369.715	657266.457	4.6 U	4.5 U	**6.6**	1.9 J
CW-12	Cove Wash Middle 3	4044603.441	658812.815	4.6 U	**4.7 J**	4.5 U	1.5 U
CW-13	Cove Wash Middle 3	4043160.908	658957.686	4.6 U	4.5 U	4.5 U	NC
CW-14	Cove Wash Middle 3E	4042934	659222	4.6 U	4.5 U	4.5 U	NC
CW-15	Cove Wash North	4046035	656751.9991	NC	NC	4.5 U	NC
CW-18	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	4.6 U	4.5 U	NC	1.7 J
CW-21	Background - Mesa IV Springs	4043108	655931	4.6 U	4.5 U	4.5 U	**2.5 J**
CW-22	Duplicate of SW-21	4043108	655931	4.6 U	NC	NC	NC
CW-26	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	**770**	**590**	**570**	**980**
CW-36	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	4.6 U	4.5 U	4.5 U	1.5 U
CW-37	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	4.6 U	4.5 U	4.5 U	1.5 U
CW-38	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	4.6 U	4.5 U	4.5 U	1.5 U
CW-39	Cove Wash Middle 2	4045453.339	658432.518	4.6 U	4.5 U	4.5 U	**3.7 J**
CW-40	Duplicated of SW-39	4045453.339	658432.518	4.6 U	NC	NC	NC
CW-41	Cove Wash Middle 1	4045552	658464	NC	4.5 U	NC	NC
CW-46	Pine Water Springs	4043788.61	661352.387	4.6 U	4.5 U	4.5 U	1.5 U
CW-47	Cove Wash Middle 3F	4043727.086	659295.82	NC	**130**	**120**	**130**
CW-48	Cove Wash Middle 3F	4044751.928	656807.090	4.6 U	4.5 U	NC	1.5 U
CW-50	Cove Wash Middle 1	4044856.247	657463.154	4.6 U	**8.2**	4.5 U	**3 J**
CW-51	Cove Wash Middle 1A	4044944.041	657035.048	4.6 U	**7**	NC	1.8 J
CW-53a	Cove Wash Middle 1	4044478	656787	**6.7**	**6.3**	4.5 U	**4.7 J**
CW-54	Cove Wash Middle 1B	4044751.928	656807.09	**5.3**	**23**	**13**	**14**
CW-55	Duplicate of CW-39	4044480.534	656337.545	NC	4.5 U	NC	NC
CW-56a	Cove Wash Middle 3A	4043135	658979	NC	**12**	**8.2**	NC
CW-57	Duplicate of CW-02	4053607.153	666731.839	NC	4.5 U	NC	NC
CW-58	Cove Wash Middle 1	4044856.247	657463.154	NC	**7.4**	NC	NC
CW-59	Background - Cove Wash Tributary 1	4051574	664210	NC	4.5 U	NC	1.5 U
CW-60	Cove Wash between 01 and 02	4051659	664274	NC	4.5 U	NC	NC
CW-62	Downstream of Dam	4046378	658785	NC	**4.8 J**	NC	NC
CW-64	Cove Wash North between CW-15 and CW-16	4045877	656444	NC	**10**	4.5 U	**3.5 J**
CW-65	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	NC	**89**	**43**	**94**
CW-66	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	NC	**130**	**85**	**120**
CW-67	Cove Wash Middle 3	4044603.441	658812.815	NC	4.5 U	NC	NC
CW-68	Duplicate of CW-67	4044603.441	658812.815	NC	4.5 U	NC	NC
CW-69	Duplicate of CW-04	4045547.649	655393.8806	NC	NC	4.5 U	**6.7**
CW-70	Cove Wash Middle 3F	4044525.919	659043.2268	NC	NC	4.5 U	2 J
CW-71	Duplicate of CW-37	4044377.806	657955.4587	NC	NC	4.5 U	1.5 U
CW-72	Duplicate of CW-11	4046373.007	657265.4893	NC	NC	4.5 U	1.5 U
CW-73	Cove Wash Middle 3D	4042208.541	658769.5923	NC	NC	NC	**2.2 J**
CW-75	Cove Wash Middle 3D	4041201.219	658764.5801	NC	NC	4.5 U	1.5 U
CW-79	Duplicate of CW-01G	4050274.524	657301.4036	NC	NC	NC	1.5 U
CW-81	Cove Wash North	4049882.052	658891.9138	NC	NC	4.5 U	1.5 U
CW-82	Cove Wash Middle 2A	4044047.322	657766.4468	NC	NC	NC	1.5 U
CW-83	Cove Wash Middle 2A	4044045.08	657643.9635	NC	NC	NC	2 J
CW-84	Cove Wash Middle 2B	4043793.108	657816.7814	NC	NC	NC	**4.5 J**
CW-85	Cove Wash Middle 2A	4043732.792	657461.944	NC	NC	NC	**2.8 J**
CW-86	Background - Cove Wash Middle 3 - Unnamed Tributary	4044482.433	659284.4116	NC	NC	NC	1.5 U
CW-87	Background - Cove Wash Middle 3 - Unnamed Tributary	4044365.372	659573.3554	NC	NC	NC	1.5 U
CW-88	Background - Cove Wash Middle 3 - Unnamed Tributary	4041663.506	658834.4595	NC	NC	NC	**15**
CW-89	Duplicate of CW-66	4042362.589	658661.6744	NC	NC	NC	**120**
CW-90	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	NC	NC	NC	**4**

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J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Navajo Nation Surface Water Quality Standards - Primary Human Contact Standard (µg/L)				75	75	75	75
Navajo Nation Surface Water Quality Standards - Secondary Human Contact Standard (µg/L)				75	75	75	75
Navajo Nation Surface Water Quality Standards - Fish Consumption (µg/L)				1	1	1	1
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Total Metals				NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)) - Total Metals				NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) - Total Metals				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Total Metals				NCNS	NCNS	NCNS	NCNS
EPA Maximum Contaminant Level - Drinking Water (µg/L)				2	2	2	2
Sample ID	Sample Information	Northing	Easting	2015 Low Flow Sampling Event	2016 Spring Snowmelt Sampling Event	2016 Low Flow Sampling Event	2017 Spring Snowmelt Sampling Event
CW-GW-01	Red Point Dug Well	4050237.04	657330.869	6.2 U	5.4 U	5.4 U	3 U
CW-01	Cove Wash	4051637.55	663372.902	7.6 U	5.4 U	5.4 U	3 U
CW-02	Cove Wash	4053607.153	666731.839	6.2 U	5.4 U	5.4 U	**3.9 J**
CW-03	Cove Wash South	4047985.628	659997.097	NC	5.4 U	NC	NC
CW-04	Background	4045556.747	655368.538	6.2 U	5.4 U	5.4 U	3 U
CW-05	orical Sample - Area 1 - Dam Surface Sample - Cove Wash Mi	4045700.298	658683.857	6.2 U	5.4 U	5.4 U	**11**
CW-06	Cove Wash (Downstream)	4050970.463	659839.728	NC	NC	NC	3 U
CW-07	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	6.2 U	5.4 U	5.4 U	3 U
CW-09	Cove Wash North	4049315.64	658120.219	NC	5.4 U	NC	NC
CW-10	Cottonwood Spring	4049586.881	660202.988	6.2 U	5.4 U	5.4 U	3 U
CW-11	Cove Wash North	4046369.715	657266.457	6.2 U	5.4 U	5.4 U	3 U
CW-12	Cove Wash Middle 3	4044603.441	658812.815	**7.9 J**	5.4 U	5.4 U	3 U
CW-13	Cove Wash Middle 3	4043160.908	658957.686	6.2 U	5.4 U	5.4 U	NC
CW-14	Cove Wash Middle 3E	4042934	659222	6.2 U	5.4 U	5.4 U	NC
CW-15	Cove Wash North	4046035	656751.9991	NC	NC	5.4 U	NC
CW-18	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	6.2 U	5.4 U	NC	**3.6 J**
CW-21	Background - Mesa IV Springs	4043108	655931	**8.3 J**	5.4 U	5.4 U	3 U
CW-22	Duplicate of SW-21	4043108	655931	6.2 U	NC	NC	NC
CW-26	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	6.2 U	5.4 U	54 U	30 U
CW-36	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	6.2 U	5.4 U	5.4 U	3 U
CW-37	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	6.2 U	5.4 U	5.4 U	3 U
CW-38	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	**10**	5.4 U	5.4 U	3 U
CW-39	Cove Wash Middle 2	4045453.339	658432.518	6.2 U	5.4 U	5.4 U	**3.8 J**
CW-40	Duplicated of SW-39	4045453.339	658432.518	6.2 U	NC	NC	NC
CW-41	Cove Wash Middle 1	4045552	658464	NC	5.4 U	NC	NC
CW-46	Pine Water Springs	4043788.61	661352.387	6.2 U	5.4 U	5.4 U	3 U
CW-47	Cove Wash Middle 3F	4043727.086	659295.82	NC	5.4 U	5.4 U	3 U
CW-48	Cove Wash Middle 3F	4044751.928	656807.090	6.2 U	5.4 U	NC	3 U
CW-50	Cove Wash Middle 1	4044856.247	657463.154	**8.5 J**	5.4 U	5.4 U	3 U
CW-51	Cove Wash Middle 1A	4044944.041	657035.048	**6.5 J**	5.4 U	NC	3 U
CW-53a	Cove Wash Middle 1	4044478	656787	6.2 U	5.4 U	5.4 U	3 U
CW-54	Cove Wash Middle 1B	4044751.928	656807.09	**11**	5.4 U	5.4 U	3 U
CW-55	Duplicate of CW-39	4044480.534	656337.545	NC	5.4 U	NC	NC
CW-56a	Cove Wash Middle 3A	4043135	658979	NC	5.4 U	5.4 U	NC
CW-57	Duplicate of CW-02	4053607.153	666731.839	NC	5.4 U	NC	NC
CW-58	Cove Wash Middle 1	4044856.247	657463.154	NC	5.4 U	NC	NC
CW-59	Background - Cove Wash Tributary 1	4051574	664210	NC	5.4 U	NC	3 U
CW-60	Cove Wash between 01 and 02	4051659	664274	NC	5.4 U	NC	NC
CW-62	Downstream of Dam	4046378	658785	NC	5.4 U	NC	NC
CW-64	Cove Wash North between CW-15 and CW-16	4045877	656444	NC	5.4 U	5.4 U	3 U
CW-65	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	NC	5.4 U	5.4 U	**3.5 J**
CW-66	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	NC	**5.7 J**	5.4 U	3 U
CW-67	Cove Wash Middle 3	4044603.441	658812.815	NC	5.4 U	NC	NC
CW-68	Duplicate of CW-67	4044603.441	658812.815	NC	5.4 U	NC	NC
CW-69	Duplicate of CW-04	4045547.649	655393.8806	NC	NC	5.4 U	**3.2 J**
CW-70	Cove Wash Middle 3F	4044525.919	659043.2268	NC	NC	5.4 U	**6.2 J**
CW-71	Duplicate of CW-37	4044377.806	657955.4587	NC	NC	5.4 U	3 U
CW-72	Duplicate of CW-11	4046373.007	657265.4893	NC	NC	5.4 U	3 U
CW-73	Cove Wash Middle 3D	4042208.541	658769.5923	NC	NC	NC	**3.4 J**
CW-75	Cove Wash Middle 3D	4041201.219	658764.5801	NC	NC	5.4 U	3 U
CW-79	Duplicate of CW-01G	4050274.524	657301.4036	NC	NC	NC	**3.7 J**
CW-81	Cove Wash North	4049882.052	658891.9138	NC	NC	5.4 U	3 U
CW-82	Cove Wash Middle 2A	4044047.322	657766.4468	NC	NC	NC	3 U
CW-83	Cove Wash Middle 2A	4044045.08	657643.9635	NC	NC	NC	3 U
CW-84	Cove Wash Middle 2B	4043793.108	657816.7814	NC	NC	NC	3 U
CW-85	Cove Wash Middle 2A	4043732.792	657461.944	NC	NC	NC	3 U
CW-86	Background - Cove Wash Middle 3 - Unnamed Tributary	4044482.433	659284.4116	NC	NC	NC	3 U
CW-87	Background - Cove Wash Middle 3 - Unnamed Tributary	4044365.372	659573.3554	NC	NC	NC	3 U
CW-88	Background - Cove Wash Middle 3 - Unnamed Tributary	4041663.506	658834.4595	NC	NC	NC	3 U
CW-89	Duplicate of CW-66	4042362.589	658661.6744	NC	NC	NC	3 U
CW-90	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	NC	NC	NC	**3.2**

Notes:
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Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Navajo Nation Surface Water Quality Standards - Primary Human Contact Standard (µg/L)				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Secondary Human Contact Standard (µg/L)				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Fish Consumption (µg/L)				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Total Metals				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)) - Total Metals				NCNS	NCNS	NCNS	NCNS
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) - Total Metals				100	100	100	100
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Total Metals				1000	1000	1000	1000
EPA Maximum Contaminant Level - Drinking Water (µg/L)				NA	NA	NA	NA
Sample ID	Sample Information	Northing	Easting	2015 Low Flow Sampling Event	2016 Spring Snowmelt Sampling Event	2016 Low Flow Sampling Event	2017 Spring Snowmelt Sampling Event
CW-GW-01	Red Point Dug Well	4050237.04	657330.869	86	80	81	84
CW-01	Cove Wash	4051637.55	663372.902	23	31	17	58
CW-02	Cove Wash	4053607.153	666731.839	45	57	53	58
CW-03	Cove Wash South	4047985.628	659997.097	NC	**140**	NC	NC
CW-04	Background	4045556.747	655368.538	22	13	3 J	3 U
CW-05	orical Sample - Area 1 - Dam Surface Sample - Cove Wash Mi	4045700.298	658683.857	12	12	6.2 J	13
CW-06	Cove Wash (Downstream)	4050970.463	659839.728	NC	NC	NC	16
CW-07	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	15	12	14	12
CW-09	Cove Wash North	4049315.64	658120.219	NC	**290**	NC	NC
CW-10	Cottonwood Spring	4049586.881	660202.988	88	31	77	60
CW-11	Cove Wash North	4046369.715	657266.457	6 J	4.8	5.4 J	8.7 J
CW-12	Cove Wash Middle 3	4044603.441	658812.815	32	12	10	8.8 J
CW-13	Cove Wash Middle 3	4043160.908	658957.686	21	8.5	9.7 J	NC
CW-14	Cove Wash Middle 3E	4042934	659222	18	7.7	7.3 J	NC
CW-15	Cove Wash North	4046035	656751.9991	NC	NC	1.4 J	NC
CW-18	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	4.2 J	3.9 J	NC	7 J
CW-21	Background - Mesa IV Springs	4043108	655931	3.9 J	3.3 J	3.4 J	3.1 J
CW-22	Duplicate of SW-21	4043108	655931	3.2 J	NC	NC	NC
CW-26	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	**4600**	**3000**	**5300**	**11000**
CW-36	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	15	12	12	9.7 J
CW-37	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	6.8 J	9 J	4.3 J	9.2 J
CW-38	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	9.8 J	9.2 J	6.8 J	11
CW-39	Cove Wash Middle 2	4045453.339	658432.518	14	6.3 J	15	20
CW-40	Duplicated of SW-39	4045453.339	658432.518	15	NC	NC	NC
CW-41	Cove Wash Middle 1	4045552	658464	NC	19	NC	NC
CW-46	Pine Water Springs	4043788.61	661352.387	1.5 J	2.9 J	2.7 J	3
CW-47	Cove Wash Middle 3F	4043727.086	659295.82	NC	51	53	48
CW-48	Cove Wash Middle 3F	4044751.928	656807.090	12	16	NC	19
CW-50	Cove Wash Middle 1	4044856.247	657463.154	21	32	8.5 J	26
CW-51	Cove Wash Middle 1A	4044944.041	657035.048	91	**150**	NC	**140**
CW-53a	Cove Wash Middle 1	4044478	656787	25	17	29	18
CW-54	Cove Wash Middle 1B	4044751.928	656807.09	66	**230**	**100**	**240**
CW-55	Duplicate of CW-39	4044480.534	656337.545	NC	27 J	NC	NC
CW-56a	Cove Wash Middle 3A	4043135	658979	NC	8.8 J	7.8 J	NC
CW-57	Duplicate of CW-02	4053607.153	666731.839	NC	57	NC	NC
CW-58	Cove Wash Middle 1	4044856.247	657463.154	NC	31	NC	NC
CW-59	Background - Cove Wash Tributary 1	4051574	664210	NC	96	NC	**130**
CW-60	Cove Wash between 01 and 02	4051659	664274	NC	50	NC	NC
CW-62	Downstream of Dam	4046378	658785	NC	16	NC	NC
CW-64	Cove Wash North between CW-15 and CW-16	4045877	656444	NC	33	27	23
CW-65	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	NC	19	35	43
CW-66	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	NC	18	32	27
CW-67	Cove Wash Middle 3	4044603.441	658812.815	NC	14	NC	NC
CW-68	Duplicate of CW-67	4044603.441	658812.815	NC	15	NC	NC
CW-69	Duplicate of CW-04	4045547.649	655393.8806	NC	NC	4.3 J	3 U
CW-70	Cove Wash Middle 3F	4044525.919	659043.2268	NC	NC	20	18
CW-71	Duplicate of CW-37	4044377.806	657955.4587	NC	NC	13	9 J
CW-72	Duplicate of CW-11	4046373.007	657265.4893	NC	NC	5.8 J	4.2 J
CW-73	Cove Wash Middle 3D	4042208.541	658769.5923	NC	NC	NC	36
CW-75	Cove Wash Middle 3D	4041201.219	658764.5801	NC	NC	5.3 J	4.6 J
CW-79	Duplicate of CW-01G	4050274.524	657301.4036	NC	NC	NC	83
CW-81	Cove Wash North	4049882.052	658891.9138	NC	NC	78	44
CW-82	Cove Wash Middle 2A	4044047.322	657766.4468	NC	NC	NC	7.9 J
CW-83	Cove Wash Middle 2A	4044045.08	657643.9635	NC	NC	NC	6.1 J
CW-84	Cove Wash Middle 2B	4043793.108	657816.7814	NC	NC	NC	47
CW-85	Cove Wash Middle 2A	4043732.792	657461.944	NC	NC	NC	5.4 J
CW-86	Background - Cove Wash Middle 3 - Unnamed Tributary	4044482.433	659284.4116	NC	NC	NC	20
CW-87	Background - Cove Wash Middle 3 - Unnamed Tributary	4044365.372	659573.3554	NC	NC	NC	17
CW-88	Background - Cove Wash Middle 3 - Unnamed Tributary	4041663.506	658834.4595	NC	NC	NC	33
CW-89	Duplicate of CW-66	4042362.589	658661.6744	NC	NC	NC	28
CW-90	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	NC	NC	NC	18

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J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Navajo Nation Surface Water Quality Standards - Primary Human Contact Standard (µg/L)				NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Secondary Human Contact Standard (µg/L)				NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Fish Consumption (µg/L)				NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Total Metals				0.87-7.7*	0.34-7.7*	1.2-7.7*	0.87-7.7*
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)) - Total Metals				0.13-0.64*	0.07-0.64*	0.17-0.64*	0.13-0.64*
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) - Total Metals				NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Total Metals				NA	NA	NA	NA
EPA Maximum Contaminant Level - Drinking Water (µg/L)				NA	NA	NA	NA
Sample ID	Sample Information	Northing	Easting	2015 Low Flow Sampling Event	2016 Spring Snowmelt Sampling Event	2016 Low Flow Sampling Event	2017 Spring Snowmelt Sampling Event
CW-GW-01	Red Point Dug Well	4050237.04	657330.869	0.76 U	0.77 U	0.77 U	1.5 U
CW-GW-03	Ellison Well	4049637.733	658749.123	**1.3 J**	NC	NC	NC
CW-01	Cove Wash	4051637.55	663372.902	**1.1 J**	0.77 U	0.77 U	1.5 U
CW-02	Cove Wash	4053607.153	666731.839	0.76 U	0.77 U	**0.94 J**	1.5 U
CW-03	Cove Wash South	4047985.628	659997.097	NC	0.77 U	NC	NC
CW-04	Background	4045556.747	655368.538	0.76 U	0.77 U	0.77 U	1.5 U
CW-05	orical Sample - Area 1 - Dam Surface Sample - Cove Wash Mi	4045700.298	658683.857	0.76 U	0.77 U	0.77 U	1.5 U
CW-06	Cove Wash (Downstream)	4050970.463	659839.728	NC	NC	NC	1.5 U
CW-07	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	0.76 U	0.77 U	0.77 U	1.5 U
CW-09	Cove Wash North	4049315.64	658120.219	NC	0.77 U	NC	NC
CW-10	Cottonwood Spring	4049586.881	660202.988	0.76 U	0.77 U	0.77 U	1.5 U
CW-11	Cove Wash North	4046369.715	657266.457	**0.85 J**	0.77 U	0.77 U	1.5 U
CW-12	Cove Wash Middle 3	4044603.441	658812.815	0.76 U	0.77 U	0.77 U	1.5 U
CW-13	Cove Wash Middle 3	4043160.908	658957.686	0.76 U	0.77 U	0.77 U	NC
CW-14	Cove Wash Middle 3E	4042934	659222	0.76 U	0.77 U	0.77 U	NC
CW-15	Cove Wash North	4046035	656751.9991	NC	NC	0.77 U	NC
CW-18	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	0.76 U	0.77 U	NC	1.5 U
CW-21	Background - Mesa IV Springs	4043108	655931	0.76 U	0.77 U	0.77 U	1.5 U
CW-22	Duplicate of SW-21	4043108	655931	0.76 U	NC	NC	NC
CW-26	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	0.76 U	0.77 U	0.77 U	1.5 U
CW-36	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	0.76 U	0.77 U	0.77 U	1.5 U
CW-37	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	0.76 U	0.77 U	0.77 U	1.5 U
CW-38	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	0.76 U	0.77 U	0.77 U	1.5 U
CW-39	Cove Wash Middle 2	4045453.339	658432.518	0.76 U	0.77 U	0.77 U	1.5 U
CW-40	Duplicated of SW-39	4045453.339	658432.518	0.76 U	NC	NC	NC
CW-41	Cove Wash Middle 1	4045552	658464	NC	0.77 U	NC	NC
CW-46	Pine Water Springs	4043788.61	661352.387	0.76 U	0.77 U	0.77 U	1.5 U
CW-47	Cove Wash Middle 3F	4043727.086	659295.82	NC	0.77 U	0.77 U	1.5 U
CW-48	Cove Wash Middle 3F	4044751.928	656807.090	0.76 U	0.77 U	NC	1.5 U
CW-50	Cove Wash Middle 1	4044856.247	657463.154	**1.5 J**	0.77 U	0.77 U	1.5 U
CW-51	Cove Wash Middle 1A	4044944.041	657035.048	**0.84 J**	0.77 U	NC	1.5 U
CW-53a	Cove Wash Middle 1	4044478	656787	**0.91 J**	0.77 U	0.77 U	1.5 U
CW-54	Cove Wash Middle 1B	4044751.928	656807.09	0.76 U	0.77 U	0.77 U	1.5 U
CW-55	Duplicate of CW-39	4044480.534	656337.545	NC	0.77 U	NC	NC
CW-56a	Cove Wash Middle 3A	4043135	658979	NC	0.77 U	0.77 U	NC
CW-57	Duplicate of CW-02	4053607.153	666731.839	NC	0.77 U	NC	NC
CW-58	Cove Wash Middle 1	4044856.247	657463.154	NC	0.77 U	NC	NC
CW-59	Background - Cove Wash Tributary 1	4051574	664210	NC	0.77 U	NC	1.5 U
CW-60	Cove Wash between 01 and 02	4051659	664274	NC	0.77 U	NC	NC
CW-62	Downstream of Dam	4046378	658785	NC	0.77 U	NC	NC
CW-64	Cove Wash North between CW-15 and CW-16	4045877	656444	NC	0.77 U	0.77 U	1.5 U
CW-65	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	NC	0.77 U	0.77 U	1.5 U
CW-66	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	NC	0.77 U	0.77 U	1.5 U
CW-67	Cove Wash Middle 3	4044603.441	658812.815	NC	0.77 U	NC	NC
CW-68	Duplicate of CW-67	4044603.441	658812.815	NC	0.77 U	NC	NC
CW-69	Duplicate of CW-04	4045547.649	655393.8806	NC	NC	0.77 U	1.5 U
CW-70	Cove Wash Middle 3F	4044525.919	659043.2268	NC	NC	0.77 U	1.5 U
CW-71	Duplicate of CW-37	4044377.806	657955.4587	NC	NC	0.77 U	1.5 U
CW-72	Duplicate of CW-11	4046373.007	657265.4893	NC	NC	0.77 U	1.5 U
CW-73	Cove Wash Middle 3D	4042208.541	658769.5923	NC	NC	NC	1.5 U
CW-75	Cove Wash Middle 3D	4041201.219	658764.5801	NC	NC	0.77 U	1.5 U
CW-79	Duplicate of CW-01G	4050274.524	657301.4036	NC	NC	NC	1.5 U
CW-81	Cove Wash North	4049882.052	658891.9138	NC	NC	0.77 U	1.5 U
CW-82	Cove Wash Middle 2A	4044047.322	657766.4468	NC	NC	NC	1.5 U
CW-83	Cove Wash Middle 2A	4044045.08	657643.9635	NC	NC	NC	1.5 U
CW-84	Cove Wash Middle 2B	4043793.108	657816.7814	NC	NC	NC	1.5 U
CW-85	Cove Wash Middle 2A	4043732.792	657461.944	NC	NC	NC	1.5 U
CW-86	Background - Cove Wash Middle 3 - Unnamed Tributary	4044482.433	659284.4116	NC	NC	NC	1.5 U
CW-87	Background - Cove Wash Middle 3 - Unnamed Tributary	4044365.372	659573.3554	NC	NC	NC	1.5 U
CW-88	Background - Cove Wash Middle 3 - Unnamed Tributary	4041663.506	658834.4595	NC	NC	NC	1.5 U
CW-89	Duplicate of CW-66	4042362.589	658661.6744	NC	NC	NC	1.5 U
CW-90	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	NC	NC	NC	1.5 U

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EPA = Environmental Protection Agency
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NC = Not Collected
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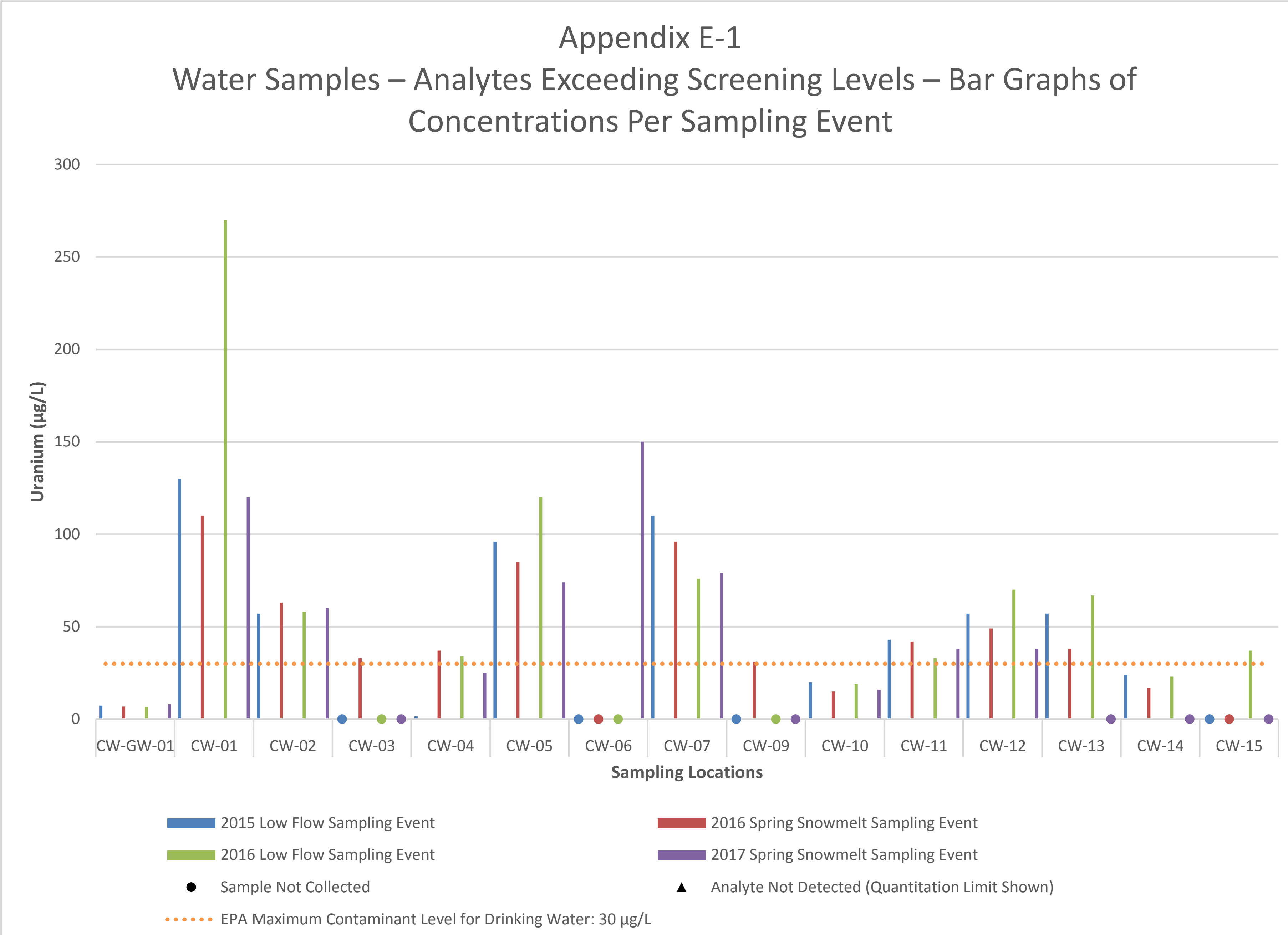
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels
* = The value is hardness dependent. Hardness was not evaluated for samples collected in 2015. Therefore, the upper range of the screening level is e

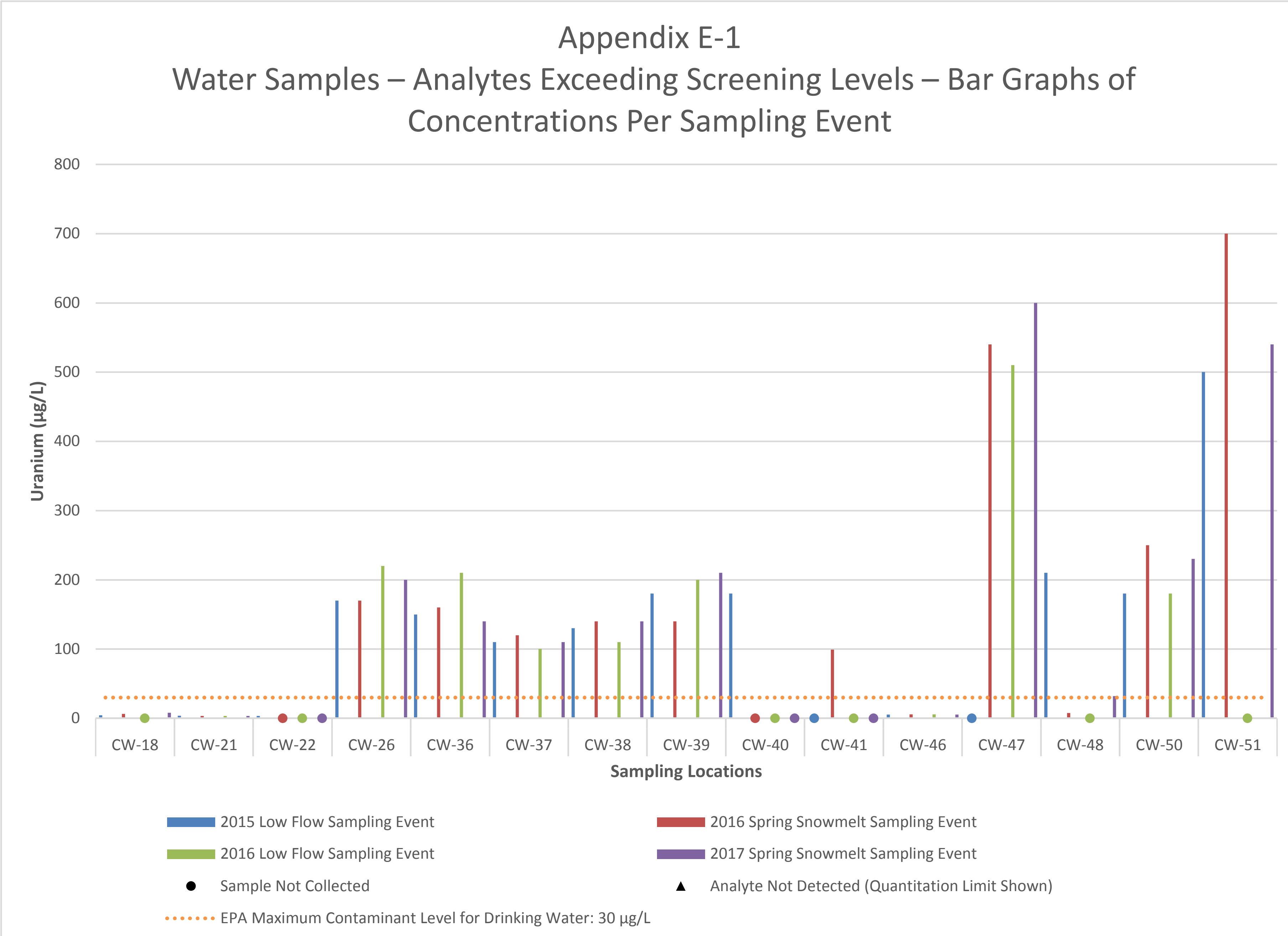
Navajo Nation Surface Water Quality Standards - Primary Human Contact Standard (µg/L)				NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Secondary Human Contact Standard (µg/L)				NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Fish Consumption (µg/L)				NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Acute (µg/L) - Total Metals				5.9-50*	2.4-50*	8.3-50*	5.9-50*
Navajo Nation Surface Water Quality Standards - Aquatic Habitat - Chronic (µg/L)) - Total Metals				4.3-29*	1.9-29*	5.8-29*	4.3-29*
Navajo Nation Surface Water Quality Standards - Livestock and Wildlife Watering (µg/L) - Total Metals				NA	NA	NA	NA
Navajo Nation Surface Water Quality Standards - Agricultural Water Supply (µg/L) - Total Metals				NA	NA	NA	NA
EPA Maximum Contaminant Level - Drinking Water (µg/L)				NA	NA	NA	NA
Sample ID	Sample Information	Northing	Easting	2015 Low Flow Sampling Event	2016 Spring Snowmelt Sampling Event	2016 Low Flow Sampling Event	2017 Spring Snowmelt Sampling Event
CW-GW-01	Red Point Dug Well	4050237.04	657330.869	2.6 J	13	1.9 U	3.3 J
CW-GW-03	Ellison Well	4049637.733	658749.123	**83**	NC	NC	NC
CW-01	Cove Wash	4051637.55	663372.902	2.2 U	1.9 U	1.9 U	3 U
CW-02	Cove Wash	4053607.153	666731.839	2.2 U	1.9 U	1.9 U	3 U
CW-03	Cove Wash South	4047985.628	659997.097	NC	2.6 J	NC	NC
CW-04	Background	4045556.747	655368.538	2.2 U	2 J	1.9 U	3 U
CW-05	orical Sample - Area 1 - Dam Surface Sample - Cove Wash Mi	4045700.298	658683.857	2.2 U	1.9 U	NC	3 U
CW-06	Cove Wash (Downstream)	4050970.463	659839.728	NC	NC	1.9 U	3 U
CW-07	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	2.2 U	1.9 U	1.9 U	3 U
CW-09	Cove Wash North	4049315.64	658120.219	NC	1.9 U	NC	NC
CW-10	Cottonwood Spring	4049586.881	660202.988	2.2 U	1.9 U	1.9 U	4.1 J
CW-11	Cove Wash North	4046369.715	657266.457	2.2 U	3 J	1.9 U	3 U
CW-12	Cove Wash Middle 3	4044603.441	658812.815	2.2 U	1.9 U	1.9 U	3 U
CW-13	Cove Wash Middle 3	4043160.908	658957.686	2.2 U	1.9 U	1.9 U	NC
CW-14	Cove Wash Middle 3E	4042934	659222	2.2 U	1.9 U	1.9 U	NC
CW-15	Cove Wash North	4046035	656751.9991	NC	NC	1.9 U	NC
CW-18	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	2.2 U	1.9 U	NC	3 U
CW-21	Background - Mesa IV Springs	4043108	655931	2.2 U	1.9 U	1.9 U	3 U
CW-22	Duplicate of SW-21	4043108	655931	2.2 U	NC	1.9 U	NC
CW-26	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	2.2 U	1.9 U	1.9 U	3 U
CW-36	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	2.2 U	1.9 U	1.9 U	3 U
CW-37	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	2.2 U	1.9 U	1.9 U	3 U
CW-38	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	2.2 U	1.9 U	1.9 U	3 U
CW-39	Cove Wash Middle 2	4045453.339	658432.518	2.2 U	1.9 U	1.9 U	3 U
CW-40	Duplicated of SW-39	4045453.339	658432.518	2.2 U	NC	NC	NC
CW-41	Cove Wash Middle 1	4045552	658464	NC	1.9 U	NC	NC
CW-46	Pine Water Springs	4043788.61	661352.387	**140**	29	5.9 J	**30**
CW-47	Cove Wash Middle 3F	4043727.086	659295.82	NC	1.9 U	1.9 U	3 U
CW-48	Cove Wash Middle 3F	4044751.928	656807.090	2.2 U	1.9 U	NC	3 U
CW-50	Cove Wash Middle 1	4044856.247	657463.154	2.2 U	1.9 U	1.9 U	3 U
CW-51	Cove Wash Middle 1A	4044944.041	657035.048	2.2 U	1.9 U	NC	3 U
CW-53a	Cove Wash Middle 1	4044478	656787	2.2 U	1.9 U	1.9 U	3 U
CW-54	Cove Wash Middle 1B	4044751.928	656807.09	2.2 U	2 J	2.8 J	3 U
CW-55	Duplicate of CW-39	4044480.534	656337.545	2.2 U	1.9 U	NC	NC
CW-56a	Cove Wash Middle 3A	4043135	658979	NC	1.9 U	1.9 U	NC
CW-57	Duplicate of CW-02	4053607.153	666731.839	NC	1.9 U	NC	NC
CW-58	Cove Wash Middle 1	4044856.247	657463.154	NC	1.9 U	NC	NC
CW-59	Background - Cove Wash Tributary 1	4051574	664210	NC	2.3 J	NC	3 U
CW-60	Cove Wash between 01 and 02	4051659	664274	NC	2.2 J	NC	NC
CW-62	Downstream of Dam	4046378	658785	NC	1.9 U	NC	NC
CW-64	Cove Wash North between CW-15 and CW-16	4045877	656444	NC	1.9 U	2.4 J	3 U
CW-65	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	NC	1.9 U	1.9 U	3 U
CW-66	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	NC	1.9 U	1.9 U	3 U
CW-67	Cove Wash Middle 3	4044603.441	658812.815	NC	1.9 U	NC	NC
CW-68	Duplicate of CW-67	4044603.441	658812.815	NC	1.9 U	NC	NC
CW-69	Duplicate of CW-04	4045547.649	655393.8806	NC	NC	1.9 U	3 U
CW-70	Cove Wash Middle 3F	4044525.919	659043.2268	NC	NC	1.9 U	3 U
CW-71	Duplicate of CW-37	4044377.806	657955.4587	NC	NC	1.9 U	3 U
CW-72	Duplicate of CW-11	4046373.007	657265.4893	NC	NC	NC	3 U
CW-73	Cove Wash Middle 3D	4042208.541	658769.5923	NC	NC	NC	3 U
CW-75	Cove Wash Middle 3D	4041201.219	658764.5801	NC	NC	1.9 U	3 U
CW-79	Duplicate of CW-01G	4050274.524	657301.4036	NC	NC	NC	6.6 J
CW-81	Cove Wash North	4049882.052	658891.9138	NC	NC	1.9 U	3 U
CW-82	Cove Wash Middle 2A	4044047.322	657766.4468	NC	NC	NC	3 U
CW-83	Cove Wash Middle 2A	4044045.08	657643.9635	NC	NC	NC	3 U
CW-84	Cove Wash Middle 2B	4043793.108	657816.7814	NC	NC	NC	3 U
CW-85	Cove Wash Middle 2A	4043732.792	657461.944	NC	NC	NC	3 U
CW-86	Background - Cove Wash Middle 3 - Unnamed Tributary	4044482.433	659284.4116	NC	NC	NC	3 U
CW-87	Background - Cove Wash Middle 3 - Unnamed Tributary	4044365.372	659573.3554	NC	NC	NC	3 U
CW-88	Background - Cove Wash Middle 3 - Unnamed Tributary	4041663.506	658834.4595	NC	NC	NC	3 U
CW-89	Duplicate of CW-66	4042362.589	658661.6744	NC	NC	NC	3 U
CW-90	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	NC	NC	NC	3 U

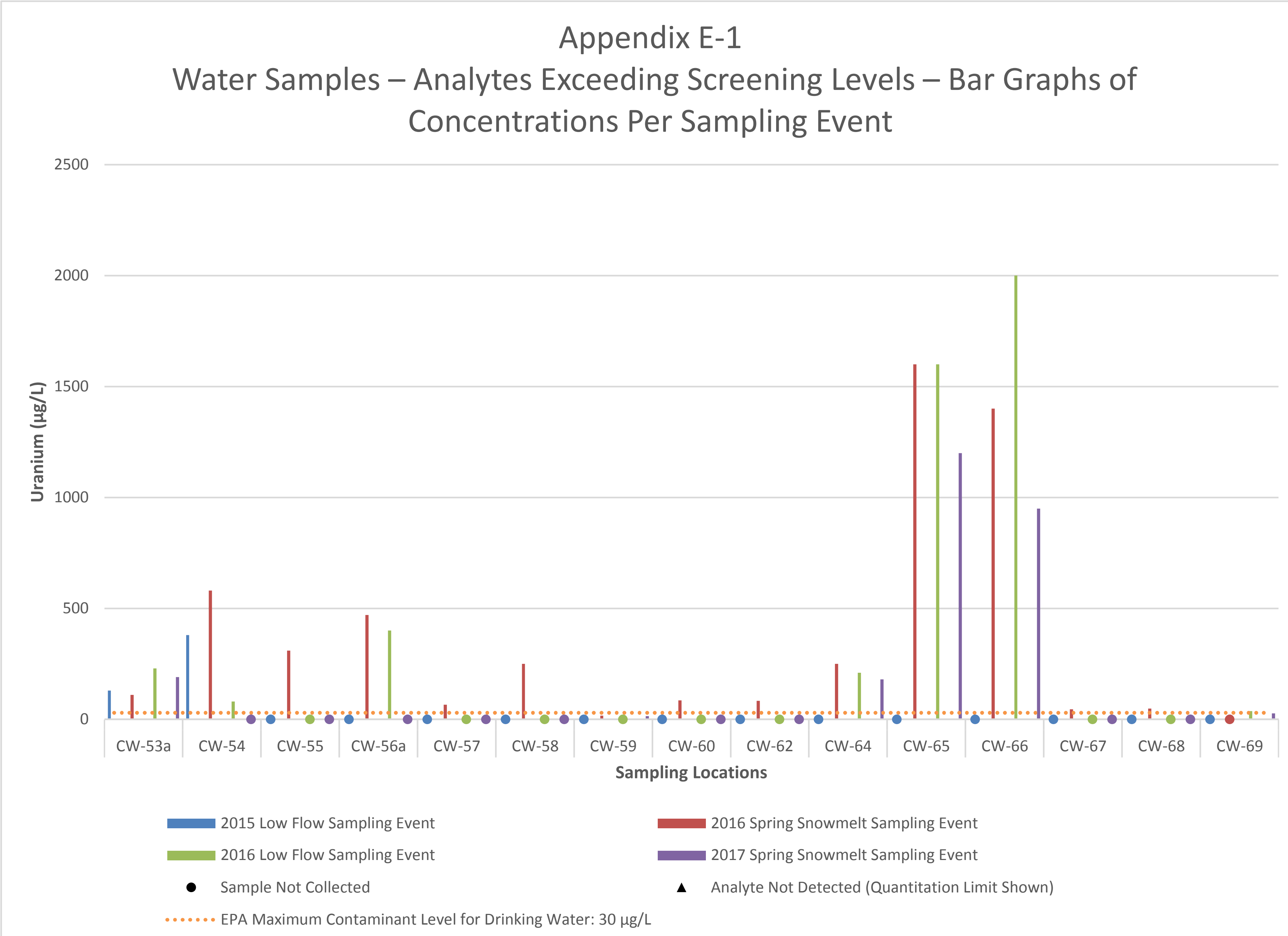
Notes:
EPA = Environmental Protection Agency
NA = Not Applicable
NC = Not Collected
NRWQC = Navajo Recommended Water Quality Criteria
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels
* = The value is hardness dependent. Hardness was not evaluated for samples collected in 2015. Therefore, the upper range of the screening level is evaluated for 2015 Low Flow sample results.

APPENDIX E:

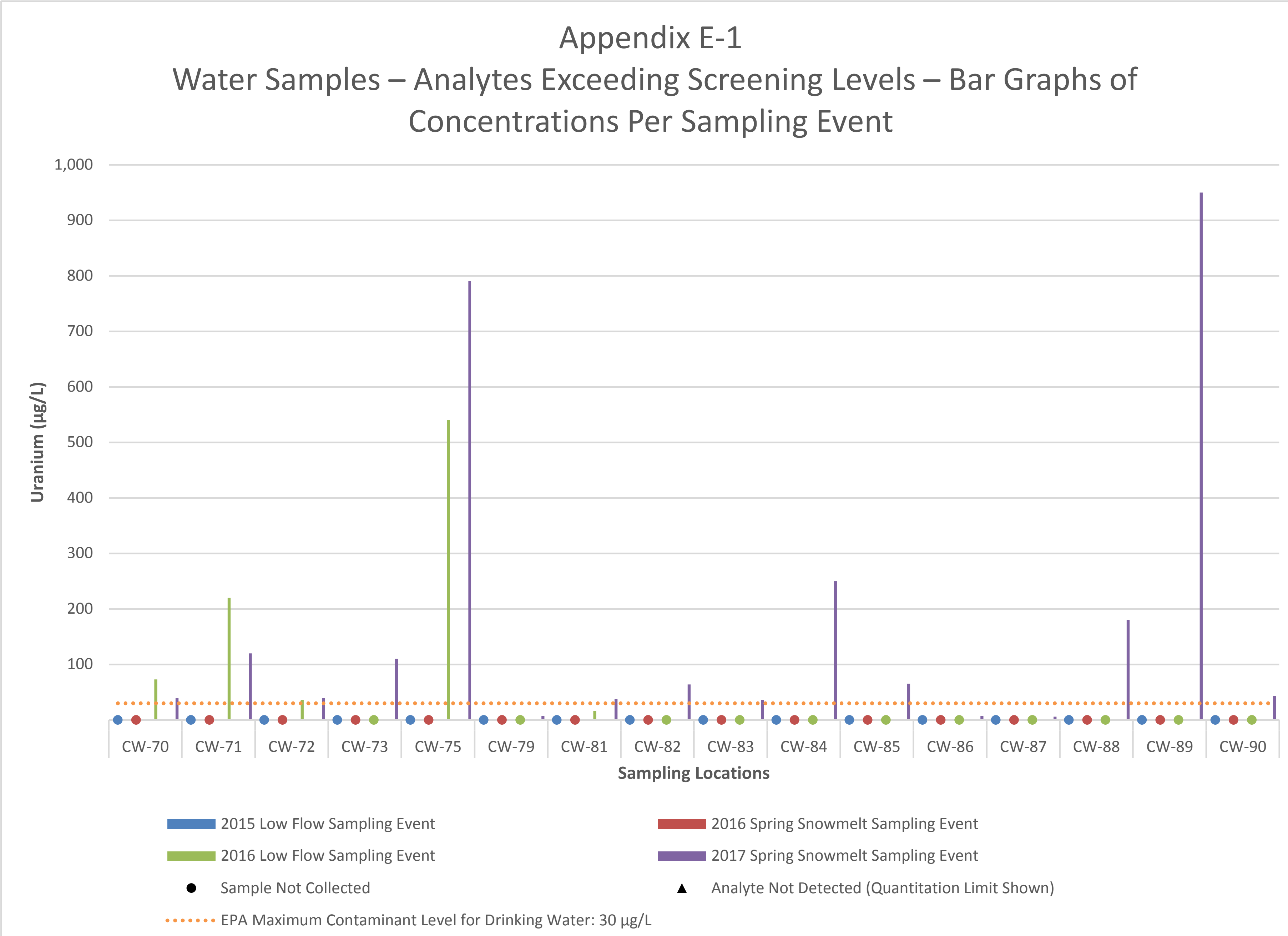
WATER SAMPLES – ANALYTES EXCEEDING SCREENING LEVELS – BAR GRAPHS OF CONCENTRATIONS PER SAMPLING EVENT

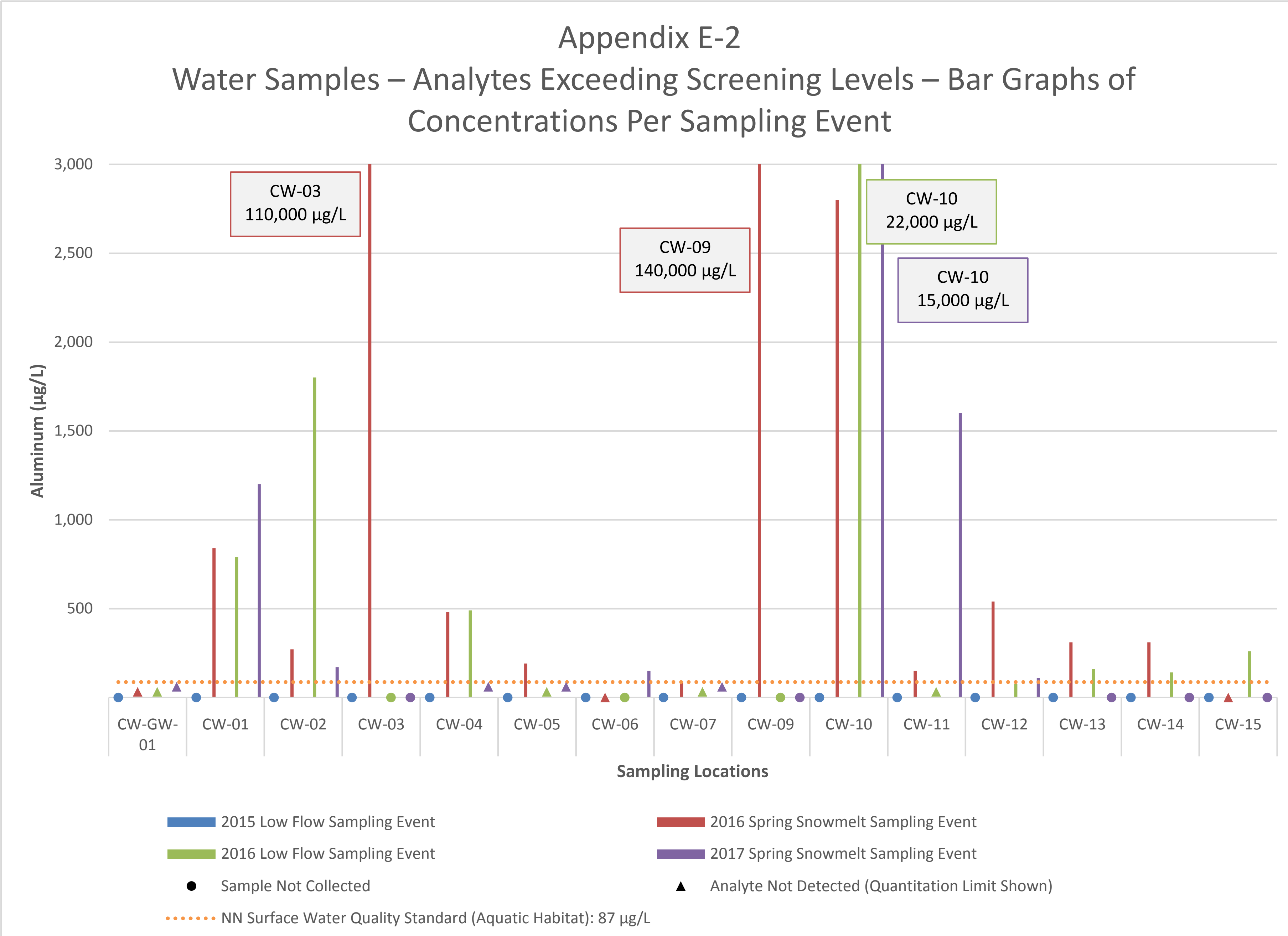

Appendix E-1
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Uranium (µg/L)
300
250
200
150
100
50
0
CW-GW-01
CW-01
CW-02
CW-03
CW-04
CW-05
CW-06
CW-07
CW-09
CW-10
CW-11
CW-12
CW-13
CW-14
CW-15
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Maximum Contaminant Level for Drinking Water: 30 µg/L


Appendix E-1
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
800
700
600
500
400
300
200
100
0
Uranium (µg/L)
CW-18
CW-21
CW-22
CW-26
CW-36
CW-37
CW-38
CW-39
CW-40
CW-41
CW-46
CW-47
CW-48
CW-50
CW-51
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Maximum Contaminant Level for Drinking Water: 30 µg/L



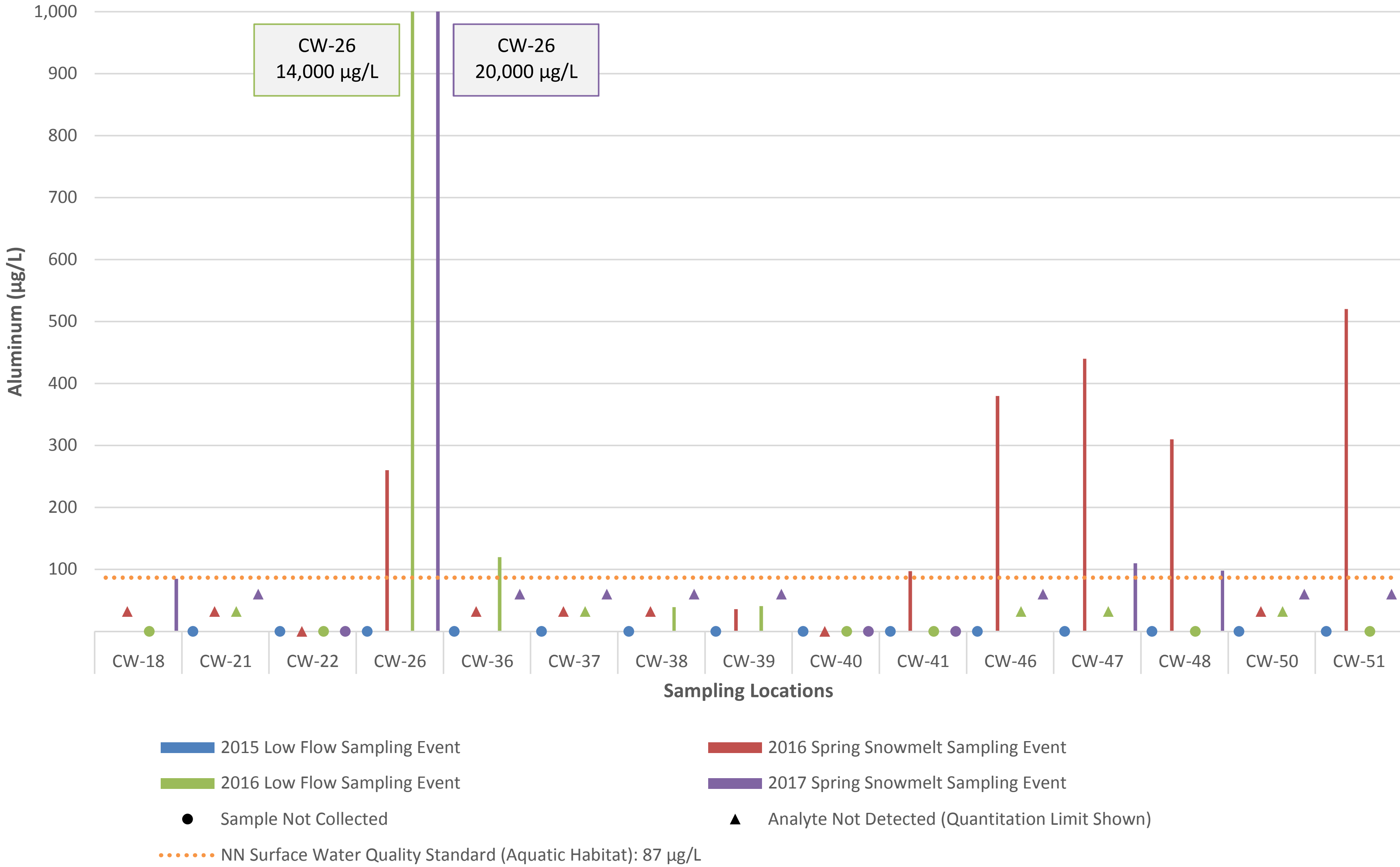
Appendix E-1
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Uranium (µg/L)
2500
2000
1500
1000
500
0
CW-53a
CW-54
CW-55
CW-56a
CW-57
CW-58
CW-59
CW-60
CW-62
CW-64
CW-65
CW-66
CW-67
CW-68
CW-69
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Maximum Contaminant Level for Drinking Water: 30 µg/L

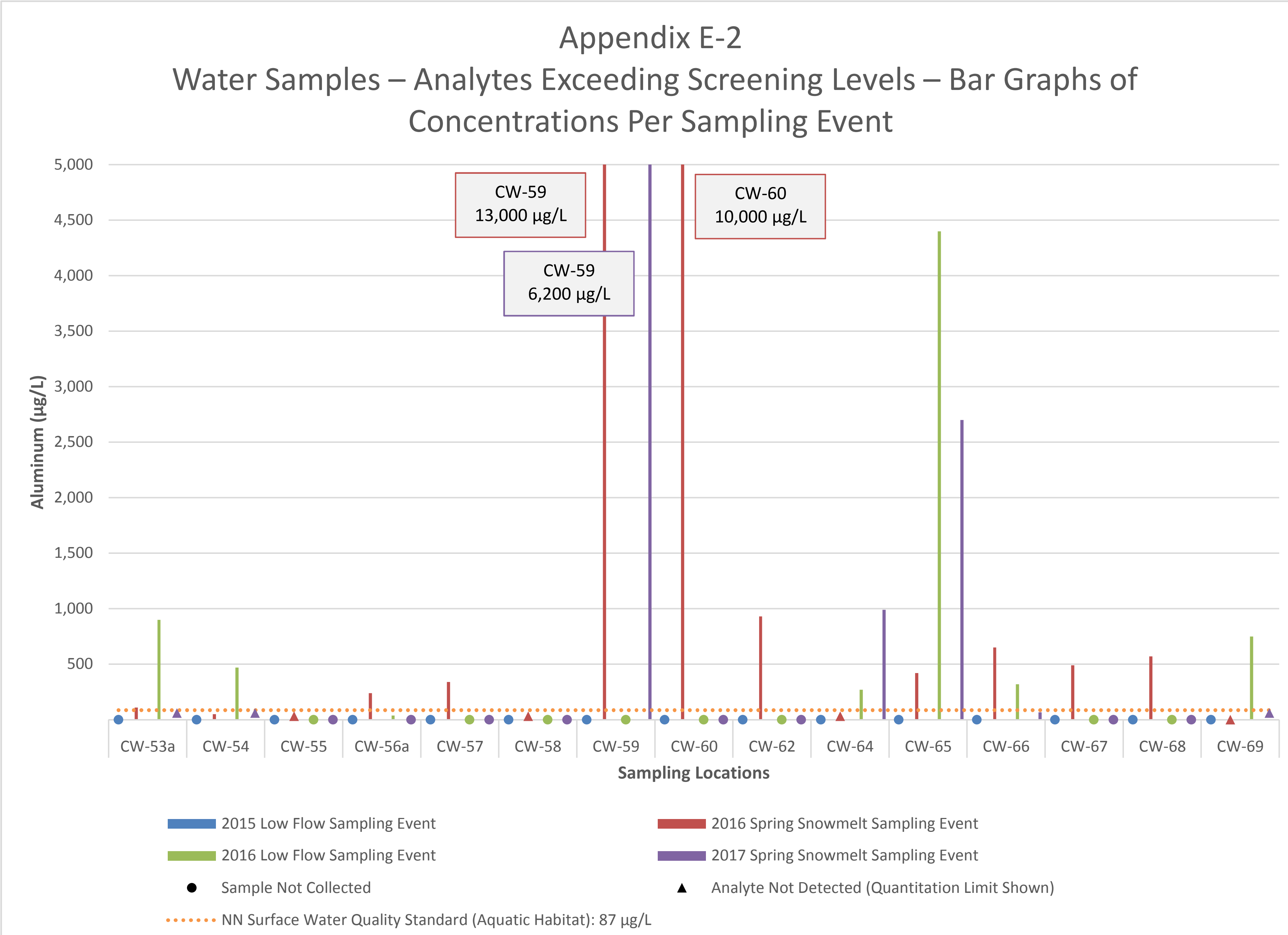

Appendix E-1
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
1,000
900
800
700
600
500
400
300
200
100
Uranium (µg/L)
CW-70
CW-71
CW-72
CW-73
CW-75
CW-79
CW-81
CW-82
CW-83
CW-84
CW-85
CW-86
CW-87
CW-88
CW-89
CW-90
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Maximum Contaminant Level for Drinking Water: 30 µg/L



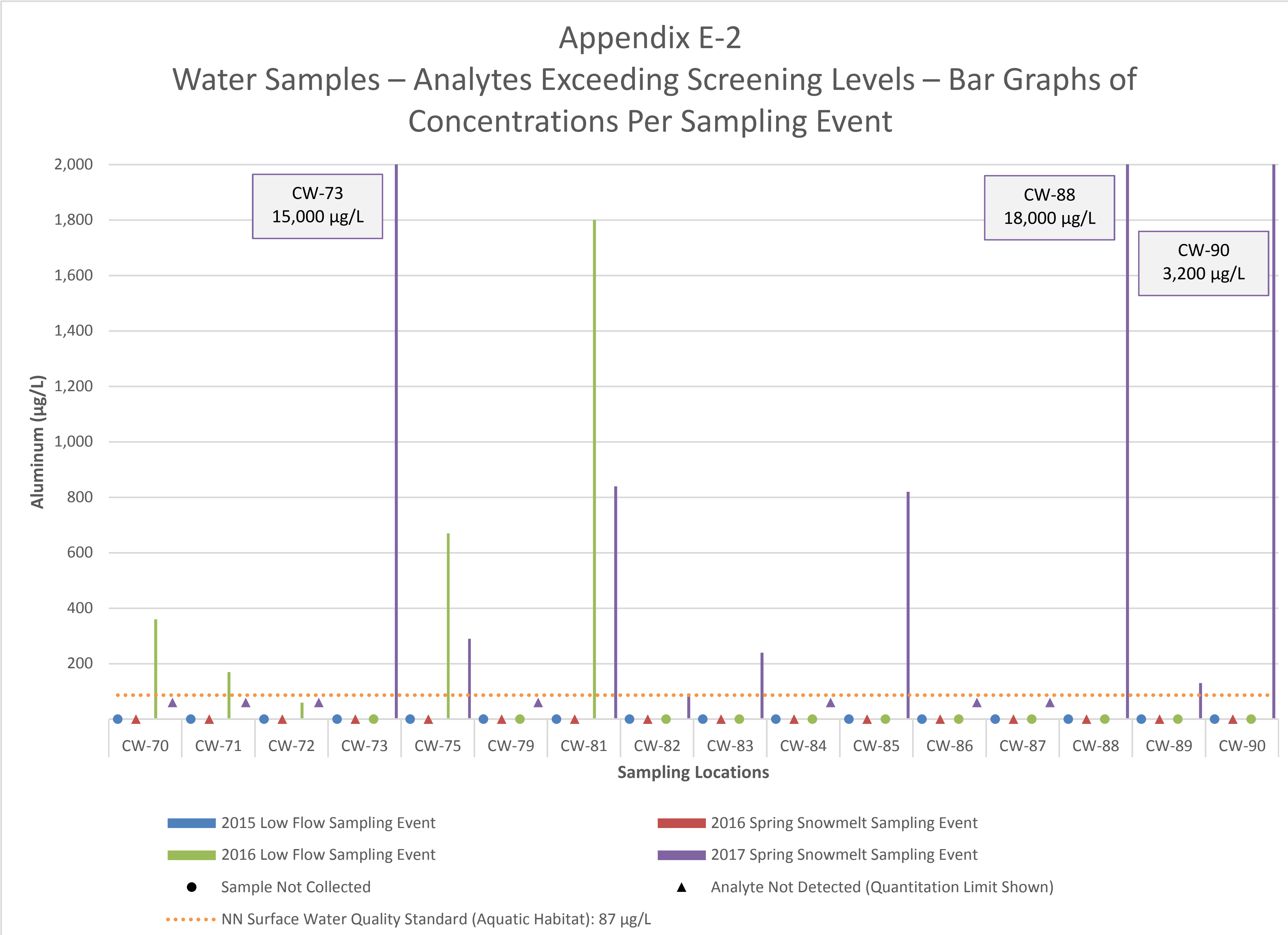
Appendix E-2
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Aluminum (µg/L)
3,000
2,500
2,000
1,500
1,000
500
CW-03
110,000 µg/L
CW-09
140,000 µg/L
CW-10
22,000 µg/L
CW-10
15,000 µg/L
CW-GW-01
CW-01
CW-02
CW-03
CW-04
CW-05
CW-06
CW-07
CW-09
CW-10
CW-11
CW-12
CW-13
CW-14
CW-15
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
NN Surface Water Quality Standard (Aquatic Habitat): 87 µg/L

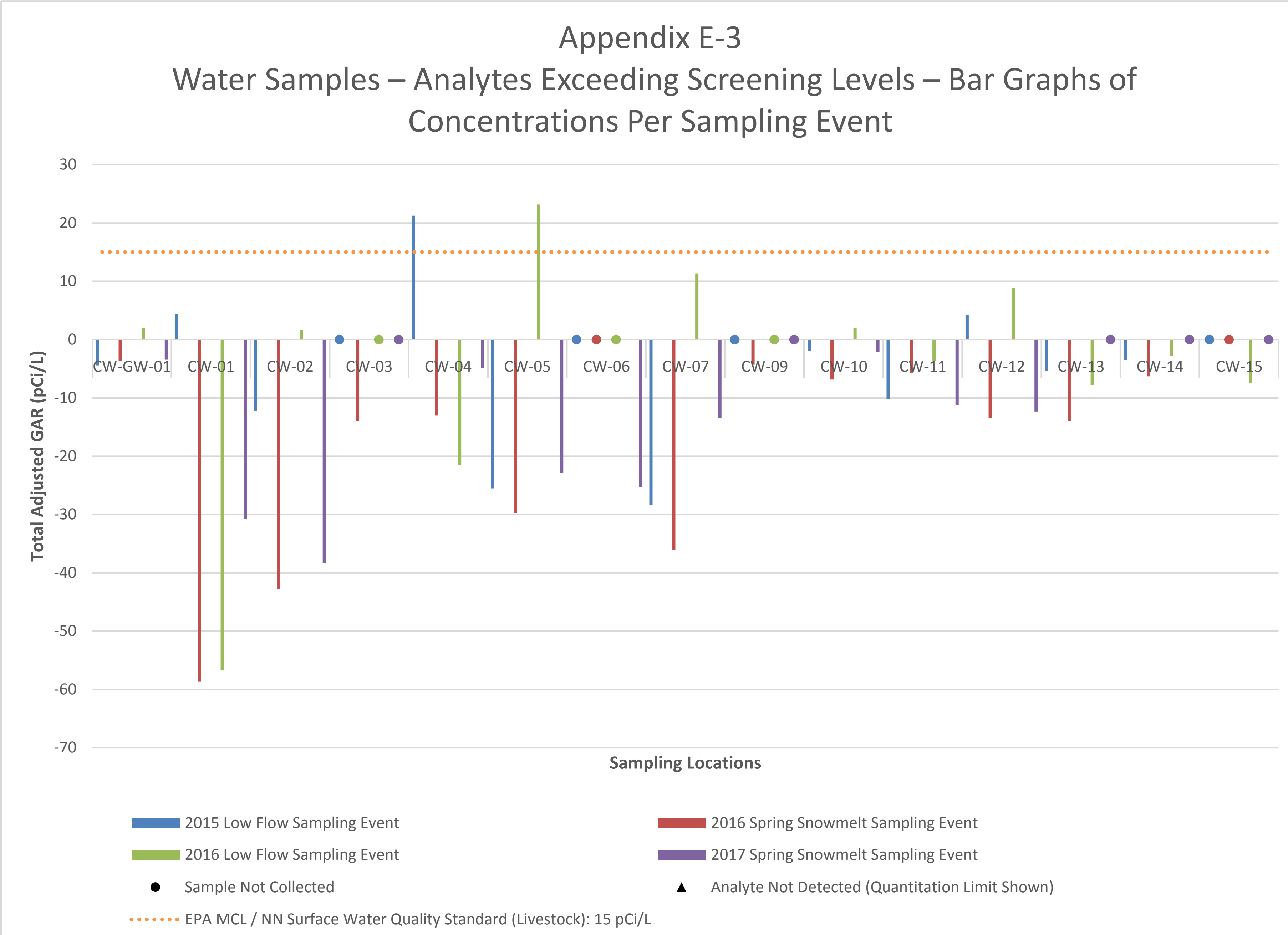
Appendix E-2
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event



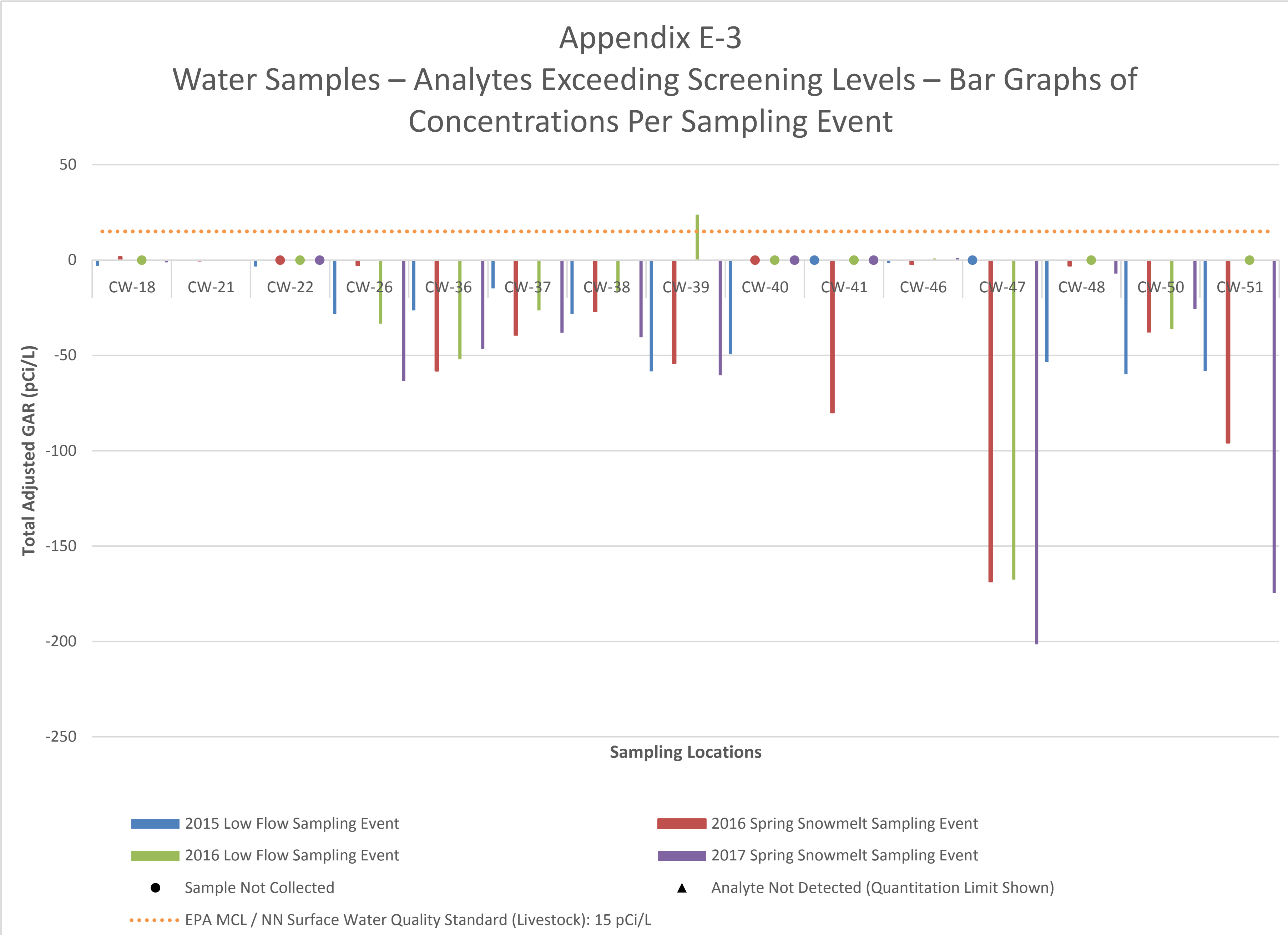


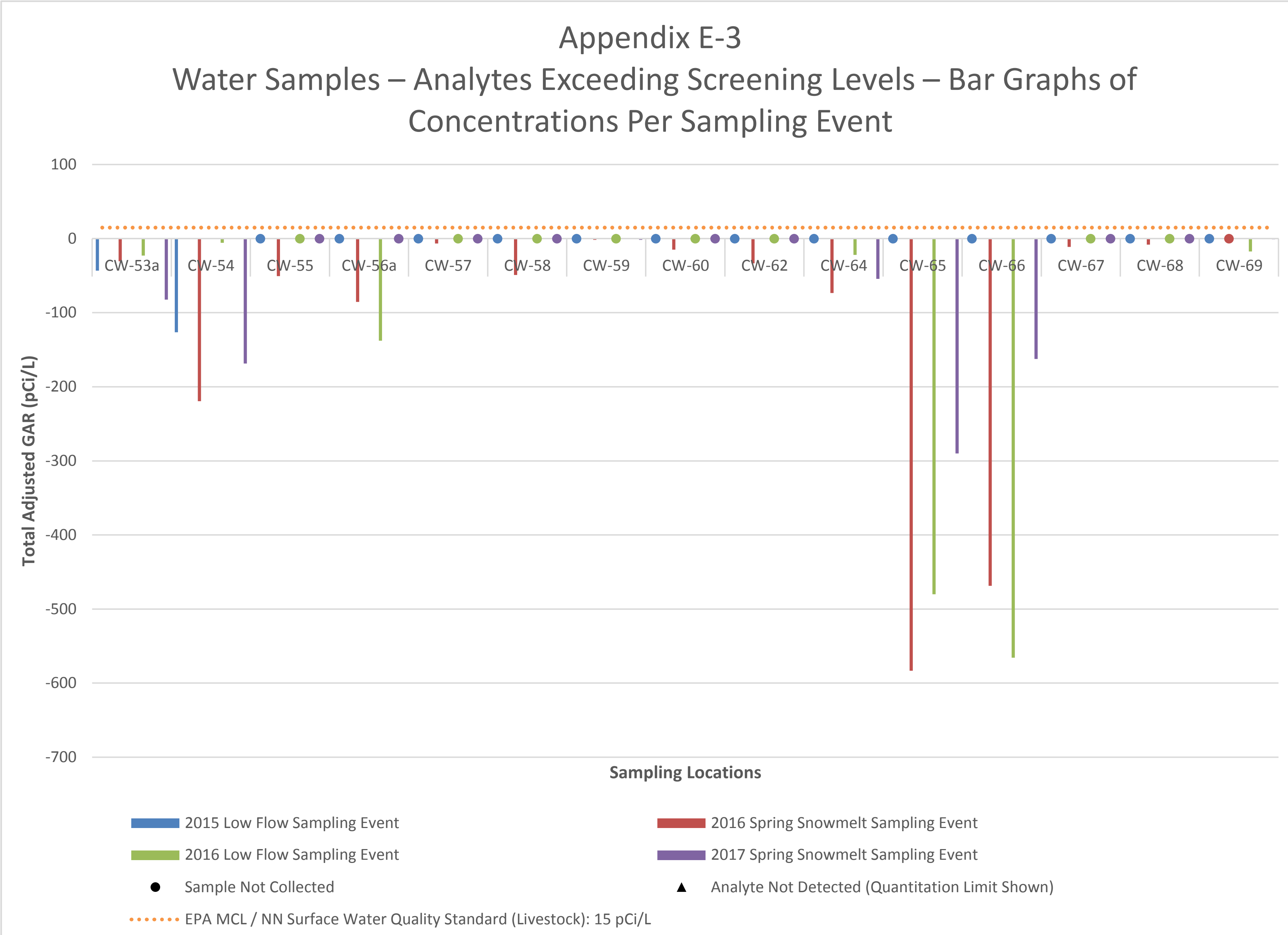
Appendix E-2
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
CW-59
13,000 µg/L
CW-59
6,200 µg/L
CW-60
10,000 µg/L
Aluminum (µg/L)
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
CW-53a
CW-54
CW-55
CW-56a
CW-57
CW-58
CW-59
CW-60
CW-62
CW-64
CW-65
CW-66
CW-67
CW-68
CW-69
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
NN Surface Water Quality Standard (Aquatic Habitat): 87 µg/L

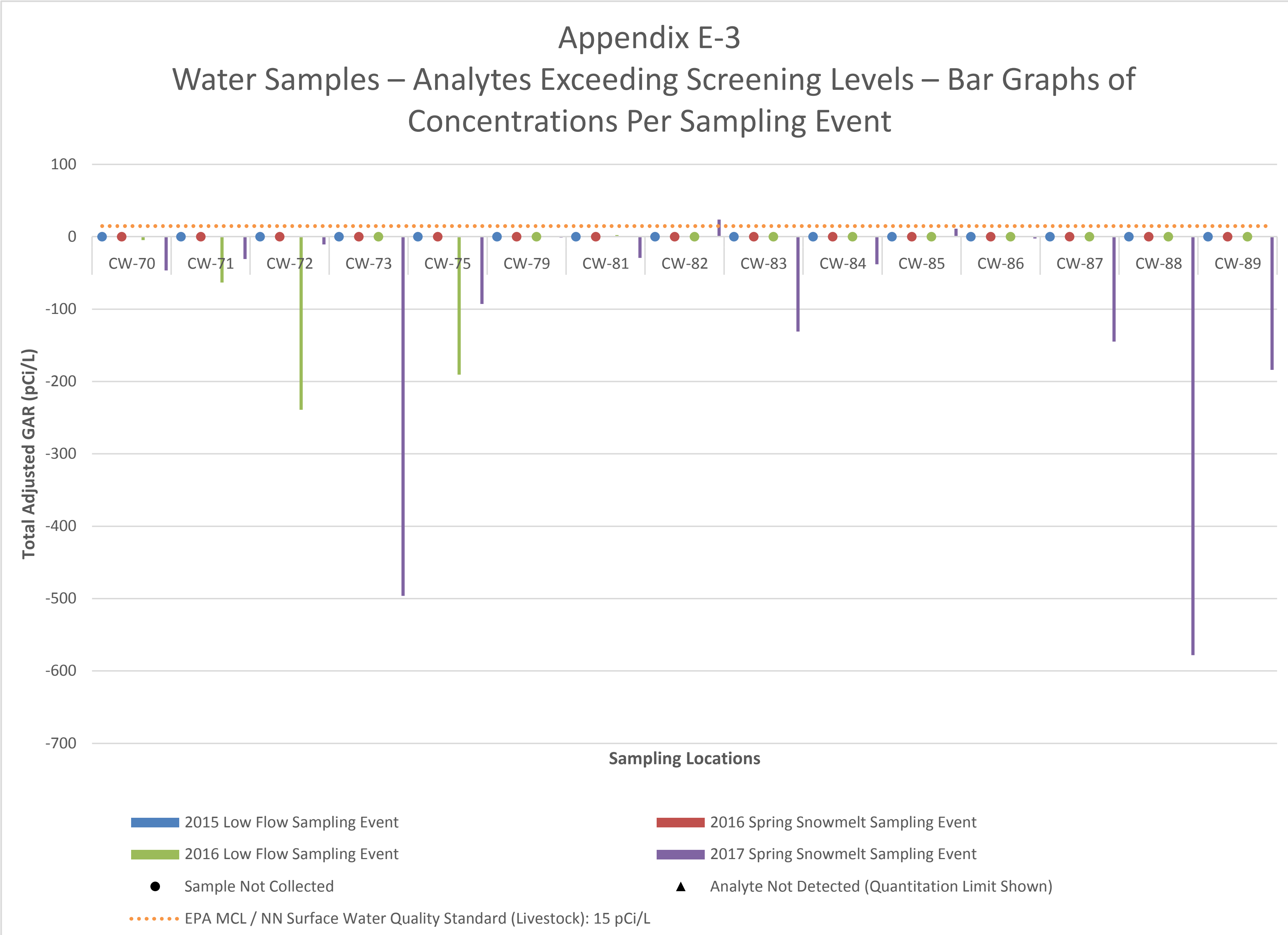

Appendix E-2
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
CW-73
15,000 µg/L
CW-88
18,000 µg/L
CW-90
3,200 µg/L
Aluminum (µg/L)
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
CW-70
CW-71
CW-72
CW-73
CW-75
CW-79
CW-81
CW-82
CW-83
CW-84
CW-85
CW-86
CW-87
CW-88
CW-89
CW-90
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
NN Surface Water Quality Standard (Aquatic Habitat): 87 µg/L



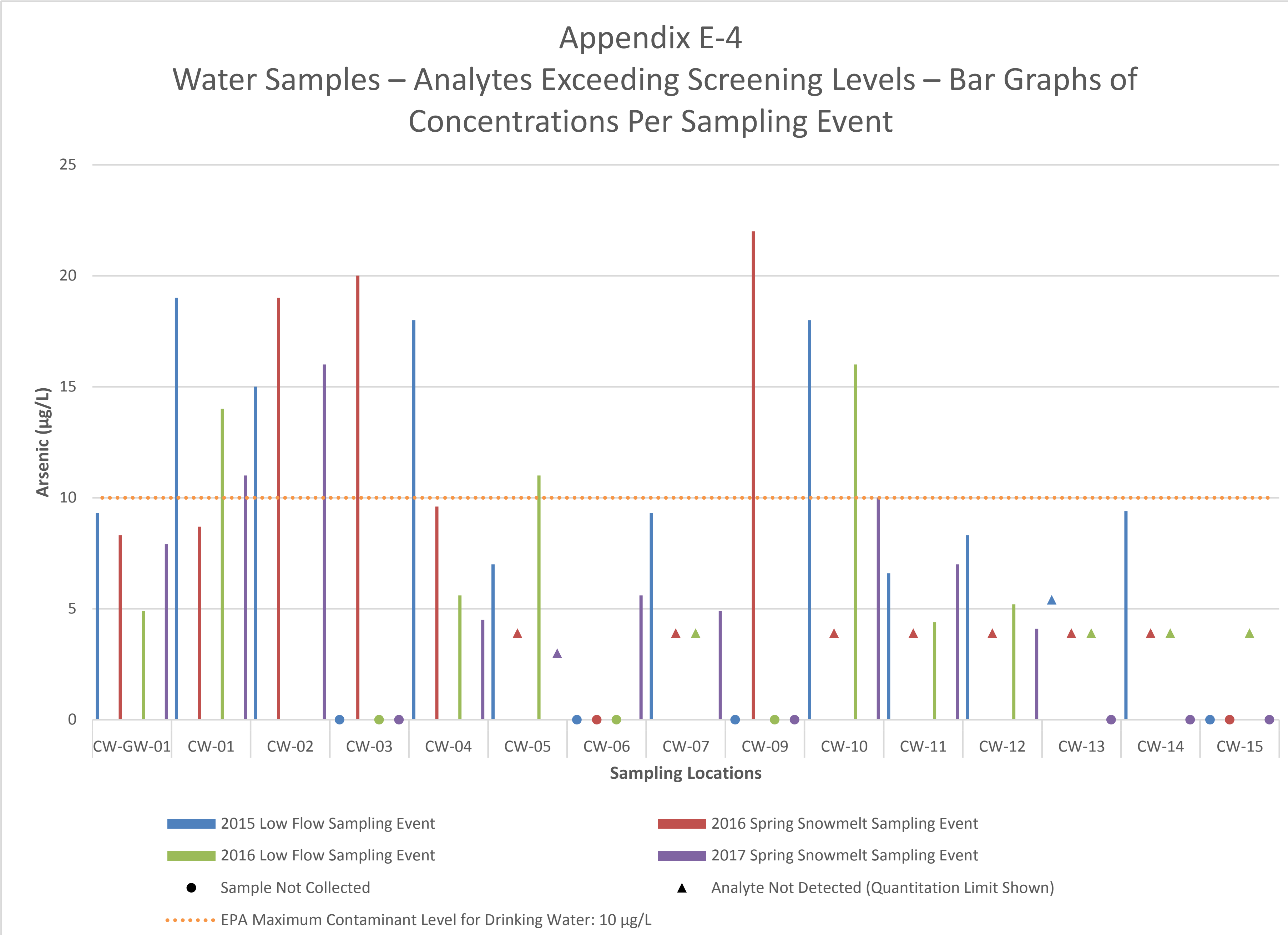
Appendix E-3
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
Total Adjusted GAR (pCi/L)
CW-GW-01
CW-01
CW-02
CW-03
CW-04
CW-05
CW-06
CW-07
CW-09
CW-10
CW-11
CW-12
CW-13
CW-14
CW-15
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA MCL / NN Surface Water Quality Standard (Livestock): 15 pCi/L

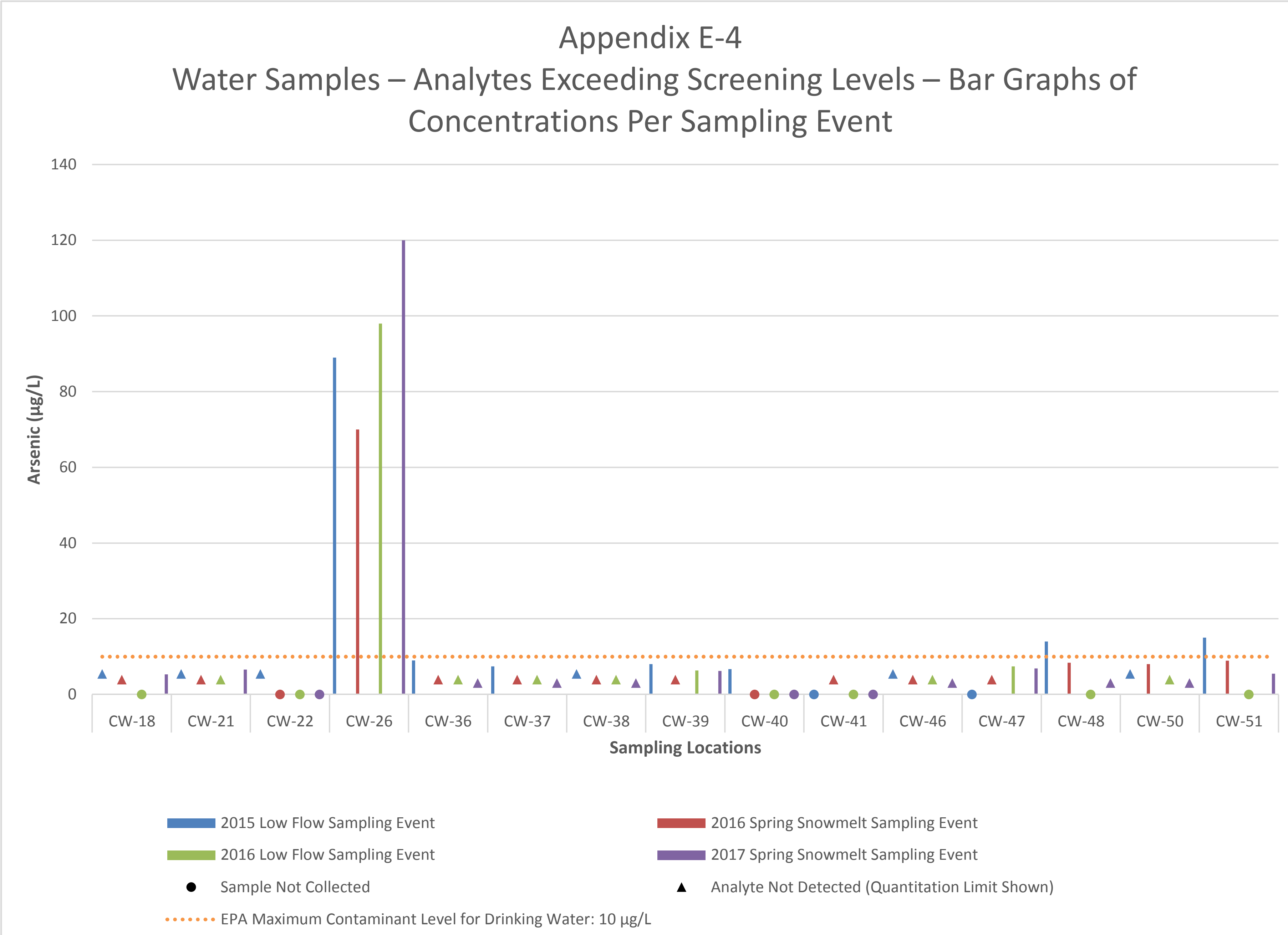

Appendix E-3
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
50
0
-50
-100
-150
-200
-250
Total Adjusted GAR (pCi/L)
CW-18
CW-21
CW-22
CW-26
CW-36
CW-37
CW-38
CW-39
CW-40
CW-41
CW-46
CW-47
CW-48
CW-50
CW-51
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA MCL / NN Surface Water Quality Standard (Livestock): 15 pCi/L

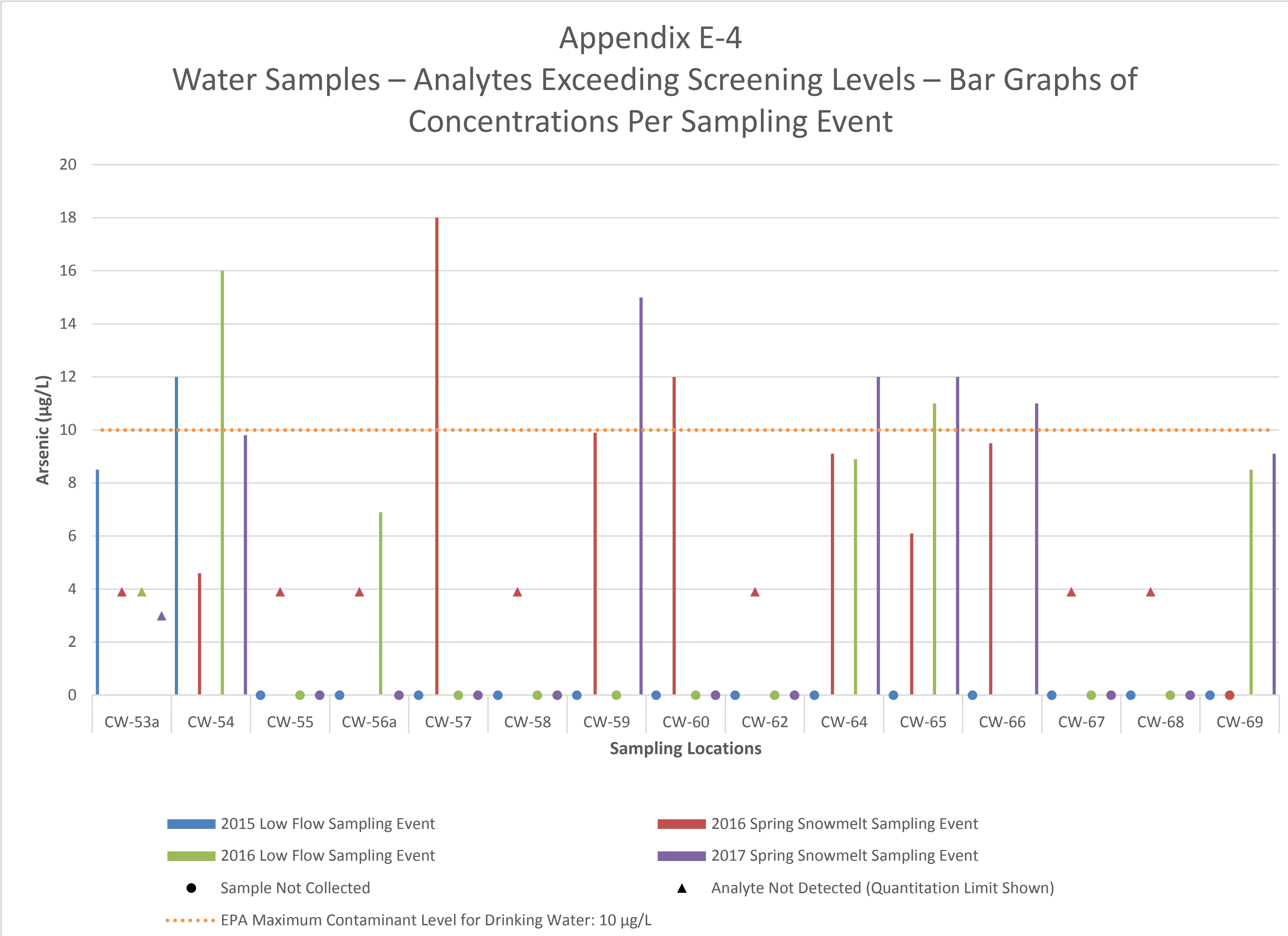

Appendix E-3
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
100
0
-100
-200
-300
-400
-500
-600
-700
Total Adjusted GAR (pCi/L)
CW-53a
CW-54
CW-55
CW-56a
CW-57
CW-58
CW-59
CW-60
CW-62
CW-64
CW-65
CW-66
CW-67
CW-68
CW-69
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA MCL / NN Surface Water Quality Standard (Livestock): 15 pCi/L



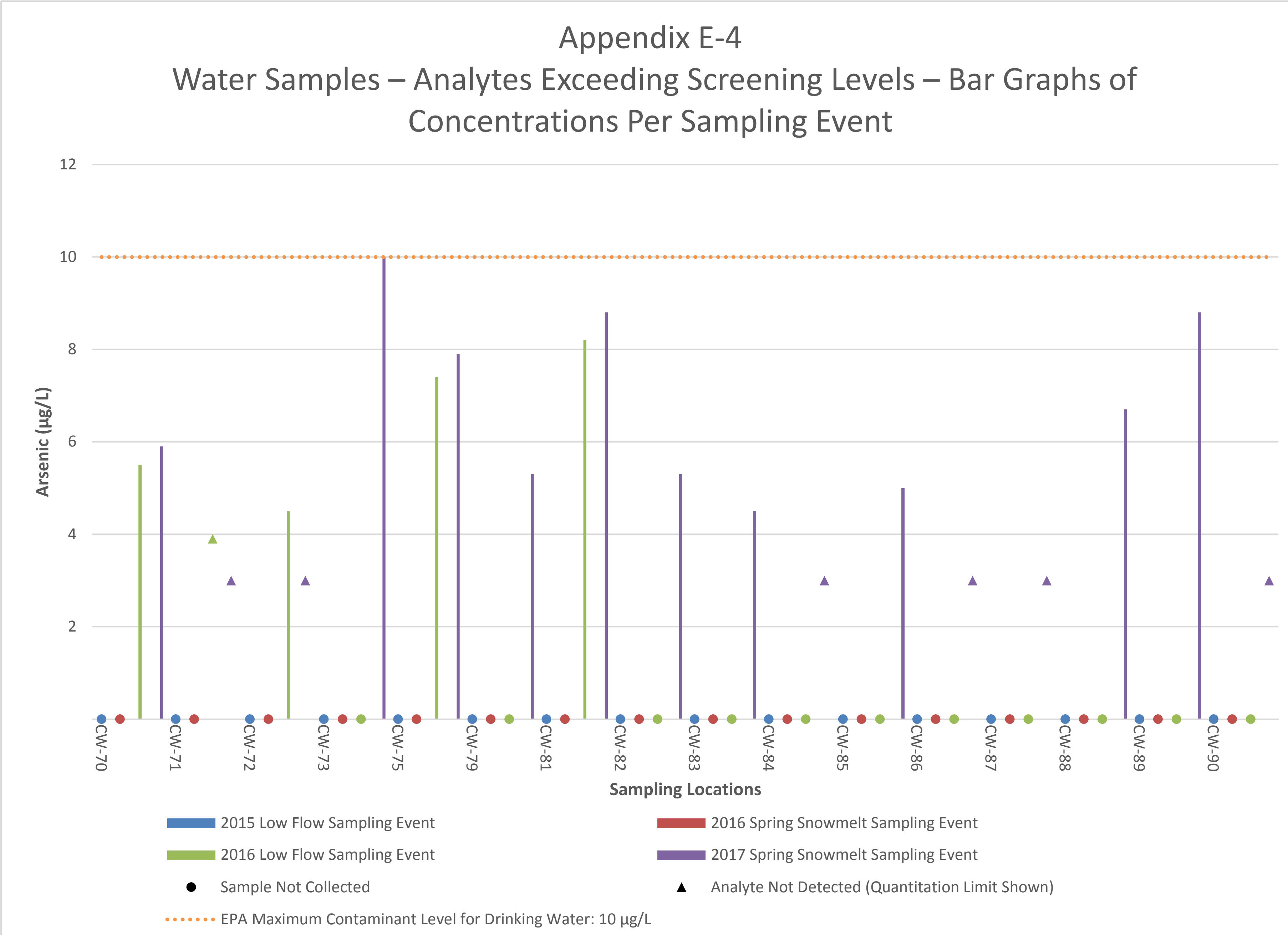
Appendix E-3
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
100
0
-100
-200
-300
-400
-500
-600
-700
Total Adjusted GAR (pCi/L)
CW-70
CW-71
CW-72
CW-73
CW-75
CW-79
CW-81
CW-82
CW-83
CW-84
CW-85
CW-86
CW-87
CW-88
CW-89
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA MCL / NN Surface Water Quality Standard (Livestock): 15 pCi/L

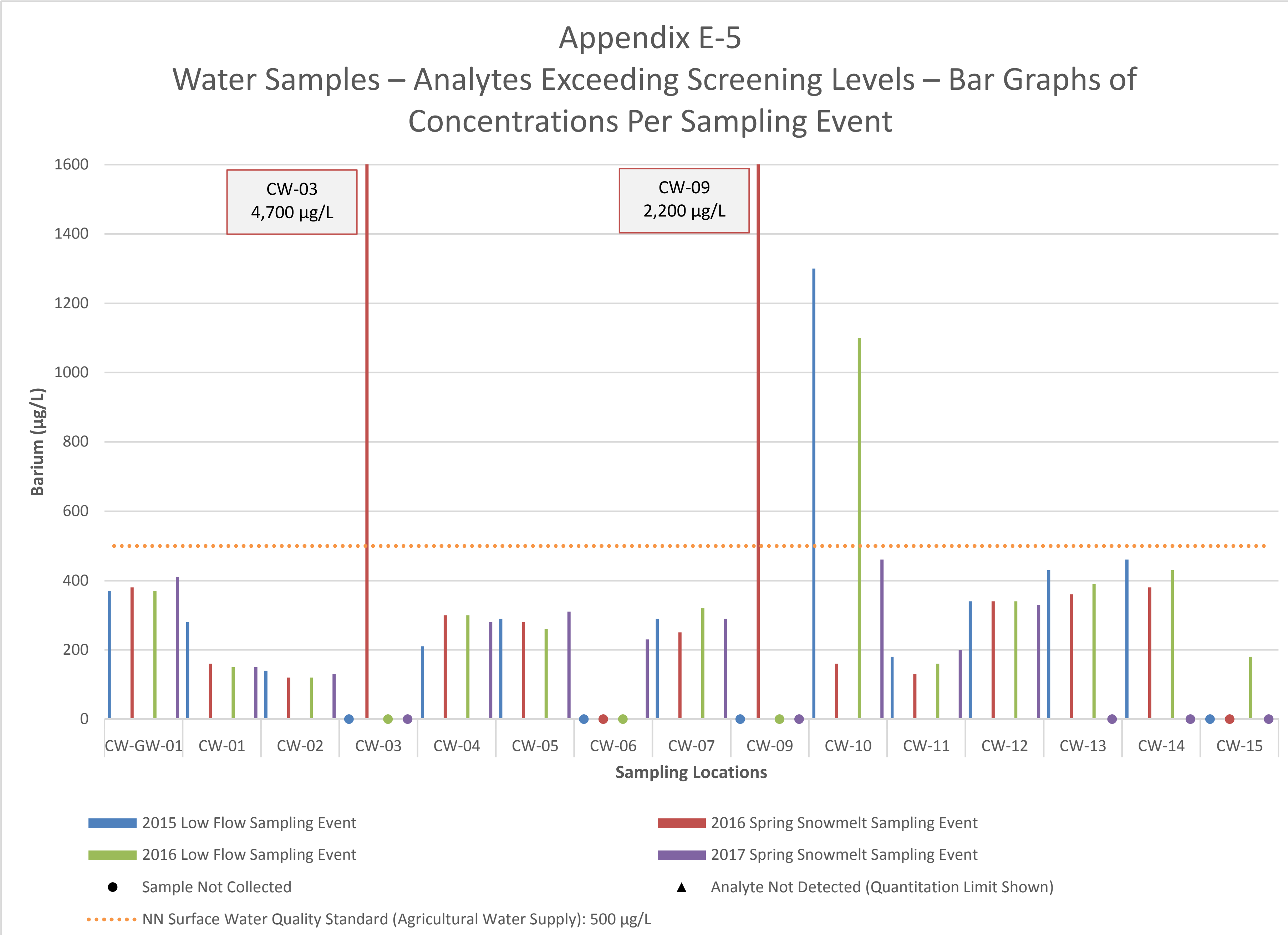

Appendix E-4
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Arsenic (µg/L)
25
20
15
10
5
0
CW-GW-01
CW-01
CW-02
CW-03
CW-04
CW-05
CW-06
CW-07
CW-09
CW-10
CW-11
CW-12
CW-13
CW-14
CW-15
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Maximum Contaminant Level for Drinking Water: 10 µg/L


Appendix E-4
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Arsenic (µg/L)
140
120
100
80
60
40
20
0
CW-18
CW-21
CW-22
CW-26
CW-36
CW-37
CW-38
CW-39
CW-40
CW-41
CW-46
CW-47
CW-48
CW-50
CW-51
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Maximum Contaminant Level for Drinking Water: 10 µg/L

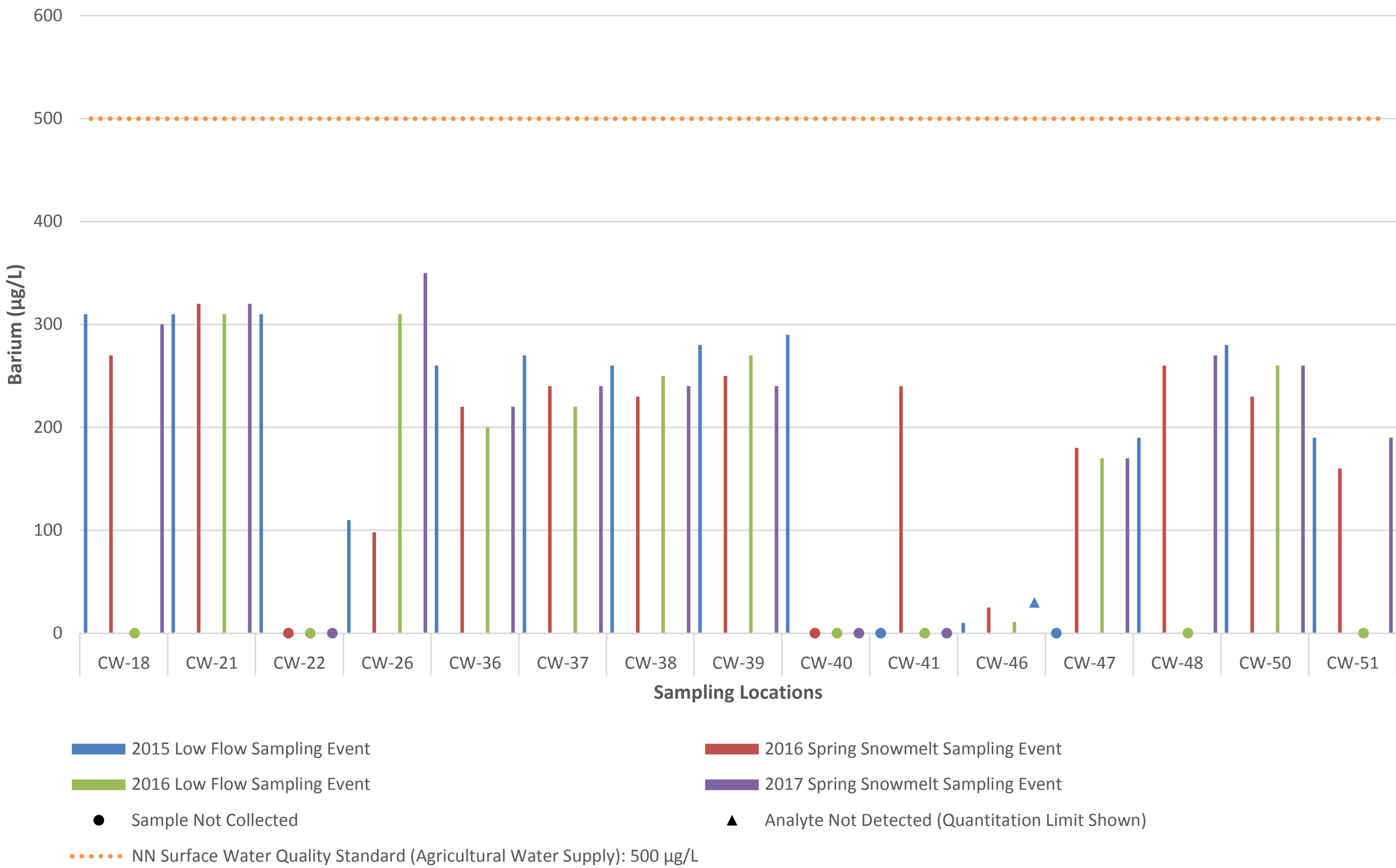


Appendix E-4
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Arsenic (µg/L)
20
18
16
14
12
10
8
6
4
2
0
CW-53a
CW-54
CW-55
CW-56a
CW-57
CW-58
CW-59
CW-60
CW-62
CW-64
CW-65
CW-66
CW-67
CW-68
CW-69
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Maximum Contaminant Level for Drinking Water: 10 µg/L

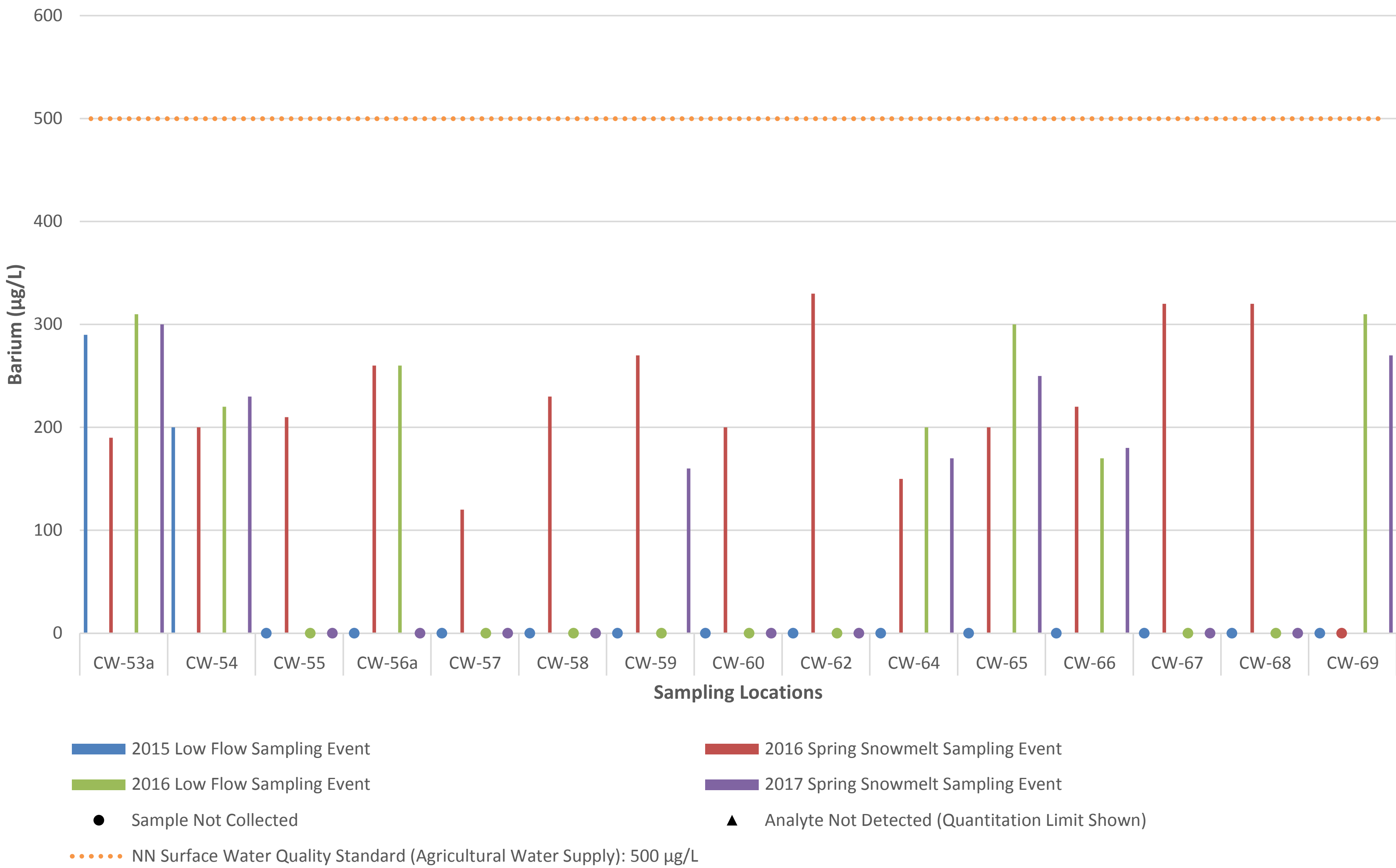

Appendix E-4
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Arsenic (µg/L)
12
10
8
6
4
2
CW-70
CW-71
CW-72
CW-73
CW-75
CW-79
CW-81
CW-82
CW-83
CW-84
CW-85
CW-86
CW-87
CW-88
CW-89
CW-90
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Maximum Contaminant Level for Drinking Water: 10 µg/L


Appendix E-5
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
CW-03
4,700 µg/L
CW-09
2,200 µg/L
Barium (µg/L)
1600
1400
1200
1000
800
600
400
200
0
CW-GW-01
CW-01
CW-02
CW-03
CW-04
CW-05
CW-06
CW-07
CW-09
CW-10
CW-11
CW-12
CW-13
CW-14
CW-15
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
NN Surface Water Quality Standard (Agricultural Water Supply): 500 µg/L

Appendix E-5
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event

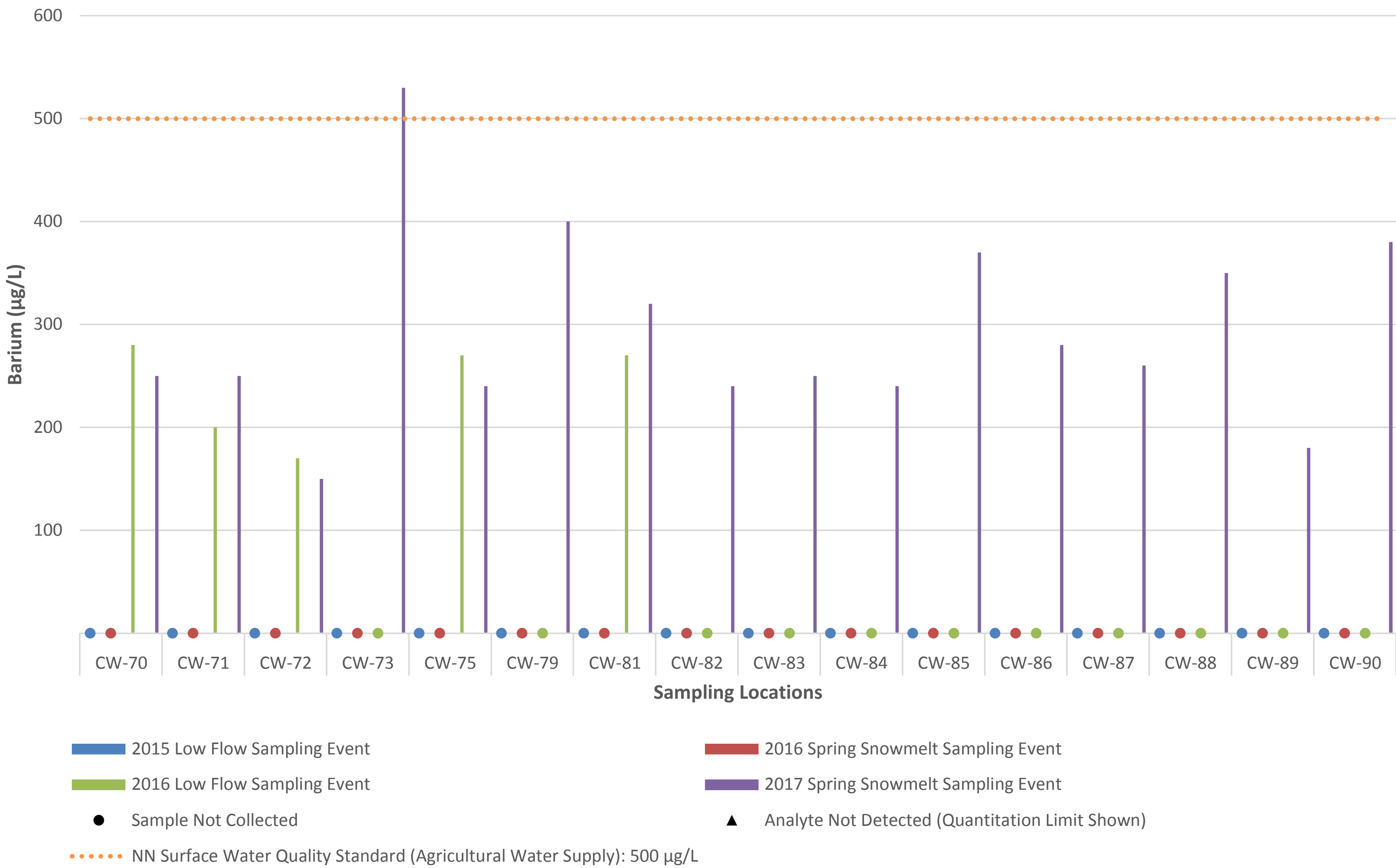


Appendix E-5
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event

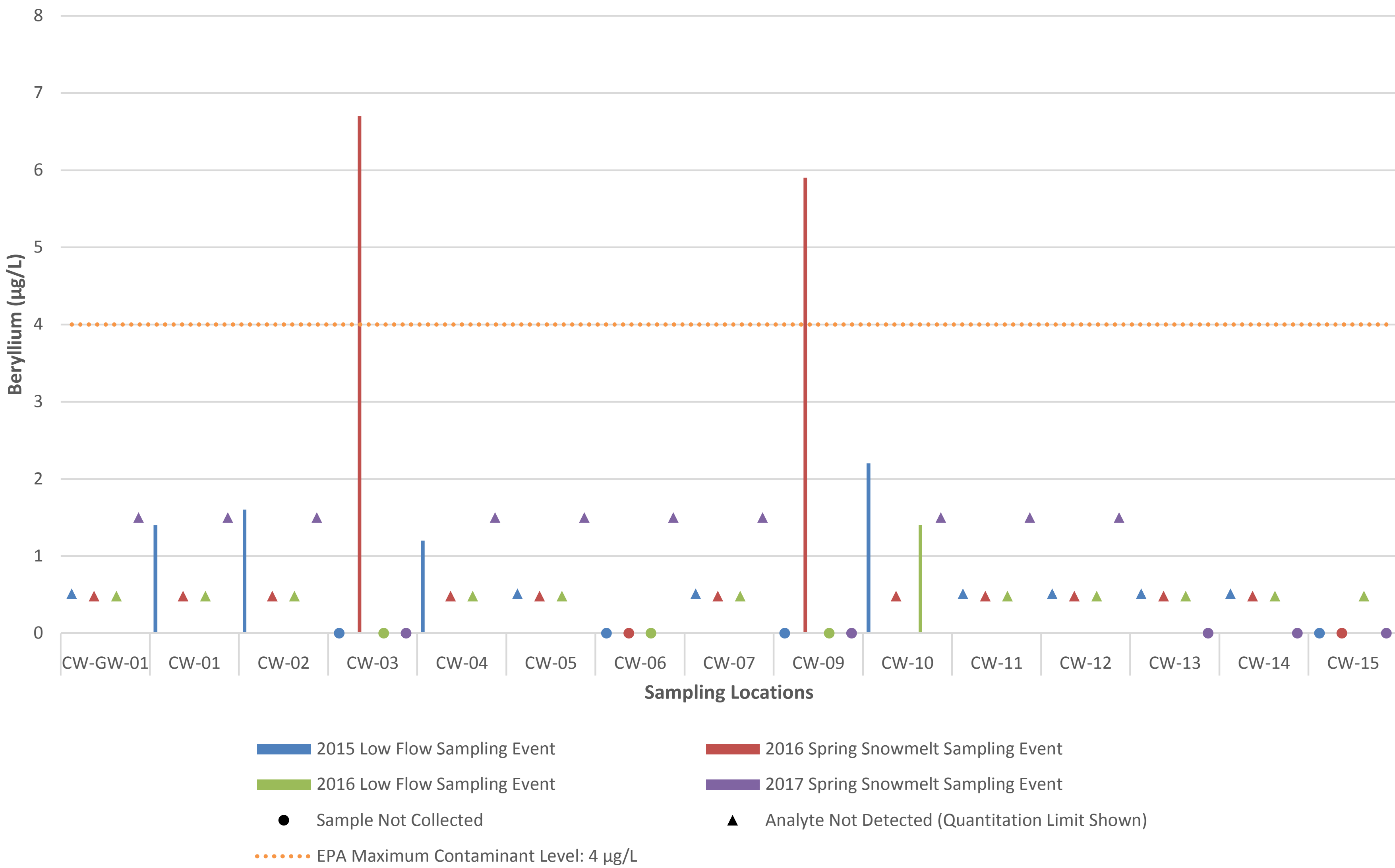


Appendix E-5

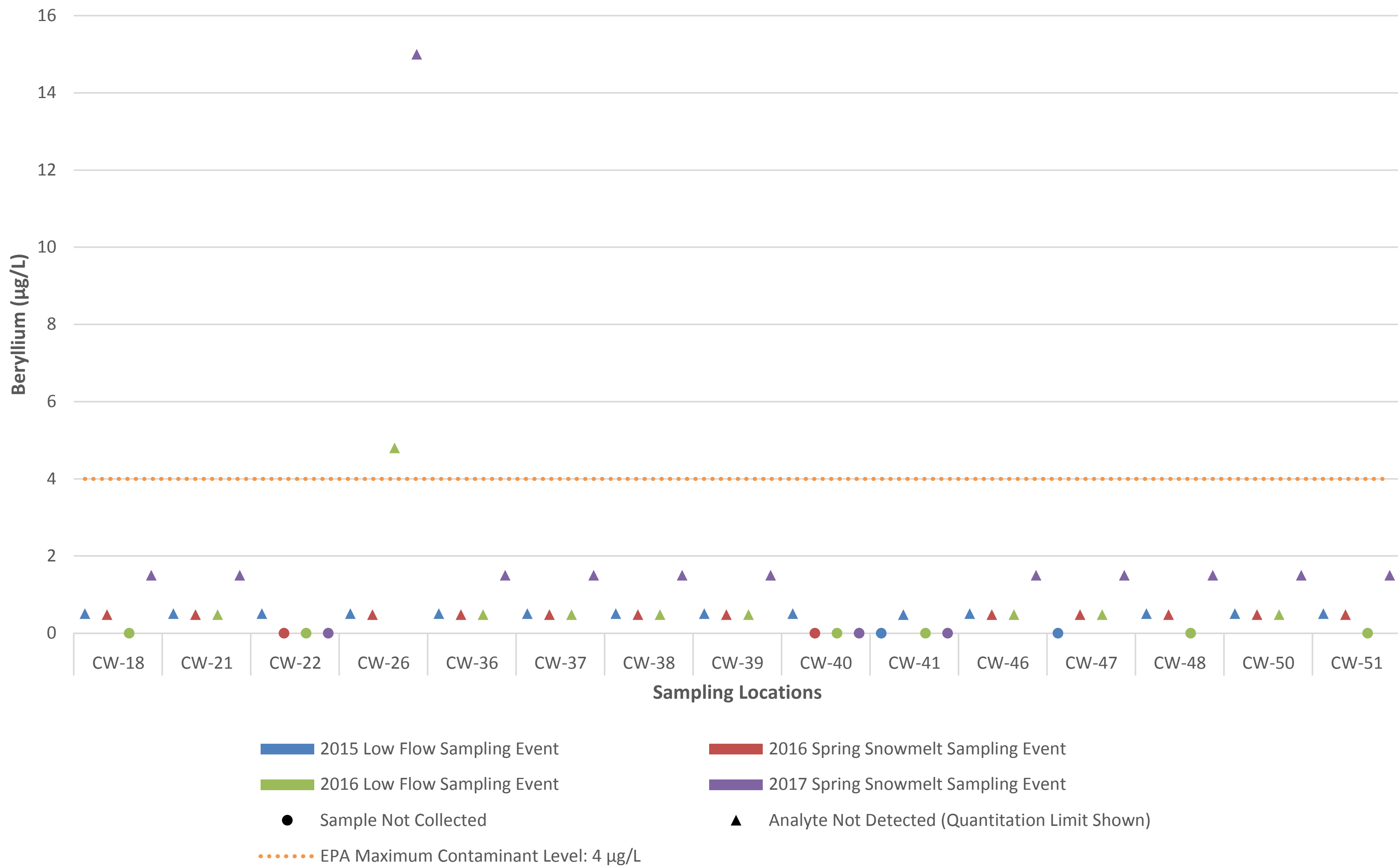
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event

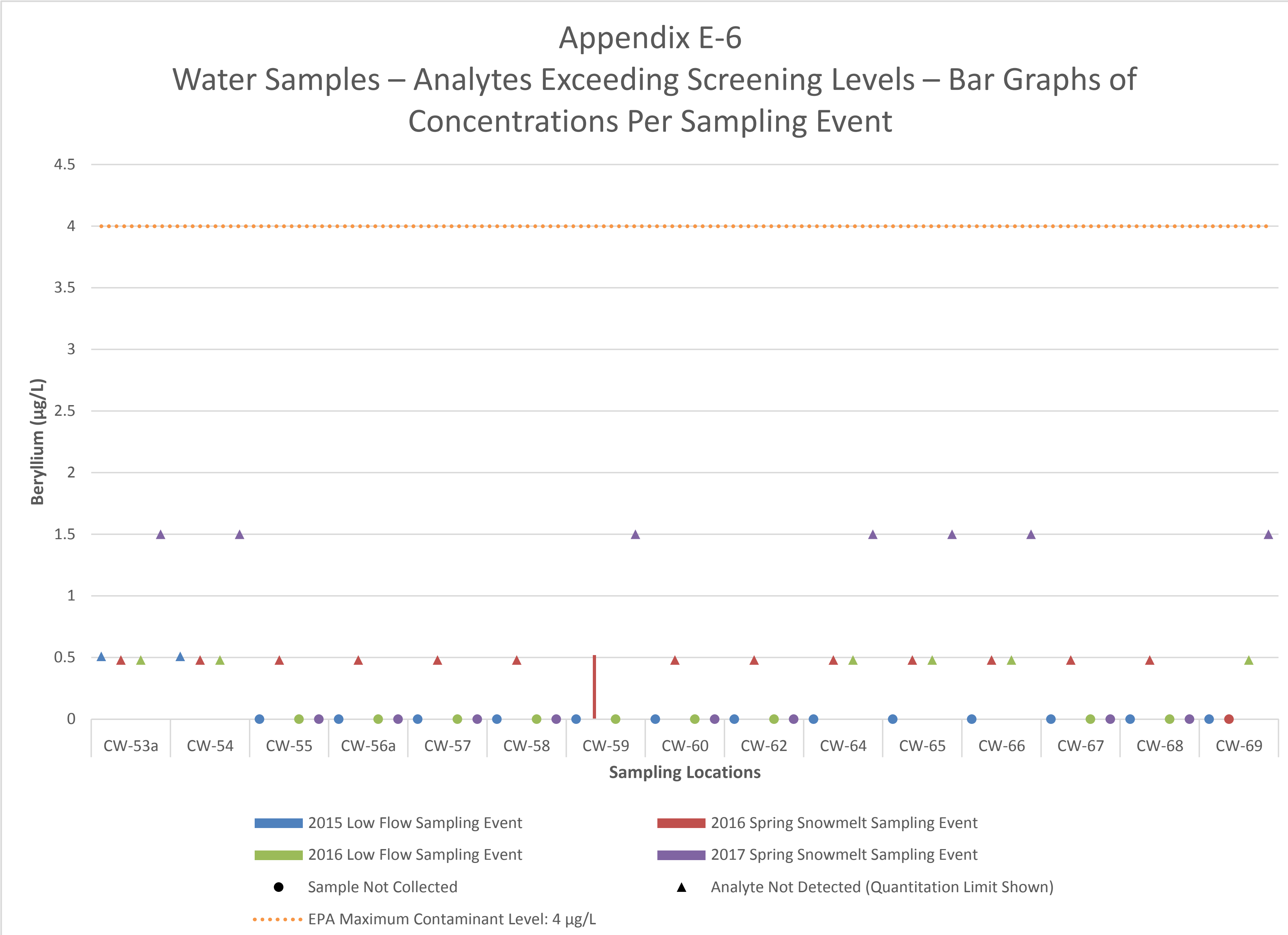


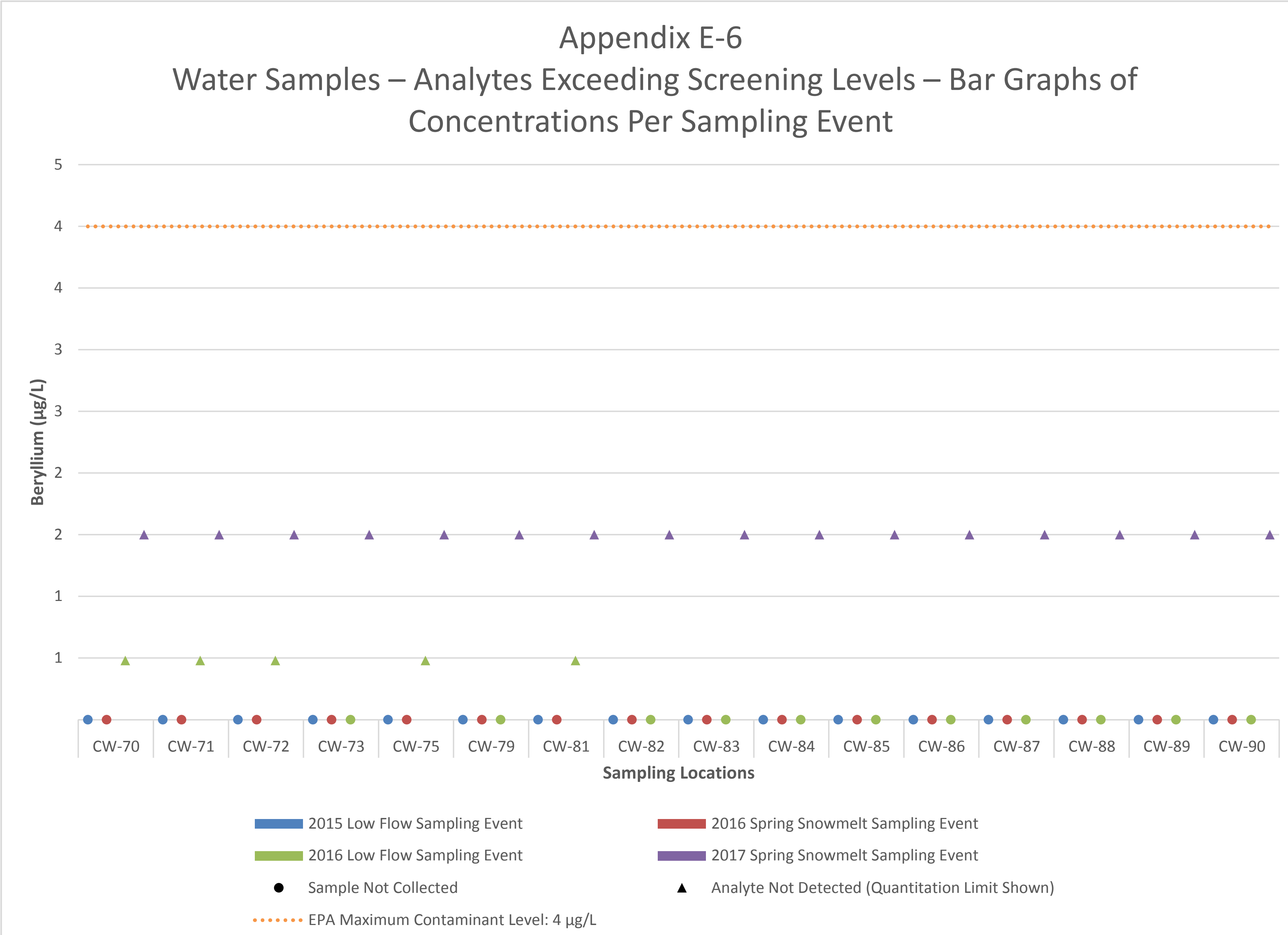
Appendix E-6
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event



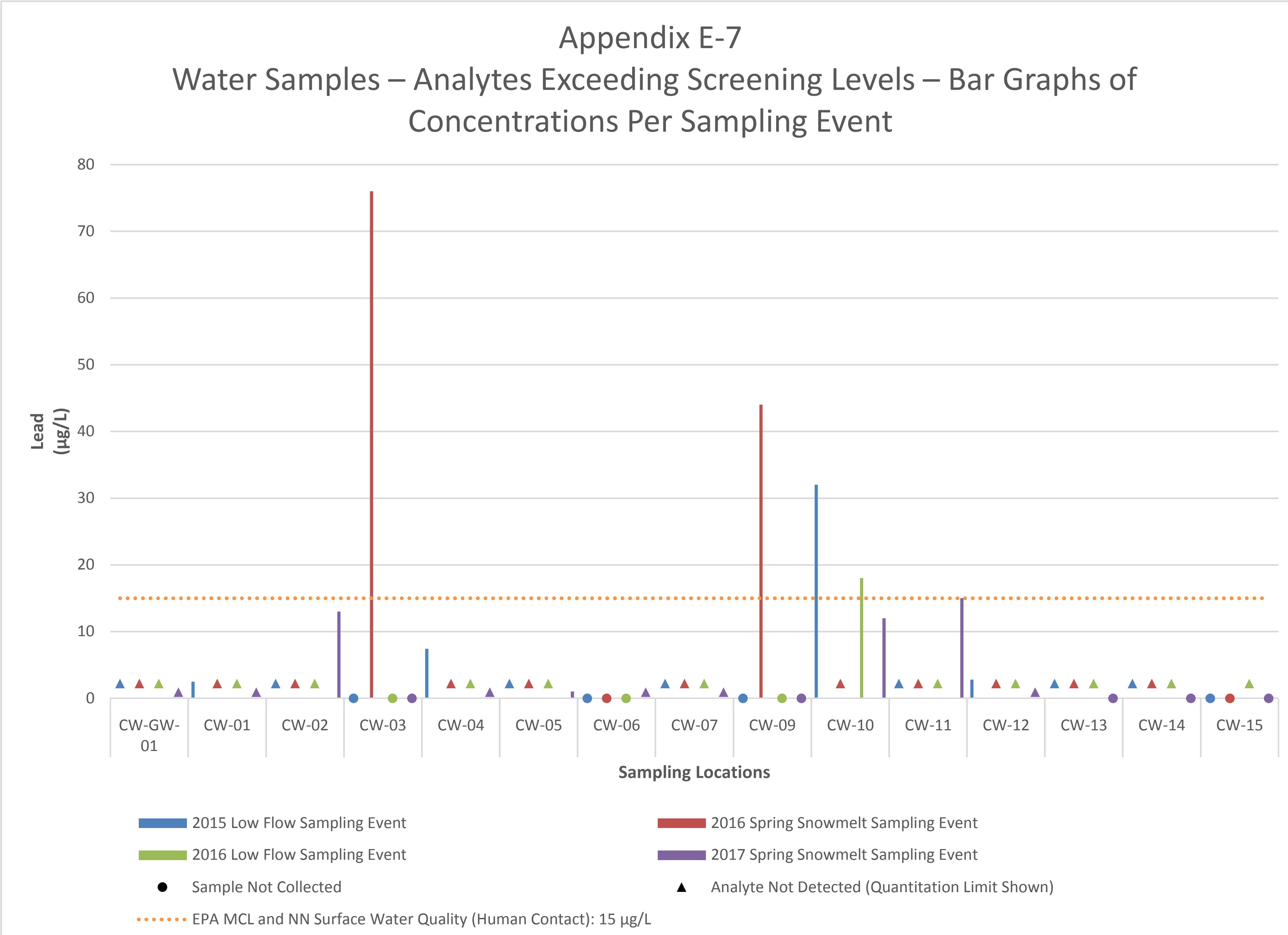
Appendix E-6
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event



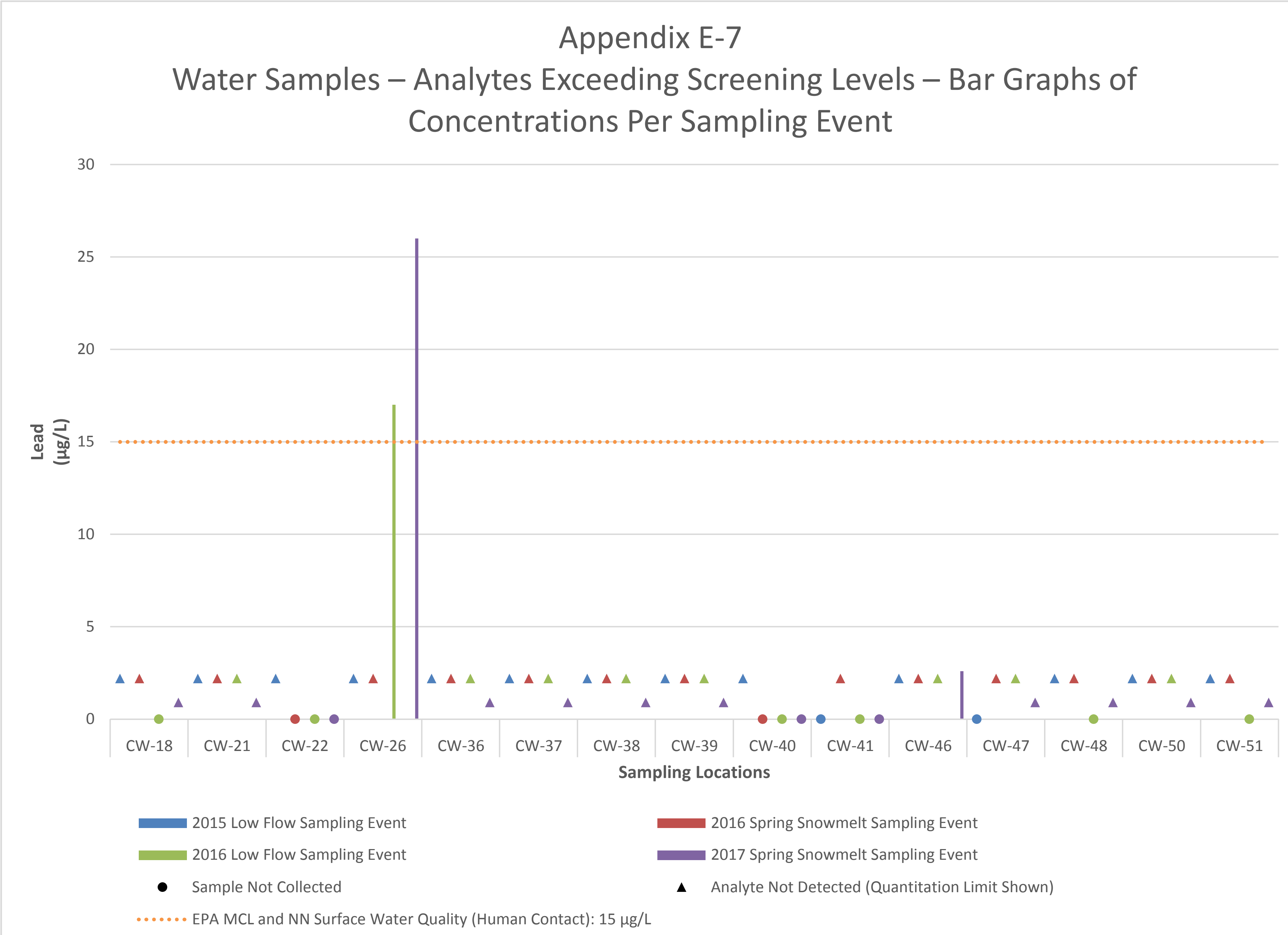

Appendix E-6
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Beryllium (µg/L)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
CW-53a
CW-54
CW-55
CW-56a
CW-57
CW-58
CW-59
CW-60
CW-62
CW-64
CW-65
CW-66
CW-67
CW-68
CW-69
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Maximum Contaminant Level: 4 µg/L



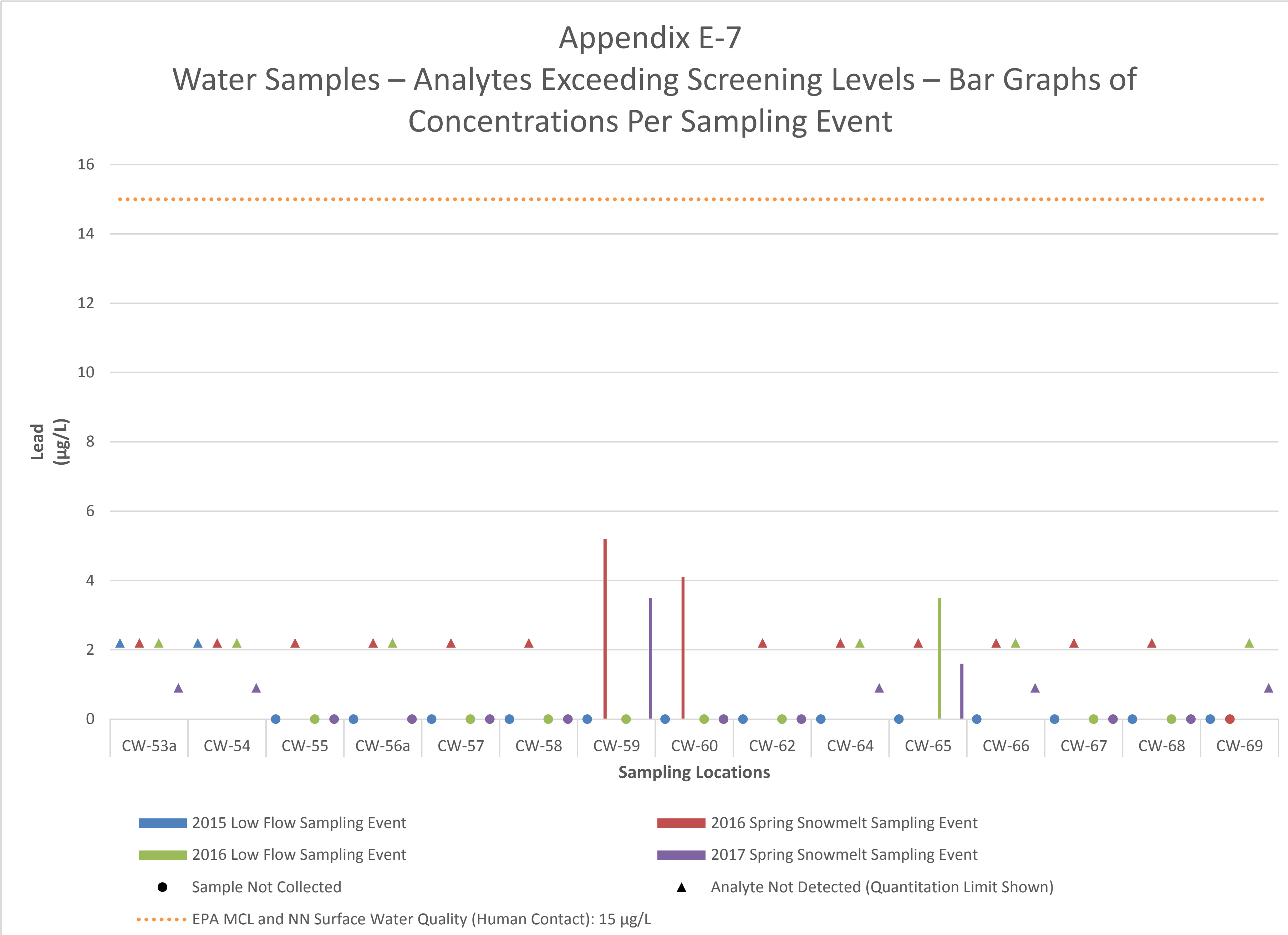
Appendix E-6
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Beryllium (µg/L)
5
4
4
3
3
2
2
1
1
CW-70
CW-71
CW-72
CW-73
CW-75
CW-79
CW-81
CW-82
CW-83
CW-84
CW-85
CW-86
CW-87
CW-88
CW-89
CW-90
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Maximum Contaminant Level: 4 µg/L



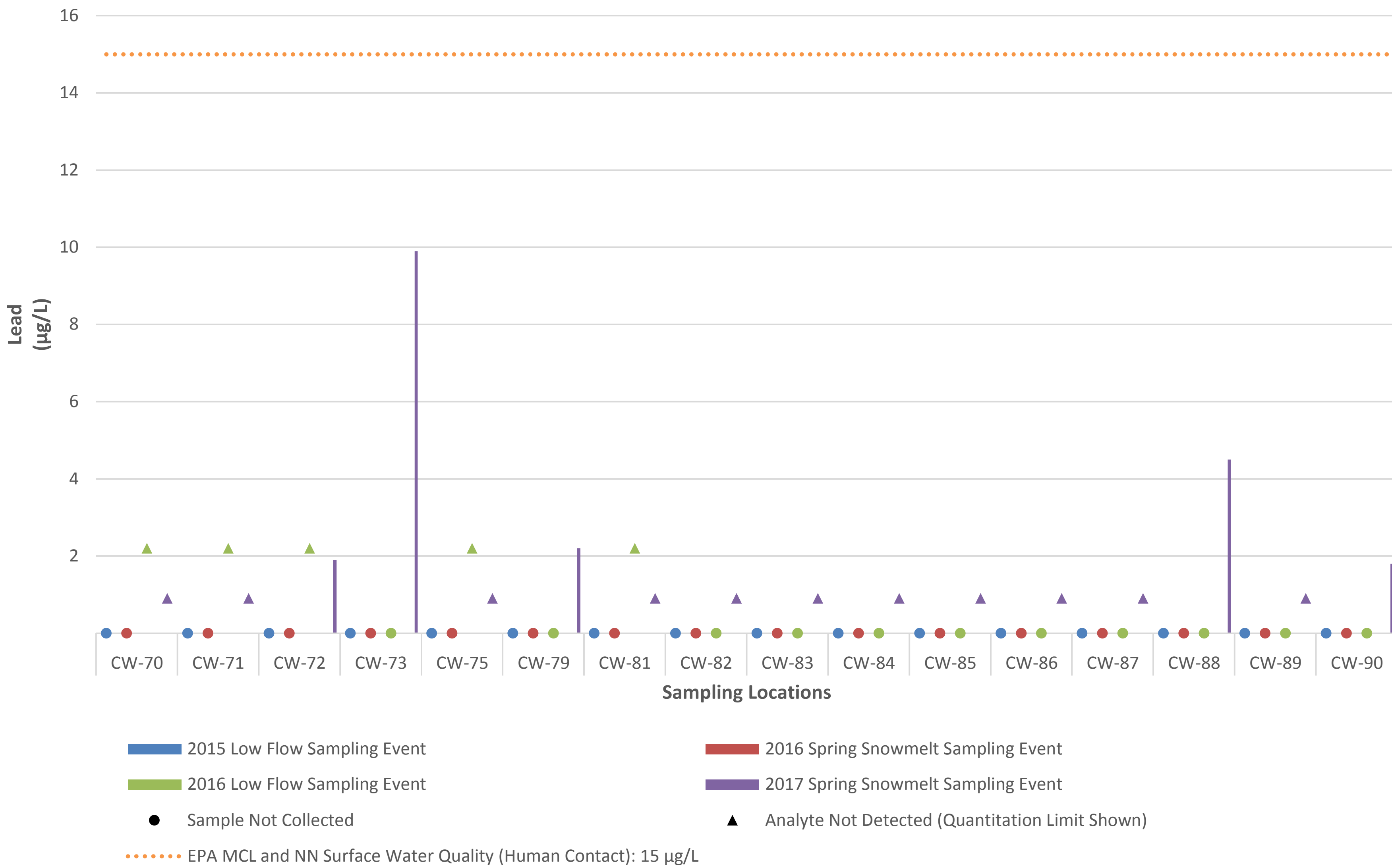
Appendix E-7
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Lead (µg/L)
0
10
20
30
40
50
60
70
80
CW-GW-01
CW-01
CW-02
CW-03
CW-04
CW-05
CW-06
CW-07
CW-09
CW-10
CW-11
CW-12
CW-13
CW-14
CW-15
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA MCL and NN Surface Water Quality (Human Contact): 15 µg/L

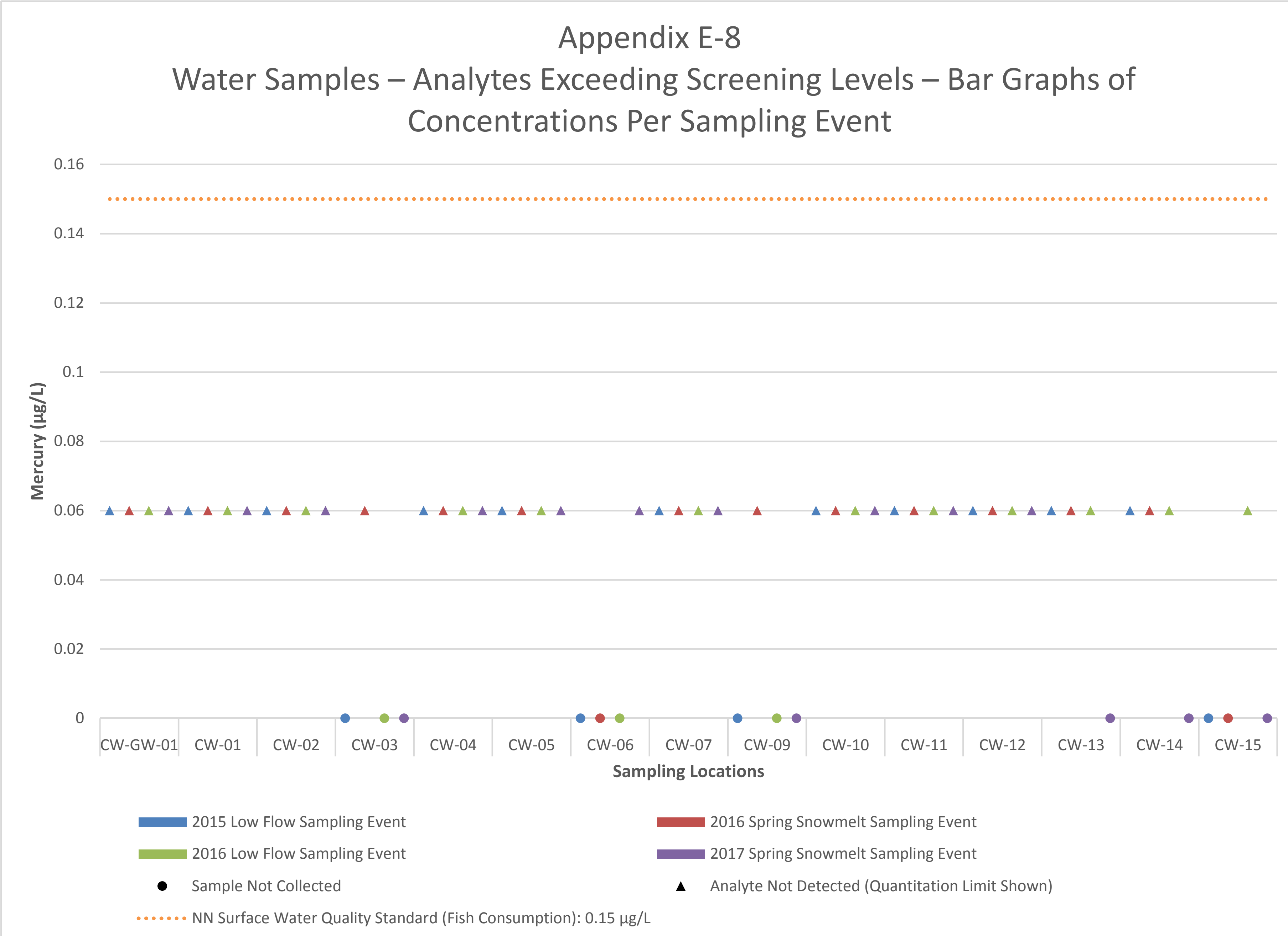


Appendix E-7
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Lead (µg/L)
30
25
20
15
10
5
0
CW-18
CW-21
CW-22
CW-26
CW-36
CW-37
CW-38
CW-39
CW-40
CW-41
CW-46
CW-47
CW-48
CW-50
CW-51
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA MCL and NN Surface Water Quality (Human Contact): 15 µg/L


Appendix E-7
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Lead (µg/L)
16
14
12
10
8
6
4
2
0
CW-53a
CW-54
CW-55
CW-56a
CW-57
CW-58
CW-59
CW-60
CW-62
CW-64
CW-65
CW-66
CW-67
CW-68
CW-69
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA MCL and NN Surface Water Quality (Human Contact): 15 µg/L

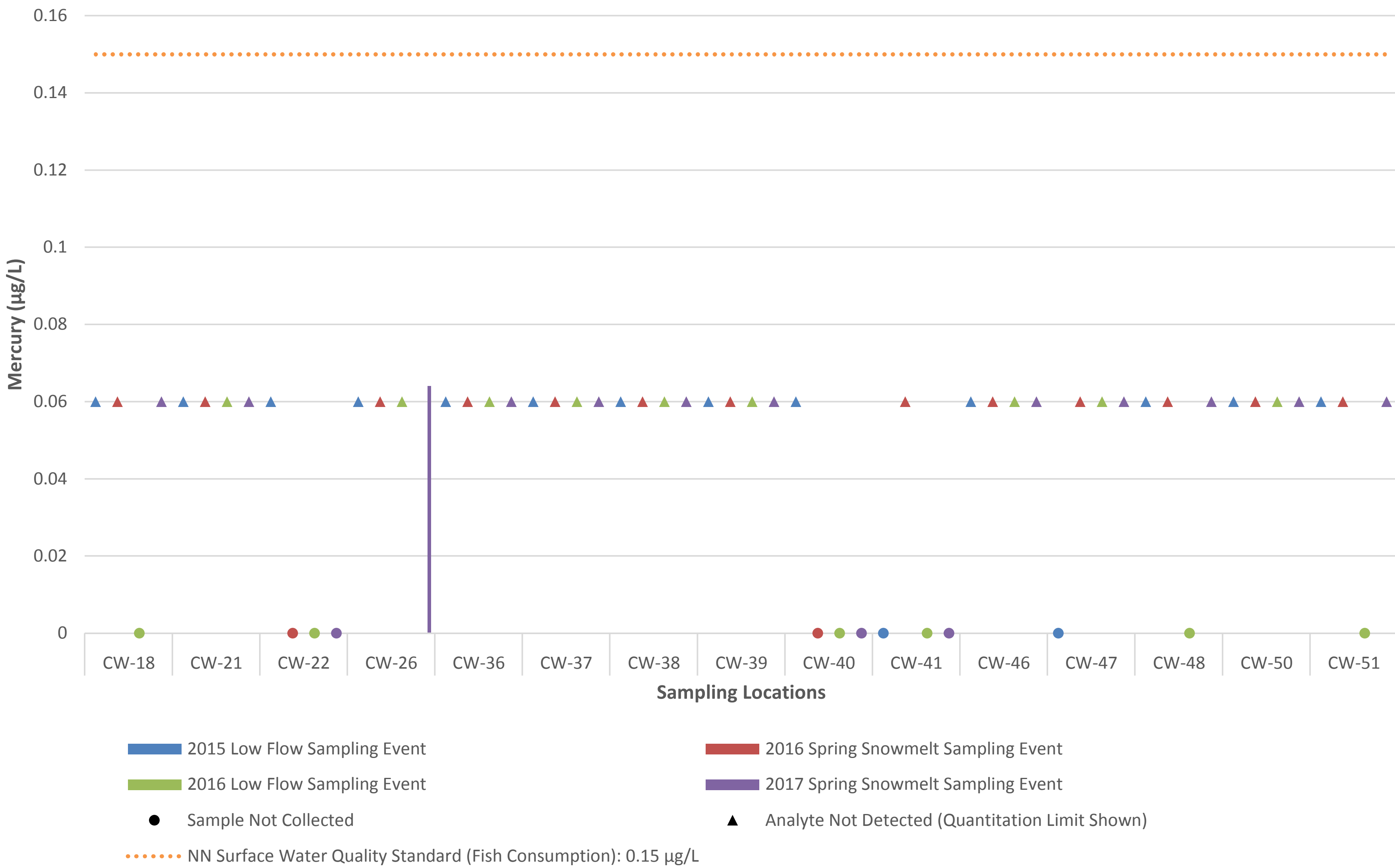
Appendix E-7
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event

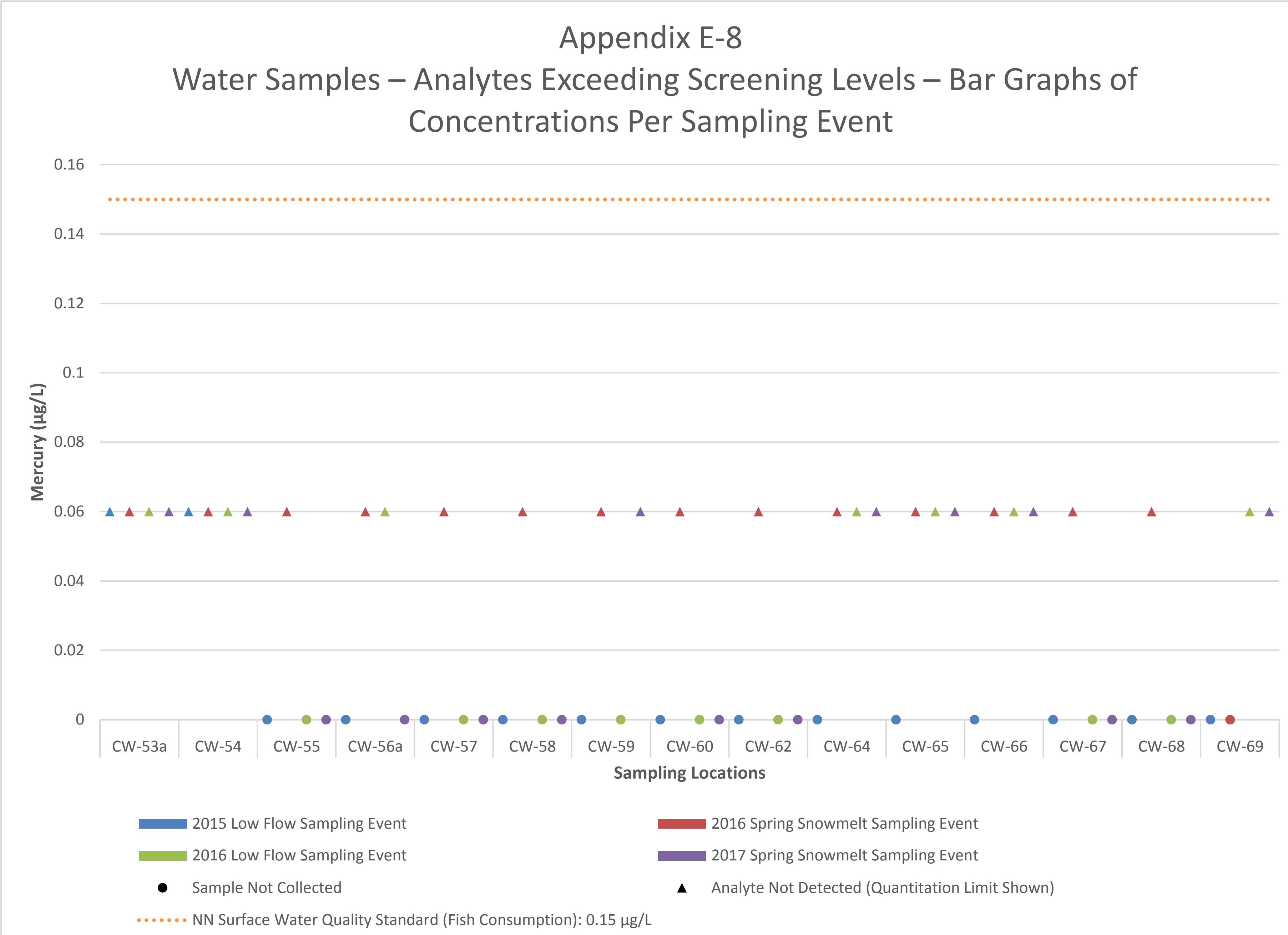


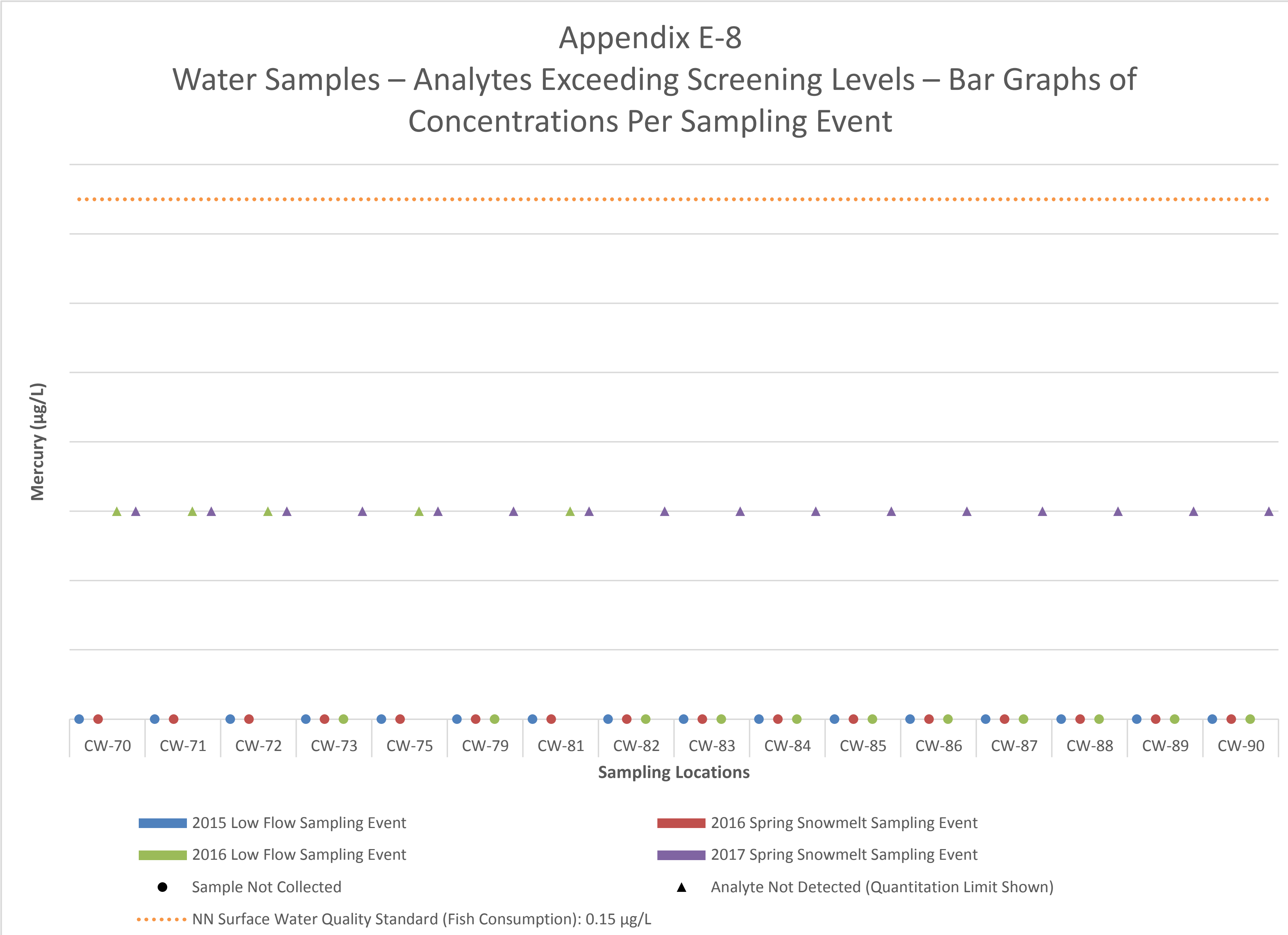

Appendix E-8
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Mercury (µg/L)
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
CW-GW-01
CW-01
CW-02
CW-03
CW-04
CW-05
CW-06
CW-07
CW-09
CW-10
CW-11
CW-12
CW-13
CW-14
CW-15
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
NN Surface Water Quality Standard (Fish Consumption): 0.15 µg/L

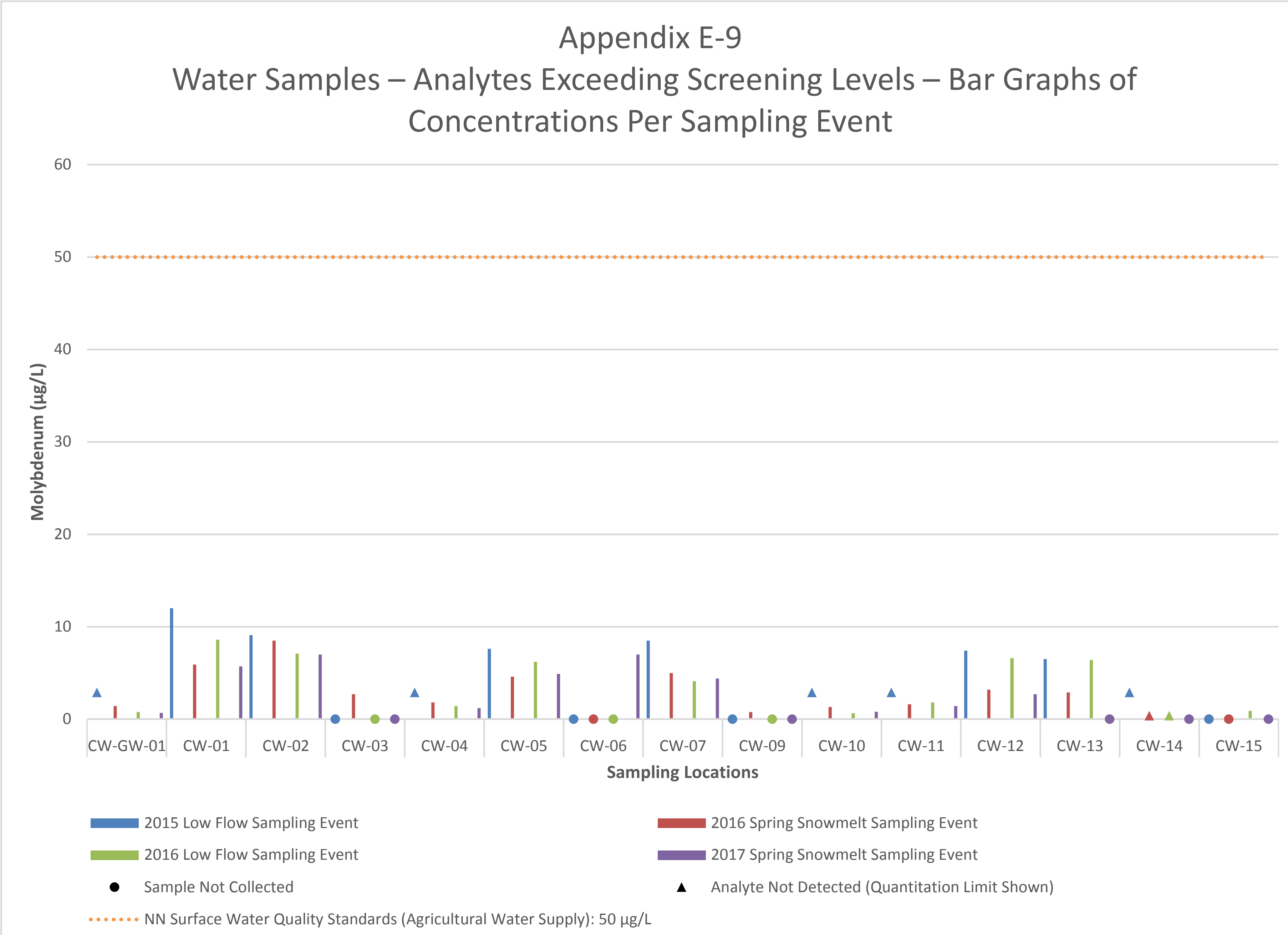
Appendix E-8

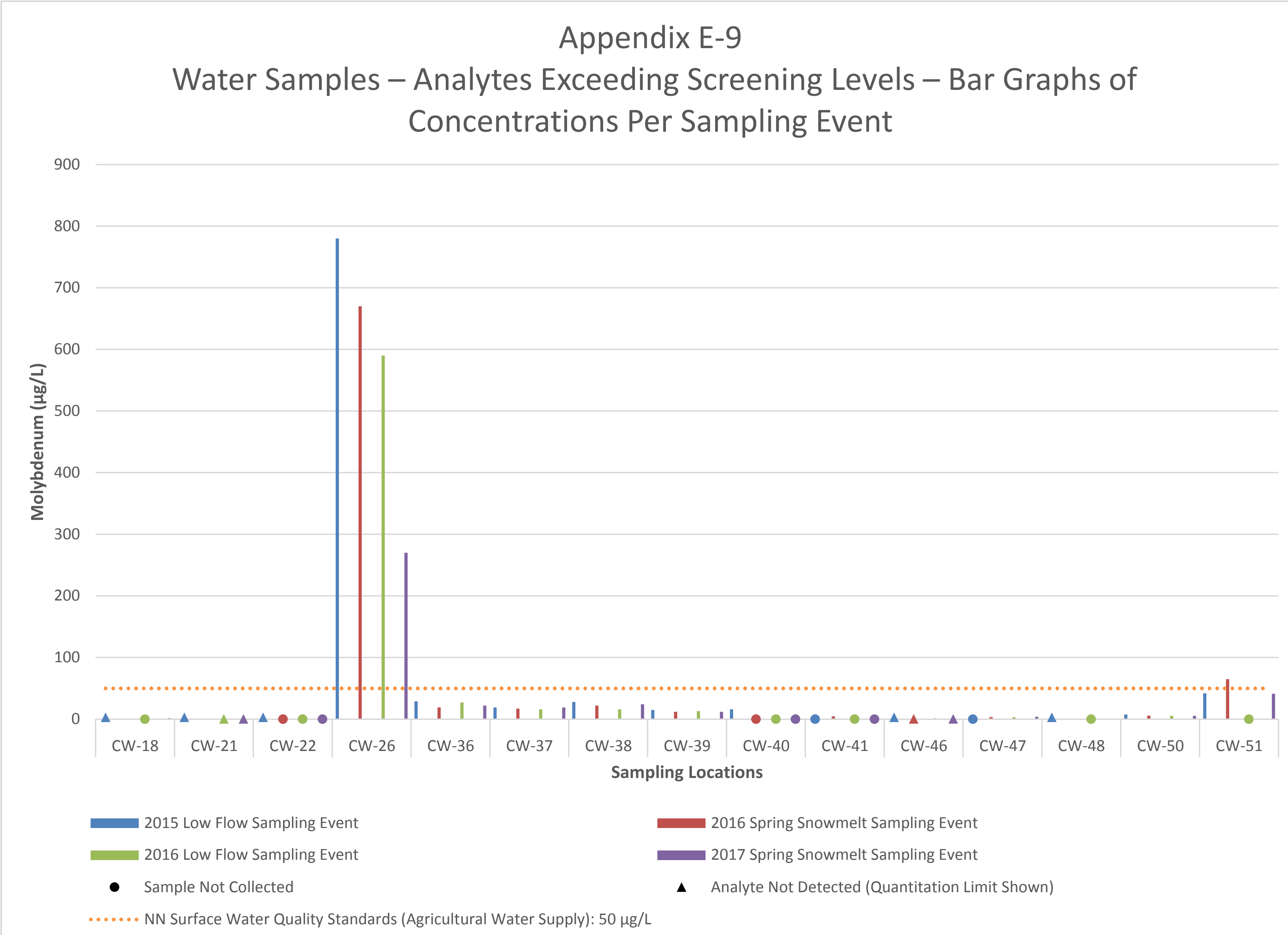
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event




Appendix E-8
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Mercury (µg/L)
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
CW-53a
CW-54
CW-55
CW-56a
CW-57
CW-58
CW-59
CW-60
CW-62
CW-64
CW-65
CW-66
CW-67
CW-68
CW-69
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
NN Surface Water Quality Standard (Fish Consumption): 0.15 µg/L


Appendix E-8
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Mercury (µg/L)
CW-70
CW-71
CW-72
CW-73
CW-75
CW-79
CW-81
CW-82
CW-83
CW-84
CW-85
CW-86
CW-87
CW-88
CW-89
CW-90
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
NN Surface Water Quality Standard (Fish Consumption): 0.15 µg/L

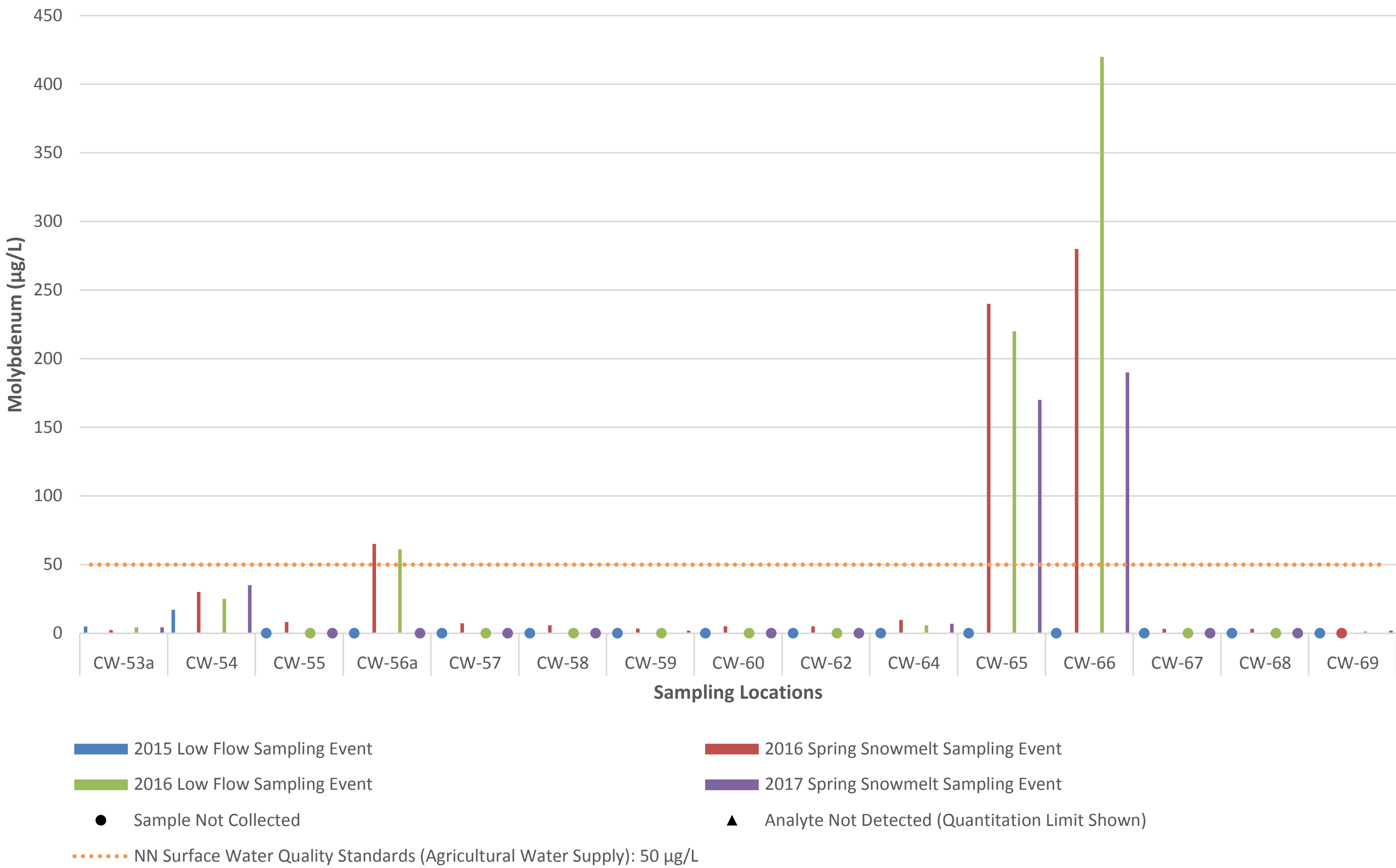

Appendix E-9
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Molybdenum (µg/L)
60
50
40
30
20
10
0
CW-GW-01
CW-01
CW-02
CW-03
CW-04
CW-05
CW-06
CW-07
CW-09
CW-10
CW-11
CW-12
CW-13
CW-14
CW-15
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
NN Surface Water Quality Standards (Agricultural Water Supply): 50 µg/L



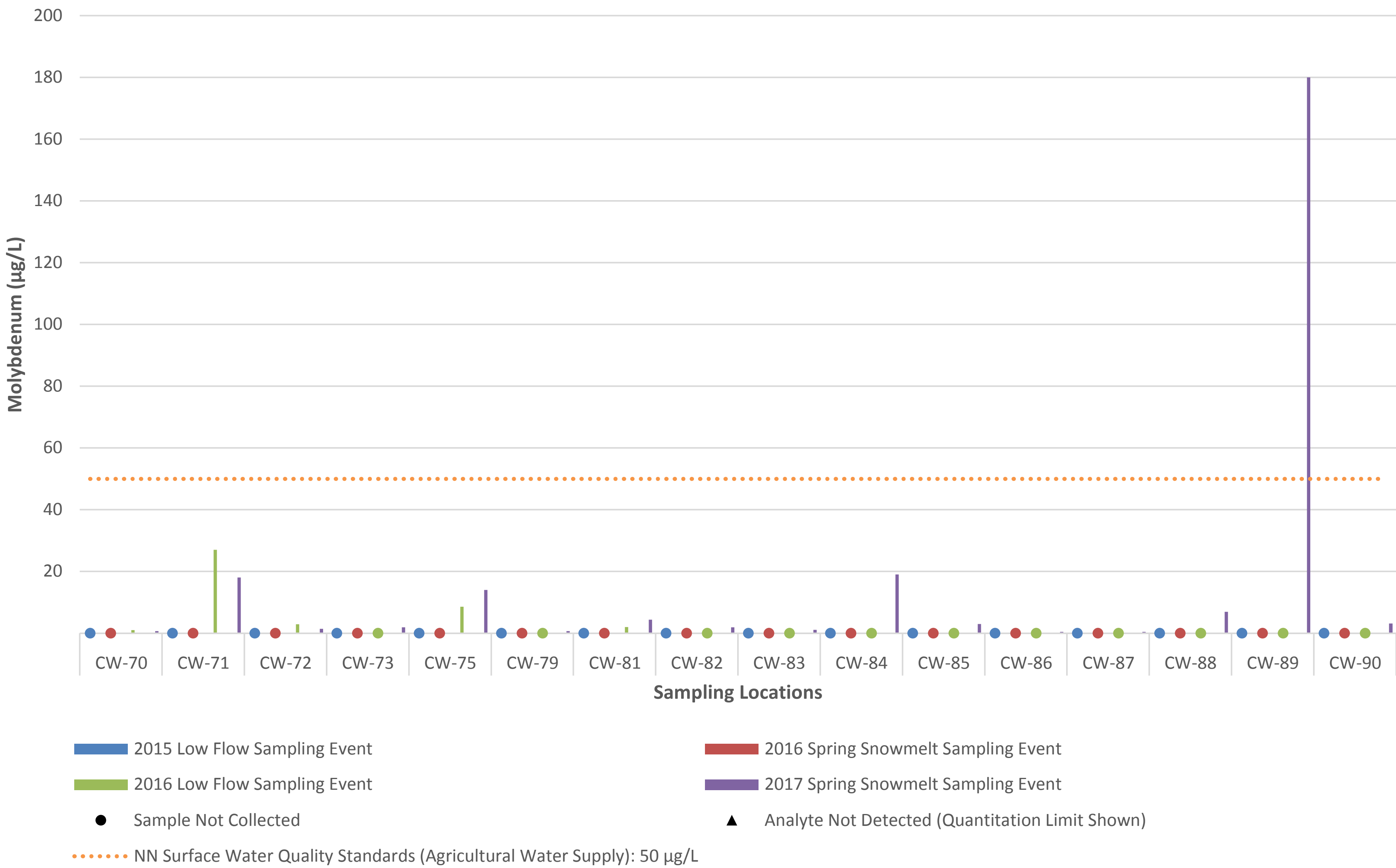
Appendix E-9
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
900
800
700
600
500
400
300
200
100
0
Molybdenum (µg/L)
CW-18
CW-21
CW-22
CW-26
CW-36
CW-37
CW-38
CW-39
CW-40
CW-41
CW-46
CW-47
CW-48
CW-50
CW-51
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
NN Surface Water Quality Standards (Agricultural Water Supply): 50 µg/L

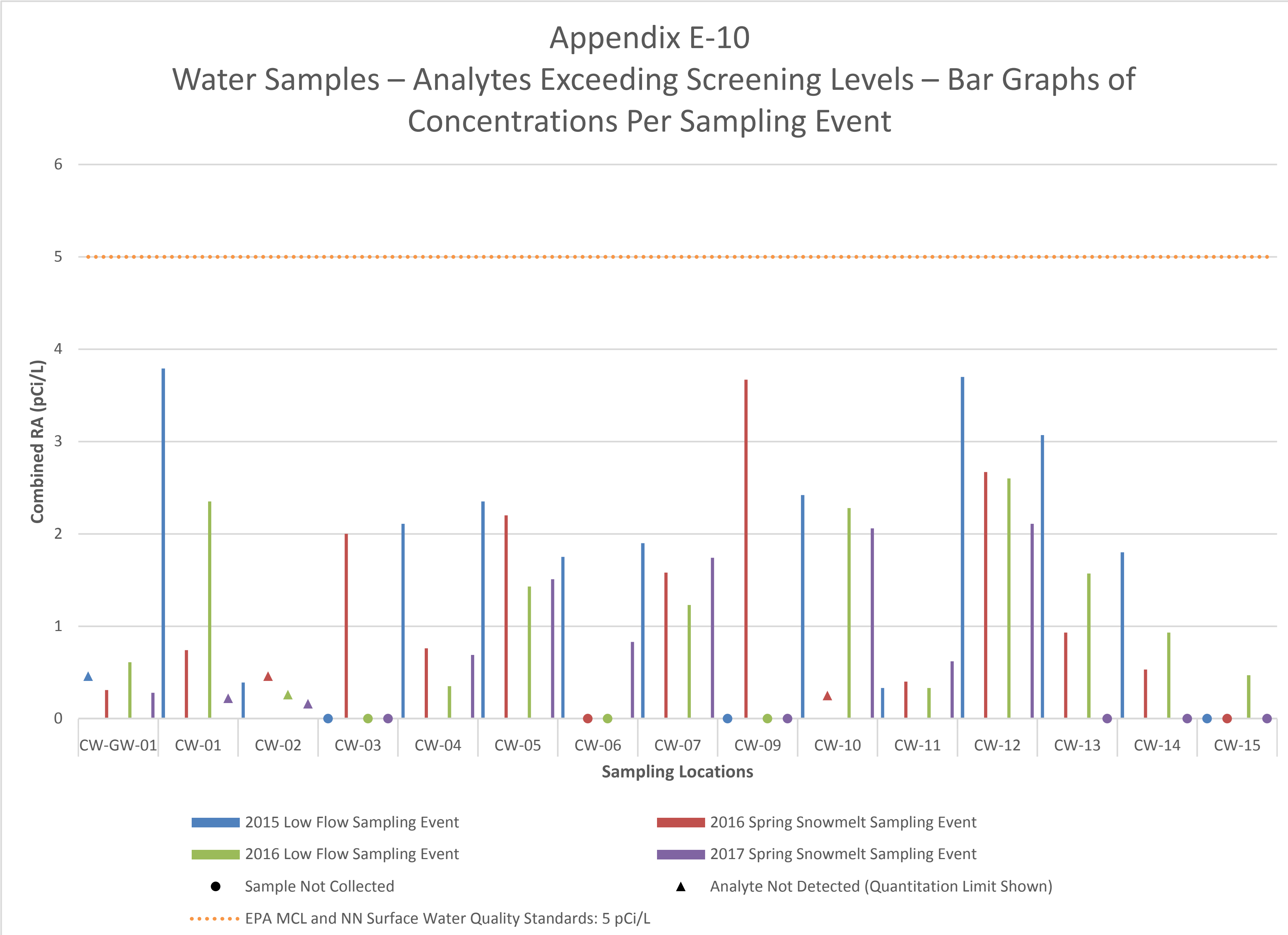
Appendix E-9

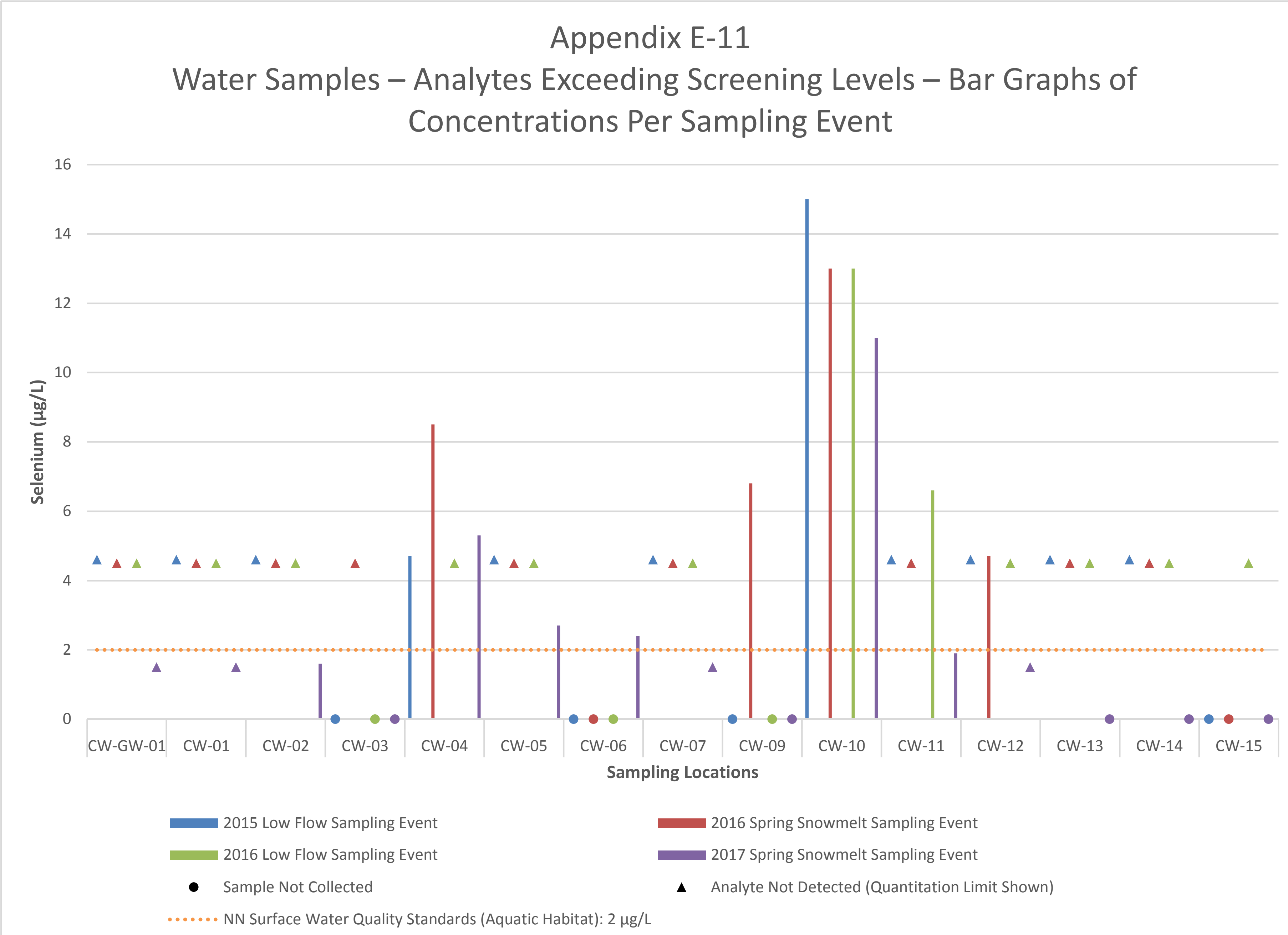
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event

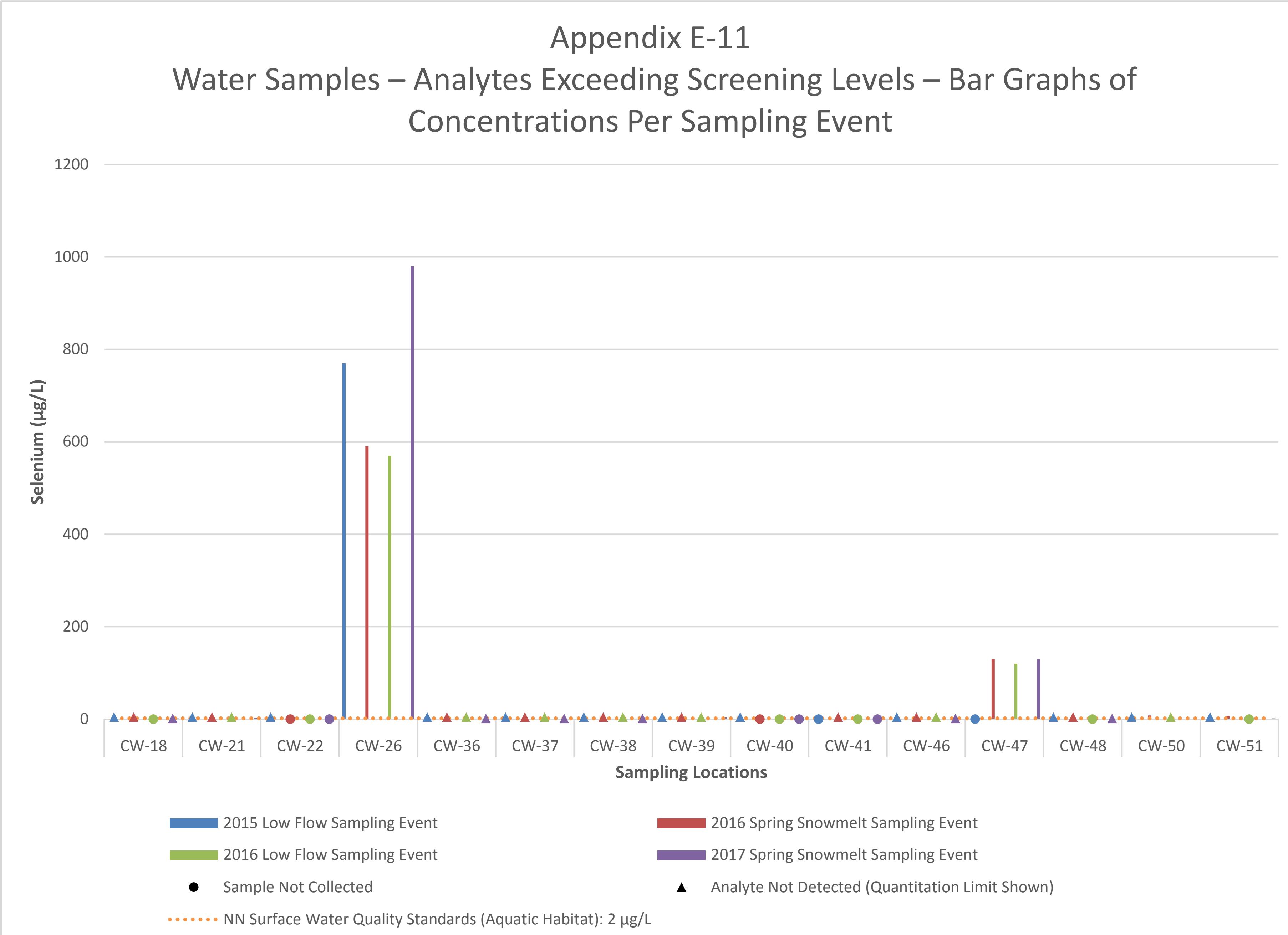


Appendix E-9
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event



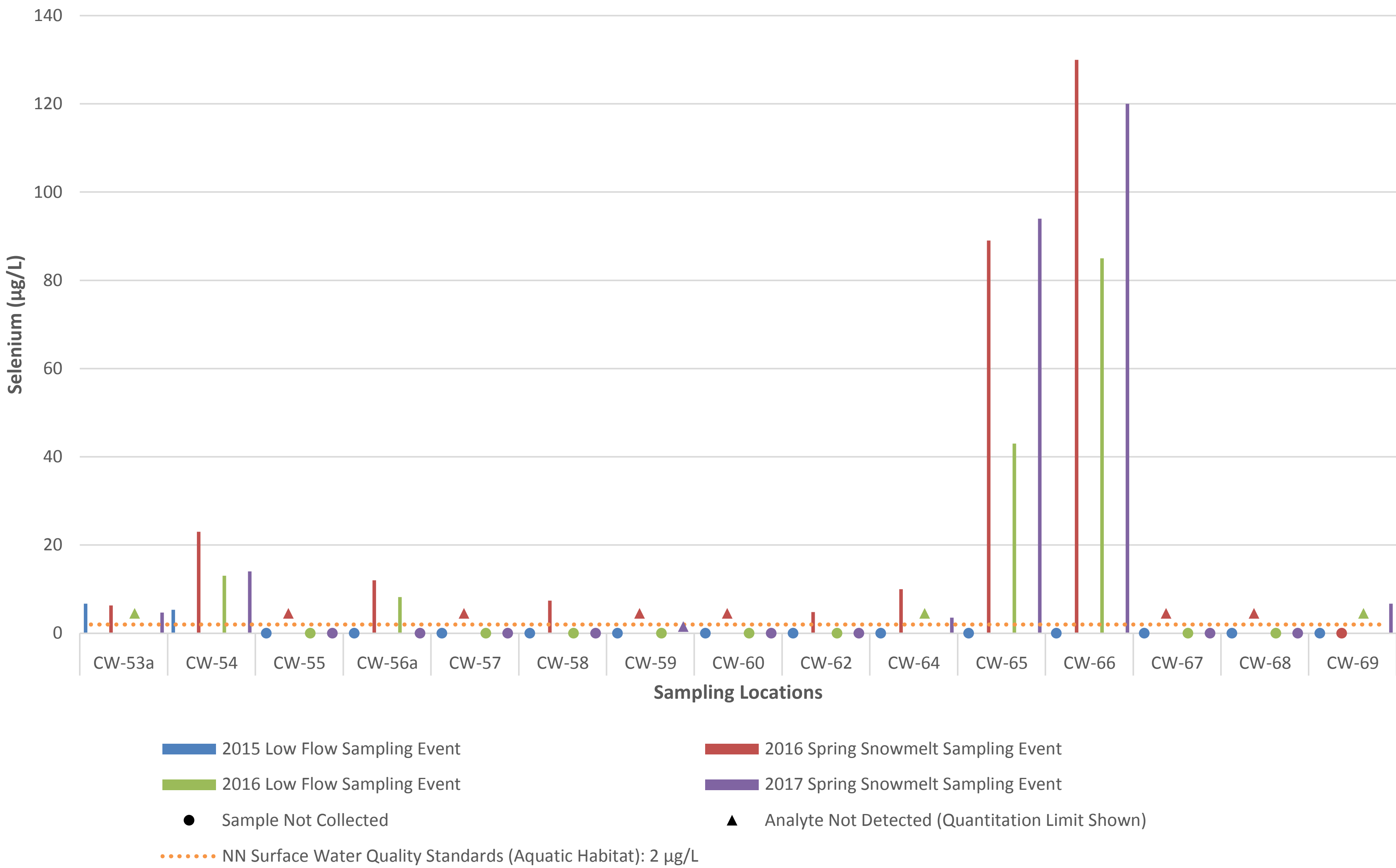

Appendix E-10
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Combined RA (pCi/L)
0
1
2
3
4
5
6
CW-GW-01
CW-01
CW-02
CW-03
CW-04
CW-05
CW-06
CW-07
CW-09
CW-10
CW-11
CW-12
CW-13
CW-14
CW-15
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA MCL and NN Surface Water Quality Standards: 5 pCi/L

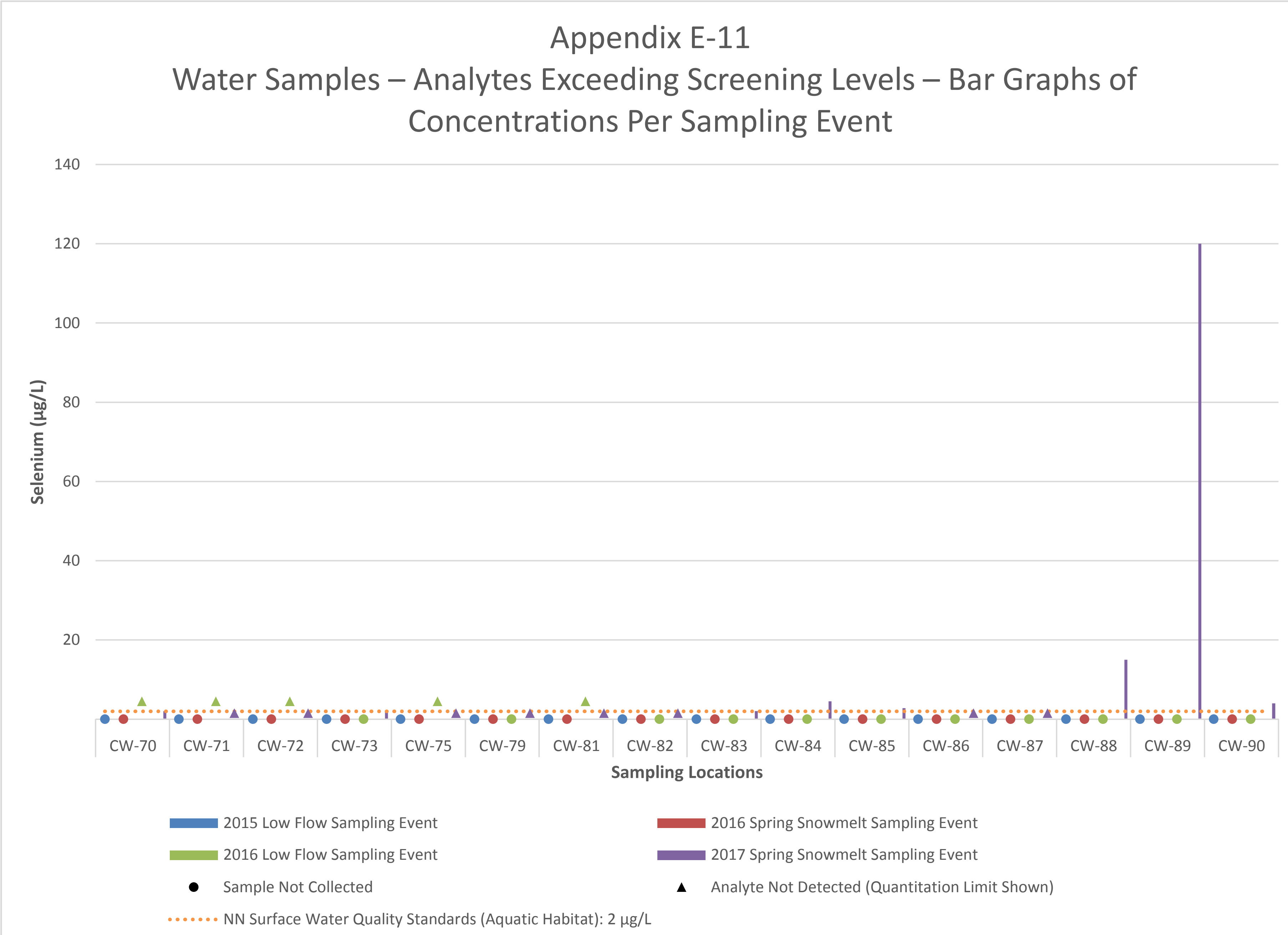

Appendix E-11
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Selenium (µg/L)
0
2
4
6
8
10
12
14
16
CW-GW-01
CW-01
CW-02
CW-03
CW-04
CW-05
CW-06
CW-07
CW-09
CW-10
CW-11
CW-12
CW-13
CW-14
CW-15
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
NN Surface Water Quality Standards (Aquatic Habitat): 2 µg/L

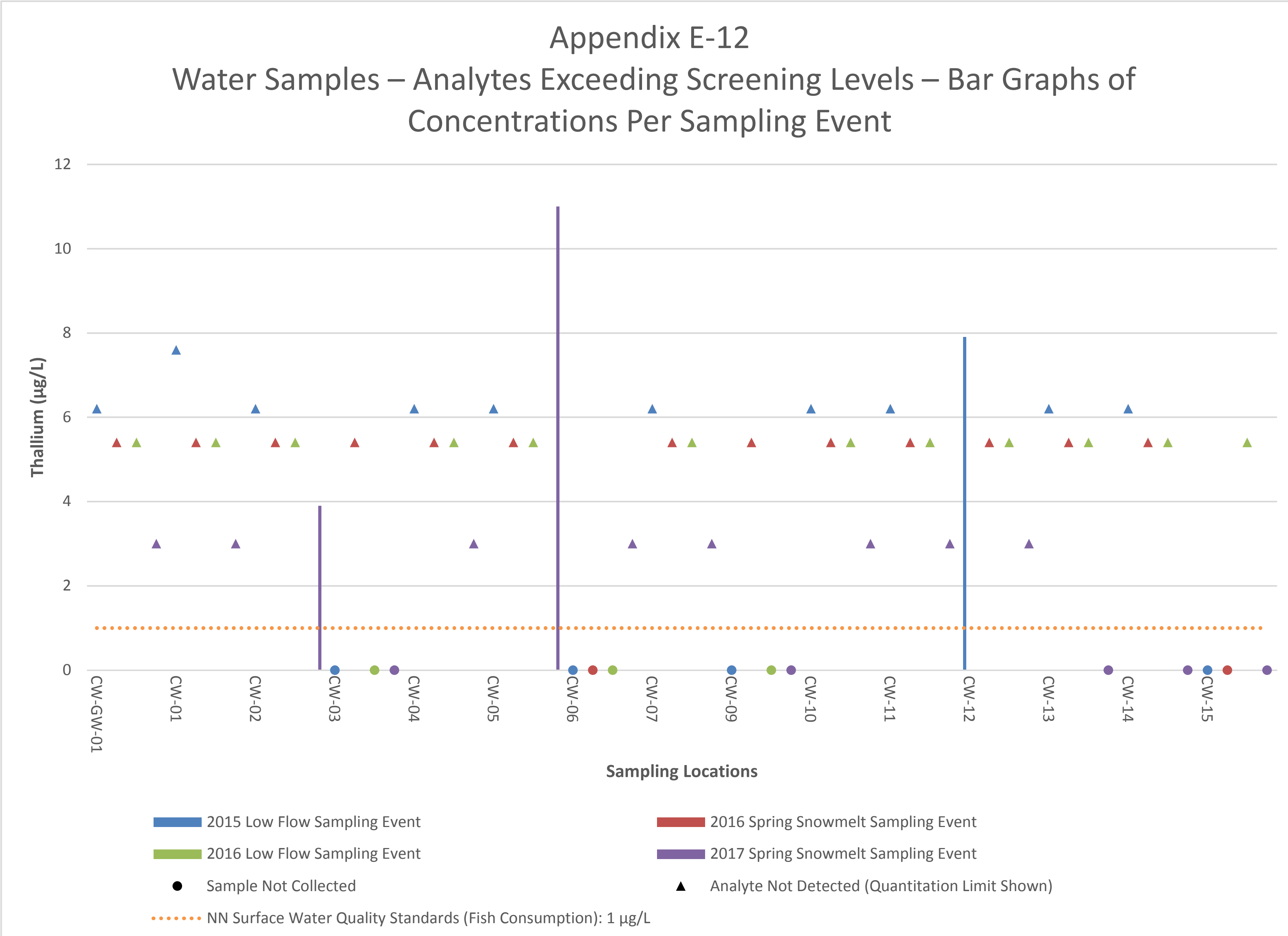


Appendix E-11
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Selenium (µg/L)
1200
1000
800
600
400
200
0
CW-18
CW-21
CW-22
CW-26
CW-36
CW-37
CW-38
CW-39
CW-40
CW-41
CW-46
CW-47
CW-48
CW-50
CW-51
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
NN Surface Water Quality Standards (Aquatic Habitat): 2 µg/L

Appendix E-11
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event



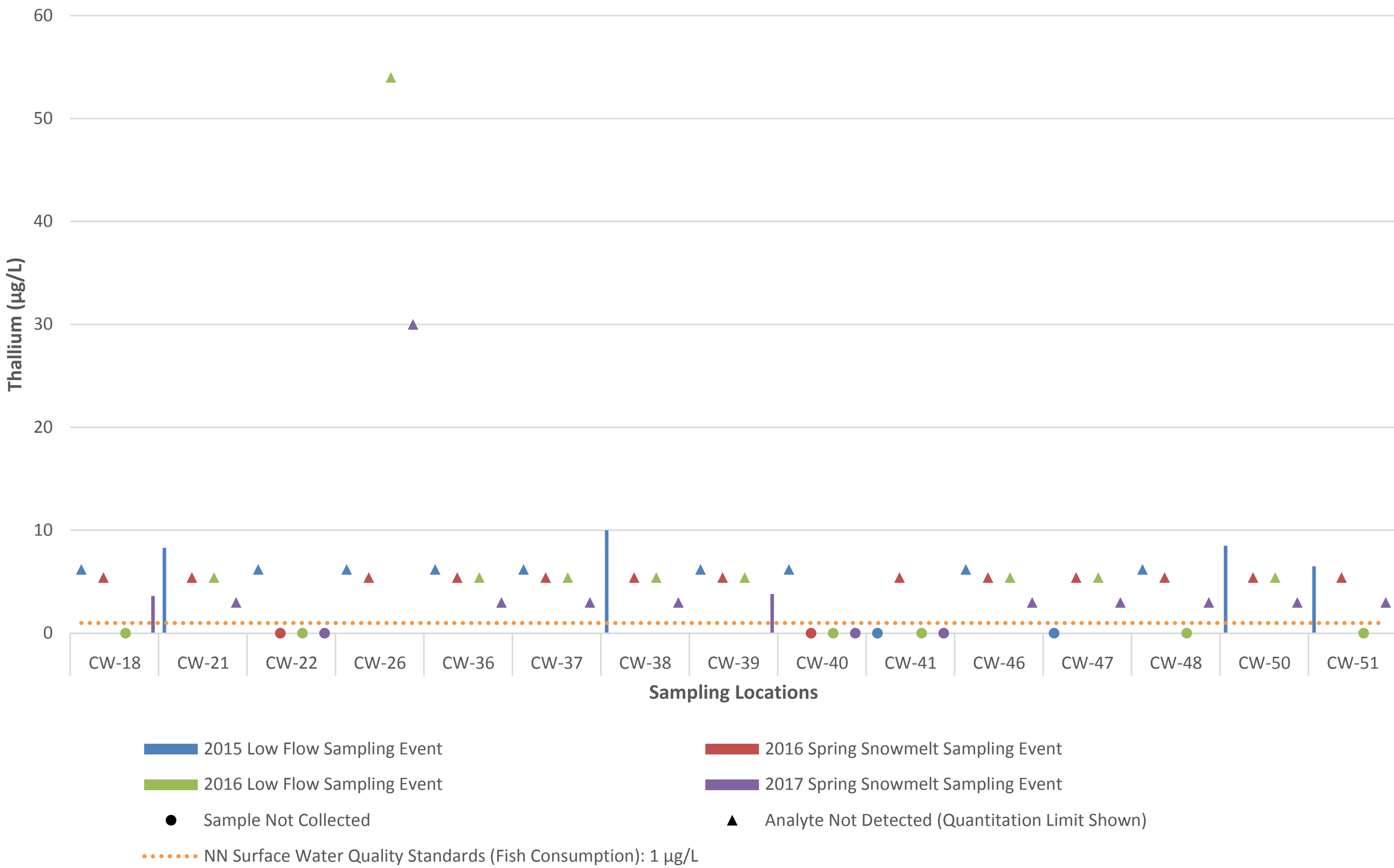

Appendix E-11
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
140
120
100
80
60
40
20
Selenium (µg/L)
CW-70
CW-71
CW-72
CW-73
CW-75
CW-79
CW-81
CW-82
CW-83
CW-84
CW-85
CW-86
CW-87
CW-88
CW-89
CW-90
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
NN Surface Water Quality Standards (Aquatic Habitat): 2 µg/L

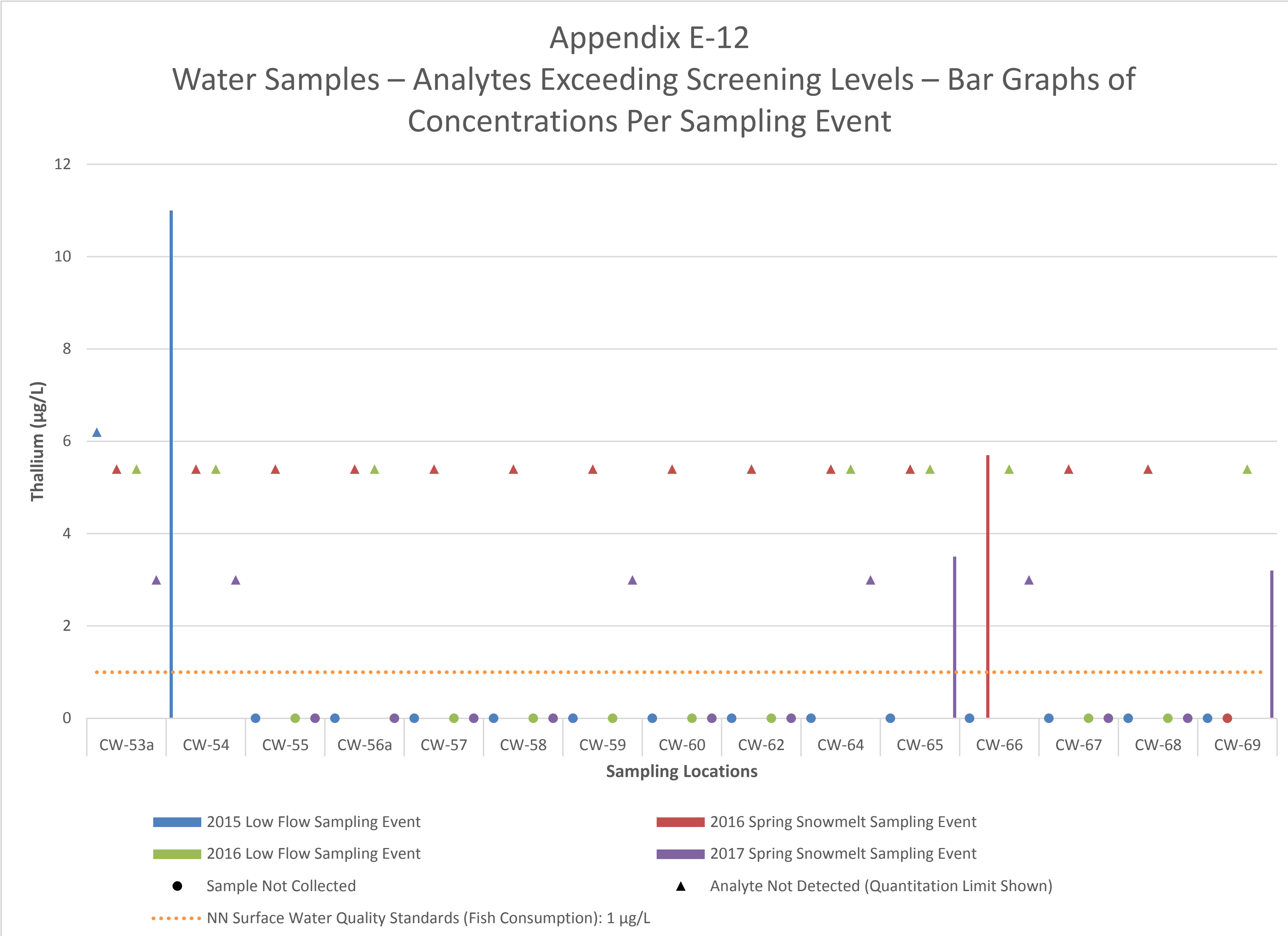


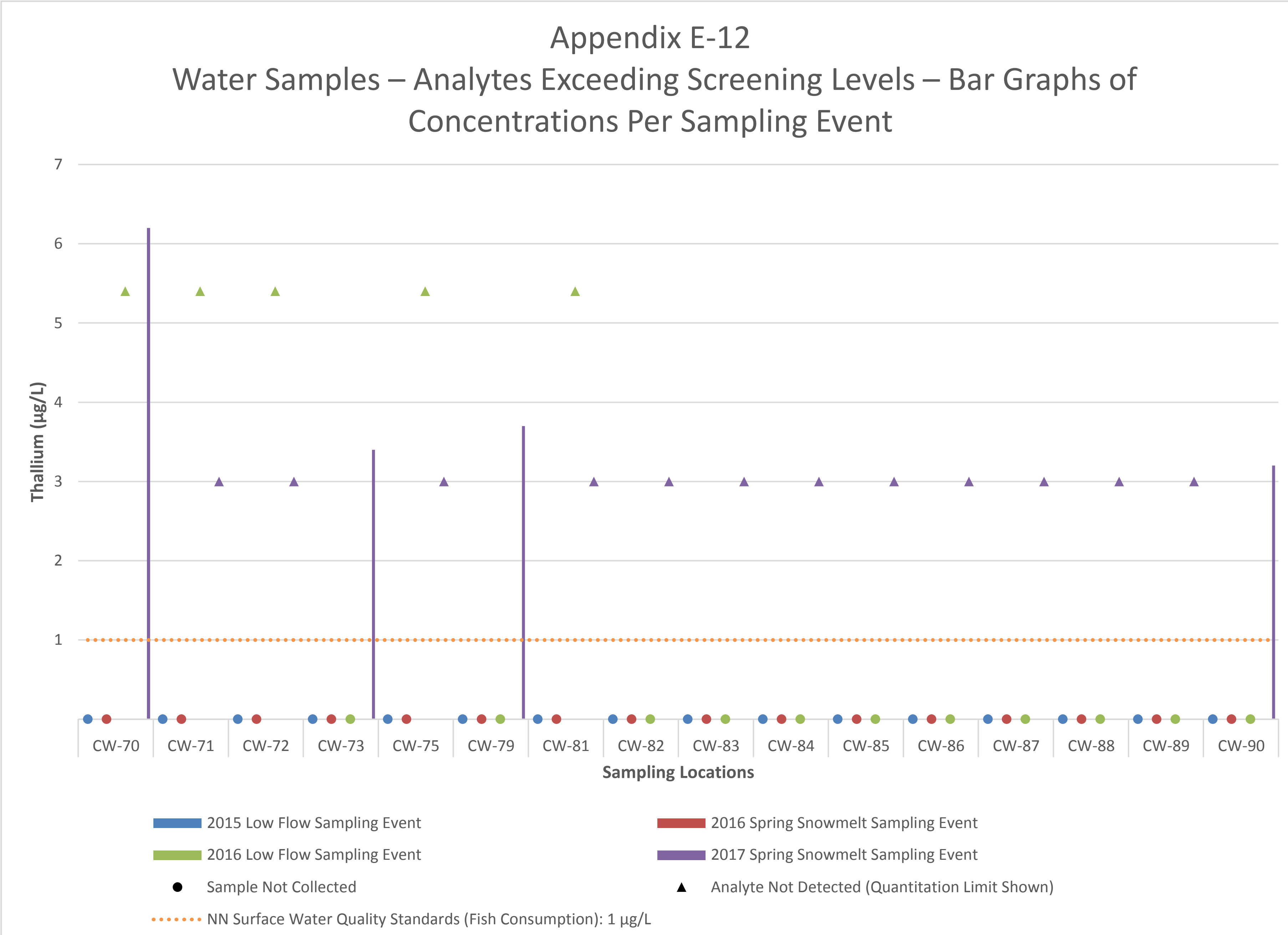
Appendix E-12
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Thallium (µg/L)
0
2
4
6
8
10
12
CW-GW-01
CW-01
CW-02
CW-03
CW-04
CW-05
CW-06
CW-07
CW-09
CW-10
CW-11
CW-12
CW-13
CW-14
CW-15
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
NN Surface Water Quality Standards (Fish Consumption): 1 µg/L

Appendix E-12

Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event

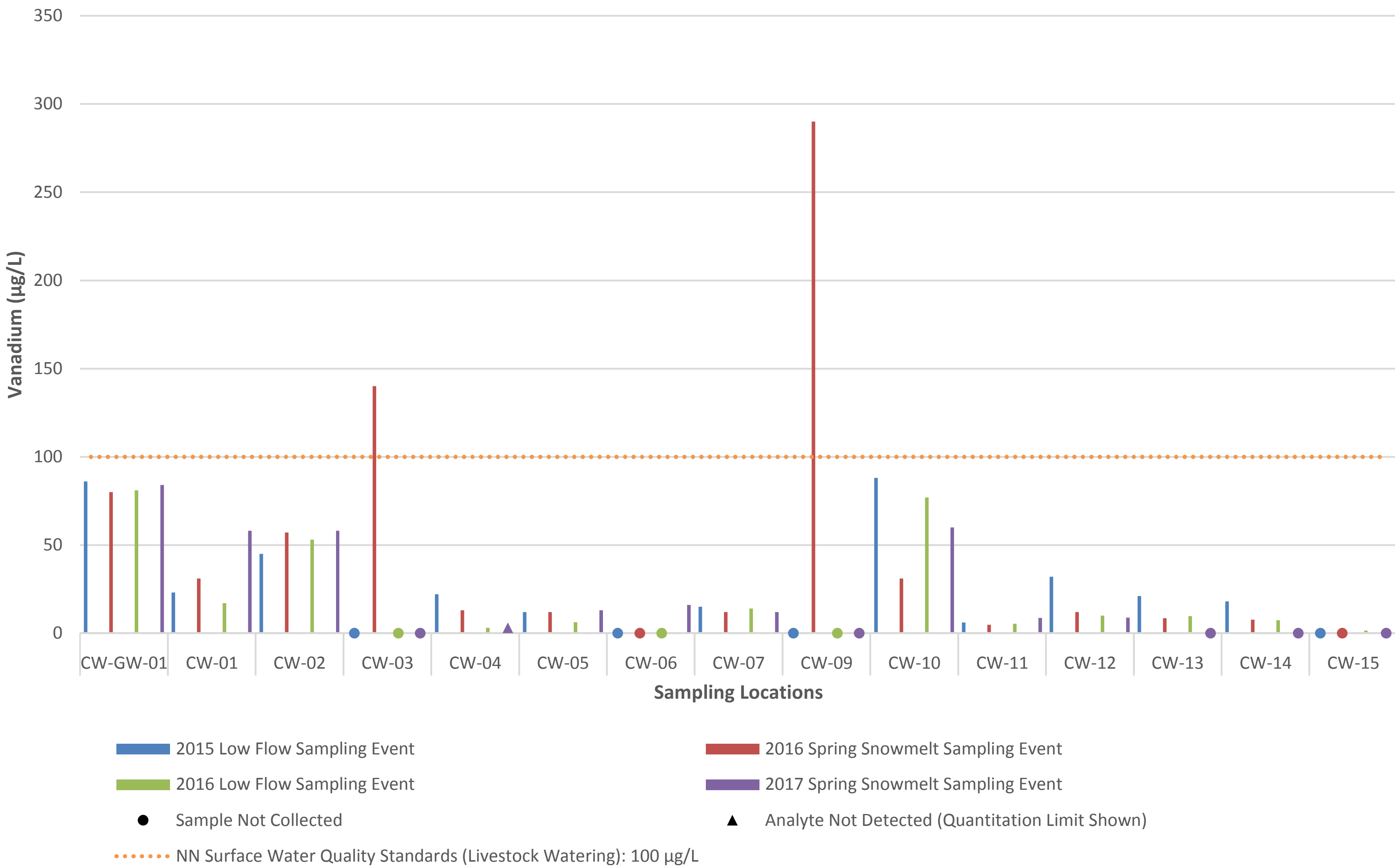


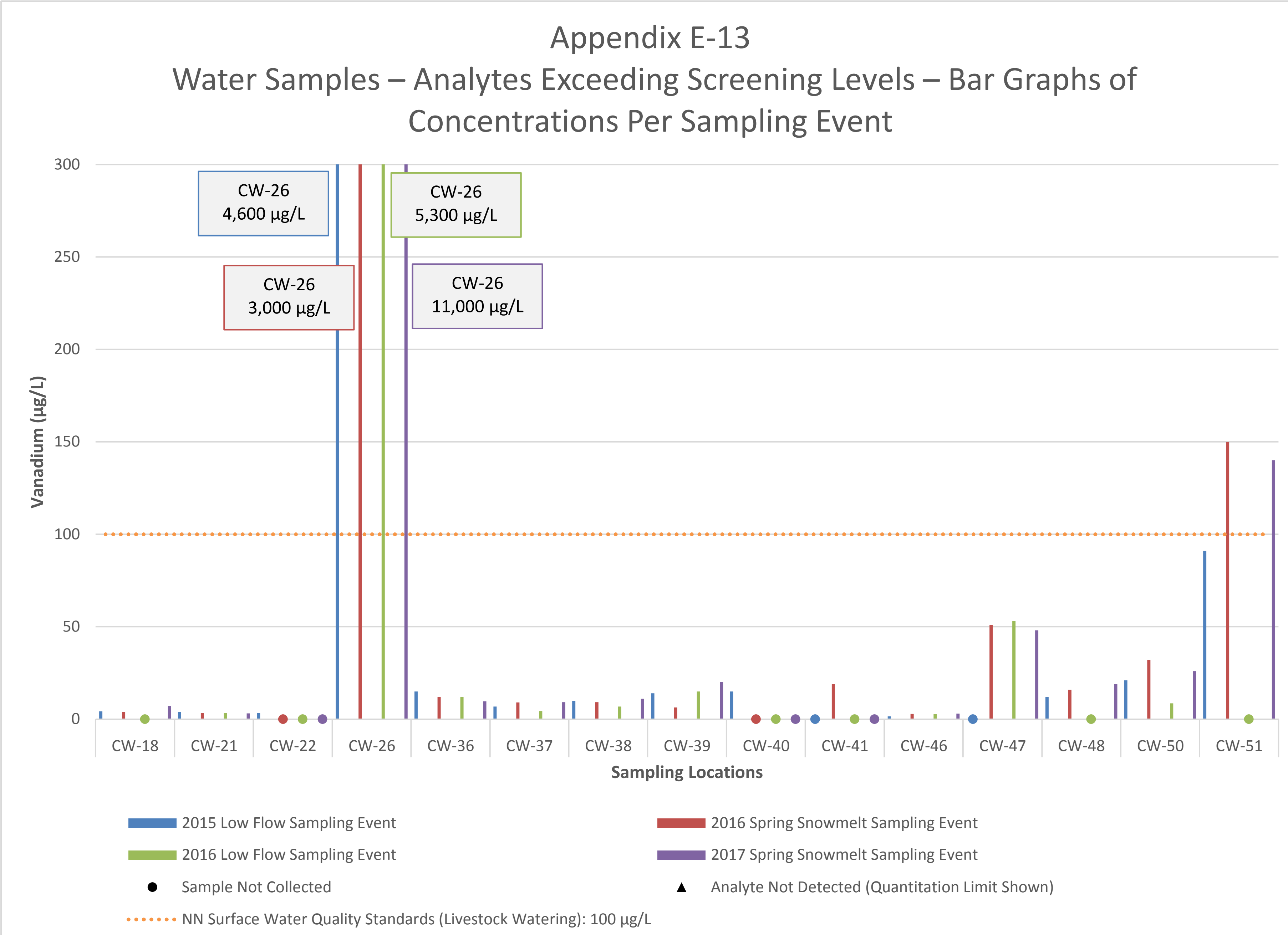

Appendix E-12
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Thallium (µg/L)
12
10
8
6
4
2
0
CW-53a
CW-54
CW-55
CW-56a
CW-57
CW-58
CW-59
CW-60
CW-62
CW-64
CW-65
CW-66
CW-67
CW-68
CW-69
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
NN Surface Water Quality Standards (Fish Consumption): 1 µg/L



Appendix E-12
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Thallium (µg/L)
7
6
5
4
3
2
1
CW-70
CW-71
CW-72
CW-73
CW-75
CW-79
CW-81
CW-82
CW-83
CW-84
CW-85
CW-86
CW-87
CW-88
CW-89
CW-90
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
NN Surface Water Quality Standards (Fish Consumption): 1 µg/L

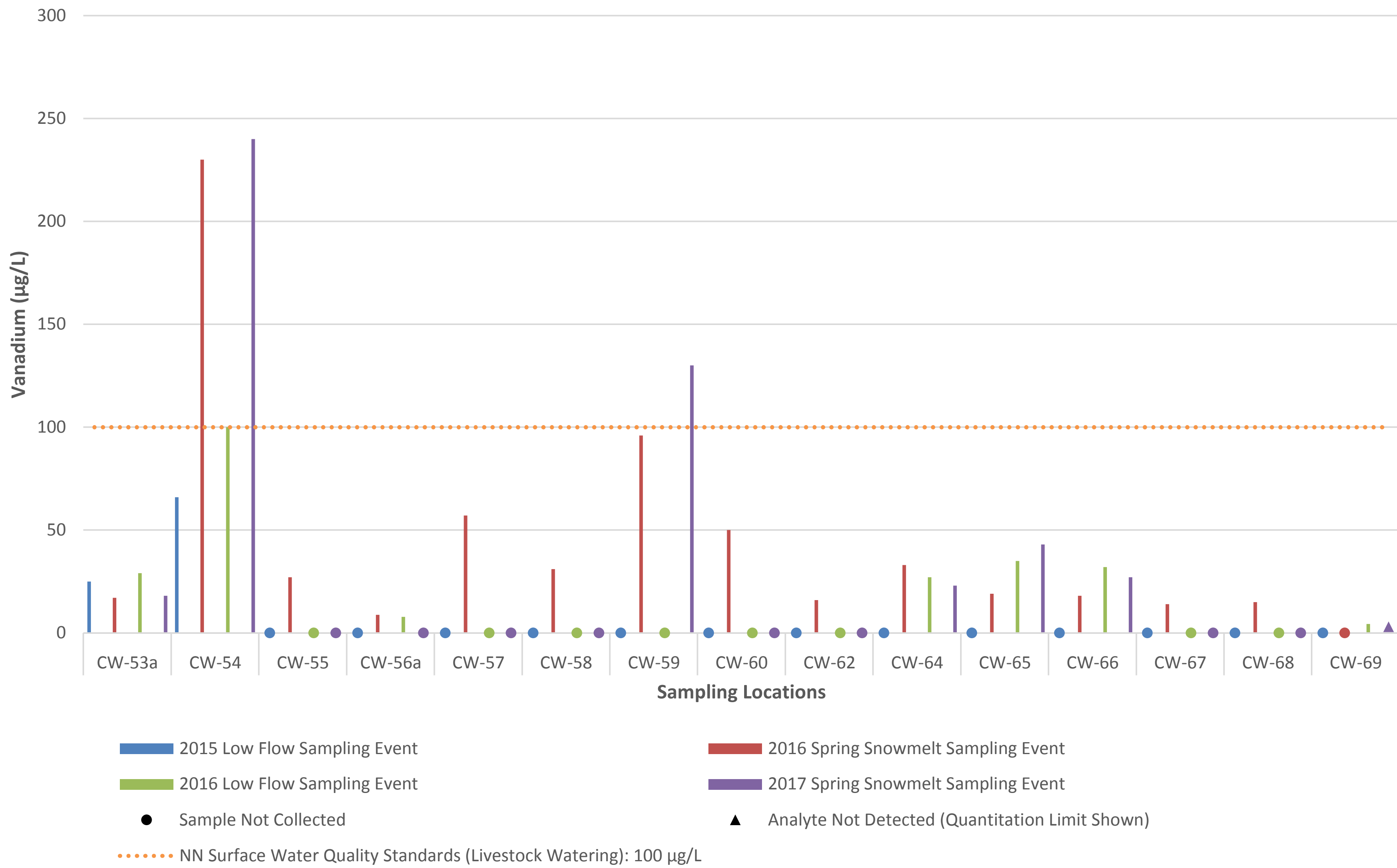
Appendix E-13
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event

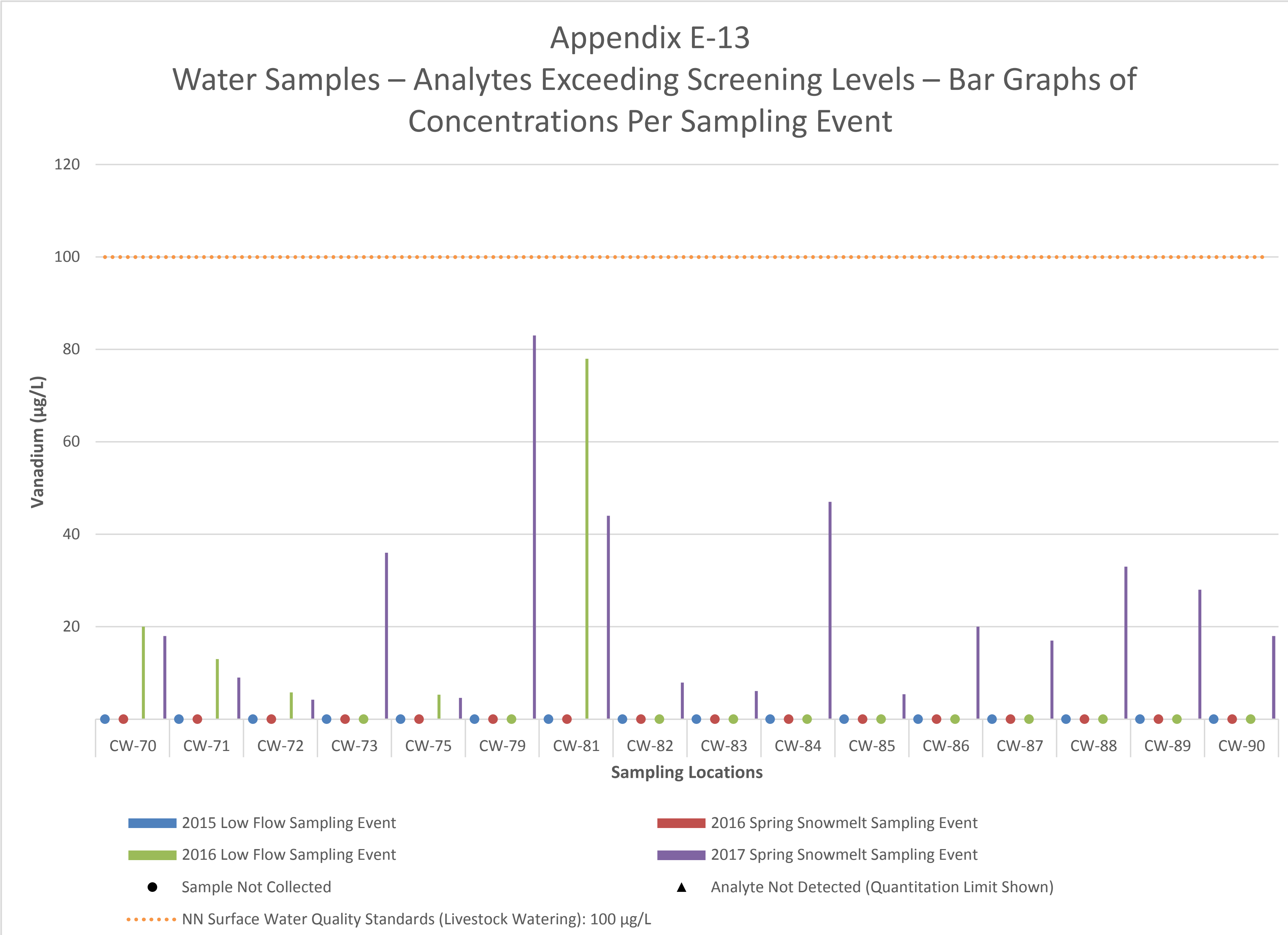




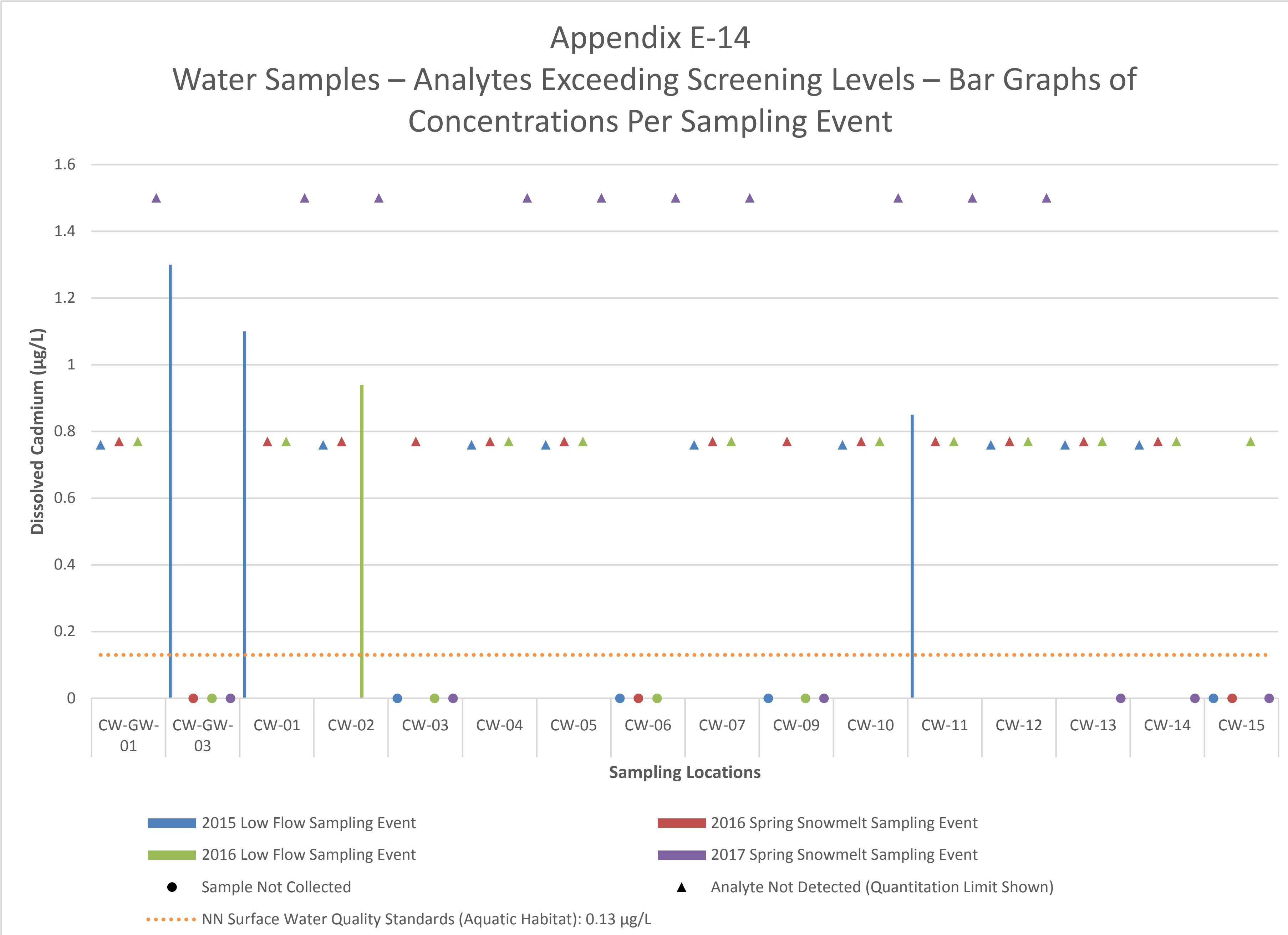
Appendix E-13
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
CW-26
4,600 µg/L
CW-26
5,300 µg/L
CW-26
3,000 µg/L
CW-26
11,000 µg/L
Vanadium (µg/L)
300
250
200
150
100
50
0
CW-18
CW-21
CW-22
CW-26
CW-36
CW-37
CW-38
CW-39
CW-40
CW-41
CW-46
CW-47
CW-48
CW-50
CW-51
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
NN Surface Water Quality Standards (Livestock Watering): 100 µg/L

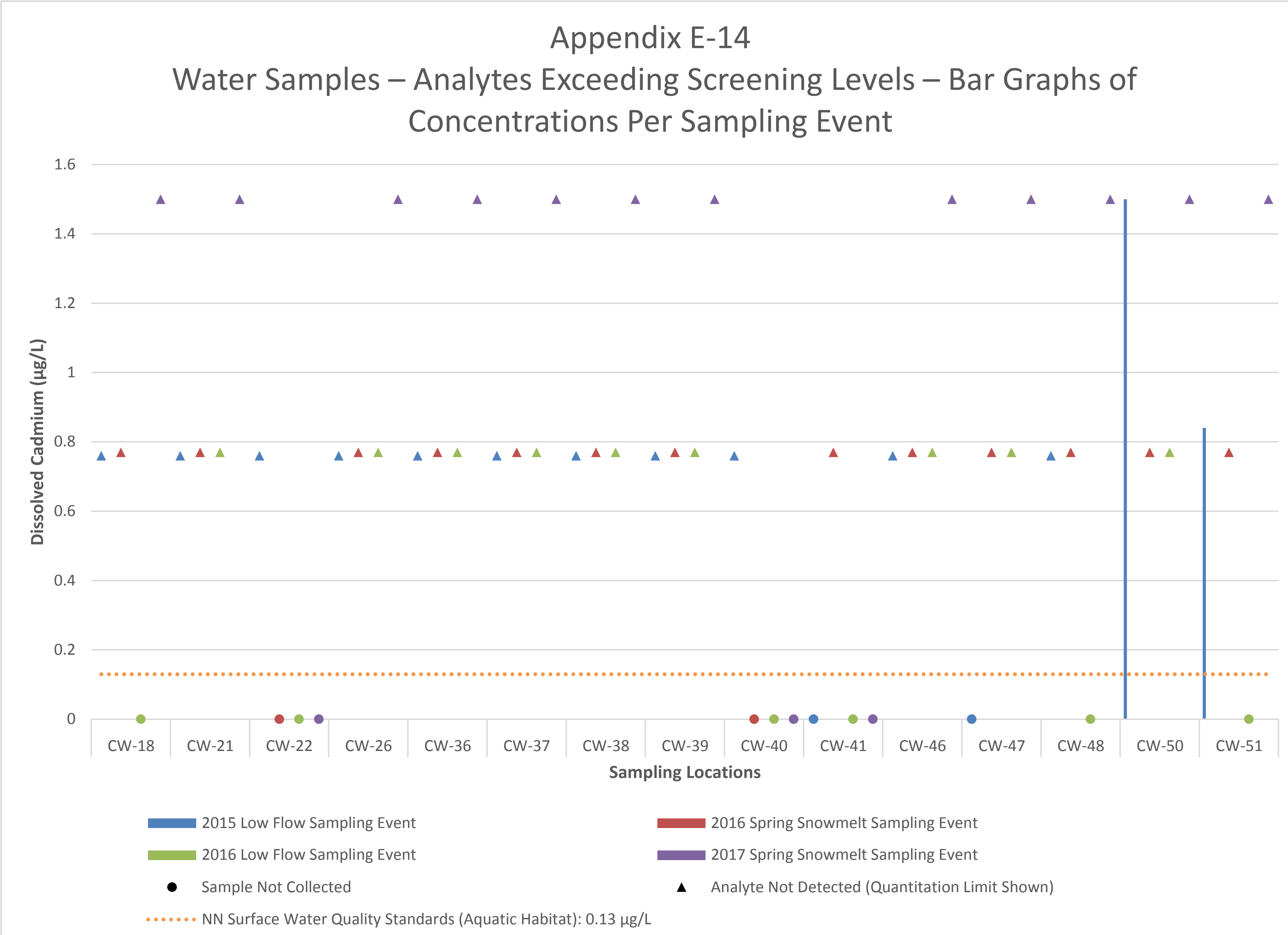
Appendix E-13
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event

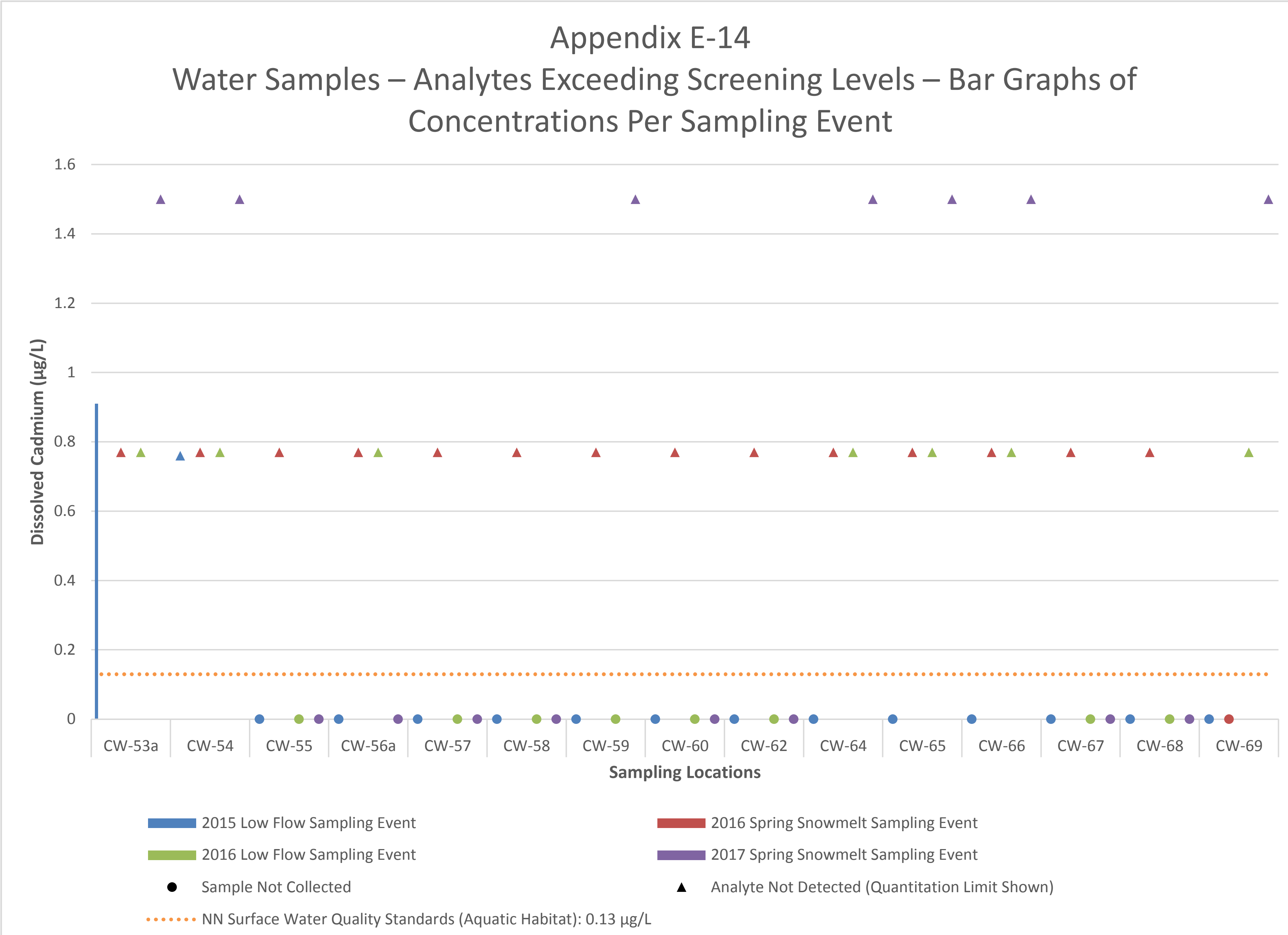




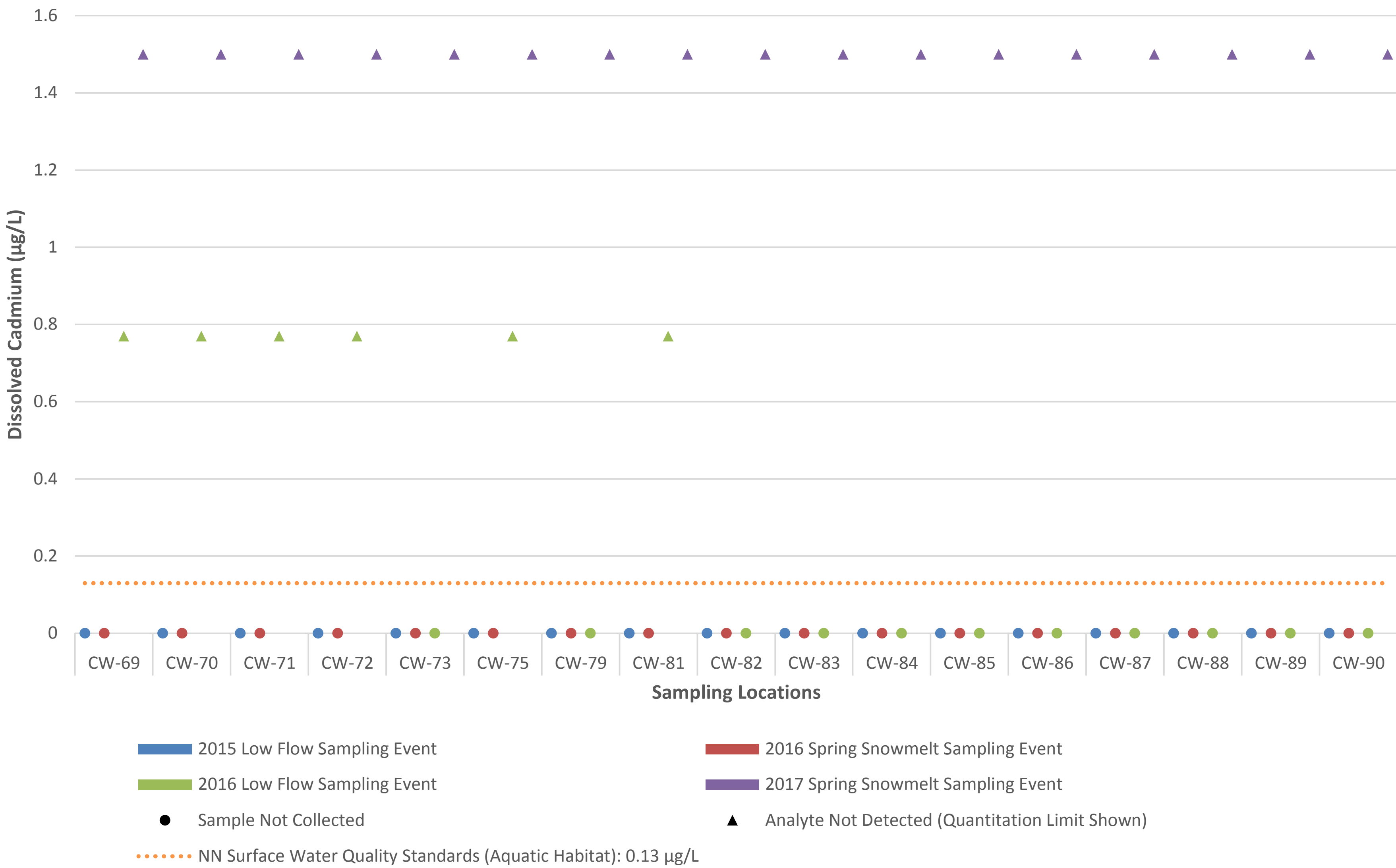
Appendix E-13
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Vanadium (µg/L)
120
100
80
60
40
20
CW-70
CW-71
CW-72
CW-73
CW-75
CW-79
CW-81
CW-82
CW-83
CW-84
CW-85
CW-86
CW-87
CW-88
CW-89
CW-90
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
NN Surface Water Quality Standards (Livestock Watering): 100 µg/L

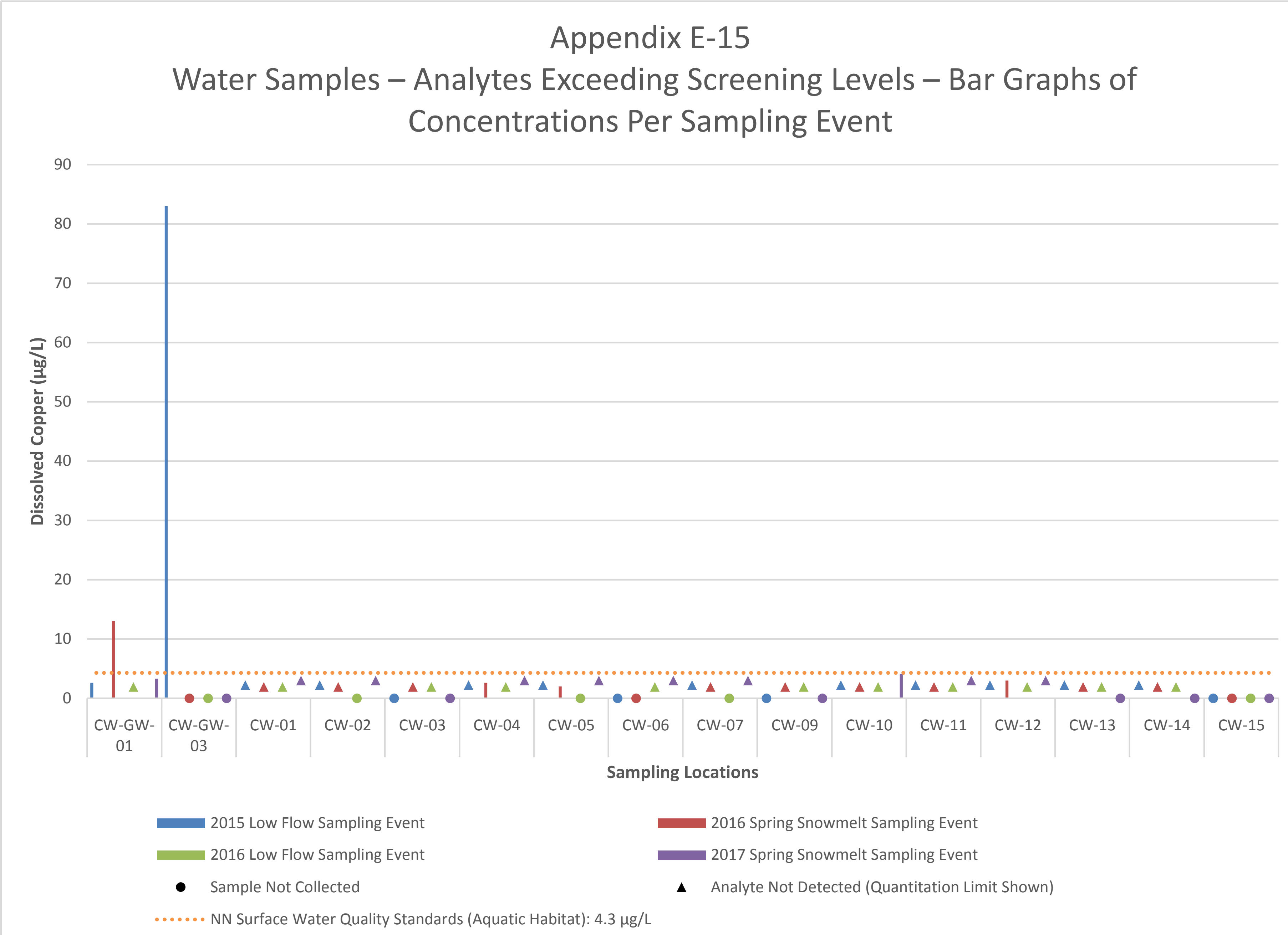

Appendix E-14
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Dissolved Cadmium (µg/L)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
CW-GW-01
CW-GW-03
CW-01
CW-02
CW-03
CW-04
CW-05
CW-06
CW-07
CW-09
CW-10
CW-11
CW-12
CW-13
CW-14
CW-15
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
NN Surface Water Quality Standards (Aquatic Habitat): 0.13 µg/L


Appendix E-14
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Dissolved Cadmium (µg/L)
CW-18
CW-21
CW-22
CW-26
CW-36
CW-37
CW-38
CW-39
CW-40
CW-41
CW-46
CW-47
CW-48
CW-50
CW-51
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
NN Surface Water Quality Standards (Aquatic Habitat): 0.13 µg/L

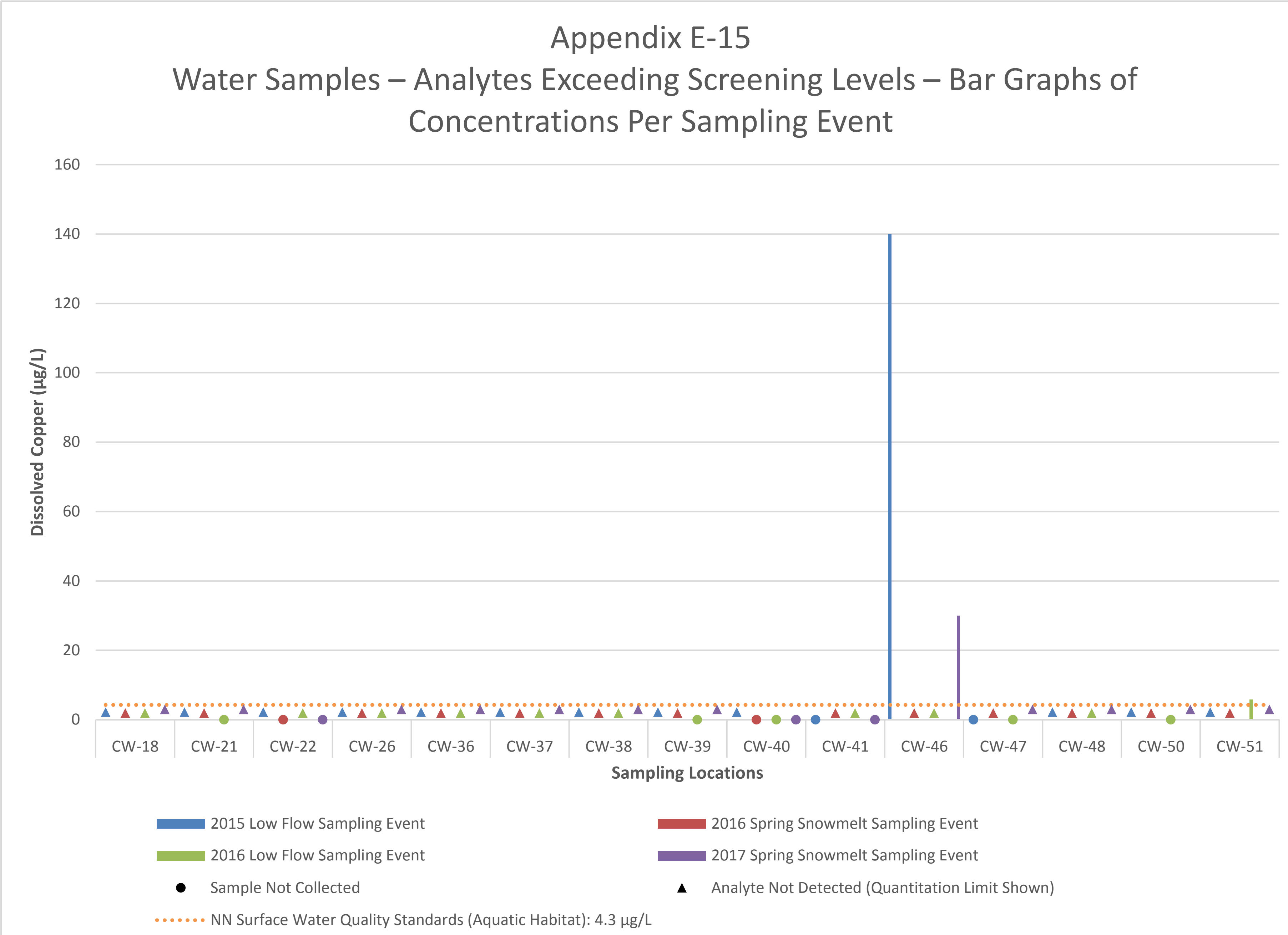

Appendix E-14
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Dissolved Cadmium (µg/L)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
CW-53a
CW-54
CW-55
CW-56a
CW-57
CW-58
CW-59
CW-60
CW-62
CW-64
CW-65
CW-66
CW-67
CW-68
CW-69
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
NN Surface Water Quality Standards (Aquatic Habitat): 0.13 µg/L

Appendix E-14
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event





Appendix E-15
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Dissolved Copper (µg/L)
90
80
70
60
50
40
30
20
10
0
CW-GW-01
CW-GW-03
CW-01
CW-02
CW-03
CW-04
CW-05
CW-06
CW-07
CW-09
CW-10
CW-11
CW-12
CW-13
CW-14
CW-15
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
NN Surface Water Quality Standards (Aquatic Habitat): 4.3 µg/L

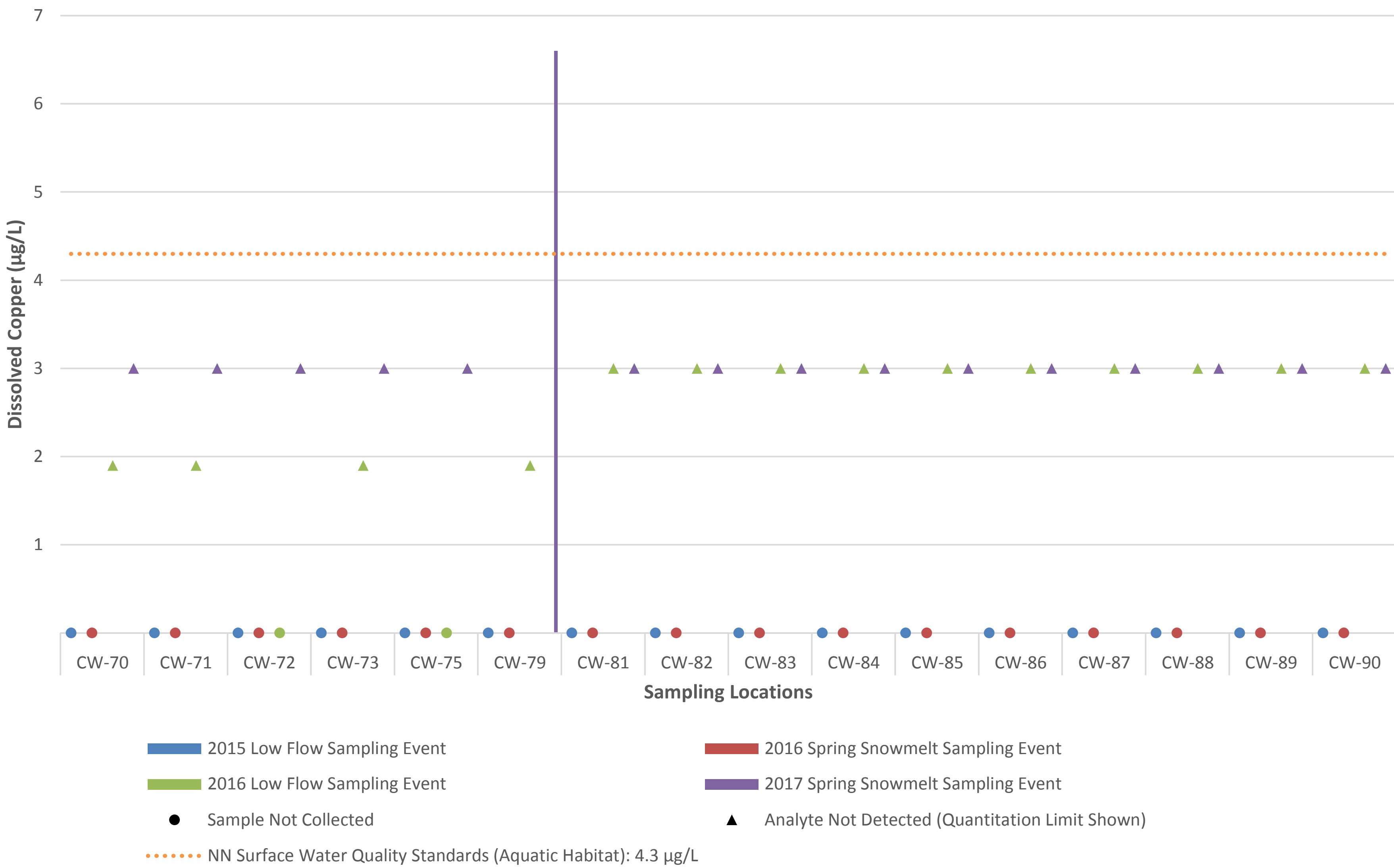

Appendix E-15
Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Dissolved Copper (µg/L)
160
140
120
100
80
60
40
20
0
CW-18
CW-21
CW-22
CW-26
CW-36
CW-37
CW-38
CW-39
CW-40
CW-41
CW-46
CW-47
CW-48
CW-50
CW-51
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
NN Surface Water Quality Standards (Aquatic Habitat): 4.3 µg/L

Appendix E-15

Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event

Appendix E-15

Water Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event



APPENDIX F:

WATER QUALITY MEASUREMENTS

Cove Wash Watershed Assessment
2015 Low Flow Sampling Event - Water Quality Measurements

Sample Location	Sample Date	Sample Information	Northing	Easting	pH	Temperature (°C)	Temperature (°F)	Conductivity (µS/cm)	ORP (mV)	Dissolved Oxygen (%)	Velocity (ft/s)
CW-GW-01	6/17/2015	Red Point Dug Well	4050237.040	657330.869	7.42	15.26	59.5	768	-47.4	131.3	Not Applicable
CW-SW-01	6/16/2015	Cove Wash	4051657.362	663305.231	8.31	28.26	82.9	1350	-4.8	22.3	NM
CW-SW-02	6/16/2015	Cove Wash	4053607.153	666731.839	8.34	26.8	80.2	1102	172.4	35.5	NM
CW-SW-04	6/17/2015	Background	4045556.747	655368.538	8.23	15.3	59.5	135	123	Not Recorded	NM
CW-SW-05/CW-SW-49	6/18/2015	Historical Sample - Area 1 - Dam Surface Sample - Cove Wash Middle	4045700.298	658683.857	8.06	16.61	61.9	659	87.8	64.6	NM
CW-SW-07	6/17/2015	Historical Sample - W07 - Cove Wash Middle	4047111.161	659124.125	7.67	20.78	69.4	643	-60.3	114.6	1
CW-SW-10	6/17/2015	Cottonwood Spring	4049594.294	660201.047	7.61	23.05	73.5	1,261	-27.8	134.3	Not Applicable
CW-SW-11	6/19/2015	Cove Wash North	4046369.715	657266.457	7.34	18.52	65.3	752	144.8	67.4	NM
CW-SW-12	6/18/2015	Cove Wash Middle 3	4044603.441	658812.815	8.9	17.2	63.0	508	-71.6	94.8	1.02
CW-SW-13	6/18/2015	Cove Wash Middle 3	4043160.908	658957.686	8.19	17.42	63.4	525	86.9	71.3	0.83
CW-SW-14	6/18/2015	Cove Wash Middle 3E	4042934	659222	8.34	18.26	64.9	490	101.7	71.1	NM
CW-SW-18	6/19/2015	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	6.47	20.7	69.3	729	-70.8	61.2	NM
CW-SW-21/CW-SW-22	6/20/2015	Background - Mesa IV Springs	4043108	655931	6.88	23.88	75.0	439	47.3	103.5	Not Applicable
CW-SW-26	6/16/2015	Cove Wash Middle 2 (Historical - Mesaa I 1/2, Mine 4)	4042501.621	657146.877	7.81	23.42	74.2	1,426	-78.4	92.4	NM
CW-SW-36	6/23/2015	Historical Sample - W006 - Cove Wash Middle 2	4044602.301	658113.531	7.42	17.27	63.1	848	-80.2	41.6	NM
CW-SW-37	6/23/2015	Historical Sample - W005 - Cove Wash Middle 2	4044377.806	657955.461	7.66	18.17	64.7	851	113.2	57.2	NM
CW-SW-38	6/23/2015	Historical Sample - W004 - Middle 2	4044173	657898	7.61	15.17	59.3	853	119	48	NM
CW-SW-39/CW-SW-40	6/23/2015	Historical Sample Area 4 - Cove Wash Middle	4045453.339	658432.518	7.69	22.52	72.5	232	67.3	52.5	NM
CW-SW-46	6/23/2015	Pine Water Springs	4043788.61	661352.387	7.27	21.3	70.3	423	-7.6	80.5	Not Applicable
CW-SW-48	6/24/2015	Cove Wash Middle 3F	4044751.928	656807.090	7.12	22.93	73.3	823	119.2	54.7	NM
CW-SW-50	6/25/2015	Cove Wash Middle 1	4044856.247	657463.154	7.48	17.92	64.3	834	57	87.3	NM
CW-SW-51	6/25/2015	Cove Wash Middle 1A	4044944.041	657035.048	7.73	14.79	58.6	894	-42.1	30.3	NM
CW-SW-53	6/25/2015	Cove Wash Middle 1	4044478	656787	6.52	14.91	58.8	802	161.8	60.7	NM
CW-SW-54	6/25/2015	Cove Wash Middle 1B	4044751.928	656807.09	7.02	18.03	64.5	1,068	158	38.4	NM

Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
°C = degree Celcius
°F = degree Fahrenheit
µS/cm = microSiemen/centimeter
mV = millivolt
% = percent
mg/L = milligram per liter
NM = Not measurable

Cove Wash Watershed Assessment
2016 Spring Snowmelt Sampling Event - Water Quality Measurements

Sample Location	Sample Date	Sample Information	Northing	Easting	pH	Temperature (°C)	Temperature (°F)	Conductivity (µS/cm)	ORP (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	Flow (ft/s)
CW-GW-01	3/28/2016	Red Point Dug Well	4050237.04	657330.869	Not Recorded	Not Recorded	Not Recorded	Not Recorded	Not Recorded	Not Recorded	Not Recorded	10.75	Not Applicable
CW-SW-01	3/28/2016	Cove Wash	4051637.55	663372.902	7.29	16.85	62.3	1456	153.2		8.5	Out of range	0.5
CW-SW-02	3/26/2016	Cove Wash	4053607.153	666731.839	8.26	14.16	57.5	1185	121	91.3		5.36	2.3
CW-SW-03	3/30/2016	Cove Wash North	4047985.628	659997.097	8.88	7	44.6	1068	155.5		30	0.38	2
CW-SW-04	4/27/2016	Background	4045556.747	655368.538	7.36	1.23	34.2	378	183	46.38		3.91	NM
CW-SW-05	3/25/2016	rical Sample - Area 1 - Dam Surface Sample - Cove Wash M	4045700.298	658683.857	7.54	11.73	53.1	1617	110	69.6		Not recorded	1.2
CW-SW-07	3/25/2016	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	7.79	15.23	59.4	1417	115.3		7.03	0.56	1.7
CW-SW-09	3/30/2016	Cove Wash North	4049315.64	658120.219	9.2	10.49	50.9	669	156.1		23.55	2	NM
CW-SW-10	3/30/2016	Cottonwood Spring	4049586.881	660202.988	8.04	9.35	48.8	1075	163		19.11	0.89	NM
CW-SW-11	3/30/2016	Cove Wash North	4046369.715	657266.457	7.88	6.91	44.4	574	169.2		7.88	4.15	0.259
CW-SW-12	3/30/2016	Cove Wash Middle 3	4044603.441	658812.815	8.19	2.06	35.7	516	176.6	74.8		0.56	NM
CW-SW-13	5/2/2016	Cove Wash Middle 3	4043160.908	658957.686	8.3	3.05	37.5	285	190.2		13.82	4	1.4
CW-SW-14	5/2/2016	Cove Wash Middle 3E	4042934	659222	8.25	3.75	38.8	279	193.3		13.06	5.54	0.87
CW-SW-18	3/30/2016	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	8.02	6.07	42.9	473	133.4		5.84	0.95	Not Applicable
CW-SW-21	4/29/2016	Background - Mesa IV Springs	4043108	655931	7.19	6.5	43.7	722	237.5	98.6	12.12	6.42	NM
CW-SW-26	4/28/2016	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	7.59	2.7	36.9	579	215.7		36.76	Not recorded	NM
CW-SW-36	3/26/2016	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	8.2	2.05	35.7	378	1523		7.18?	6.71	0.45
CW-SW-37	3/26/2016	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	8.16	3.12	37.6	424	152.1		6.34	1.72	NM
CW-SW-38	3/26/2016	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	8.07	2.91	37.2	421	1683		10.32	12.94	0.04
CW-SW-39	3/25/2016	Cove Wash Middle 2	4045453.339	658432.518	6.92	10.35	50.6	1746	158.2		6.92	11.2	2
CW-SW-41	3/25/2016	Cove Wash Middle 1	4045552	658464	7.32	10.25	50.5	2313	183	71.1		3.34	1.72
CW-SW-46	5/3/2016	Pine Water Springs	4043788.61	661352.387	7.71	9.44	49.0	281	250.7		12.37	7.61	Not Applicable
CW-SW-47	5/3/2016	Cove Wash Middle 3F	4043727.086	659295.82	7.71	5.73	42.3	691	270.9		8.48	10.78	NM
CW-SW-48	3/26/2016	Cove Wash Middle 3F	4044751.928	656807.09	8.12	3.41	38.1	532	170	75.3		1.23	3.6
CW-SW-49	3/26/2016	Background - Cove Wash Middle 1 BKG	4049586.881	660202.988	8.02	6.07	42.9	473	133.4		5.84	1.21	NM
CW-SW-50	3/29/2016	Cove Wash Middle 1	4044856.247	657463.154	7.56	3.25	37.9	523	227		9.3	13.9	0.27
CW-SW-51	3/29/2016	Cove Wash Middle 1A	4044944.041	657035.048	7.4	2.79	37.0	302	1.66	666.6	88.62	Not recorded	NM
CW-SW-53A	5/2/2016	Cove Wash Middle 1	4044478	656787	7.93	5.67	42.2	497	198.1		14.3	0.61	NM
CW-SW-54	5/2/2016	Cove Wash Middle 1B	4044751.928	656807.09	7.85	10.08	50.1	934	185.8		12.74	0	NM
CW-SW-55	3/25/2016	Cove Wash Middle 2	4044480.534	656337.545	7.95	10.11	50.2	1571	139.4		7.30	1.72	0.06
CW-SW-56A	5/2/2016	Cove Wash Middle 3A	4043135	658979	7.37	3.16	37.7	564	208		7.98	1.35	NM
CW-SW-57	3/26/2016	Duplicate ocf CW-02	4053607.153	666731.839	8.26	14.16	57.5	1185	121	91.3		0.62	2.3
CW-SW-58	3/29/2016	Cove Wash Middle 1	4044856.247	657463.154	7.56	3.25	37.9	523	227		9.3	6.05	NM
CW-SW-59	3/30/2016	Cove Wash Tributary 1	4051574	664210	8.19	12	53.6	575	154.5		10.27	1.8	0.53
CW-SW-60	3/30/2016	Cove Wash between 01 and 02	4051659	664274	8.56	9.45	49.0	1022	168.9		9.5	170	1.37
CW-SW-62	5/3/2016	Downstream of Dam	4046378	658785	8.99	18.07	64.5	653	199.5		11.83	Not recorded	1
CW-SW-64	4/29/2016	Cove Wash North between CW-15 and CW-16	4045877	656444	6.8	2.21	36.0	1444	205.5		6.42	Not recorded	1
CW-SW-65	4/30/2016	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	8.39	7.46	45.4	2400	208.2		3.65	245	NM
CW-SW-66	4/30/2016	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	8.7	7.35	45.2	2731	183.4		11.76	20.5	NM
CW-SW-67	5/2/2016	Cove Wash Middle 3 - Location of CW-12	4044603.441	658812.815	8.34	2.62	36.7	281	184.2		14.23	6.42	NM
CW-SW-68	5/2/2016	Duplicate of CW-67	4044603.441	658812.815	8.34	2.62	36.7	281	184.2		14.23	1.8	NM

Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
°C = degree Celcius
°F = degree Fahrenheit
µS/cm = microSiemen/centimeter
mV = millivolt
% = percent
mg/L = milligram per liter

Cove Wash Watershed Assessment
2016 Low Flow Sampling Event - Water Quality Measurements

Sample Location	Sample Date	Sample Information	Northing	Easting	pH	Temperature (°C)	Temperature (°F)	Conductivity (µS/cm)	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	Velocity (ft/s)
CW-GW-01G-160628	6/28/2016	Red Point Dug Well	4050274.524	657301.4036	7.41	11.53	52.8	901	98.7	3.51	2.67	Not Applicable
CW-GW-79-160629	6/28/2016	Red Point Dug Well	4050274.524	657301.4036	7.41	11.53	52.8	901	98.7	3.51	2.67	Not Applicable
CW-SW-01-160627	6/27/2016	Cove Wash (Downstream)	4051637.55	663372.9034	8.8	10.56	51.0	1010	217.3	12.23	12	NM
CW-SW-02-160627	6/27/2016	Cove Wash (Downstream)	4053607.153	666731.839	8.16	12.67	54.8	971	168.1	8.65	8.23	NM
CW-SW-04-160618	6/18/2016	Background (Upstream)	4045547.649	655393.8806	7.17	7.96	46.3	1433	-20.2	3.3	20.0	NM
CW-SW-05-160627	6/27/2016	Dam (Historical)	4045709.002	658675.5894	8.1	19.88	67.8	576	264.4	16.21	20.0	NM
CW-SW-07-160628	6/28/2016	Cove Wash Middle (Historical)	4047101.942	659123.9337	8.43	14.6	58.3	1138	145.2	7.9	2.16	NM
CW-SW-10-160628	6/28/2016	Cottonwood Spring (Seeing capped well)	4049594.436	660198.1416	7.6	19.5	67.1	1592	103.8	11.2	0.38	NM
CW-SW-11-160621	6/21/2016	Cove Wash North	4046373.007	657265.4893	8.3	22.59	72.7	887	8.29	15.17	11.9	NM
CW-SW-12-160627	6/27/2016	Cove Wash Middle 3	4044603.441	658812.8183	8.7	12.11	53.8	281	220.1	7.62	0.38	0.61
CW-SW-13-160623	6/23/2016	Cove Wash Middle 4	4043160.908	658957.6858	8.65	14.12	57.4	606	114	16.87	0.38	0.79
CW-SW-14-160623	6/23/2016	Cove Wash Middle 3E	4042934	659222.0031	8.81	12.25	54.1	505	119.4	8.31	2.69	0.5
CW-SW-15-160625	6/25/2016	Cove Wash North	4046035	656751.9991	7.78	12.78	55.0	983	101.4	7.32	5.94	NM
CW-SW-21-160620	6/20/2016	Background (Mesa IV Springs)	4043108	655931.0041	7.36	20.77	69.4	636	100.3	13.77	3.56	Not Applicable
CW-SW-26-160620	6/20/2016	Cove Wash Middle 2 (Historical - Mesaa I 1/2, Mine 4)	4042501.621	657146.8765	7.62	15.9	60.6	2056	-91.5	16.58	8.84	NM
CW-SW-36-160618	6/18/2016	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	8.46	2.66	36.8	589	147.1	8.01	0.87	NM
CW-SW-37-160618	6/18/2016	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	8.55	9.98	50.0	618	26.6	11.48	6.83	NM
CW-SW-38-160618	6/18/2016	Cove Wash Middle 2 (Historical)	4044173	657897.9975	8.31	6.14	43.1	632	-52.9	10.67	10.4	NM
CW-SW-39-160627	6/27/2016	Cove Wash Middle 2	4045453.338	658432.5145	7.97	17.30	63.1	497	191.2	4.04	10.4	NM
CW-SW-46-160621	6/21/2016	Background (Pine Water Springs)	4043788.61	661352.387	7.82	9.28	48.7	390	77.7	5.61	10.4	Not Applicable
CW-SW-47-160617	6/17/2016	Cove Wash Middle 3F	4043774.185	659297.1492	7.52	2.45	36.4	1354	146.9	7.5	0.35	NM
CW-SW-50-160624	6/24/2016	Cove Wash Middle 1	4044856.248	657463.1536	7.48	7.57	45.6	743	176.8	8.39	1.48	NM
CW-SW-53a-160624	6/24/2016	Cove Wash Middle 1 (Near original location)	4044567	656816	6.99	11.47	52.6	784	157.7	1.35	0.02	NM
CW-SW-54-160624	6/24/2016	Cove Middle 1B	4044752.579	656806.108	7.61	9.23	48.6	767	-141.5	1.02	0.97	NM
CW-SW-56a-160623	6/23/2016	Cove Wash Middle 3A (Near original location)	4043135	658979	7.63	12.76	55.0	1093	6.9	10.57	0.65	NM
CW-SW-64-160621	6/21/2016	Cove Wash North	4045877	656444	7.29	10.04	50.1	1109	167.6	9.2	23.2	NM
CW-SW-65-160622	6/22/2016	Cove Wash Middle 3A	4042362.589	658661.6744	8.27	18.56	65.4	1912	95.2	17.27	14.4	NM
CW-SW-66-160622	6/22/2016	Cove Wash Middle 3A	4042362.589	658661.6744	8.75	21.6	70.9	2817	99.3	9.79	0.57	NM
CW-SW-69-160618	6/18/2016	Background (Upstream)	4045547.649	655393.8806	7.17	7.96	46.3	1433	-20.2	3.3	3.78	NM
CW-SW-70-160617	6/17/2016	Cove Wash Middle 3F	4044525.919	659043.2268	8.38	26.41	79.5	830	79.9	6.48	11.8	NM
CW-SW-71-160618	6/18/2016	Cove Wash Middle 2 (Historical)	4046373.007	657265.4893	8.55	9.98	50.0	618	26.6	11.48	13.1	NM
CW-SW-72-160621	6/21/2016	Cove Wash North	4046373.007	657265.4893	8.3	22.59	72.7	887	8.29	15.17	11.9	NM
CW-SW-75-160622	6/22/2016	Cove Wash Middle 3D	4041201.219	658764.5801	8.39	12.03	53.7	1251	130.1	9.6	11.2	NM
CW-SW-81-160629	6/29/2016	Cove Wash North	4049882.052	658891.9138	8.84	12.38	54.3	1790	33.5	3.27	33	NM

Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
°C = degree Celcius
°F = degree Fahrenheit
µS/cm = microSiemen/centimeter
mV = millivolt
% = percent
mg/L = milligram per liter
NM = Not measurable

Cove Wash Watershed Assessment
2017 Spring Snowmelt Sampling Event - Water Quality Measurements

Sample Location	Sample Date	Sample Information	Northing	Easting	pH	Temperature (°C)	Temperature (°F)	Conductivity (µS/cm)	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	Flow (ft^3/s)
CW-SW-01	04/26/2017	Cove Wash (Downstream)	4050274.524	657301.4036	8.48	17.59	63.7	1158	216.2	7.21	18.1	0.02
CW-SW-01G	04/26/2017	Red Point Dug Well	4051637.55	663372.9034	7.1	10.2	50.4	784	197	4.29	0.7	NM
CW-SW-02	04/19/2017	Cove Wash (Downstream)	4053607.153	666731.839	8.59	19.24	66.6	1544	89.4	5.59	3.55	0.09
CW-SW-05	04/18/2017	Dam (Historical)	4045709.002	658675.5894	7.57	18.7	65.7	601	337.3	8.13	2.66	0.66
CW-SW-06	04/26/2017	Cove Wash (Downstream)	4050970.463	659839.728	8.73	19.85	67.7	739	39.4	7.54	3.31	NM
CW-SW-07	04/26/2017	Cove Wash Middle (Historical)	4047101.942	659123.9337	8.47	10.32	50.6	607	112.2	9.3	2.24	NM
CW-SW-10	04/26/2017	Cottonwood Springs	4049594.436	660198.1416	8.61	8.46	47.2	1186	197.2	12.68	43.4	NM
CW-SW-12	04/19/2017	Cove Wash Middle 3	4044603.441	658812.8183	7.81	6.06	42.9	678	194	6.76	4.22	1.09
CW-SW-26	04/20/2017	Cove Wash Middle 2 (Historical - Mesaa I 1/2, Mine 4)	4042501.621	657146.8765	9.06	9.17	48.5	1823	161.5	9.03	48.3	NM
CW-SW-37	04/20/2017	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	8.23	8.32	47.0	935	191.9	6.22	1.47	0.04
CW-SW-38	04/20/2017	Cove Wash Middle (Historical)	4044173	657897.9975	8.26	5.16	41.3	946	155.8	6.7	1.06	0.05
CW-SW-38	04/20/2017	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	8.23	8.32	47.0	923	177.7	5.92	1.78	0.05
CW-SW-39	04/18/2017	Cove Wash Middle 2	4045453.338	658432.5145	7.49	15.46	59.8	808	341.2	5.09	0.64	0.13
CW-SW-46	04/19/2017	Pine Water Springs	4043788.61	661352.387	9.08	11.49	52.7	354	161.5	9.79	1.95	NM
CW-SW-47	04/19/2017	Cove Wash Middle 3F	4043774.185	659297.1492	8.31	6.18	43.1	774	179	7.38	13.36	NM
CW-SW-48	04/19/2017	Cove Wash Middle 3	4044446.562	659271.0138	6.95	10.91	51.6	693	329.9	5.6	0.4	0.04
CW-SW-50	04/21/2017	Cove Wash Middle 1	4044856.248	657463.1536	7.63	5.35	41.6	1918	118	13.25	1.13	0.23
CW-SW-51	04/21/2017	Cove Wash Middle 1A	4044944.041	657035.0523	6.55	5.92	42.7	954	286.8	6.09	2.34	NM
CW-SW-53a	04/21/2017	Cove Wash Middle 1	4044567	656816	7.82	5.1	41.2	1024	105.8	17.02	2.54	NM
CW-SW-54	04/21/2017	Cove Wash Middle 1B	4044752.579	656806.108	8.06	17.64	63.8	1233	124.6	13.01	1	NM
CW-SW-59	04/26/2017	Cove Wash Tributary 1 (Downstream)	4051574.576	664210.2048	8.19	16.41	61.5	730	97.7	8.19	73.1	0.69
CW-SW-65	04/22/2017	Cove Wash Middle 3A	4042362.589	658661.6744	8.27	10.93	51.7	1397	99	11.06	1.77	NM
CW-SW-66	04/22/2017	Cove Wash Middle 3A	4042362.589	658661.6744	8.11	8.7	47.7	1374	-9	9.69	4.16	NM
CW-SW-69	04/24/2017	Duplicate of CW-04	4045547.649	655393.8806	8.44	4.39	39.9	850	136.4	8.86	0.68	NM
CW-SW-70	04/19/2017	Cove Wash Middle 3F	4044525.919	659043.2268	8.26	8.44	47.2	692	152.3	5.38	0.67	0.14
CW-SW-71	04/20/2017	Duplicate of CW-37	4044377.806	657955.4587	8.23	8.32	47.0	935	191.9	6.22	1.47	0.05
CW-SW-72	04/21/2017	Duplicate of CW-11	4046373.007	657265.4893	9.83	15.32	59.6	838	122.5	8.03	1.16	0.05
CW-SW-73	04/22/2017	Cove Wash Middle 3D	4042208.541	658769.5923	8.39	13.31	56.0	685	17.1	10.15	Not Recorded	NM
CW-SW-75	04/22/2017	Cove Wash Middle 3D	4041201.219	658764.5801	7.95	5.76	42.4	865	82.4	7.67	11.29	NM
CW-SW-79	04/26/2017	Duplicate of CW-01G	4050274.524	657301.4036	7.1	10.2	50.4	784	197	4.29	0.7	NM
CW-SW-82	04/24/2017	Cove Wash Middle 2A	4044047.322	657766.4468	8.09	5.69	42.2	769	66.1	10.43	1.42	NM
CW-SW-83	04/24/2017	Cove Wash Middle 2A	4044045.08	657643.9635	7.48	5.39	41.7	725	26.1	6.32	1.58	NM
CW-SW-84	04/24/2017	Cove Wash Middle 2B	4043793.108	657816.7814	7.17	4.88	40.8	830	-114.8	3.5	3.79	NM
CW-SW-85	04/24/2017	Cove Wash Middle 2A	4043732.792	657461.944	7.66	6.4	43.5	750	155.8	6.66	0.97	NM
CW-SW-89	04/22/2017	Duplicate of CW-66	4042362.589	658661.6744	8.11	8.7	47.7	1374	-9	9.69	4.16	NM
CW-SW-90	04/26/2017	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	8.4	1.58	34.8	559	37.6	10.7	21.2	NM

Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
°C = degree Celcius
°F = degree Fahrenheit
µS/cm = microSiemen/centimeter
mV = millivolt
% = percent
mg/L = milligram per liter
ft/s = feet per second
NM = Not measurable

APPENDIX G:

SEDIMENT RESULTS TABLES WITH HIGHLIGHTED EXCEEDANCES

Cove Wash Watershed Assessment
2015 Low Flow Sampling Event
Sediment - Metal Results

EPA Soil Screening Level - Protective of groundwater (Exceedances are bolded, underlined, and highlighted)					0.27	0.29	82	3.2	0.38	180,000	NA	46	14	0.1	NA	NA	0.26	NA	0.14	14	NA	NA
Sample Location	Sample Date	Sample Type	Northing	Easting	Antimony (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Beryllium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Cobalt (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)	Molybdenum (mg/kg)	Nickel (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)	Thallium (mg/kg)	Uranium (mg/kg)	Vandium (mg/kg)	Zinc (mg/kg)
CW-SS-01	6/16/2015	Cove Wash	4051637.550	663372.902	0.9 U	**3.1**	**280**	0.4 J	0.098 U	8.3	3.9	6.4	6.7	0.0056 J	0.38 U	9.9	0.6 U	0.2 U	0.92 U	1	18	13
CW-SS-02	6/16/2015	Cove Wash	4053607.153	666731.839	0.8 U	**3.5**	**800**	0.47 J	0.087 U	11	3.8	6.4	7.1	0.0044 J	0.34 U	15	0.53 U	0.18 U	0.82 U	1.6	21	14
CW-SS-03	6/16/2015	Cove Wash South	4047985.628	659997.097	0.72 U	**3.8**	**1900**	0.5 J	0.078 U	14	3.8	5	8.3	0.0061 J	0.3 U	13	0.48 U	0.16 U	0.74 U	1	20	12
CW-SS-04	6/17/2015	Background	4045556.747	655368.538	**2.8 J**	**45**	**510**	**3.8**	**0.38 J**	40	16	31	**32**	0.078 J	7.8	17	**5.2**	0.37 U	3.3 U	8.1	95	110
CW-SS-05	6/18/2015	Historical Sample - Area 1 - Dam Surface Sample - Cove Wash Middle	4045709.002	658675.587	0.86 U	**1.3**	**85**	0.22 J	0.093 U	5.4	1.6	2.8	3.7	0.0043 J	0.36 U	2.9	0.56 U	0.19 U	0.87 U	5.3	30	10
CW-SS-06	6/17/2015	Cove Wash	4050970.463	659839.731	0.84 U	**1.4**	**100**	0.2 J	0.091 U	4.3	1.4	2.2	3.2	0.0042 J	0.35 U	3.3	0.55 U	0.19 U	0.85 U	2	19	6.8
CW-SS-07	6/17/2015	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	0.81 U	**1.7**	**130**	0.21 J	0.088 U	4.3	1.6	3.1	4.4	0.0049 J	0.34 U	2.8	0.53 U	0.18 U	0.82 U	6.5	32	9.3
CW-SS-08	6/17/2015	Background	4050235.455	657139.219	0.68 U	**1.8**	**160**	0.34 J	0.074 U	6.2	3.4	4.7	6.3	0.0038 J	0.29 U	7.4	**0.49**	0.15 U	0.7 U	0.35	10	12
CW-SS-09	6/17/2015	Cove Wash North	4049315.640	658120.219	0.7 U	**2.1**	**270**	0.35 J	0.076 U	5.6	3.2	3.5	6.2	0.0057 J	0.3 U	6.2	0.46 U	0.16 U	0.72 U	0.42	11	11
CW-SS-10	6/17/2015	Cottonwood Springs	4049586.881	660202.988	0.93 U	**2.6**	**240**	0.47 J	0.1 U	9.3	3.2	6.9	6.7	0.014 J	0.39 U	8.2	**2.8**	0.21 U	0.95 U	1.5	21	27
CW-SS-11	6/19/2015	Cove Wash North	4046369.715	657266.457	0.84 U	**1.5**	**120**	0.18 J	0.091 U	2.6	1 J	1.8	2.6	0.0045 J	0.35 U	1.2 J	0.55 U	0.19 U	0.85 U	0.64	11	6.3
CW-SS-12	6/18/2015	Cove Wash Middle 3	4044617.964	658818.118	0.89 U	**1.4**	**91**	0.25 J	0.096 U	4.9	1.8	2.6	4.2	0.0046 J	0.37 U	3.8	0.58 U	0.2 U	0.9 U	3.5	18	9.9
CW-SS-13	6/18/2015	Cove Wash Middle 3	4043160.908	658957.686	0.82 U	**3.3**	**150**	0.062 U	0.089 U	4.7	2.1	4.4	5.9	0.0086 J	0.35 U	3.5	**2.2**	0.18 U	0.84 U	**39**	430	12
CW-SS-14	6/18/2015	Cove Wash Middle 3E	4042934	659222	0.72 U	**2.5**	**210**	0.25 J	0.078 U	5.4	2.8	5.7	5.9	0.0055 J	0.3 U	4.6	**1.1**	0.16 U	0.74 U	**85**	120	16
CW-SS-15	6/19/2015	Cove Wash North	4046035	656752	0.74 U	**3.2**	**110**	0.4 J	0.08 U	3.8	2	3.8	4.8	0.0093 J	0.31 U	2.2	**0.5 J**	0.17 U	0.75 U	1.2	13	13
CW-SS-16	6/19/2015	Cove Wash North	4045602	656065	0.67 U	**2.4**	**210**	0.16 J	0.073 U	1.8	1	1.3	4.7	0.0035 J	0.3 J	0.97 J	0.44 U	0.15 U	0.68 U	1.1	17	5.3
CW-SS-17	6/20/2015	Cove Wash South	4050338.789	662352.178	0.68 U	**2.1**	**570**	0.43 J	0.075 J	9.4	2.6	3	5.9	0.0059 J	0.29 U	9.3	0.45 U	0.15 U	0.7 U	1.1	11	9.9
CW-SS-18	6/20/2015	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	0.87 UJ	**1.7**	70	0.28 J	0.094 U	5.1	2.1	4.4	4.5	0.0045 U	0.37 U	4.2	0.57 U	0.2 U	0.89 U	0.49	16	9.1
CW-SS-19	6/22/2015	Historical Sample - Cove Mesa 2	4042075.375	657976.189	0.69 UJ	**3.6**	**150**	0.39 J	0.074 U	3.5	2.7	6.1	5.3	0.0055 J	0.34 J	3.6	**0.88**	0.15 U	0.7 U	2.9 J	16	17
CW-SS-19-12	6/22/2015	Cove Wash Middle 3B Subsurface	4042071.484	657962.307	0.76 U	**6.7**	**150**	0.51 J	0.083 U	9	4.6	12	7.5	0.0073 J	0.63 J	6.2	**0.98**	0.17 U	0.78 U	4.9	18	26
CW-SS-20	6/22/2015	Cove Wash Middle 3C	4041480.197	658288.117	0.74 U	**5.2**	**200**	0.41 J	0.081 U	4.9	2.9	7.7	5.9	0.0053 J	0.31 U	4.4	**0.99**	0.17 U	0.76 U	3.1	17	21
CW-SS-21	6/20/2015	Background - Mesa IV Springs	4043108	655931	0.92 U	**2.2**	**170**	0.44 J	0.1 U	23	2.3	4.9	5.6	0.012 J	0.39 U	4.4	**0.68**	0.21 U	0.94 U	1.1	13	44
CW-SS-21-12	6/20/2015	Background - Mesa IV Springs Subsurface	4043108	655931	0.77 U	**2.7**	**110**	0.42 J	0.083 U	5	2.8	3.9	4.2	0.049	0.32 U	4.8	**0.57**	0.17 U	0.78 U	0.56	11	14
CW-SS-26	6/22/2015	Cove Wash Middle 2B	4042501.621	657146.877	0.87 UJ	**4.3**	**150**	0.24 J	0.095 U	4.3	2.2	4.7	4.8	0.0046 U	0.95 J	2.9	**1.2**	0.2 U	0.89 U	1.8	19	14
CW-SS-27	6/22/2015	Cove Wash Middle 2B	4042693.122	657319.281	0.75 U	**2.5**	**96**	0.34 J	0.082 U	4.5	2.8	8	5.4	0.0084 J	0.34 J	3.9	**1**	0.17 U	0.77 U	9.3	39	17
CW-SS-28	6/22/2015	Duplicate of CW-SS-27	4042693.122	657319.281	0.78 U	**2.2**	**93**	0.31 J	0.084 U	4.9	2.7	6.5	5.3	0.0077 J	0.33 U	3.7	**0.66**	0.17 U	0.79 U	8.1	39	16
CW-SS-29	6/22/2015	Cove Wash Middle 2C	4042595.541	658108.120	0.7 U	**1.4**	**180**	0.23 J	0.076 U	2.9	1.9	4	4.3	0.0046 J	0.29 U	2.3	**0.62**	0.16 U	0.71 U	1.6	18	13
CW-SS-30	6/23/2015	Background	4046867.444	654397.08	0.69 U	**0.67J**	56	0.14 J	0.075 U	2.8	1.1	2	2.4	0.0047 J	0.29 U	2	0.45 U	0.15 U	0.7 U	0.32	5.2	14
CW-SS-31	6/23/2015	Background	4044527.019	655114.311	0.68 U	0.48U	29	0.1 J	0.073 U	3.2	1.2	1.3	2.2	0.0046 J	0.29 U	1.7 J	0.45 U	0.15 U	0.69 U	0.28	4.6	5.2
CW-SS-32	6/23/2015	Cove Wash Middle 1E	4043933	655742	0.68 U	**0.99**	63	0.28 J	0.074 U	3.8	1.7	2.8	3.3	0.0079 J	0.29 U	3.1	**0.5**	0.15 U	0.69 U	1.3	15	10
CW-SS-36	6/23/2015	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	0.86 U	**2.1**	**220**	0.27 J	0.093 U	5.3	2.1	4.3	4.3	0.0069 J	0.36 U	3.4	0.57 U	0.19 U	0.88 U	6.1	37	13
CW-SS-37	6/23/2015	Historical Sample - W004 - Middle 2	4044377.806	657955.461	0.84 U	**2.2**	**130**	0.22 J	0.091 U	4.7	1.8	3.6	4	0.0045 J	0.35 U	2.7	0.55 U	0.19 U	0.86 U	**14**	55	11
CW-SS-38	6/23/2015	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	0.85 U	**1.8**	**110**	0.24 J	0.093 U	5.2	1.9	3	4.1	0.0051 J	0.36 U	3.1	0.56 U	0.19 U	0.87 U	4	28	12
CW-SS-39	6/23/2015	Cove Wash Middle 2	4045453.339	658432.518	0.94 U	**2**	**130**	0.4 J	0.1 U	7	2.9	6.8	5.7	0.012 J	0.4 U	4.9	**0.87**	0.21 U	0.96 U	8.6	41	19
CW-SS-41	6/23/2015	Cove Wash Middle 1	4045552	658464	0.71 U	0.77J	71	0.21 J	0.077 U	4.2	1.6	1.9	3.4	0.0053 J	0.3 U	3.2	0.47 U	0.16 U	0.72 U	0.34	11	7.5
CW-SS-42-14	6/23/2015	Irrigation Ditch Subsurface - Cove Middle	4045665.019	658693.563	0.77 U	**1.4**	**300**	0.16 J	0.083 U	4.1	1.3	1.9	3.2	0.0046 J	0.32 U	2.7	0.5 U	0.17 U	0.78 U	3.8	31	7.8
CW-SS-43-12	6/23/2015	Dam Subsurface - Cove Middle	4045684.910	658673.278	0.7 U	0.56J	**180**	0.16 J	0.076 U	3.6	1.2	1.8	2.6	0.005 J	0.29 U	2.1	0.46 U	0.16 U	0.71 U	2	14	7.1
CW-SS-44	6/24/2015	Pine Water Springs Drainage	4043806.688	661260.528	**0.84 J**	**1.9**	**230**	1.3	0.073 U	50	7.1	10	9.5	0.0076 J	0.28 U	56	**0.86**	0.15 U	0.69 U	1.9	22	28
CW-SS-45	6/24/2015	Background - Deer Springs Drainage	4042151.211	661078.707	0.65 U	**1.2**	59	0.21 J	0.071 U	4.2	2	2	3.3	0.0058 J	0.27 U	3	0.43 U	0.15 U	0.66 U	0.43	8.8	8.9
CW-SS-46	6/24/2015	Pine Water Springs	4043788.61	661352.387	0.82 U	**1.9**	**140**	0.69	0.092 J	28	4.5	20	11	0.009 J	0.35 U	29	**0.69**	0.18 U	0.84 U	1.2	19	61
CW-SS-46-14	6/24/2015	Pine Water Springs Subsurface	4043788.61	661352.387	0.72 U	**1.3**	71	0.36 J	0.078 U	12	2.8	4.5	4.4	0.0097 J	0.3 U	11	0.47 U	0.16 U	0.73 U	0.82	11	19
CW-SS-47	6/24/2015	Cove Wash Middle 3F	4043727.086	659295.820	0.73 U	**2**	**250**	0.39 J	0.079 U	8.7	2.7	6.2	6.2	0.006 J	0.31 U	8	0.48 U	0.16 U	0.74 U	**16**	75	16
CW-SS-48	6/24/2015	Cove Wash Middle 3F	4044751.928	656807.090	0.91 U	**1.8**	**120**	0.27 J	0.099 U	5.1	2	3.6	4.4	0.0055 J	0.38 U	4	0.6 U	0.2 U	0.93 U	5.7	38	11
CW-SS-49	6/18/2015	Duplicate of CW-SS-10	4049586.881	660202.988	0.93 U	**3.5**	**240**	0.45 J	0.1 U	8.1	3.2	6.8	6.5	0.013 J	0.39 U	7.2	**2.6**	0.21 U	0.95 U	1.4	20	26
CW-SS-50	6/25/2015	Cove Wash Middle 1	4044856.247	657463.154	0.79 U	**1.7**	63	0.26 J	0.13 J	3.5	1.6	2.3	3	0.0041 U	1.4	2.8	0.52 U	0.18 U	0.81 U	7.4	46	8.8
CW-SS-51	6/25/2015	Cove Wash Middle 1A	4044944.041	657035.048	0.47 U	**1.3**	65	0.17 J	0.066 J	2.7	1.1	2	2.2	0.0038 U	0.86	1.9	**0.32 J**	0.11 U	0.48 U	8.3	45	6.2
CW-SS-52	6/25/2015	Cove Wash Middle 1G	4044553.333	657329.590	0.68 U	**1.5**	59	0.28 J	0.14 J	4.8	1.8	2.6	3.7	0.0033 U	0.74 J	3.1	0.45 U	0.15 U	0.7 U	1.2	32	10
CW-SS-53	6/25/2015	Cove Wash Middle 1	4044478	656787	0.82 U	0.75J	**90**	0.23 J	0.16 J	2.6	1.2	1.7	2.8	0.0038 U	0.34 U	2 J	0.54 U	0.18 U	0.83 U	4.1	24	7
CW-SS-54	6/25/2015	Cove Wash Middle 1B	4044751.928	656807.09	0.78 U	**1.6**	81	0.31 J	0.1 J	2.8	1.5	1.9	3.7	0.0041 U	0.39 J	2.2 J	**0.86**	0.17 U	0.79 U	**17**	160	8.2
CW-SS-55	6/25/2015	Cove Wash Middle 1C	4044480.534	656337.545	0.82 U	**3**	**82**	0.56 J	0.17 J	3.5	3.1	7.6	5.4	0.0042 U	0.7 J	4.5	**1.3**	0.18 U	0.84 U	3.2	110	17
CW-SS-56	6/25/2015	Cove Wash Middle 3A	4042779	658775	0.84 U	**2**	**84**	0.36 J	0.18 J	3.2	2.4	4.1	4.7	0.0041 U	0.42 J	3.2	0.55 U	0.19 U	0.86 U	4.1	18	13

Notes:
EPA = Environmental Protection Agency
NA = Not Applicable
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
mg/kg = milligram per kilogram
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Cove Wash Watershed Assessment
2015 Low Flow Sampling Event
Sediment - Radium Results

Sample Location	Sample Date	Samply Type	Northing	Easting	Radium 226 (pCi/g)	Radium 228 (pCi/g)	Combined Radium 226/228 (pCi/g)
CW-SS-01	6/16/2015	Cove Wash	4051637.550	663372.902	1.48	0.61 J	2.09 J
CW-SS-02	6/16/2015	Cove Wash	4053607.153	666731.839	1.17	0.97 J	2.14 J
CW-SS-03	6/16/2015	Cove Wash South	4047985.628	659997.097	1.14	0.67 J	1.81 J
CW-SS-04	6/17/2015	Background	4045556.747	655368.538	2.55 J	1.15 J	3.7 J
CW-SS-05	6/18/2015	Historical Sample - Area 1 - Dam Surface Sample - Cove Wash Middle	4045709.002	658675.587	2.78	0.24 U	2.78
CW-SS-06	6/17/2015	Cove Wash	4050970.463	659839.731	1.83	0.29 U	1.83
CW-SS-07	6/17/2015	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	2.38	0.17 U	2.38
CW-SS-08	6/17/2015	Background	4050235.455	657139.219	0.58	0.53 U	0.58
CW-SS-09	6/17/2015	Cove Wash North	4049315.640	658120.219	0.71	0.88 U	0.71
CW-SS-10	6/17/2015	Cottonwood Springs	4049586.881	660202.988	1.08	0.63 U	1.08
CW-SS-11	6/19/2015	Cove Wash North	4046369.715	657266.457	0.51	0.42 U	0.51
CW-SS-12	6/18/2015	Cove Wash Middle 3	4044617.964	658818.118	1.35	0.31 U	1.35
CW-SS-13	6/18/2015	Cove Wash Middle 3	4043160.908	658957.686	35.1	1.05 U	35.1
CW-SS-14	6/18/2015	Cove Wash Middle 3E	4042934	659222	19.8	0.78 U	19.8
CW-SS-15	6/19/2015	Cove Wash North	4046035	656752	0.88	0.83 U	0.88
CW-SS-16	6/19/2015	Cove Wash North	4045602	656065	0.49	0.26 U	0.49
CW-SS-17	6/20/2015	Cove Wash South	4050338.789	662352.178	0.96	0.72 J	1.68 J
CW-SS-18	6/20/2015	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	0.61	0.33 U	0.61
CW-SS-19	6/22/2015	Historical Sample - Cove Mesa 2	4042075.375	657976.189	1.72	0.75 U	1.72
CW-SS-19-12	6/22/2015	Cove Wash Middle 3B Subsurface	4042071.484	657962.307	3.65	0.65 U	3.65
CW-SS-20	6/22/2015	Cove Wash Middle 3C	4041480.197	658288.117	2.7	0.18 U	2.7
CW-SS-21	6/20/2015	Background - Mesa IV Springs	4043108	655931	0.88	0.56 U	0.88
CW-SS-21-12	6/20/2015	Background - Mesa IV Springs Subsurface	4043108	655931	0.92	0.5 U	0.92
CW-SS-26	6/22/2015	Cove Wash Middle 2B	4042501.621	657146.877	1.28 J	0.65 U	1.35 J
CW-SS-27	6/22/2015	Cove Wash Middle 2B	4042693.122	657319.281	5.56	0.92 U	5.56
CW-SS-28	6/22/2015	Duplicate of CW-SS-27	4042693.122	657319.281	5.55	0.82 U	5.55
CW-SS-29	6/22/2015	Cove Wash Middle 2C	4042595.541	658108.120	1.72	0.76 U	1.72
CW-SS-30	6/23/2015	Background	4046867.444	654397.08	0.46 U	0.92 U	0.92 U
CW-SS-31	6/23/2015	Background	4044527.019	655114.311	0.61	0.61 U	0.61
CW-SS-32	6/23/2015	Cove Wash Middle 1E	4043933	655742	1.71	0.66 U	1.71
CW-SS-36	6/23/2015	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	3.89	0.56U	3.89
CW-SS-37	6/23/2015	Historical Sample - W004 - Middle 2	4044377.806	657955.461	3.47	0.79 U	3.47
CW-SS-38	6/23/2015	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	2.17	0.71 U	2.17
CW-SS-39	6/23/2015	Cove Wash Middle 2	4045453.339	658432.518	4.29	0.82 U	4.29
CW-SS-41	6/23/2015	Cove Wash Middle 1	4045552	658464	0.58	0.49 U	0.58
CW-SS-42-14	6/23/2015	Irrigation Ditch Subsurface - Cove Middle	4045665.019	658693.563	2.56	0.76 U	2.56
CW-SS-43-12	6/23/2015	Dam Subsurface - Cove Middle	4045684.910	658673.278	1.69	0.50 U	1.69
CW-SS-44	6/24/2015	Pine Water Springs Drainage	4043806.688	661260.528	1.7	2.42	4.12
CW-SS-45	6/24/2015	Background - Deer Springs Drainage	4042151.211	661078.707	0.86	0.88 U	0.86
CW-SS-46	6/24/2015	Pine Water Springs	4043788.61	661352.387	1.13	0.88 J	2.01 J
CW-SS-46-14	6/24/2015	Pine Water Springs Subsurface	4043788.61	661352.387	0.87	0.9 J	1.77 J
CW-SS-47	6/24/2015	Cove Wash Middle 3F	4043727.086	659295.820	16.2	0.8 U	16.2
CW-SS-48	6/24/2015	Cove Wash Middle 3F	4044751.928	656807.090	3.33	0.93 U	3.33
CW-SS-49	6/18/2015	Duplicate of CW-SS-10	4049586.881	660202.988	0.81	0.71 U	0.81
CW-SS-50	6/25/2015	Cove Wash Middle 1	4044856.247	657463.154	4.65	0.78 U	4.65
CW-SS-51	6/25/2015	Cove Wash Middle 1A	4044944.041	657035.048	10.6	0.86 U	10.6
CW-SS-52	6/25/2015	Cove Wash Middle 1G	4044553.333	657329.590	2.38	0.83 U	2.38
CW-SS-53	6/25/2015	Cove Wash Middle 1	4044478	656787	4.79	0.83 U	4.79
CW-SS-54	6/25/2015	Cove Wash Middle 1B	4044751.928	656807.09	6.34	0.82 U	6.34
CW-SS-55	6/25/2015	Cove Wash Middle 1C	4044480.534	656337.545	2.84	0.76 U	2.84
CW-SS-56	6/25/2015	Cove Wash Middle 3A	4042779	658775	1.72	0.73 U	1.72

Notes:
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
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J = Compound detected, but result value is approximate.
pCi/g = picocurie per gram
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Cove Wash Watershed Assessment
2015 Low Flow Sampling Event
Sediment - Uranium Isotope Results

Sample Location	Sample Date	Sample Type	Northing	Easting	U-233/U-234 (pCi/g)	U-235/U-236 (pCi/g)	U-238 (pCi/g)	Total U Activity (pCi/g)
CW-SS-01	6/16/2015	Cove Wash	4051637.550	663372.902	0.57	0.044	0.61	1.224
CW-SS-02	6/16/2015	Cove Wash	4053607.153	666731.839	0.73	0.087 J	0.75 J	1.6 J
CW-SS-03	6/16/2015	Cove Wash South	4047985.628	659997.097	0.54	0.049	0.66	1.249
CW-SS-04	6/17/2015	Background	4045556.747	655368.538	1.79	0.111	2.09	3.991
CW-SS-05	6/18/2015	Historical Sample - Area 1 - Dam Surface Sample - Cove Wash Middle	4045709.002	658675.587	1.5	0.072	1.38	2.952
CW-SS-06	6/17/2015	Cove Wash	4050970.463	659839.731	0.68	0.071	0.61	1.361
CW-SS-07	6/17/2015	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	1.43	0.129	1.46	3.019
CW-SS-08	6/17/2015	Background	4050235.455	657139.219	0.336	0.034	0.39	0.76
CW-SS-09	6/17/2015	Cove Wash North	4049315.640	658120.219	0.38	0.02 U	0.46	0.84
CW-SS-10	6/17/2015	Cottonwood Springs	4049586.881	660202.988	0.75	0.035	0.66	1.445
CW-SS-49	6/18/2015	Duplicate of CW-SS-10	4049586.881	660202.988	0.89	0.101	0.7	1.691
CW-SS-11	6/19/2015	Cove Wash North	4046369.715	657266.457	0.36	0.035	0.35	0.745
CW-SS-12	6/18/2015	Cove Wash Middle 3	4044617.964	658818.118	1.2	0.058	1.16	2.418
CW-SS-13	6/18/2015	Cove Wash Middle 3	4043160.908	658957.686	15.9	0.99	15.2	32.09
CW-SS-14	6/18/2015	Cove Wash Middle 3E	4042934	659222	24.1	1.33	25.4	50.83
CW-SS-15	6/19/2015	Cove Wash North	4046035	656752	0.71	0.038	0.69	1.438
CW-SS-16	6/19/2015	Cove Wash North	4045602	656065	0.41	0.028	0.49	0.928
CW-SS-17	6/20/2015	Cove Wash South	4050338.789	662352.178	0.62	0.044	0.71	1.374
CW-SS-18	6/20/2015	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	0.32	0.039	0.4	0.759
CW-SS-19	6/22/2015	Historical Sample - Cove Mesa 2	4042075.375	657976.189	1.05	0.105	1.38	2.535
CW-SS-19-12	6/22/2015	Cove Wash Middle 3B Subsurface	4042071.484	657962.307	1.9	0.089	1.88	3.869
CW-SS-20	6/22/2015	Cove Wash Middle 3C	4041480.197	658288.117	1.21	0.057	1.32	2.587
CW-SS-21	6/20/2015	Background - Mesa IV Springs	4043108	655931	0.67	0.038	0.54	1.248
CW-SS-21-12	6/20/2015	Background - Mesa IV Springs Subsurface	4043108	655931	0.46	0.031	0.5	0.991
CW-SS-26	6/22/2015	Cove Wash Middle 2B	4042501.621	657146.877	0.62	0.05 U	0.76	1.38
CW-SS-27	6/22/2015	Cove Wash Middle 2B	4042693.122	657319.281	3.13	0.257	3.11	6.497
CW-SS-28	6/22/2015	Duplicate of CW-SS-27	4042693.122	657319.281	2.81	0.141	2.66	5.611
CW-SS-29	6/22/2015	Cove Wash Middle 2C	4042595.541	658108.120	0.76	0.070 U	0.97	1.73
CW-SS-30	6/23/2015	Background	4046867.444	654397.08	0.32	0.067 U	0.48	0.8
CW-SS-31	6/23/2015	Background	4044527.019	655114.311	0.34	0.039 U	0.37	0.71
CW-SS-32	6/23/2015	Cove Wash Middle 1E	4043933	655742	0.72	0.048 U	0.87	1.59
CW-SS-36	6/23/2015	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	3.88	0.357	3.66	7.897
CW-SS-37	6/23/2015	Historical Sample - W004 - Middle 2	4044377.806	657955.461	3.64	0.173	3.35	7.163
CW-SS-38	6/23/2015	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	1.23	0.131	1.25	2.611
CW-SS-39	6/23/2015	Cove Wash Middle 2	4045453.339	658432.518	2.32	0.136	2.39	4.846
CW-SS-41	6/23/2015	Cove Wash Middle 1	4045552	658464	0.331	0.028 U	0.39	0.721
CW-SS-42-14	6/23/2015	Irrigation Ditch Subsurface - Cove Middle	4045665.019	658693.563	1.35	0.069 U	1.36	2.71
CW-SS-43-12	6/23/2015	Dam Subsurface - Cove Middle	4045684.910	658673.278	0.73	0.078 U	0.55	1.28
CW-SS-44	6/24/2015	Pine Water Springs Drainage	4043806.688	661260.528	0.9	0.059	0.94	1.899
CW-SS-45	6/24/2015	Background - Deer Springs Drainage	4042151.211	661078.707	0.63	0.044 U	0.59	1.22
CW-SS-46	6/24/2015	Pine Water Springs	4043788.61	661352.387	0.69	0.046 U	0.74	1.43
CW-SS-46-14	6/24/2015	Pine Water Springs Subsurface	4043788.61	661352.387	0.6	0.013 J	0.65 J	1.3 J
CW-SS-47	6/24/2015	Cove Wash Middle 3F	4043727.086	659295.820	4.35	0.214	4.7	9.264
CW-SS-48	6/24/2015	Cove Wash Middle 3F	4044751.928	656807.090	1.68	0.061 U	2.03	3.71
CW-SS-50	6/25/2015	Cove Wash Middle 1	4044856.247	657463.154	3.07	0.108	2.74	5.918
CW-SS-51	6/25/2015	Cove Wash Middle 1A	4044944.041	657035.048	5.69	0.38	5.9	11.97
CW-SS-52	6/25/2015	Cove Wash Middle 1G	4044553.333	657329.590	1.15	0.083	0.91	2.143
CW-SS-53	6/25/2015	Cove Wash Middle 1	4044478	656787	1.75	0.122	1.83	3.702
CW-SS-54	6/25/2015	Cove Wash Middle 1B	4044751.928	656807.09	3.41	0.198	3.47	7.078
CW-SS-55	6/25/2015	Cove Wash Middle 1C	4044480.534	656337.545	1.29	0.061	1.28	2.631
CW-SS-56	6/25/2015	Cove Wash Middle 3A	4042779	658775	1.16	0.04	1.23	2.43

Notes:
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J = Compound detected, but result value is approximate.
pCi/g = picocurie per gram
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

EPA Soil Screening Level - Protective of groundwater (Exceedances are bolded, underlined, and highlighted)					NA	0.27	0.29	82	3.2	NA	0.38	NA	180,000	NA	46	NA	14	NA	NA	NA	0.1	NA	NA	NA	NA	0.26	NA	NA	NA	0.14	14	NA	NA
Sample Location	Sample Date	Sample Information	Northing	Easting	Aluminium (mg/kg)	Antimony (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Beryllium (mg/kg)	Boron (mg/kg)	Cadmium (mg/kg)	Calcium (mg/kg)	Chromium (mg/kg)	Cobalt (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Lead (mg/kg)	Lithium (mg/kg)	Magnesium (mg/kg)	Manganese (mg/kg)	Mercury (mg/kg)	Molybdenum (mg/kg)	Nickel (mg/kg)	Phosphorus (mg/kg)	Potassium (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)	Sodium (mg/kg)	Strontium (mg/kg)	Thallium (mg/kg)	Uranium (mg/kg)	Vandium (mg/kg)	Zinc (mg/kg)
CW-SS-01	3/28/2016	Cove Wash	4051637.55	663372.902	5800 J	0.62 U	**2.1**	**220**	0.34 J	6 J	0.099 U	81000 J	5.2	3.6	5.2	6300 J	9.2	10 J	13000 J	590	0.0041 U	0.32 U	7.5	360 J	1500 J	0.57 U	0.21 U	1600 J	460 J	0.42 U	0.89	11	11
CW-SS-02	3/26/2016	Cove Wash	4053607.153	666731.839	4900 J	0.58 U	**2.5**	**660**	0.3 J	4.8 J	0.092 U	64000 J	7.2	3.2	7.1	4400 J	5.4	6.6 J	11000 J	410	0.0039 U	0.3 U	11	400 J	1400 J	0.53 U	0.19 U	2600 J	350 J	0.39 U	0.94	14	10
CW-SS-03	3/30/2016	Cove Wash South	4047985.628	659997.097	5500 J	0.55 U	**1.6**	**240**	0.35 J	4.4 J	0.089 U	120000 J	8.1	2.8	3.2	5500 J	6.3	10 J	8300 J	520	0.0039 U	0.29 U	9.6	340 J	1500 J	0.51 U	0.19 U	1400 J	420 J	0.38 U	0.82	14	9.5
CW-SS-04	4/27/2016	Background	4045556.747	655368.538	2300	0.59 U	**1.1 J**	63	0.19 J	1 U	0.095 U	10000	1.3	1.3	2.9	4700	3.5	2.5	1100	200	0.0042 U	0.31 U	1.4 J	210	660	0.55 U	0.2 U	32 J	81	0.4 U	0.4	7.9	8.9
CW-SS-05	3/25/2016	Historical Sample - Area 1 - Dam Surface Sample - Cove Wash Middle	4045700.298	658683.857	2000 J	0.62 U	**1.1 J**	**87**	0.11 J	1.5 J	0.098 U	22000 J	2.6	1.2 J	2.1	2700 J	3.4	4.2 J	3300 J	190	0.0043 U	0.32 U	2.4	150 J	450 J	0.57 U	0.21 U	86 J	69 J	0.42 U	11	130	7.1
CW-SS-06	3/28/2016	Cove Wash	4050970.463	659839.731	8100 J	0.5 U	**1.8**	**180**	0.29 J	6.6 J	0.08 U	72000 J	4.3	4.5	4.6	7300 J	8.3	9.8 J	9700 J	490	0.0032 U	0.26 U	6.6	370 J	1900 J	0.46 U	0.17 U	2700 J	370 J	0.34 U	0.56	14	10
CW-SS-07	3/25/2016	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	1500 J	0.62 U	**1.1 J**	70	0.07 J	1 UJ	0.099 U	12000 J	2.1	0.78 J	1.2	2000 J	2.4	2.8 J	1700 J	130	0.0041 U	0.32 U	1.7 J	110 J	300 J	0.57 U	0.21 U	99 J	41 J	0.42 U	2.9	21	5.6
CW-SS-08	3/28/2016	Background	4050235.455	657139.219	4100 J	0.5 U	**0.95 J**	**120**	0.17 J	3.8 J	0.079 U	38000 J	3.1	1.9	2.7	4300 J	4.3	5.2 J	7500 J	210	0.0034 U	0.26 U	3.7	230 J	1000 J	0.46 U	0.17 U	1200 J	160 J	0.34 U	0.26	6.9	8.1
CW-SS-09	3/30/2016	Cove Wash North	4049315.64	658120.219	8000 J	**0.71 J**	**1.7**	**390**	0.37 J	8.2 J	0.13 J	130000 J	5	3.7	4	7300 J	7.9	9.7 J	19000 J	830	0.058	0.35 U	6.7	370 J	2400 J	0.62 U	0.23 U	2800 J	650 J	0.46 U	0.6	15	11
CW-SS-10	3/30/2016	Cottonwood Spring	4049586.881	660202.988	4600 J	0.73 U	**2.3**	**160**	0.24 J	8.7 J	0.12 U	38000 J	4.5	2	4.2	5900 J	4.2	9.5 J	9300 J	210	0.0051 U	0.38 U	4.3	460 J	1900 J	**0.88**	0.25 U	720 J	390 J	0.5 U	0.75	12	19
CW-SS-11	3/30/2016	Cove Wash North	4046369.715	657266.457	3700 J	0.63 U	**1.3**	81	0.17 J	1.7 J	0.1 U	10000 J	2.8	1.3	1.8	4100 J	3.2	6 J	3400 J	160	0.0041 U	0.32 U	2.3 J	180 J	540 J	0.58 U	0.21 U	77 J	57 J	0.42 U	1	18	8.5
CW-SS-12	3/30/2016	Cove Wash Middle 3	4044603.441	658812.815	2400 J	0.6 U	**1.1 J**	**88**	0.14 J	2.2 J	0.095 U	51000 J	3.1	1.5	2	3100 J	3.2	6 J	7000 J	340	0.0041 U	0.31 U	3.6	200 J	710 J	0.55 U	0.2 U	190 J	180 J	0.4 U	5.4	28	8.4
CW-SS-13	5/2/2016	Cove Wash Middle 3	4043160.908	658957.686	2800	0.69 U	**1.3**	81	0.24 J	1.5 J	0.11 U	11000	2.2	1.5	2.3	4000	3.2	4.9	1800	210	0.0044 U	0.36 U	2.2 J	200	660	0.63 U	0.23 U	83 J	39	0.47 U	7	25	9.5
CW-SS-14	5/2/2016	Cove Wash Middle 3E	4042934	659222	3300	0.68 U	**1.1 J**	**96**	0.28 J	1.5 J	0.11 U	13000	2.5	1.7	2.6	5000	4.1	5.4	1900	220	0.0048 U	0.35 U	2.4 J	260	790	0.63 U	0.23 U	45 J	44	0.46 U	2.9	15	12
CW-SS-15	4/29/2016	Cove Wash North	4046035	656752	3500	0.52 U	**3**	54	0.11 J	1 J	0.084 U	16000	3.2	1.6	2.4	4200	3.5	8.4	3600	180	0.0036 U	0.27 U	2.3	160	650	0.48 U	0.18 U	34 J	44	0.36 U	1.6	150	9.7
CW-SS-16	4/29/2016	Cove Wash North	4045602	656065	3200	0.52 U	**2.4**	53	0.19 J	0.87 U	0.083 U	8200	2.7	1.6	3	4300	3.5	5.2	2200	150	0.0036 U	0.27 U	2.1	160	690	0.48 U	0.17 U	25 J	40	0.35 U	1.2	17	10
CW-SS-17	3/30/2016	Cove Wash South	4050338.789	662352.178	5700 J	**0.66 J**	**1.8**	**280**	0.44 J	4.2 J	0.11 J	60000 J	5.5	2.9	3.5	6700 J	7.5	8 J	6300 J	720	0.0043 U	0.33 U	7.1	320 J	1200 J	0.59 U	0.22 U	1200 J	240 J	0.43 U	0.94	11	9.6
CW-SS-18	3/30/2016	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	1700 J	0.66 U	**0.52 J**	44	0.093 J	1 J	0.11 U	17000 J	2.3	1.1 J	1.5	2200 J	3	3.1 J	3100 J	220	0.0043 U	0.34 U	2.4 J	100 J	290 J	0.61 U	0.22 U	44 J	33 J	0.45 U	0.27	9.1	5.5
CW-SS-19	4/28/2016	Cove Mesa 2 (Historical)	4042075.375	657976.189	7700	0.65 U	**5.3**	**100**	0.35 J	2.6 J	0.1 U	21000	5.2	3.8	10	9700	7.7	15	6800	270	0.0046 U	1.3 U	5.9	320	1600	**3.2**	0.22 U	74 J	200	0.44 U	8.6	48	25
CW-SS-19-12	4/27/2016	Cove Mesa 2 (Historical) - Subsurface	4042075.375	657976.189	6900	**0.62 J**	**8.6**	65	0.37 J	3.3 J	0.089 U	33000	3.5	4.4	12	9500	7.6	14	5300	200	0.0039 U	1.5	5.4	400	1800	**7**	0.19 U	86 J	180	0.38 U	6	25	26
CW-SS-20	4/28/2016	Cove Wash Middle 3C	4041480.197	658288.117	4100	0.63 U	**4.5**	58	0.22 J	1.3 J	0.1 U	13000	2.3	2.3	5.7	5400	5.3	6.6	3100	170	0.0046 U	0.33 U	2.8	220	960	0.58 U	0.21 U	51 J	78	0.43 U	5.6	17	14
CW-SS-21	4/29/2016	Background - Mesa IV Springs	4043108	655931	4200	0.8 U	**1.1**	**94**	0.15 J	2.9 J	0.13 U	2200	2.5	1.3	3.5	5700	4	5.4	1700	78	0.0064 U	0.42	2.4	120	1000	**0.74**	0.27 U	39 J	15	0.54 U	0.88	10	31
CW-SS-21-12	4/30/2016	Background - Mesa IV Springs Subsurface	4043108	655931	2600	0.57 U	**1.2 J**	**83**	0.28 J	3 J	0.092 U	6300	3.6	2.2 J	2.7	4000	4.5	3.6	1200	290	0.0045 J	0.3 U	4 J	320	740	0.53 U	0.19 U	48 J	25	0.39 U	0.56	11	12
CW-SS-26	4/28/2016	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	4100	0.66 U	**4.3**	64	0.18 J	1.5 J	0.11 U	13000	3.2	2.1	5.7	6800	5.6	7.7	2900	180	0.0044 U	2.8	3.5	260	910	**5.6**	0.22 U	180	84	0.45 U	4.7	77	15
CW-SS-27	4/29/2016	Cove Wash Middle 2B	4042693.122	657319.281	3200	0.56 U	**1.6**	76	0.18 J	0.98 J	0.089 U	20000 J	2.6	1.7	3.9	5800	3.9	6.1	2300	200	0.0037 U	0.35 J	2.7	190	780	0.51 U	0.19 U	37 J	60	0.38 U	**18**	54 J	12
CW-SS-29	4/29/2016	Cove Wash Middle 2C	4042595.541	658108.12	5600	**0.68 J**	**1.6**	53	0.33 J	2.1 J	0.099 J	40000	4.7	3.7	11	8100	5.7	12	4700	280	0.0056 J	0.27 U	6.1	360	1400	0.49 U	0.18 U	70 J	120	0.36 U	3.4	28	22
CW-SS-30	4/27/2016	Background	4046867.444	654397.08	3400	0.78 U	**1.2 J**	79	0.24 J	1.9 J	0.12 U	3000	3.1	1.9	3.2	4600	4.7	4.3	1500	190	0.0088 J	0.4 U	3	170	900	0.72 U	0.26 U	33 J	18	0.53 U	0.7	9.2	10
CW-SS-31	4/27/2016	Background	4044527.019	655114.311	3600	0.62 U	**1.4**	64	0.22 J	1.1 J	0.1 U	1400	3.9	2.3	2.8	5500	4.2	4.1	1400	250	0.0061 J	0.32 U	3.7	100	730	0.58 U	0.21 U	28 J	10	0.42 U	0.54	10	10
CW-SS-32	4/29/2016	Cove Wash Middle 1E	4043933	655742	4500	0.64 U	**1.3**	**89**	0.25 J	1.6 J	0.1 U	3500	3.5	2.6	5.4	6400	5.2	5.6	2200	250	0.011 J	0.33 U	3.6	230	1100	0.59 U	0.22 U	31 J	28	0.44 U	2.1	16	17
CW-SS-36	3/26/2016	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	1100 J	0.6 U	**0.53 J**	**92**	0.029 U	0.97 UJ	0.096 U	29000 J	1.6	0.57 J	0.72 J	1900 J	2.1	2.4 J	950 J	300	0.0042 U	0.31 U	1 J	90 J	230 J	0.55 U	0.2 U	47 J	47 J	0.41 U	2.9	16	4.5
CW-SS-37	3/26/2016	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	1900 J	0.62 U	**0.57 J**	72	0.057 J	1.1 UJ	0.099 U	9000 J	2.1	0.81 J	1.3	2400 J	2.2	3.4 J	1500 J	130	0.0042 U	0.32 U	1.4 J	100 J	450 J	0.57 U	0.21 U	65 J	29 J	0.42 U	2.9	20	5.8
CW-SS-38	3/26/2016	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	2000 J	0.61 U	**1 J**	69	0.06 J	1 UJ	0.097 U	11000 J	2.1	0.92 J	1.8	2500 J	2.6	3.6 J	1500 J	130	0.0041 U	0.55 J	1.5 J	110 J	480 J	0.56 U	0.2 U	76 J	28 J	0.41 U	4.3	34	6.4
CW-SS-39	3/25/2016	Cove Wash Middle 2	4045453.339	658432.518	2000 J	0.57 U	**1.1**	65	0.073 J	0.94 J	0.092 U	13000 J	2.2	1.1 J	1.4	2500 J	2.4	3.7 J	1600 J	150	0.0043 U	0.3 U	1.6 J	100 J	460 J	0.53 U	0.19 U	79 J	32 J	0.39 U	2.2	20 J	5.6
CW-SS-41	3/25/2016	Cove Wash Middle 1	4045552	658464	1900 J	0.59 U	**1.6**	68	0.06 J	0.96 UJ	0.094 U	12000 J	2.3	1.1 J	1.5	2400 J	2.4	3.7 J	1600 J	170	0.0042 U	0.31 U	1.8 J	97 J	430 J	**13**	0.2 U	57 J	27 J	0.4 U	2.6	100	5.9
CW-SS-42-10	3/28/2016	Irrigation Ditch Subsurface - Cove Middle	4045665.019	658693.563	2400 J	0.56 U	**1.5**	**140**	0.16 J	1.5 J	0.09 U	39000 J	2.4	1.1	1.2	3400 J	2.5	5.6 J	2600 J	410	0.0041 U	0.29 U	2.3	140 J	590 J	0.52 U	0.19 U	64 J	190 J	0.38 U	2.6	9.7	6.2
CW-SS-44	5/3/2016	Pine Water Springs Drainage	4043806.688	661260.528	4800	0.71 U	**1.4**	**100**	0.43 J	2.7 J	0.11 U	2200	13	3.5	4.8	7600	6.1	5.6	2100	280	0.0064 J	0.37 U	12	260	1400	0.66 U	0.24 U	45 J	18	0.48 U	0.59	15	16
CW-SS-45	5/3/2016	Background - Deer Springs Drainage	4042151.211	661078.707	1700	0.56 U	**0.74 J**	28	0.14 J	1.2 J	0.09 U	630	1.9	1 J	1.4	2400	2.3	2.4	680	130	0.0037 U	0.29 U	1.8 J	59	470	0.52 U	0.19 U	19 J	4.6	0.38 U	0.23	4.6	5.6
CW-SS-46	5/3/2016	Pine Water Springs	4043788.61	661352.387	3600	0.58 U	**1.4 J**	**95**	0.54 J	1.9 J	0.093 U	1900	19	2.7 J	6.8	6000	4.4	4.8	2200	90	0.0041 U	0.3 U	22 J	380	1100	0.54 U	0.2 U	56 J	26	0.4 U	0.99	15	45
CW-SS-46-12	5/3/2016	Pine Water Springs - Subsurface	4043788.61	661352.387	3200	0.58 U	**1.1**	78	0.44 J	1.7 J	0.093 U	3000	15	3	7.2	6100	5	5.2	2700	200	0.0051 U	0.3 U	18	740	1100	0.53 U	0.2 U	76 J	49	0.39 U	1.2	13	36
CW-SS-47	5/3/2016	Cove Wash Middle 3F	4043727.086	659295.82	1800	0.65 U	**0.79 J**	33	0.15 J	1.1 U	0.1 U	2800	2.1	0.95 J	1.9	2600	2.5	2.9	1100	100	0.0044 U	0.34 U	2.1 J	110	440	0.6 U	0.22 U	31 J	18	0.44 U	1.7	45	5.6
CW-SS-48	3/26/2016	Cove Wash Middle 3F	4044751.928	656807.09	3500 J	0.58 U	**1.2**	**150**	0.17 J	3.4 J	0.093 U	53000 J	4.1	2.2	2.3	4200 J	5.1	8 J	7500 J	240	0.0037 U	0.3 U	5	260 J	1000 J	0.53 U	0.2 U	340 J	180 J	0.39 U	0.35	6.8	11
CW-SS-49	3/26/2016	Duplicate of CW-18	4049586.881	660202.988	1800 J	0.65 U	**0.49 U**	56 J	0.1 J	1 UJ	0.1 U	17000 J	2.6	1.1 J	1.5	2100 J	3.1	3.2 J	2800 J	200	0.0043 U	0.34 U	2.5 J	99 J	400 J	0.6 U	0.22 U	47 J	33 J	0.44 U	0.27 J	9.6	5.6
CW-SS-50	3/29/2016	Cove Wash Middle 1	4044856.247	657463.154	3300 J	0.61 U	**2.8 J**	74 J	0.16 J	1.6 J	0.097 U	47000 J	2.2	1.4 J	3.3	4600 J	4.5	9.3 J	3700 J	250	0.004 U	0.46 J	2 J	170 J	640 J	0.56 U	0.21 U	66 J	130 J	0.41 U	**65 J**	220 J	7.7 J
CW-SS-51	3/29/2016	Cove Wash Middle 1A	4044944.041	657035.048	3400 J	0.52 U	**3.8**	72	0.17 J	1.3 J	0.082 U	15000 J	2.9	1.8	3.2	4700 J	3.8	6.6 J	2700 J	180	0.0037 U	1.1	2.5	160 J	710 J	0.47 U	0.17 U	39 J	49 J	0.35 U	8	58 J	9.9
CW-SS-52	3/29/2016	Cove Wash Middle 1G	4044553.333	657329.59	3600 J	0.54 U	**3.7**	48	0.14 J	1.3 J	0.087 U	27000 J	3.2	1.4	2	4200 J	3.2	8.3 J	3200 J	240	0.0036 U	0.89 J	2.4	190 J	720 J	0.5 U	0.18 U	35 J	37 J	0.37 U	2.7	25	8.5
CW-SS-53a	5/2/2016	Cove Wash Middle 1	4044478	656787	2500	0.56 U	**1.2**	**130**	0.2 J	1 J	0.089 U	34000	2.1	1.1	1.9	3500	4.5	6.2	2000	270	0.0039 U	0.29 U	1.7 J	140	600	**1.3**	0.19 U	38 J	38	0.38 U	**16**	170	8.1
CW-SS-54	5/2/2016	Cove Wash Middle 1B	4044751.928	656807.09	3900	0.62 U	**1.3**	75	0.24 J	1.8 J	0.1 U	8000	3.6	1.8	3.1	4700	4.1	7.2	3000	170	0.0042 U	0.32 U	3	190	770	**0.73**	0.21 U	66 J	41	0.42 U	5.2	40	11
CW-SS-55	3/25/2016	Cove Wash Middle 2	4044480.534	656337.545	1800 J	0.59 U	**1.2**	69	0.07 J	1.1 UJ	0.095 U	14000 J	2.1	0.8 J	1.5	2400 J	2.4	3.6 J	1500 J	170	0.0041 U	0.31 U	1.5 J	110 J	490 J	**1.2**	0.2 U	97 J	25 J	0.4 U	6.8	87 J	6.5
CW-SS-55a	5/3/2016	Cove Wash Middle 2	4044480.534	656337.545	3100	0.56 U	**1.4**	**110**	0.22 J	0.98 J	0.089 U	6400	1.8	1.7	4	4500	3.7	3.7	1600	160	0.0039 U	0.29 U	2.2	130	760	0.51 U	0.19 U	34 J	22	0.38 U	1.7	23	9.8
CW-SS-56a	5/2/2016	Cove Wash Middle 3A	4043135	658979	2500	0.62 U	**1.8**	58	0.17 J	1.4 J	0.099 U	12000	2.1	1.2 J	2.7	3500	2.9	4.4	1800	160	0.0042 U	0.32 U	1.9 J	150	660	0.57 U	0.21 U	81 J	45	0.42 U	2	11	8.6
CW-SS-57	3/26/2016	Duplicate of CW-02	4053607.153	666731.839	5200 J	0.6 U	**2.2**	**420**	0.42 J	5.1 J	0.11 J	75000 J	9.1	3.9	5.8	5300 J	6.9	8 J	15000 J	540	0.0042 U	0.31 U	18	430 J	1600 J	0.55 U	0.2 U	2600 J	420 J	0.4 U	1.3	14	13
CW-SS-58	3/29/2016	Duplicate of CW-50	4044856.247	657463.154	3000 J	**0.92 J**	**5.3 J**	**110 J**	0.14 J	1.1 J	0.094 U	37000 J	2.7	2.6 J	3.9	5300 J	4.7	7 J	2500 J	310	0.0042 U	0.39 J	2.8	170 J	700 J	**0.63**	0.2 U	64 J	63 J	0.4 U	**36 J**	330 J	13 J
CW-SS-59	3/30/2016	Background - Cove Wash Tributary 1	4051574	664210	5800 J	0.57 U	**2.1**	**350**	0.52 J	5.4 J	0.092 U	65000 J	11	3.9	5.6	6300 J	7	8.2 J	8800 J	420	0.0041 U	0.3 U	16	560 J	1900 J	0.53 U	0.19 U	2100 J	310 J	0.39 U	1.5	15	13
CW-SS-60	3/30/2016	Cove Wash between 01 and 02	4051659	664274	6500 J	0.64 U	**2.1**	**270**	0.35 J	7.5 J	0.1 U	92000 J	5.3	3.6	3.7	6700 J	8	11 J	11000 J	660	0.0044 U	0.33 U	7.3	430 J	1900 J	0.59 U	0.22 U	2700 J	400 J	0.43 U	0.73	14	10
CW-SS-61	3/30/2016	Cove Wash Tributary 2 (Downstream)	4051575	663979	7300 J	0.63 U	**1.8**	**330**	0.42 J	11 J	0.1 U	39000 J	6.4	3.8	3.5	8000 J	7.1	11 J	6400 J	460	0.0044 U	0.33 U	8.9	460 J	1900 J	0.58 U	0.21 U	4500 J	230 J	0.43 U	1.3	19	10
CW-SS-62	5/3/2016	Downstream of Dam	4046378	658785	4100	0.61 U	**1.3**	78	0.23 J	3.4 J	0.098 U	20000	3.9	2	3.1	4900	4.3	6.6	3600	190	0.0043 U	0.32 U	4.3	270	1100	0.57 U	0.21 U	140	60	0.42 U	0.62	12	11
CW-SS-63	5/3/2016	Duplicate of CW-27	4042693.122	657319.281	4800	0.7 U	**4.6**	57	0.22 J	1.2 U	0.11 U	23000 J	4	3.1	6.8	7600	5.9	9.5	3400	280	0.0045 U	1.1 J	4	330	1100	**0.87**	0.24 U	54 J	76	0.47 U	**20**	79 J	19
CW-SS-64	4/29/2016	Cove Wash North between CW-15 and CW-16	4045877	656444	4100	0.7 U	**1 J**	**98**	0.29 J	1.2 U	0.11 U	8200	2.9	2.2	4	5600	4.5	6.2	2800	160	0.0047 U	0.36 U	2.7 J	180	840	**1**	0.24 U	90 J	90	0.47 U	4.2	17	12
CW-SS-65	4/30/2016	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	2400	0.61 U	**1.7**	51	0.14 J	1 U	0.098 U	11000	1.9	1.2	2.4	3500	2.9	4.4	1800	140	0.0041 U	0.32 U	2 J	160	610	0.56 U	0.21 U	150	45	0.42 U	2.5	11	8.9
CW-SS-66	4/30/2016	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	1400	0.59 U	**1.4**	50	0.081 J	1 U	0.095 U	6600	1.3	0.81 J	1.4	2700	2.1	2.7	1100	110	0.0039 U	0.31 U	1.3 J	89	390	0.55 U	0.2 U	81 J	32	0.4 U	0.97	7.4	5.9
CW-SS-67	5/2/2016	Cove Wash Middle 3	4044603.441	658812.815	2100	0.62 U	**1.2**	**110**	0.15 J	1.2 J	0.1 U	12000	2.1	1 J	1.6	2900	2.5	3.9	2100	150	0.0041 U	0.32 U	2.2 J	160	520	0.57 U	0.21 U	45 J	39	0.42 U	2.2	21	6.3
CW-SS-68	5/2/2016	Duplicate of CW-67	4044603.441	658812.815	2400	0.62 U	**0.89 J**	**84**	0.15 J	1.5 J	0.1 U	16000	2.3	1.1 J	1.7	3200	3	4.6	2600	160	0.0042 U	0.32 U	2.5	150	610	0.57 U	0.21 U	54 J	47	0.42 U	2.5	15	6.7

Notes:
EPA = Environmental Protection Agency
NA = Not Applicable
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
mg/kg = milligram per kilogram
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Cove Wash Watershed Assessment
2016 Spring Snow Melt Sampling Event
Sediment - Radium Results

Sample Location	Sample Date	Sample Information	Northing	Easting	Radium 226 (pCi/g)	Radium 228 (pCi/g)	Combined Radium 226/228 (pCi/g)
CW-SS-01	3/28/2016	Cove Wash	4051637.55	663372.902	0.92 J	0.43 U	0.92 J
CW-SS-02	3/26/2016	Cove Wash	4053607.153	666731.839	1.25	0.92 J	2.17 J
CW-SS-03	3/30/2016	Cove Wash South	4047985.628	659997.097	0.68 J	0.83 J	1.51 J
CW-SS-04	4/27/2016	Background	4045556.747	655368.538	0.61 UJ	0.68 UJ	0.68 UJ
CW-SS-05	3/25/2016	Historical Sample - Area 1 - Dam Surface Sample - Cove Wash Middle	4045700.298	658683.857	1.99	0.23 U	1.99
CW-SS-06	3/28/2016	Cove Wash	4050970.463	659839.731	0.76 J	0.78 J	1.54 J
CW-SS-07	3/25/2016	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	1.67	0.09 U	1.67
CW-SS-08	3/28/2016	Background	4050235.455	657139.219	0.38 U	0.5 U	0.5 U
CW-SS-09	3/30/2016	Cove Wash North	4049315.64	658120.219	0.55 J	1.03 J	1.58 J
CW-SS-10	3/30/2016	Cottonwood Spring	4049586.881	660202.988	0.93 J	0.37 UJ	0.93 J
CW-SS-11	3/30/2016	Cove Wash North	4046369.715	657266.457	0.78 J	0.58 UJ	0.78 J
CW-SS-12	3/30/2016	Cove Wash Middle 3	4044603.441	658812.815	3.06	0.39 U	3.06
CW-SS-13	5/2/2016	Cove Wash Middle 3	4043160.908	658957.686	2.91	0.33 U	2.91
CW-SS-14	5/2/2016	Cove Wash Middle 3E	4042934	659222	1.25 J	0.91 J	2.16 J
CW-SS-15	4/29/2016	Cove Wash North	4046035	656752	1.67	0.34 U	1.67
CW-SS-16	4/29/2016	Cove Wash North	4045602	656065	1.59 J	0.36 UJ	1.59 J
CW-SS-17	3/30/2016	Cove Wash South	4050338.789	662352.178	0.81 J	0.72 J	1.53 J
CW-SS-18	3/30/2016	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	0.56 J	0.03 U	0.56 J
CW-SS-19	4/28/2016	Cove Mesa 2 (Historical)	4042075.375	657976.189	8.3 J	0.56 UJ	8.3 J
CW-SS-19-12	4/27/2016	Cove Mesa 2 (Historical) - Subsurface	4042075.375	657976.189	5.52 J	1.1 J	6.62 J
CW-SS-20	4/28/2016	Cove Wash Middle 3C	4041480.197	658288.117	2	0.18 U	2
CW-SS-21	4/29/2016	Background - Mesa IV Springs	4043108	655931	0.79 J	0.39 UJ	0.79 J
CW-SS-21-12	4/30/2016	Background - Mesa IV Springs - Subsurface	4043108	655931	1 J	1.14 J	2.14 J
CW-SS-26	4/28/2016	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	4.36	0.54 U	4.36
CW-SS-27	4/29/2016	Cove Wash Middle 2B	4042693.122	657319.281	6.07 J	1.16 J	7.23 J
CW-SS-29	4/29/2016	Cove Wash Middle 2C	4042595.541	658108.12	1.94	0.29 U	1.94
CW-SS-30	4/27/2016	Background	4046867.444	654397.08	0.93 J	0.36 UJ	0.93 J
CW-SS-31	4/27/2016	Background	4044527.019	655114.311	0.83 J	0.57 UJ	0.83 J
CW-SS-32	4/29/2016	Cove Wash Middle 1E	4043933	655742	2.81 J	0.46 UJ	2.81 J
CW-SS-36	3/26/2016	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	1.53	0.45 U	1.53
CW-SS-37	3/26/2016	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	2.42	0.57 J	2.99 J
CW-SS-38	3/26/2016	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	2.97	0.45 U	2.97
CW-SS-39	3/25/2016	Cove Wash Middle 2	4045453.339	658432.518	2.52	0.03 U	2.52
CW-SS-41	3/25/2016	Cove Wash Middle 1	4045552	658464	2.77	0.43 U	2.77
CW-SS-42-10	3/28/2016	Irrigation Ditch Subsurface - Cove Middle	4045665.019	658693.563	1.69 J	1.01 J	2.7 J
CW-SS-44	5/3/2016	Pine Water Springs Drainage	4043806.688	661260.528	0.85 J	0.76 UJ	0.85 J
CW-SS-45	5/3/2016	Background - Deer Springs Drainage	4042151.211	661078.707	0.69 J	0.84 J	1.53 J
CW-SS-46	5/3/2016	Pine Water Springs	4043788.61	661352.387	1.05 J	1.25 J	2.3 J
CW-SS-46-12	5/3/2016	Pine Water Springs - subsurface	4043788.61	661352.387	1.04 J	0.95 J	1.99 J
CW-SS-47	5/3/2016	Cove Wash Middle 3F	4043727.086	659295.82	3.18	0.68 U	3.18
CW-SS-48	3/26/2016	Cove Wash Middle 3F	4044751.928	656807.09	0.74 J	0.43 U	0.74 J
CW-SS-49	3/26/2016	Duplicate of CW-18	4049586.881	660202.988	0.53 J	0.24 U	0.53 J
CW-SS-50	3/29/2016	Cove Wash Middle 1	4044856.247	657463.154	14.1 J	0.51 U	14.1 J
CW-SS-51	3/29/2016	Cove Wash Middle 1A	4044944.041	657035.048	9.6	0.85 U	9.6
CW-SS-52	3/29/2016	Cove Wash Middle 1G	4044553.333	657329.59	5.5	0.09 U	5.5
CW-SS-53a	5/2/2016	Cove Wash Middle 1	4044478	656787	22.1	0.61 U	22.1
CW-SS-54	5/2/2016	Cove Wash Middle 1B	4044751.928	656807.09	7.41 J	0.65 UJ	7.41 J
CW-SS-55	3/25/2016	Cove Wash Middle 2	4044480.534	656337.545	3.91	0.4 U	3.91
CW-SS-55a	5/3/2016	Cove Wash Middle 2	4044480.534	656337.545	2.46	0.59 U	2.46
CW-SS-56a	5/2/2016	Cove Wash Middle 3A	4043135	658979	1.67	0.22 U	1.67
CW-SS-57	3/26/2016	Duplicate of CW-02	4053607.153	666731.839	0.79 J	0.83	1.62 J
CW-SS-58	3/29/2016	Duplicate of CW-50	4044856.247	657463.154	1.66 J	0.039 U	1.66 J
CW-SS-59	3/30/2016	Background - Cove Wash Tributary 1	4051574	664210	1.17	1.04	2.21
CW-SS-60	3/30/2016	Cove Wash between 01 and 02	4051659	664274	1.08	0.9 J	1.98 J
CW-SS-61	3/30/2016	Cove Wash Tributary 2 (Downstream)	4051575	663979	1.26 J	0.87 J	2.13 J
CW-SS-62	5/3/2016	Downstream of Dam	4046378	658785	0.85 J	0.98 J	1.83 J
CW-SS-63	5/3/2016	Duplicate of CW-27	4042693.122	657319.281	10.1 J	0.14 U	10.1 J
CW-SS-64	4/29/2016	Cove Wash North between CW-15 and CW-16	4045877	656444	0.45 J	0.03 U	0.45 J
CW-SS-65	4/30/2016	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	1.77 J	0.4 UJ	1.77 J
CW-SS-66	4/30/2016	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	1.02	0.57 U	1.02
CW-SS-67	5/2/2016	Cove Wash Middle 3	4044603.441	658812.815	1.27 J	0.33 UJ	1.27 J
CW-SS-68	5/2/2016	Duplicate of CW-67	4044603.441	658812.815	2	0.01 U	2

Notes:
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J = Compound detected, but result value is approximate.
pCi/g = picocurie per gram
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Cove Wash Watershed Assessment
2016 Spring Snow Melt Sampling Event
Sediment - Uranium Isotope Results

Sample Location	Sample Date	Sample Information	Northing	Easting	U-233/U-234 (pCi/g)	U-235/U-236 (pCi/g)	U-238 (pCi/g)	Total U Isotope Activity (pCi/g)
CW-SS-01	3/28/2016	Cove Wash	4051637.55	663372.902	0.53	0.022 U	0.63	1.16
CW-SS-02	3/26/2016	Cove Wash	4053607.153	666731.839	0.49	0.005 U	0.57	1.06
CW-SS-03	3/30/2016	Cove Wash South	4047985.628	659997.097	0.53	0.015 J	0.64	1.18 J
CW-SS-04	4/27/2016	Background	4045556.747	655368.538	0.42	0.027 J	0.37	0.81 J
CW-SS-05	3/25/2016	Historical Sample - Area 1 - Dam Surface Sample - Cove Wash Middle	4045700.298	658683.857	2.3	0.136	1.9	4.336
CW-SS-06	3/28/2016	Cove Wash	4050970.463	659839.731	0.49	0.009 U	0.58	1.07
CW-SS-07	3/25/2016	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	1.27	0.061 J	1.33	2.6
CW-SS-08	3/28/2016	Background	4050235.455	657139.219	0.28	0.029 J	0.35	0.66 J
CW-SS-09	3/30/2016	Cove Wash North	4049315.64	658120.219	0.48	0.007 U	0.48	0.96
CW-SS-10	3/30/2016	Cottonwood Spring	4049586.881	660202.988	0.63	0.022 U	0.42	1.05
CW-SS-11	3/30/2016	Cove Wash North	4046369.715	657266.457	0.68	0.023 J	0.67	1.37 J
CW-SS-12	3/30/2016	Cove Wash Middle 3	4044603.441	658812.815	2.93	0.132	3.1	6.162
CW-SS-13	5/2/2016	Cove Wash Middle 3	4043160.908	658957.686	2.22	0.117	2.25	4.587
CW-SS-14	5/2/2016	Cove Wash Middle 3E	4042934	659222	1.08	0.039 J	1.09	2.21 J
CW-SS-15	4/29/2016	Cove Wash North	4046035	656752	1.49	0.061 J	1.64	3.19 J
CW-SS-16	4/29/2016	Cove Wash North	4045602	656065	1.11	0.058 J	1.12	2.29 J
CW-SS-17	3/30/2016	Cove Wash South	4050338.789	662352.178	0.7	0.031 J	0.55	1.28 J
CW-SS-18	3/30/2016	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	0.36	0.023 U	0.336	0.696
CW-SS-19	4/28/2016	Cove Mesa 2 (Historical)	4042075.375	657976.189	3.97	0.2	3.79	7.96
CW-SS-19-12	4/27/2016	Cove Mesa 2 (Historical) - Subsurface	4042075.375	657976.189	2.32	0.112	2.75	5.182
CW-SS-20	4/28/2016	Cove Wash Middle 3C	4041480.197	658288.117	1.37	0.035 J	1.39	2.79 J
CW-SS-21	4/29/2016	Background - Mesa IV Springs	4043108	655931	0.66	0.026 J	0.49	1.21 J
CW-SS-21-12	4/30/2016	Background - Mesa IV Springs - Subsurface	4043108	655931	0.5	0.024 U	0.45	0.95
CW-SS-26	4/28/2016	Historical Sample-W0006-Cove Wash Middle 2B	4042501.621	657146.877	1.45	0.056 J	1.54	3.05 J
CW-SS-27	4/29/2016	Cove Wash Middle 2B	4042693.122	657319.281	4.19	0.206	4.08	8.476
CW-SS-29	4/29/2016	Cove Wash Middle 2C	4042595.541	658108.12	1.17	0.041 J	1.1	2.33 J
CW-SS-30	4/27/2016	Background	4046867.444	654397.08	0.56	0.009 U	0.56	1.12
CW-SS-31	4/27/2016	Background	4044527.019	655114.311	0.62	0.032 J	0.53	1.18 J
CW-SS-32	4/29/2016	Cove Wash Middle 1E	4043933	655742	1.2	0.051 J	1.15	2.4 J
CW-SS-36	3/26/2016	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	0.71	0.062 J	0.64	1.41 J
CW-SS-37	3/26/2016	Historical Sample - W004 - Cove Wash Middle 2	4044377.806	657955.461	1.43	0.108	1.54	3.078
CW-SS-38	3/26/2016	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	1.32	0.052 J	1.57	2.94 J
CW-SS-39	3/25/2016	Cove Wash Middle 2	4045453.339	658432.518	1.04	0.05 J	0.94	2.03 J
CW-SS-41	3/25/2016	Cove Wash Middle 1	4045552	658464	1.56	0.053 J	1.49	3.1 J
CW-SS-42-10	3/28/2016	Irrigation Ditch Subsurface - Cove Middle	4045665.019	658693.563	1	0.046 J	0.81	1.85 J
CW-SS-44	5/3/2016	Pine Water Springs Drainage	4043806.688	661260.528	0.46	0.021 U	0.45	0.91
CW-SS-45	5/3/2016	Background - Deer Springs Drainage	4042151.211	661078.707	0.229	0.013 U	0.292	0.521
CW-SS-46	5/3/2016	Pine Water Springs	4043788.61	661352.387	0.79	0.054 J	0.79	1.63 J
CW-SS-46-12	5/3/2016	Pine Water Springs	4043788.61	661352.387	0.87	0.037 J	0.82	1.73 J
CW-SS-47	5/3/2016	Cove Wash Middle 3F	4043727.086	659295.82	1.29	0.074 J	1.35	2.71 J
CW-SS-48	3/26/2016	Cove Wash Middle 3F	4044751.928	656807.09	0.37	0.011 U	0.45	0.82
CW-SS-49	3/26/2016	Duplicate of CW-18	4049586.881	660202.988	0.289	0.001 U	0.299	0.588
CW-SS-50	3/29/2016	Cove Wash Middle 1	4044856.247	657463.154	15 J	0.62	13.7 J	29.32 J
CW-SS-51	3/29/2016	Cove Wash Middle 1A	4044944.041	657035.048	6.7	0.274	5.9	12.874
CW-SS-52	3/29/2016	Cove Wash Middle 1G	4044553.333	657329.59	1.95	0.06 J	1.9	3.91 J
CW-SS-53a	5/2/2016	Cove Wash Middle 1	4044478	656787	32.5	1.2	30.6	64.3
CW-SS-54	5/2/2016	Cove Wash Middle 1B	4044751.928	656807.09	3.49	0.168	3.4	7.058
CW-SS-55	3/25/2016	Cove Wash Middle 2	4044480.534	656337.545	1.46	0.075 J	1.61	3.15 J
CW-SS-55a	5/3/2016	Cove Wash Middle 2	4044480.534	656337.545	1.08	0.037 J	1.21	2.33 J
CW-SS-56a	5/2/2016	Cove Wash Middle 3A	4043135	658979	1.05	0.057 J	1.11	2.22 J
CW-SS-57	3/26/2016	Duplicate of CW-02	4053607.153	666731.839	0.62	0.023 J	0.57	1.21 J
CW-SS-58	3/29/2016	Duplicate of CW-50	4044856.247	657463.154	8 J	0.28	7.7 J	15.98 J
CW-SS-59	3/30/2016	Background - Cove Wash Tributary 1	4051574	664210	0.63	0.018 J	0.63	1.28 J
CW-SS-60	3/30/2016	Cove Wash between 01 and 02	4051659	664274	0.65	0.053 J	0.56	1.26 J
CW-SS-61	3/30/2016	Cove Wash Tributary 2 (Downstream)	4051575	663979	0.88	0.035 J	0.8	1.72 J
CW-SS-62	5/3/2016	Downstream of Dam	4046378	658785	0.49	0.038 J	0.52	1.05 J
CW-SS-63	5/3/2016	Duplicate of CW-27	4042693.122	657319.281	5.5	0.176	5.21	10.886
CW-SS-64	4/29/2016	Cove Wash North between CW-15 and CW-16	4045877	656444	0.55	0.066 J	0.51	1.13 J
CW-SS-65	4/30/2016	Cove Wash Middle 3A downstream of 3B	4042357.618	658662.9305	1.2	0.063 J	1.34	2.6 J
CW-SS-66	4/30/2016	Cove Wash Middle 3A downstream of 3D	4042352.488	658661.5916	0.73	0.028 J	0.77	1.52 J
CW-SS-67	5/2/2016	Cove Wash Middle 3	4044603.441	658812.815	1.72	0.099 J	1.57	3.389
CW-SS-68	5/2/2016	Duplicate of CW-67	4044603.441	658812.815	1.51	0.062 J	1.33	2.9 J

Notes:
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Bold, Underlined and Highlighted = Analytical result exceeds screening levels

EPA Soil Screening Level - Protective of groundwater (Exceedances are bolded, underlined, and highlighted)					NA	0.27	0.29	82	3.2	NA	0.38	NA	180,000	NA	46	NA	14	NA	NA	NA	0.1	NA	NA	NA	NA	0.26	NA	NA	NA	0.14	14	NA	NA
Sample Location	Sample Date	Sample Information	Northing	Easting	Aluminium (mg/kg)	Antimony (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Beryllium (mg/kg)	Boron (mg/kg)	Cadmium (mg/kg)	Calcium (mg/kg)	Chromium (mg/kg)	Cobalt (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Lead (mg/kg)	Lithium (mg/kg)	Magnesium (mg/kg)	Manganese (mg/kg)	Mercury (mg/kg)	Molybdenum (mg/kg)	Nickel (mg/kg)	Phosphorus (mg/kg)	Potassium (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)	Sodium (mg/kg)	Strontium (mg/kg)	Thallium (mg/kg)	Uranium (mg/kg)	Vandium (mg/kg)	Zinc (mg/kg)
CW-SS-01-160627	27-Jun-16	Cove Wash (Downstream)	4051637.55	663372.9034	10000	0.89 U	**0.96 J**	**340**	0.51 J	8.4 J	0.082 J	36000	6.2	4.5	1.3	8100	7.2	14	5800	300	0.0044 UJ	0.56 U	11	490	1900	**0.64**	0.092 U	2300	260	0.39 U	2.3	19	12
CW-SS-02-160627	27-Jun-16	Cove Wash (Downstream)	4053607.153	666731.839	5900	0.83 U	**2.6**	**250**	0.16 J	7.2 J	0.059 J	42000	5.5	3.3	3.7	5300	4.6	8.8	10000	280	0.0039 UJ	0.52 U	9.7	360	1500	**0.51 J**	0.19 J	3200	270	0.37 U	0.84	13	17
CW-SS-03-160628	28-Jun-16	Cove Wash South	4047985.628	659997.0959	6000	0.72 U	**2.1**	**320 J**	0.24 J	5.4 J	0.085 J	70000	8.6	3	3.2	5900	5.2	11	8400 J	380 J	0.0034 UJ	0.46 U	12	470	1600	1.5 U	0.075 U	1500	330	0.32 U	0.93 J	15 J	11
CW-SS-04-160618	27-Jun-16	Background (Upstream)	4045547.649	655393.8806	2700	1 U	**1.8**	75	0.17 J	2.8 J	0.062 U	11000	1.2 J	1.5	2.8	4200	3.9	3.2	1300	180	0.0057 J	0.66 U	1.6 J	230	1200	**0.64 J**	0.11 U	55 J	98	0.46 U	0.6	7.9	9.5
CW-SS-05-160627	27-Jun-16	Dam (Historical)	4045709.002	658675.5894	2100	0.85 U	**0.85 J**	76	0.05 U	1.2 U	0.058 J	19000	2	1.2	1.1	2600	2.5	4.5	2800	160	0.004 UJ	0.54 U	2.3	170	600	0.34 U	0.09 J	100 J	74	0.38 U	4.5	18	6.8
CW-SS-06-160628	28-Jun-16	Cove Wash (Downstream)	4050970.463	659839.728	6800	0.75 U	**1.7**	**190**	0.16 J	5.5 J	0.11 J	68000	3.8	3.2	2.3	6000	5.8	11	9700	360	0.0036 UJ	0.47 U	6.4	360	1600	1.5 U	0.1 J	2300	340	0.33 U	0.51	14	10
CW-SS-07-160628	28-Jun-16	Cove Wash Middle (Historical)	4047101.942	659123.9337	1900	0.9 U	**1.3**	**82**	0.052 U	1.5 J	0.054 U	13000	2.1	0.99 J	1.3	2400	2.1	3.6	1900	120	0.0045 UJ	0.57 U	1.9 J	140	530	**0.66**	0.59 J	240	55	0.4 U	3.9	17	5.8
CW-SS-08-160628	28-Jun-16	Background (Downstream)	4050235.456	657139.2197	9300	0.75 U	**2.1**	**120**	0.13 J	7.9 J	0.1 J	70000	4.3	3.8	6.2	6800	6.8	12	18000	310	0.0035 UJ	0.47 U	8.3	410	2500	1.5 U	0.12 J	3500	490 J	0.33 U	0.34	14 J	14
CW-SS-09-160627	27-Jun-16	Cove Wash North	4049315.64	658120.2201	8000	0.71 U	**1.7**	**710**	0.17 J	6.4 J	0.12 J	86000	4.3	3.6	3.8	6300	5.5	14	13000	410	0.0035 UJ	0.45 U	7.3	390	2100	1.4 U	0.18 J	2200	480	0.31 U	0.5	12	12
CW-SS-10-160628	28-Jun-16	Cottonwood Spring (Seeping capped well)	4049594.436	660198.1416	4000	0.96 U	**2.1**	**150**	0.13 J	4 J	0.081 J	25000	4.2	1.9	2.7	4700	3.5	8.4	5700	130	0.0048 J	0.61 U	4.3	330	1200	0.39 U	0.23 J	310	260	0.42 U	0.7	11	14
CW-SS-11-160621	21-Jun-16	Cove Wash North	4046373.007	657265.4893	2900	0.96 U	**0.87 J**	53	0.21 J	1.9 J	0.057 U	15000	3.1	1.6	1.1 J	3800	3.2	5.8	4900	150	0.0047 UJ	0.61 U	3.2	180	670	0.39 U	0.18 J	73 J	51	0.42 U	0.57	12	8.6
CW-SS-12-160627	27-Jun-16	Cove Wash Middle 3	4044603.441	658812.8183	4200	0.86 U	**0.91 J**	**110**	0.29 J	2.9 J	0.12 J	46000	9.4	3.1	3.2	5300	5.2	10	9200	270	0.0037 UJ	0.55 U	15	580	1300	0.35 U	0.09 U	290	210	0.38 U	1.1	10	14
CW-SS-13-160623	23-Jun-16	Cove Wash Middle 3	4043160.908	658957.6858	2200	0.97 U	0.46 U	65	0.17 J	1.9 J	0.058 U	8200	1.9	1.1 J	0.96 J	3000	2.7	3.5	1200	110	0.0048 UJ	0.61 U	1.7 J	160	540	0.39 U	0.19 J	45 J	35	0.43 U	4.2	13	7
CW-SS-14-160623	23-Jun-16	Cove Wash Middle 3E	4042934	659222.0031	3400	0.93 U	**0.96 J**	**97**	0.24 J	1.9 J	0.056 U	11000	2.6	1.8	1.5	4700	4.2	5.8	1900	170	0.0047 J	0.59 U	2.3 J	240	760	0.37 U	0.16 J	31 J	48	0.41 U	2.9	19	11
CW-SS-15-160625	25-Jun-16	Cove Wash North	4046035	656751.9991	7100	0.91 U	**2.1**	**120**	0.29 J	4.4 J	0.054 U	12000	5.1	3	3.3	7100	6.3	14	5800	170	0.0076 J	0.57 U	4.3	320	1200	0.36 U	0.19 J	160	120	0.4 U	1.9	23	18
CW-SS-16-160621	21-Jun-16	Cove Wash North	4045602	656065.0033	6400	0.82 U	**3**	**100**	0.11 J	4.3 J	0.13 J	16000	3.9	3	4.9	6900	7.3	11	3800	230	0.0049 J	0.52 U	3.6	270	1200	0.33 U	0.16 J	30 J	82	0.36 U	1.7	49	18
CW-SS-17-160627	27-Jun-16	Cove Wash South (Downstream)	4050338.789	662352.1776	4800	0.8 U	**1.9**	**260**	0.26 J	2.8 J	0.094 J	63000	6.8	2.3	2.6	5200	4.9	9.7	4800	720	0.0035 UJ	0.5 U	8.2	310	990	1.6 U	0.14 J	650	210	0.35 U	1.8	11	8.4
CW-SS-18-160625	25-Jun-16	Background (Cove Wash Middle 1)	4045597.485	658407.8511	1800	0.72 U	**1.7**	44	0.18 J	1 U	0.043 U	17000	2	1	0.72 J	2200	2.7	3.8	2500	190	0.0034 UJ	0.46 U	1.8 J	110	360	**0.45 J**	0.14 J	66 J	36	0.32 U	0.24	9.6	4.5
CW-SS-19-10-160622	22-Jun-16	Cove Mesa 2 (Historical) - Subsurface	4042075.979	657975.2607	4900	0.83 U	**3.3**	**120**	0.1 J	4.2 J	0.059 J	18000	2.6	2.4	6.4	6200	21 J	8.2	3000	210 J	0.0037 UJ	0.52 U	3.6	250	1100	**0.46 J**	0.22 J	31 J	81	0.37 U	5.5	34	17
CW-SS-19-160622	22-Jun-16	Cove Mesa 2 (Historical)	4042075.979	657975.2607	4500	0.8 U	**2.4**	**140**	0.27 J	4.7 J	0.073 J	12000	3.1	2.5	3.9	6900	5.4	7.6	2700	130	0.0034 UJ	0.51 U	3.7	250	1100	0.32 U	0.17 J	30 J	79	0.35 U	2.1	17	16
CW-SS-20a-160622	22-Jun-16	Cove Wash Middle 3C (Downstream of CW-20)	4041601.022	658538.7969	4300	0.89 U	**0.81 J**	32	0.28 J	2.6 J	0.053 U	25000	3.2	1.7	0.41 J	3200	2.8	12	4200	130	0.0044 UJ	0.56 U	2.4	200	570	**0.63**	0.11 J	820	82	0.39 U	4.8	7.8	10
CW-SS-21-12-160628	28-Jun-16	Background (Mesa IV Springs) - Subsurface	4043108	655931.0041	4900	0.81 U	**1.8**	81	0.25 J	2.4 J	0.072 J	2200	3.8	2.4	2	5500	3.9	6.1	1800	190	0.0065 J	0.51 U	3.7	170	1900	0.33 U	0.084 U	32 J	17	0.36 U	0.65	11	14
CW-SS-21-160620	28-Jun-16	Background (Mesa IV Springs)	4043108	655931.0041	3200	1.2 U	**0.88 J**	**85**	0.31 J	3.3 J	0.07 U	4400	2.6	1.4 J	4.7	3700	4.1	3.9	1200	79	0.011 J	0.74 U	2.5 J	320	1000	**0.67 J**	0.19 J	32 J	20	0.52 U	0.86	9.8	31
CW-SS-26-160620	20-Jun-16	Cove Wash Middle 2 (Historical)	4042501.621	657146.8765	4100	0.91 U	**5.3**	80	0.053 U	5.7 J	0.06 J	14000	2.8	2.2	3.8	5400	5.3	7.8	2500	160	0.0051 J	4.2	3.2	320	1700	**16**	0.18 J	280	91	0.4 U	**14**	160	15
CW-SS-27-160620	20-Jun-16	Cove Wash Middle 2B	4042693.122	657319.2808	4600	0.77 U	**4.7**	**120**	0.045 U	4.3 J	0.082 J	19000	2.9	3.3	4.4	7100	6.3	8.6	2800	210	0.0038 UJ	1 J	4	240	1000	**3.2**	0.12 J	30 J	60	0.34 U	**100**	140	15
CW-SS-29-160622	22-Jun-16	Cove Wash Middle 2C	4042595.541	658108.1172	2800	0.77 U	**1.3**	**100**	0.19 J	1.4 J	0.047 J	13000	1.4	1.6	2	3900	3.1	3.5	1300	230	0.0036 UJ	0.49 U	1.7 J	140	600	0.31 U	0.097 J	17 J	35	0.34 U	1.1	11	9.3
CW-SS-30-160618	18-Jun-16	Background (West Upstream)	4046867.444	654397.084	4100	0.76 U	**2.3**	63	0.44 J	2.7 J	0.045 U	3100 J	2	1.5	1.5	4200	5.2	4.1	1300	94	0.0047 J	0.48 U	2.3	100	970	0.3 U	0.078 U	16 J	21	0.33 U	0.53	9.3	7.8
CW-SS-31-160618	18-Jun-16	Background (Upstream)	4044527.019	655114.312	2600	0.72 U	**1.4**	45	0.042 U	2.1 J	0.043 U	930	3.2	1.8	1.5	4400	4.3	3.4	950	170	0.0033 UJ	0.45 U	2.7	100	690	0.29 U	0.074 U	15 J	7.4	0.32 U	0.48	9.4	7.7
CW-SS-32-160620	20-Jun-16	Cove Wash Middle 1E	4043933	655741.9975	6300	1.1 U	**2.7**	**110**	0.36 J	4.7 J	0.13 J	5000	4.2	3.2	4.8	7200	7.2	7.9	2800	270	0.014 J	0.67 U	4.8	250	1500	0.43 U	0.23 J	26 J	42	0.47 U	2.3	21	22
CW-SS-36-160618	18-Jun-16	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	1800	0.92 U	**2.3**	**85**	0.15 J	1.3 U	0.055 U	10000	1.8	0.95 J	1 J	2400	2.4	3.9	1400	150	0.0045 UJ	0.58 U	1.4 J	100	450	**0.61 J**	0.096 U	50 J	43	0.41 U	1.9	20	5.6
CW-SS-37-160618	18-Jun-16	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	1800	0.96 U	**2 J**	**170 J**	0.17 J	2 J	0.058 U	18000 J	1.9	1.1 J	0.72 J	2800	2.5	4.3	1400	190	0.0043 UJ	0.61 U	1.4 J	110	420	**0.52 J**	0.1 U	89 J	46	0.43 U	3.7	30	5.9
CW-SS-38-160618	18-Jun-16	Cove Wash Middle (Historical)	4044173	657897.9975	1800	0.85 U	**1.9**	**84**	0.098 J	1.2 U	0.051 U	8500	1.8	1 J	1.2	2500	2.6	3.8	1400	130	0.0042 UJ	0.54 U	1.4 J	100	450	0.34 U	0.088 U	47 J	35	0.38 U	2	23	5.8
CW-SS-39-160627	27-Jun-16	Cove Wash Middle 2	4045453.338	658432.5145	2400	0.83 U	**2**	44	0.097 J	1.2 U	0.089 J	48000	2.4	1.2	1.4	3100	2.4	6.8	2000	370	0.0038 UJ	0.52 U	2.2 J	180	570	**0.76**	0.1 J	99 J	73	0.37 U	3.7	59	6.8
CW-SS-42-12-160627	27-Jun-16	Irrigation Ditch - Subsurface	4045665.7	658700.6	3200	0.78 U	**1.3**	**100**	0.12 J	1.1 U	0.065 J	18000	3.1	1.5	1.4	3800	3.1	6	2500	190	0.0036 UJ	0.49	2.8	180	730	0.31 U	0.09 J	50 J	81	0.34 U	2.3	18	9.6
CW-SS-44-160621	21-Jun-16	Pine Water Springs Drainage	4043806.688	661260.5257	5300	0.71 U	**1.3**	**110**	0.24 J	3.4 J	0.043 U	1600	15	3	2.8	5900	5.4	6.1	1900	96	0.0078 J	0.46 U	11	110	930	0.29 U	0.075 U	29 J	14	0.32 U	0.83	12	13
CW-SS-45-160621	21-Jun-16	Background (Deer Springs Drainage)	4042151.212	661078.7105	2100	0.73 U	**0.89 J**	31	0.14 J	2.1 J	0.043 U	730	2.4	1.2	0.93 J	3000	2.8	2.9	780	120	0.0033 UJ	0.46 U	1.9	78	590	0.29 U	0.077 J	12 J	5.7	0.32 U	0.31	6.3	7
CW-SS-46-160621	21-Jun-16	Pine Water Springs	4043788.61	661352.387	4500	0.82 U	**1.6**	**110**	0.048 U	5.1 J	0.067 J	2700	22	4	5.4	7100	5.7	6.7	3200	120	0.0039 UJ	0.52 U	26	830	1700	0.33 U	0.085 U	68 J	54	0.36 U	1.2	18	27
CW-SS-46-12-160621	29-Jun-16	Pine Water Springs - Subsurface	4043788.61	661352.387	6500	0.89 U	**2**	**120**	0.48 J	3.5 J	0.13 J	3400	14	4.6	5.6	8000	6.2	8.3	2900	310	0.013 J	0.56 U	17	340	1700	0.36 U	0.092 U	80 J	34	0.39 U	1.5	17	20
CW-SS-47-160617	17-Jun-16	Cove Wash Middle 3F	4043774.185	659297.1492	6000	1.2 U	**3.2**	**100**	0.32 J	3.9 J	0.079 J	18000	5.2	3.3	4.2	6900	7.2	13	4100	240	0.0066 J	0.75 U	6.2	340	1300	**5.8**	0.12 U	68 J	91	0.53 U	**16**	68	17
CW-SS-48-160617	17-Jun-16	Cove Wash Middle 3F	4044446.562	659271.0138	4700	0.73 U	**2.2**	**140**	0.11 J	5.2 J	0.094 J	37000	5.1	3.2	2.7	6100	4.5	12	12000	310	0.0032 UJ	0.46 U	7.2	380	1100	**0.65**	0.076 U	120	120	0.32 U	2.5	13	14
CW-SS-50-160624	24-Jun-16	Cove Wash Middle 1	4044856.248	657463.1536	2700	0.94 U	**1.1 J**	**120**	0.055 U	1.3 U	0.056 U	7400	2.5	1.2 J	1.3	3300	3.6	5.3	1900	88	0.0044 UJ	0.59 U	1.8 J	130	550	0.38 U	0.13 J	66 J	35	0.42 U	9.4	39	7.5
CW-SS-51-160624	24-Jun-16	Cove Wash Middle 1A	4044944.041	657035.0523	3900	0.74 U	**2.7**	**94**	0.043 U	2.4 J	0.044 U	9600	4.1	1.8	2	4000	3.9	8	2900	130	0.0033 J	0.5 J	2.8	180	690	**0.52**	0.14 J	25 J	37	0.33 U	11	62	11
CW-SS-52-160624	24-Jun-16	Cove Wash Middle 1G	4044553.333	657329.5884	3700	0.73 U	**3.4**	81 J	0.042 U	2.7 J	0.044 U	13000 J	3.4	1.7	2	4100	4.4	7.8	2600	130 J	0.0032 UJ	0.82 J	2.9	200	710	0.29 U	0.21 J	20 J	30 J	0.32 U	5.5	37 J	10
CW-SS-53a-160624	24-Jun-16	Cove Wash Middle 1 (Near original location)	4044567	656816	2700	0.85 U	**2.9**	**87**	0.11 J	1.2 U	0.051 U	17000	2.3	1.6	2.3	4200	6.6	6	2100	230	0.0047 J	0.54 U	2.2 J	170	550	**0.89**	0.088 U	37 J	41	0.37 U	11	140	8.8
CW-SS-54-160624	24-Jun-16	Cove Wash Middle 1B	4044752.579	656806.108	4400	0.86 U	**3.2**	**95**	0.4 J	2.1 J	0.078 J	12000	3.3	2.4	5.2	5300	5	8.9	3300	140	0.0092 J	0.61 J	3.7	270	900	**6.3**	0.089 U	150	110	0.38 U	**24**	88	14
CW-SS-55-160625	25-Jun-16	Cove Wash Middle 1C	4044480.534	656337.5433	3700	0.95 U	**5.4**	76	0.37 J	1.7 J	0.057 U	12000	2.3	2.4	5.1	5300	4.5	7.1	2300	180	0.0052 J	1.3	3.2	240	970	**20**	0.098 U	240	120	0.42 U	**14**	210	13
CW-SS-56a-160623	23-Jun-16	Cove Wash Middle 3A (Near original location)	4043135	658979	2300	0.9 U	**3.1**	62	0.17 J	1.3 U	0.054 U	18000	2.1	1.6	2.1	4700	3.8	4.9	1700	230	0.004 UJ	0.57 U	2 J	190	580	**0.43 J**	0.093 U	100 J	66	0.4 U	2.8	19	9.7
CW-SS-59-160627	27-Jun-16	Cove Wash Tributary 1 (Downstream)	4051574.576	664210.2048	7100	0.9 U	**3.4**	**310**	0.41 J	6 J	0.15 J	68000	10	3.9	5.6	6700	6.2	11	11000	390	0.004 UJ	0.57 U	18	700	2000	1.8 U	0.093 U	2300	390	0.4 U	1.5	17	15
CW-SS-60-160627	27-Jun-16	Cove Wash between 01 and 02 (Downstream)	4051659.495	664274.984	8000	0.91 U	**2.1**	**290**	0.33 J	6.9 J	0.12 J	52000	7.7	3.9	4.5	7200	6.3	12	7600	370	0.0041 UJ	0.57 U	11	500	1900	0.37 U	0.17 J	2200	300	0.4 U	0.99	16	13
CW-SS-61-160627	27-Jun-16	Cove Wash Tributary 2 (Downstream)	4051575.939	663979.3813	7000	0.84 U	**2.4**	**460**	0.35 J	8.5 J	0.13 J	73000	6.4	4.1	5.2	6800	13	14	23000	370	0.0039 UJ	0.53 U	12	460	1500	1.7 U	0.11 J	4400	680	0.37 U	1.7	19	14
CW-SS-62-160628	28-Jun-16	Downstream of Dam	4046378.374	658785.0735	5300	0.75 U	**2**	**110**	0.25 J	2.9 J	0.082 J	23000	4.1	2.5	2.6	5900	5.6	9.2	4300	210	0.0057 J	0.47 U	4.8	290	1200	0.3 U	0.17 J	78 J	78	0.33 U	1	15	13
CW-SS-64-160621	21-Jun-16	Cove Wash North	4045877	656444	2300	0.93 U	**1.5**	**82**	0.17 J	1.3 U	0.056 U	6400	1.8	1.3	1.4	3300	2.7	4.2	1700	120	0.0045 UJ	0.59 U	1.7 J	140	510	**0.73**	0.097 U	64 J	46	0.41 U	1.5	10	7.4
CW-SS-65-160622	22-Jun-16	Cove Wash Middle 3A	4042362.589	658661.6744	1900	0.85 U	**2**	69	0.17 J	1.2 U	0.051 U	11000	1.6	1.1 J	1.5	3000	2.2	3.8	1400	160	0.0043 UJ	0.54 U	1.4 J	140	510	**1**	0.088 U	260	53	0.38 U	2.8	11	6.7
CW-SS-66-160622	22-Jun-16	Cove Wash Middle 3A	4042362.589	658661.6744	2400	0.86 U	**3.2**	71	0.24 J	1.2 U	0.052 U	10000	2.4	1.6	2.2	6200	3.7	4.5	1800	140	0.0044 UJ	0.54 U	2 J	180	880	**1.2**	0.089 U	300	64	0.38 U	5.2	12	11
CW-SS-69-160618	18-Jun-16	Duplicate of CW-04	4045547.649	655393.8806	2800	0.96 U	**2**	**110**	0.28 J	2.8 J	0.057 U	12000	1.3	1.5	2.7	4200	3.6	3.2	1200	210	0.0061 J	0.6 U	1.4 J	220	1100	**0.53 J**	0.099 U	47 J	98	0.42 U	0.68	8.4	9.8
CW-SS-70-160617	17-Jun-16	Cove Wash Middle 3F	4044525.919	659043.2268	3400	1 U	**1.2 J**	**100**	0.17 J	4.5 J	0.087 J	36000	3.6	2.2	2	4300	4.9	8.8	7700	200	0.0048 UJ	0.64 U	4.6	280	890	**0.72**	0.1 U	140	150	0.45 U	1.3	10	9.9
CW-SS-71-160618	18-Jun-16	Duplicate of CW-37	4044602.301	658113.5333	1600	0.89 U	**0.89 J**	**90 J**	0.14 J	1.3 U	0.053 U	9200 J	1.7	0.75 J	0.8 J	2100	1.9	3.5	1200	140	0.004 UJ	0.56 U	1.1 J	110	400	**0.4 J**	0.093 U	46 J	46	0.39 U	2.1	25	5
CW-SS-72-160621	21-Jun-16	Duplicate of CW-11	4045547.649	655393.8806	2800	0.89 U	**1.4**	41	0.21 J	1.3 U	0.053 U	25000	3.8	2.1	1 J	4400	3.1	6.8	8100	220	0.0042 UJ	0.56 U	4.3	240	670	0.36 U	0.092 U	94 J	72	0.39 U	0.52	12	9.3
CW-SS-73-160622	22-Jun-16	Cove Wash Middle 3D	4042208.541	658769.5923	2600	0.78 U	**1.5**	53	0.046 J	1.1 U	0.046 U	13000	1.9	1.4	1.7	3700	2.9	4.7	1800	210	0.0034 UJ	0.49 U	1.9 J	170	580	0.31 U	0.081 U	24 J	54	0.34 U	0.41	7.8	8.5
CW-SS-74-160622	22-Jun-16	Cove Wash Middle 3D	4041604.376	658745.2414	2100	0.73 U	**3**	33	0.17 J	1 U	0.044 J	7400	1.8	1.3	2.1	4000	2.8	4.1	1400	130	0.0037 UJ	0.46 U	2.1	150	610	**0.4 J**	0.075 U	19 J	32	0.32 U	0.99	10	9
CW-SS-75-160622	22-Jun-16	Cove Wash Middle 3D	4041201.219	658764.5801	1500	0.91 U	**1.6**	27	0.13 J	1.3 U	0.054 U	4900	1.4	0.89 J	1.3	2300	1.8	2.8	990	72	0.0043 UJ	0.57 U	1.4 J	110	480	0.36 U	0.094 U	46 J	30	0.4 U	0.84	7.1	6.1
CW-SS-76-10-160622	22-Jun-16	Duplicate of CW-19-10	4042075.979	657975.2607	3900	0.92 U	**2.8**	**100 J**	0.34 J	1.3 U	0.067 J	26000	2.4	2.3	6.6	5900	8.3 J	7.2	2600	480 J	0.0042 UJ	0.58 U	3.2	270	950	**1.1 J**	0.095 U	33 J	98	**0.88 J**	5.6	41	15
CW-SS-77-12-160627	27-Jun-16	Cove Wash Middle 3D - Subsurface	4045656.58	658677.1375	1700	0.78 U	**2**	**170**	0.046 U	1.1 U	0.061 J	29000	2	1.2	0.93 J	2600	2.4	4.4	1600	250	0.0038 UJ	0.49 U	1.8 J	130	410	0.31 U	0.14 J	30 J	67	0.35 U	2.2	63	5.5
CW-SS-77-160627	27-Jun-16	Cove Wash Middle 3D	4045656.58	658677.1375	2600	0.88 U	**1.4**	**92**	0.051 U	2.1 J	0.052 U	15000	2.6	1.3	1.1 J	3200	2.8	5.3	2300	130	0.0041 UJ	0.55 U	2.2 J	150	610	0.35 U	0.091 U	73 J	57	0.39 U	1.5	12	8.2
CW-SS-78-160628	28-Jun-16	Duplicate of CW-03	4047985.628	659997.0959	5100	0.72 U	**2.6**	**210 J**	0.13 J	6.5 J	0.043 U	64000	8 J	2.9	2.8	5400	5.5	8.9	8000	350 J	0.0035 UJ	0.45 U	12	500	1400	1.4 U	0.074 U	1400	280	0.32 U	0.96	14	10
CW-SS-80-160628	28-Jun-16	Duplicate of CW-08	4050235.456	657139.2197	7300	0.74 U	**1.6**	**120**	0.17 J	7.1 J	0.052 J	65000	3.7	3	3.3	5200	5.5	9.9	12000	230	0.0033 UJ	0.47 U	6.7	370	2100	1.5 U	0.13 J	2400	340 J	0.33 U	0.3	8 J	11
CW-SS-81-160629	29-Jun-16	Cove Wash North	4049882.052	658891.9138	6800	0.82 U	**1.6**	**380**	0.16 J	8.7 J	0.06 J	110000	3.3	3.4	4.7	5200	5.9	12	17000	380	0.0037 UJ	0.52 U	6.8	310	1600	1.6 U	0.1 J	2400	520	0.36 U	0.43	14	11

Notes:
EPA = Environmental Protection Agency
NA = Not Applicable
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
mg/kg = milligram per kilogram
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Cove Wash Watershed Assessment
2016 Low Flow Sampling Event
Sediment - Radium Results

Sample Location	Sample Date	Sample Information	Northing	Easting	Radium 226 (pCi/g)	Radium 228 (pCi/g)	Combined Radium 226/228 (pCi/g)
CW-SS-01-160627	27-Jun-16	Cove Wash (Downstream)	4051637.55	663372.9034	1.13	1.1 J	2.2 J
CW-SS-02-160627	27-Jun-16	Cove Wash (Downstream)	4053607.153	666731.839	0.66 J	0.12 U	0.66 J
CW-SS-03-160628	28-Jun-16	Cove Wash South	4047985.628	659997.0959	0.8 J	1.37	2.2J
CW-SS-04-160618	27-Jun-16	Background (Upstream)	4045547.649	655393.8806	0.46 UJ	0.63 UJ	0.63 UJ
CW-SS-05-160627	27-Jun-16	Dam (Historical)	4045709.002	658675.5894	1.82	0.36 U	1.82
CW-SS-06-160628	28-Jun-16	Cove Wash (Downstream)	4050970.463	659839.728	0.73 J	0.18 U	0.73 J
CW-SS-07-160628	28-Jun-16	Cove Wash Middle (Historical)	4047101.942	659123.9337	1.46	0.35 U	1.46
CW-SS-08-160628	28-Jun-16	Background (Downstream)	4050235.456	657139.2197	0.64 J	0.63 U	0.64 J
CW-SS-09-160627	27-Jun-16	Cove Wash North	4049315.64	658120.2201	0.62 J	0.7 J	1.3 J
CW-SS-10-160628	28-Jun-16	Cottonwood Spring (Seeping capped well)	4049594.436	660198.1416	0.78 J	0.55 UJ	0.78 J
CW-SS-11-160621	21-Jun-16	Cove Wash North	4046373.007	657265.4893	0.57 J	0.33 U	0.57 J
CW-SS-12-160627	27-Jun-16	Cove Wash Middle 3	4044603.441	658812.8183	2.26	0.78 J	3.0 J
CW-SS-13-160623	23-Jun-16	Cove Wash Middle 3	4043160.908	658957.6858	1.99	0.29 U	1.99
CW-SS-14-160623	23-Jun-16	Cove Wash Middle 3E	4042934	659222.0031	3.78	0.48 J	4.3 J
CW-SS-15-160625	25-Jun-16	Cove Wash North	4046035	656751.9991	0.83 J	0.84 J	1.7 J
CW-SS-16-160621	21-Jun-16	Cove Wash North	4045602	656065.0033	2.17	0.56 U	2.17
CW-SS-17-160627	27-Jun-16	Cove Wash South (Downstream)	4050338.789	662352.1776	0.94 J	0.76 U	0.94 J
CW-SS-18-160625	25-Jun-16	Background (Cove Wash Middle 1)	4045597.485	658407.8511	0.71 J	0.49 U	0.71 J
CW-SS-19-10-160622	22-Jun-16	Cove Mesa 2 (Historical) - Subsurface	4042075.979	657975.2607	10.3	0.22 U	10.3
CW-SS-19-160622	22-Jun-16	Cove Mesa 2 (Historical)	4042075.979	657975.2607	1.94	0.66 J	2.6 J
CW-SS-20a-160622	22-Jun-16	Cove Wash Middle 3C (Downstream of CW-20)	4041601.022	658538.7969	0.53 J	0.11 UJ	0.53 J
CW-SS-21-12-160628	28-Jun-16	Background (Mesa IV Springs) - Subsurface	4043108	655931.0041	0.88 J	0.75 UJ	0.88 J
CW-SS-21-160620	28-Jun-16	Background (Mesa IV Springs)	4043108	655931.0041	0.7 J	0.49 UJ	0.7 J
CW-SS-26-160620	20-Jun-16	Cove Wash Middle 2 (Historical)	4042501.621	657146.8765	16.2 J	0.7 UJ	16.2 J
CW-SS-27-160620	20-Jun-16	Cove Wash Middle 2B	4042693.122	657319.2808	12.8	0.46 U	12.8
CW-SS-29-160622	22-Jun-16	Cove Wash Middle 2C	4042595.541	658108.1172	0.99 J	0.51 U	0.99 J
CW-SS-30-160618	18-Jun-16	Background (West Upstream)	4046867.444	654397.084	0.76 J	1.06 J	1.8 J
CW-SS-31-160618	18-Jun-16	Background (Upstream)	4044527.019	655114.312	1.66	1.48 J	3.14 J
CW-SS-32-160620	20-Jun-16	Cove Wash Middle 1E	4043933	655741.9975	4.04 J	0.55 UJ	4.04 J
CW-SS-36-160618	18-Jun-16	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	2.66	-0.03 U	2.66
CW-SS-37-160618	18-Jun-16	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	3.2	0 U	3.2
CW-SS-38-160618	18-Jun-16	Cove Wash Middle (Historical)	4044173	657897.9975	3.26	-0.13 U	3.26
CW-SS-39-160627	27-Jun-16	Cove Wash Middle 2	4045453.338	658432.5145	5.42	0.54 U	5.42
CW-SS-42-12-160627	27-Jun-16	Irrigation Ditch - Subsurface	4045665.7	658700.6	2.25	0.52 U	2.25
CW-SS-44-160621	21-Jun-16	Pine Water Springs Drainage	4043806.688	661260.5257	1.18 J	0.84 UJ	1.18 J
CW-SS-45-160621	21-Jun-16	Background (Deer Springs Drainage)	4042151.212	661078.7105	0.73 J	0.64 J	1.4 J
CW-SS-46-12-160629	29-Jun-16	Pine Water Springs - Subsurface	4043788.61	661352.387	1.28 J	0.83 UJ	1.28 J
CW-SS-46-160621	21-Jun-16	Pine Water Springs	4043788.61	661352.387	0.97 J	1.11 J	2.1 J
CW-SS-47-160617	17-Jun-16	Cove Wash Middle 3F	4043774.185	659297.1492	7.36 J	0.97 J	8.3 J
CW-SS-48-160617	17-Jun-16	Cove Wash Middle 3F	4044446.562	659271.0138	1.44 J	0.32 UJ	1.44 J
CW-SS-50-160624	24-Jun-16	Cove Wash Middle 1	4044856.248	657463.1536	5.55	0.65 J	6.2 J
CW-SS-51-160624	24-Jun-16	Cove Wash Middle 1A	4044944.041	657035.0523	8.8	0.39 U	8.8
CW-SS-52-160624	24-Jun-16	Cove Wash Middle 1G	4044553.333	657329.5884	8.8	0.64 U	8.8
CW-SS-53a-160624	24-Jun-16	Cove Wash Middle 1 (Near original location)	4044567	656816	16.3	0.72 U	16.3
CW-SS-54-160624	24-Jun-16	Cove Wash Middle 1B	4044752.579	656806.108	10.8 J	0.99 J	11.8 J
CW-SS-55-160625	25-Jun-16	Cove Wash Middle 1C	4044480.534	656337.5433	9.9 J	0.32 UJ	9.9 J
CW-SS-56a-160623	23-Jun-16	Cove Wash Middle 3A (Near original location)	4043135	658979	1.73	0.28 U	1.73
CW-SS-59-160627	27-Jun-16	Cove Wash Tributary 1 (Downstream)	4051574.576	664210.2048	1.2	0.87 J	2.1 J
CW-SS-60-160627	27-Jun-16	Cove Wash between 01 and 02 (Downstream)	4051659.495	664274.984	0.81 J	0.56 J	1.4 J
CW-SS-61-160627	27-Jun-16	Cove Wash Tributary 2 (Downstream)	4051575.939	663979.3813	0.88 J	0.77 J	1.7 J
CW-SS-62-160628	28-Jun-16	Downstream of Dam	4046378.374	658785.0735	1.64	0.53 U	1.64
CW-SS-64-160621	21-Jun-16	Cove Wash North	4045877	656444	0.55 J	0.47 U	0.55 J
CW-SS-65-160622	22-Jun-16	Cove Wash Middle 3A	4042362.589	658661.6744	1.81	0.13 U	1.81
CW-SS-66-160622	22-Jun-16	Cove Wash Middle 3A	4042362.589	658661.6744	1.21	0.2 U	1.21
CW-SS-69-160618	18-Jun-16	Duplicate of CW-04	4045547.649	655393.8806	0.68 J	0.71 UJ	0.68 J
CW-SS-70-160617	17-Jun-16	Cove Wash Middle 3F	4044525.919	659043.2268	0.94 J	0.24 UJ	0.94 J
CW-SS-71-160618	18-Jun-16	Duplicate of CW-37	4044602.301	658113.5333	2.64	-0.02 U	2.64
CW-SS-72-160621	21-Jun-16	Duplicate of CW-11	4045547.649	655393.8806	0.47 J	0.25 U	0.47 J
CW-SS-73-160622	22-Jun-16	Cove Wash Middle 3D	4042208.541	658769.5923	0.69 J	0.37 U	0.69 J
CW-SS-74-160622	22-Jun-16	Cove Wash Middle 3D	4041604.376	658745.2414	1.45	0.48 J	1.9 J
CW-SS-75-160622	22-Jun-16	Cove Wash Middle 3D	4041201.219	658764.5801	0.92 J	0.37 U	0.92 J
CW-SS-76-10-160622	22-Jun-16	Duplicate of CW-19-10	4042075.979	657975.2607	6.22 J	0.17 U	6.22 J
CW-SS-77-12-160627	27-Jun-16	Cove Wash Middle 3D - Subsurface	4045656.58	658677.1375	11.6	-0.25 U	11.6
CW-SS-77-160627	27-Jun-16	Cove Wash Middle 3D	4045656.58	658677.1375	2.22	0.35 U	2.22
CW-SS-78-160628	28-Jun-16	Duplicate of CW-03	4047985.628	659997.0959	0.79 J	0.84 J	1.6 J
CW-SS-80-160628	28-Jun-16	Duplicate of CW-08	4050235.456	657139.2197	0.61 J	0.59 J	1.2 J
CW-SS-81-160629	29-Jun-16	Cove Wash North	4049882.052	658891.9138	1.02	0.6 U	1.02

Notes:
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
pCi/g = picocurie per gram
<u>Bold, Underlined and Highlighted</u> = Analytical result exceeds screening levels

Cove Wash Watershed Assessment
2016 Low Flow Sampling Event
Sediment - Uranium Isotopes

Sample Location	SampleDate	Sample Information	Northing	Easting	U-233/U-234 (pCi/g)	U-235/U-236 (pCi/g)	U-238 (pCi/g)	Total U Isotope Activity (pCi/g)
CW-SS-01-160627	27-Jun-16	Cove Wash (Downstream)	4051637.55	663372.9034	1.27	0.055 J	1.26	3.8
CW-SS-02-160627	27-Jun-16	Cove Wash (Downstream)	4053607.153	666731.839	0.58	0.017 U	0.56	1.1
CW-SS-03-160628	28-Jun-16	Cove Wash South	4047985.628	659997.0959	0.64	0.027 J	0.58	1.2
CW-SS-04-160618	27-Jun-16	Background (Upstream)	4045547.649	655393.8806	0.66	0.033 J	0.5	1.2
CW-SS-05-160627	27-Jun-16	Dam (Historical)	4045709.002	658675.5894	2.14	0.075 J	2.23	1.0 J
CW-SS-06-160628	28-Jun-16	Cove Wash (Downstream)	4050970.463	659839.728	0.47	0.052 J	0.49	1.0 J
CW-SS-07-160628	28-Jun-16	Cove Wash Middle (Historical)	4047101.942	659123.9337	1.85	0.108	1.88	3.8
CW-SS-08-160628	28-Jun-16	Background (Downstream)	4050235.456	657139.2197	0.42	0.03 U	0.41	0.8
CW-SS-09-160627	27-Jun-16	Cove Wash North	4049315.64	658120.2201	0.4	0.036 J	0.53	0.96 J
CW-SS-10-160628	28-Jun-16	Cottonwood Spring (Seeping capped well)	4049594.436	660198.1416	0.56	0.028 U	0.57	1.1
CW-SS-11-160621	21-Jun-16	Cove Wash North	4046373.007	657265.4893	0.59	0.033 J	0.5	1.1
CW-SS-12-160627	27-Jun-16	Cove Wash Middle 3	4044603.441	658812.8183	1.03	0.036 U	0.96	2.0
CW-SS-13-160623	23-Jun-16	Cove Wash Middle 3	4043160.908	658957.6858	1.23	0.093 J	1.19	2.5 J
CW-SS-14-160623	23-Jun-16	Cove Wash Middle 3E	4042934	659222.0031	1.93	0.071 J	1.72	3.7
CW-SS-15-160625	25-Jun-16	Cove Wash North	4046035	656751.9991	1.22	0.068 J	0.92	2.2 J
CW-SS-16-160621	21-Jun-16	Cove Wash North	4045602	656065.0033	1.16	0.065 J	1.18	2.4 J
CW-SS-17-160627	27-Jun-16	Cove Wash South (Downstream)	4050338.789	662352.1776	0.62	0.054 J	0.72	1.4 J
CW-SS-18-160625	25-Jun-16	Background (Cove Wash Middle 1)	4045597.485	658407.8511	0.34	0.04 J	0.38	0.8 J
CW-SS-19-10-160622	22-Jun-16	Cove Mesa 2 (Historical) - Subsurface	4042075.979	657975.2607	2.99 J	0.106 J	2.77 J	5.9 J
CW-SS-19-160622	22-Jun-16	Cove Mesa 2 (Historical)	4042075.979	657975.2607	1.34	0.084 J	1.31	2.7
CW-SS-20a-160622	22-Jun-16	Cove Wash Middle 3C (Downstream of CW-20)	4041601.022	658538.7969	1.73	0.086 J	1.66	3.5 J
CW-SS-21-12-160628	28-Jun-16	Background (Mesa IV Springs) - Subsurface	4043108	655931.0041	0.65	0.034 J	0.63	1.3
CW-SS-21-160620	28-Jun-16	Background (Mesa IV Springs)	4043108	655931.0041	0.74	0.034 J	0.58	1.4 J
CW-SS-26-160620	20-Jun-16	Cove Wash Middle 2 (Historical)	4042501.621	657146.8765	5.41	0.212	5.51	11.1
CW-SS-27-160620	20-Jun-16	Cove Wash Middle 2B	4042693.122	657319.2808	8.9	0.4	8.9	18
CW-SS-29-160622	22-Jun-16	Cove Wash Middle 2C	4042595.541	658108.1172	0.6	0.027 J	0.6	1.2
CW-SS-30-160618	18-Jun-16	Background (West Upstream)	4046867.444	654397.084	0.62	0.029 J	0.53	1.2
CW-SS-31-160618	18-Jun-16	Background (Upstream)	4044527.019	655114.312	0.72	0.049 J	0.62	1.4 J
CW-SS-32-160620	20-Jun-16	Cove Wash Middle 1E	4043933	655741.9975	1.52	0.08 J	1.44	3.0 J
CW-SS-36-160618	18-Jun-16	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	1.14	0.044 J	1.24	2.4
CW-SS-37-160618	18-Jun-16	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	1.66	0.114	1.74	3.5
CW-SS-38-160618	18-Jun-16	Cove Wash Middle (Historical)	4044173	657897.9975	1.74	0.118	1.86	3.7
CW-SS-39-160627	27-Jun-16	Cove Wash Middle 2	4045453.338	658432.5145	4.19	0.205	4.12	8.5
CW-SS-42-12-160627	27-Jun-16	Irrigation Ditch	4045665.7	658700.6	0.94	0.026 U	0.91	1.9
CW-SS-44-160621	21-Jun-16	Pine Water Springs Drainage	4043806.688	661260.5257	0.67	0.042 J	0.57	1.3 J
CW-SS-45-160621	21-Jun-16	Background (Deer Springs Drainage)	4042151.212	661078.7105	0.48	0.046 J	0.45	0.98 J
CW-SS-46-12-160629	29-Jun-16	Pine Water Springs - Subsurface	4043788.61	661352.387	0.88	0.046 J	0.78	1.7
CW-SS-46-160621	21-Jun-16	Pine Water Springs	4043788.61	661352.387	0.69	0.078 J	0.73	1.5 J
CW-SS-47-160617	17-Jun-16	Cove Wash Middle 3F	4043774.185	659297.1492	8.3	0.335	7.6	16
CW-SS-48-160617	17-Jun-16	Cove Wash Middle 3F	4044446.562	659271.0138	0.89	0.057 J	0.96	1.9
CW-SS-50-160624	24-Jun-16	Cove Wash Middle 1	4044856.248	657463.1536	3.62	0.184	3.57	7.4
CW-SS-51-160624	24-Jun-16	Cove Wash Middle 1A	4044944.041	657035.0523	5.9	0.24	5.9	12
CW-SS-52-160624	24-Jun-16	Cove Wash Middle 1G	4044553.333	657329.5884	6.2	0.246	6.4	13
CW-SS-53a-160624	24-Jun-16	Cove Wash Middle 1 (Near original location)	4044567	656816	14.5	0.79	14.7	30
CW-SS-54-160624	24-Jun-16	Cove Wash Middle 1B	4044752.579	656806.108	6.2	0.278	6.1	13
CW-SS-55-160625	25-Jun-16	Cove Wash Middle 1C	4044480.534	656337.5433	5.8	0.274	6	12
CW-SS-56a-160623	23-Jun-16	Cove Wash Middle 3A (Near original location)	4043135	658979	2.63	0.142	2.8	5.6
CW-SS-59-160627	27-Jun-16	Cove Wash Tributary 1 (Downstream)	4051574.576	664210.2048	0.7	0.029 J	0.7	1.4
CW-SS-60-160627	27-Jun-16	Cove Wash between 01 and 02 (Downstream)	4051659.495	664274.984	0.6	0.007 U	0.58	1.2
CW-SS-61-160627	27-Jun-16	Cove Wash Tributary 2 (Downstream)	4051575.939	663979.3813	1.14	0.06 J	0.89	2.1 J
CW-SS-62-160628	28-Jun-16	Downstream of Dam	4046378.374	658785.0735	0.66	0.035 J	0.75	1.4
CW-SS-64-160621	21-Jun-16	Cove Wash North	4045877	656444	0.92	0.054 J	0.92	1.9 J
CW-SS-65-160622	22-Jun-16	Cove Wash Middle 3A	4042362.589	658661.6744	1.87	0.071 J	1.87	3.8 J
CW-SS-66-160622	22-Jun-16	Cove Wash Middle 3A	4042362.589	658661.6744	2.14	0.134	1.9	4.2
CW-SS-69-160618	18-Jun-16	Duplicate of CW-04	4045547.649	655393.8806	0.51	0.041 J	0.4	0.96 J
CW-SS-70-160617	17-Jun-16	Cove Wash Middle 3F	4044525.919	659043.2268	0.73	0.087 J	0.56	1.4 J
CW-SS-71-160618	18-Jun-16	Duplicate of CW-37	4044602.301	658113.5333	1.23	0.053 J	1.19	2.5 J
CW-SS-72-160621	21-Jun-16	Duplicate of CW-11	4045547.649	655393.8806	0.54	0.037 J	0.59	1.2 J
CW-SS-73-160622	22-Jun-16	Cove Wash Middle 3D	4042208.541	658769.5923	0.44	0.014 J	0.49	0.94 J
CW-SS-74-160622	22-Jun-16	Cove Wash Middle 3D	4041604.376	658745.2414	0.68	0.034 J	0.75	0.78 J
CW-SS-75-160622	22-Jun-16	Cove Wash Middle 3D	4041201.219	658764.5801	0.62	0.029 J	0.65	1.3
CW-SS-76-10-160622	22-Jun-16	Duplicate of CW-19	4042075.979	657975.2607	9.7 J	0.44 J	8.5 J	19
CW-SS-77-12-160627	27-Jun-16	Cove Wash Middle 3D	4045656.58	658677.1375	3.73	0.191	3.35	7.3
CW-SS-77-160627	27-Jun-16	Cove Wash Middle 3D - Subsurface	4045656.58	658677.1375	0.83	0.035 J	1.08	1.9
CW-SS-78-160628	28-Jun-16	Duplicate of CW-03	4047985.628	659997.0959	0.59	0.048 J	0.61	1.2
CW-SS-80-160628	28-Jun-16	Duplicate of CW-08	4050235.456	657139.2197	0.39	0.063 J	0.41	0.86 J
CW-SS-81-160629	29-Jun-16	Cove Wash North	4049882.052	658891.9138	0.61	0.034 U	0.5	1.1

Notes:

Coordinates System for Northing/Easting is UTM Zone 12 NAD 83

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J = Compound detected, but result value is approximate.

pCi/g = picocurie per gram

Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Cove Wash Watershed Assessment
2017 Spring Snow Melt Sampling Event
Sediment - Metal Results

EPA Soil Screening Level - Protective of groundwater (Exceedances are bolded, underlined, and highlighted)					NA	0.27	0.29	82	3.2	NA	0.38	NA	180,000	NA	46	NA	14	NA	NA	NA	0.1	NA	NA	NA	NA	0.26	NA	NA	NA	0.14	14	NA	NA
Sample Location	Sample Date	Sample Information	Northing	Easting	Aluminium (mg/kg)	Antimony (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Beryllium (mg/kg)	Boron (mg/kg)	Cadmium (mg/kg)	Calcium (mg/kg)	Chromium (mg/kg)	Cobalt (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Lead (mg/kg)	Lithium (mg/kg)	Magnesium (mg/kg)	Manganese (mg/kg)	Mercury (mg/kg)	Molybdenum (mg/kg)	Nickel (mg/kg)	Phosphorus (mg/kg)	Potassium (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)	Sodium (mg/kg)	Strontium (mg/kg)	Thallium (mg/kg)	Uranium (mg/kg)	Vandium (mg/kg)	Zinc (mg/kg)
CW-SS-01-170426	04/26/2017	Cove Wash (Downstream)	4051637.55	663372.9034	4,100	0.73 U	**1.4**	**130**	0.19	4.1 J	0.18 U	52,000	3.8	2.2	3.2	3,900	4.7	5.5	7,000	350	0.0027 J	0.37 U	5.5	290	1,100	0.18 U	0.37 U	2,400	240	0.43 U	0.54	9.8	7.5
CW-SS-02-170419	04/19/2017	Cove Wash (Downstream)	4053607.153	666731.839	5,500	0.77 U	**1.4**	**260**	0.3 J	3.8 U	0.19 U	65,000	2.7	2.4	2.7	1,700	4.6	8	9,400	440	0.0014 J	0.38 U	6.2	400	1,600	0.19 U	0.38 U	3,500	310	**0.71 J**	0.82	7.4	7.8
CW-SS-03-170426	04/26/2017	Cove Wash South	4047985.628	659997.0959	4,600	0.71 U	**1.9**	**220**	0.36	4.6 J	0.18 U	74,000	7.7	2.8	3.2	5,600	6.9	8.3	8,300	500	0.0036 J	0.35 U	9	400	1,600	0.18 U	0.35 U	2,000	310	0.41 U	0.61	12	8.9
CW-SS-05-170418	04/18/2017	Dam (Historical)	4045709.002	658675.5894	1,600	0.69 U	0.48 J	60	0.17 U	3.4 U	0.17 U	22,000	0.98 J	0.87 J	1.3	1,300	1.9	3.8	3,400	150	0.0012 J	0.34 U	2.1 J	190	430	0.17 U	0.34 U	100 J	68	0.4 U	1.9	6.9	5.7
CW-SS-06-170426	04/26/2017	Cove Wash (Downstream)	4050970.463	659839.728	4,500	0.81 U	**1.6**	**160**	0.21	4.4 J	0.2 U	47,000	3.2	2.3	2.7	4,600	4.8	6.9	6,900	310	0.0033J	0.4 U	4.9	270	1,200	0.2 U	0.4 U	1,700	240	0.47 U	0.81	11	7.9
CW-SS-07-170426	04/26/2017	Cove Wash Middle (Historical)	4047101.942	659123.9337	1,700	0.76 U	**1.1**	42	0.19	3.8 U	0.19 U	19,000	1.7	1.1 J	1.5	2,300	2.2	3.1	2,400	170	0.0026 J	0.38 U	2.3 J	140	500	0.19 U	0.38 U	290	69	0.45 U	0.82	13	5.1
CW-SS-09-170424	04/24/2017	Cove Wash North	4049315.64	658120.2201	6,400	**0.74 J**	**2**	**320**	0.38 J	8 J	0.15 U	87,000	4.6	3.8	3.3	7,400	8.5	11	11,000	600	0.0023 J	0.31 U	6.3	440	1,800	**0.35 J**	0.31 U	3,300	410	0.36 U	0.51	13	9.7
CW-SS-10-170426	04/26/2017	Cottonwood Springs	4049594.436	660198.1416	3,400	0.77 U	**1.5**	**150**	0.22 J	5.4 J	0.19 U	27,000	4.1	2.1	3.8	4,700	4.4	8.2	5,700	150	0.0083 J	0.39 U	4.6	310	1,900	**0.31 J**	0.39 U	990	230	0.45 U	0.5	11	14
CW-SS-11-170421	04/21/2017	Cove Wash North	4046373.007	657265.4893	1400 J	0.76 U	0.38 U	45 J	0.19 U	3.8 U	0.19 U	8,800	1.4	0.57 J	0.95 J	1700 J	1.8	3.2	1,400	95	0.0014 J	0.38 U	1.5 J	100	260 J	0.19 U	0.38 U	81 J	29	**0.63 J**	0.37	8.3 J	4.6
CW-SS-12-170419	04/19/2017	Cove Wash Middle 3	4044603.441	658812.8183	1,400	0.76 U	**2**	**91**	0.19 U	3.8 U	0.19 U	25000 J	3.4	1.3 J	4.1	3,200	4.5	3.1	3,300	160	0.0017 J	0.38 U	3.6	280	370	0.19 U	3.6 J	120 J	88 J	**0.53 J**	0.59	23 J	5.7
CW-SS-15-170425	04/25/2017	Cove Wash North	4046035	656751.9991	5,800	0.81 U	**3.1**	**120**	0.43 J	4 U	0.2 U	14,000	3.6	3	5.5	7,700	6.9	8.9	3,900	270	0.014 J	0.4 U	3.8	280	1,100	0.2 U	0.4 U	77 J	94	0.47 U	1.5	20	17
CW-SS-16-170425	04/25/2017	Cove Wash North	4045602	656065.0033	1,600	0.76 U	**1.6**	44	0.19 U	3.8 U	0.19 U	5,500	0.89	0.86 J	1.8	2,800	3.4	2	760	140	0.0027 J	0.38 U	1 J	90	330	0.19 U	0.38 U	38 U	24	0.44 U	0.43	8.1	5.2
CW-SS-17-170426	04/26/2017	Cove Wash South (Downstream)	4050338.789	662352.1776	2,800	0.62 U	**1.4**	**210**	0.35 J	3.1 U	0.15 U	56,000	5.6	2.1	3.4	4,000	5.4	6.2	4,400	600	0.0039 J	0.31 U	7.9	320	790	0.15 U	0.31 U	700	200	0.36 U	0.92	8.1	7.3
CW-SS-19-170422	04/22/2017	Cove Wash Middle 3B	4042075.979	657975.2607	2,500	0.61 U	**2.5**	60	0.22 J	3.1 U	0.15 U	11,000	1.4	1.5	3.1	4,100	3.7	3.4	1,500	200	0.0016 J	0.31 U	1.9 J	150	490	0.37 J	0.31 U	31 J	48	0.36 U	0.99	8.5	9.3
CW-SS-20a-170422	04/22/2017	Cove Wash Middle 3C	4041601.022	658538.7969	2,400	0.64 U	**2.1**	67	0.19 J	3.2 U	0.16 U	10,000	2.5	1.6	2.7	5,300	3.9	4.2	1,800	160	0.0017 J	0.32 U	2.2	170	470	0.16 U	0.32 U	34 J	39	0.37 U	2	15	10
CW-SS-26-170420	04/20/2017	Cove Wash Middle 2 (Historical)	4042501.621	657146.8765	2,700	0.76 U	**3.2**	51	0.19 J	3.8 U	0.19 U	9,800	2	1.9	4.1	4,700	4.1	4.4	1,900	150	0.0028 J	4.4	2.8	180	630	**6.1**	0.38 U	120 J	58	0.45 U	3.9	50	11
CW-SS-27-170420	04/20/2017	Cove Wash Middle 2B	4042693.122	657319.2808	3,300	0.72 U	**1.2**	70	0.24 J	3.6 U	0.18 U	11,000	3	1.9	2.9	4,600	4.9	6.1	2,700	230	0.0054 J	0.36 U	2.8	240	560	0.18 U	0.36 U	36 U	40	0.42 U	1.6	14	12
CW-SS-29-170420	04/20/2017	Cove Wash Middle 2C	4042595.541	658108.1172	2,200	0.59 U	**1**	47	0.2 J	3 U	0.15 U	18,000	1.2	1.6	3.2	3,800	3.6	3.1	1,300	330	0.0058 J	0.3 U	1.9 J	150	460	0.33 J	0.3 U	30 U	39	0.35 U	1.8	14	8.6
CW-SS-32-170421	04/21/2017	Cove Wash Middle 1E	4043933	655741.9975	5,500	0.72 U	**2.7**	**110**	0.42 J	3.6 U	0.18 U	4,800	4.1	3.7	7.6	8,100	7.6	7.5	3,200	370	0.015 J	0.36 U	5.8	280	1,300	0.56 J	0.36 U	36 U	40	0.42 U	2.5	19	22
CW-SS-36-170420	04/20/2017	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	1,600	0.7 U	0.35 U	59	0.18 U	3.5 U	0.18 U	8,200	1.5	1 J	1.6	2,700	3.1	3	1,300	110	0.0016 J	0.35 U	1.5 J	130	350	0.18 U	0.35 U	35 U	27	0.41 U	3.4	19	6.7
CW-SS-37-170420	04/20/2017	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	2,100	0.73 U	**1.8**	38 J	0.18 U	3.7 U	0.18 U	37,000	1.9	1.3	1.9	3,300	3.4	5	2,100	340	0.0031 J	0.37 U	2.3 J	160	400	0.18 U	0.37 U	66 J	62	0.43 U	4.1 J	51	7.9
CW-SS-38-170420	04/20/2017	Cove Wash Middle (Historical)	4044173	657897.9975	2,300	0.78 U	**1.7**	63	0.2 U	3.9 U	0.2 U	18,000	2	2.2	3.2	4,000	3.9	4.4	2,000	230	0.002 J	0.39 U	2.5 J	140	450	0.2 U	0.39 U	73 J	53	0.46 U	4	57	8.7
CW-SS-39-170418	04/18/2017	Cove Wash Middle 2	4045453.338	658432.5145	1,900	0.78 U	**1.5**	58	0.2 U	3.9 U	0.2 U	13,000	1.9	1 J	1.6	2,800	3.6	3.8	1,700	170	0.002 J	0.39 U	1.9 J	160	380	0.2 U	0.39 U	60 J	38	0.46 U	2.5	23	6.7
CW-SS-44-170419	04/19/2017	Pine Water Springs Drainage	4043806.688	661260.5257	7,100	0.74 U	**2.2**	**150**	1.3	3.7 U	0.18 U	3,500	34	6.8	9.5	10,000	11	10	5,700	210	0.0029 J	0.37 U	46	500	1,900	0.18 U	0.37 U	69 J	54	0.43 U	1.4	16	24
CW-SS-46-170419	04/19/2017	Pine Water Springs	4043788.61	661352.387	3,500	0.78 U	**0.95 J**	**83**	0.7	3.9 U	0.19 U	5,300	19	3.8	34	6,500	6.3	5.3	3,700	89	0.0068 J	0.39 U	28	970	1,100	0.19 U	0.39 U	82 J	75	0.46 U	1.2	13	110
CW-SS-47-170419	04/19/2017	Cove Wash Middle 3F	4043774.185	659297.1492	3,300	0.79 U	**1.1 J**	66	0.21 J	4 U	0.2 U	12,000	3	1.7	2.3	4,000	4.4	6.9	2,900	140	0.006 J	0.4 U	3.2	240	550	0.54 J	0.4 U	49 J	41	0.46 U	**24**	60	10
CW-SS-48-170419	04/19/2017	Cove Wash Middle 3F	4044446.562	659271.0138	2,400	0.75 U	**1.4**	**92**	0.19 U	3.7 U	0.19 U	39,000	3.2	1.8	1.8	4,100	4.6	6	7,100	240	0.0021 J	0.37 U	4.2	260	640	0.19 U	0.37 U	150	130	0.44 U	1.3	11	8.4
CW-SS-50-170421	04/21/2017	Cove Wash Middle 1	4044856.248	657463.1536	2,700	0.8 U	**2.7**	65	0.2 U	4 U	0.2 U	14,000	2.7	1.4	2.4	3,500	3.6	5.6	2,500	140	0.0035 J	0.4 U	2.4 J	190	450	**1.4**	0.4 U	66 J	41	0.47 U	7.2	52	8.7
CW-SS-51-170421	04/21/2017	Cove Wash Middle 1A	4044944.041	657035.0523	3,400	0.76 U	**5.1**	63	0.24 J	3.8 U	0.19 U	18,000	3.3	2.1	4.3	5,000	4.8	7.2	3,200	200	0.0035 J	1.4	3.6	190	570	**0.98**	0.38 U	45 J	60	0.44 U	**14**	110	12
CW-SS-52-170421	04/21/2017	Cove Wash Middle 1G	4044553.333	657329.5884	2,800	0.61 U	**2.4**	52	0.19 J	3 U	0.15 U	13,000	3	1.6	2	3,500	3.8	6.2	2,700	130	0.0026 J	0.39 J	2.8	190	450	0.15 U	0.3 U	30 U	31	0.35 U	**14**	91	8.8
CW-SS-53a-170421	04/21/2017	Cove Wash Middle 3A	4044567	656816	2,900	0.76 U	**1.2 J**	55	0.19 U	3.8 U	0.19 U	8,400	2.9	1.5	2.1	3,600	3.6	6	2,900	110	0.0037 J	0.38 U	2.7	180	450	0.23 J	0.38 U	43 J	29	0.44 U	9.4	44	9.2
CW-SS-54-170421	04/21/2017	Cove Wash Middle 1B	4044752.579	656806.108	2,000	0.71 U	**0.84 J**	26	0.18 U	3.5 U	0.18 U	1,600	2.2	1.4	1.5	2,300	2.6	3.4	1,600	73	0.003 J	0.35 U	2.1 J	82	320	0.24 J	0.35 U	45 J	27	0.41 U	0.89	9.2	5.6
CW-SS-55-170421	04/21/2017	Cove Wash Middle 1C	4044480.534	656337.5433	2,900	0.68 U	**3.2**	73	0.25 J	3.4 U	0.17 U	11,000	1.9	2.1	4.5	4,500	4.1	4.6	2,000	170	0.0033 J	0.48 J	2.9	170	680	**1.8**	0.34 U	73 J	83	0.4 U	6.7	95	11
CW-SS-60-170420	04/20/2017	Cove Wash between 01 and 02 (Downstream)	4051659.495	664274.984	2,800	0.67 U	**1.4**	**190**	0.19 J	3.6 J	0.17 U	62,000	2.9	1.7	2.3	3,300	4.4	4.6	5,200	350	0.0017 J	0.33 U	4.7	250	790	0.17 U	0.33 U	1,800	220	0.39 U	0.63	8.5	6.1
CW-SS-61-170420	04/20/2017	Cove Wash Tributary 2 (Downstream)	4051575.939	663979.3813	2,100	0.6 U	**2.2**	**230**	0.29 J	3.8 J	0.15 U	33,000	5.3	2.1	2.7	3,900	4.8	4.2	4,400	260	0.0012 J	0.3 U	9.2	370	620	0.15 U	0.3 U	2,200	170	0.35 U	0.99	11	7.5
CW-SS-62-170425	04/25/2017	Downstream of Dam	4046378.374	658785.0735	4,500	0.7 U	**1.5**	**150**	0.33 J	3.5 U	0.18 U	35,000	4.7	3.1	6	6,200	7	8.7	4,600	300	0.0097 J	0.35 U	6	350	1,300	0.24 J	0.35 U	74 J	100	0.41 U	0.61	12	15
CW-SS-64-170425	04/25/2017	Cove Wash North	4045877	656444	4,000	0.79 U	**2.1**	**93**	0.32 J	4 U	0.2 U	12,000	2.8	2.4	4.7	5,600	5.2	6.6	2,900	250	0.006 J	0.48 J	2.9	250	800	**0.51 J**	0.4 U	120 J	93	0.46 U	2.2	13	13
CW-SS-65-170422	04/22/2017	Cove Wash Middle 3A	4042362.589	658661.6744	1,900	0.77 U	**2**	38	0.19 U	3.9 U	0.19 U	10,000	1.4	1.1 J	2.1	3,000	2.7	3.4	1,400	120	0.0017 J	0.39 U	1.6 J	130	500	0.19 U	0.39 U	200	42	0.45 U	1.2	7.9	7.8
CW-SS-66-170422	04/22/2017	Cove Wash Middle 3A	4042362.589	658661.6744	2,200	0.74 U	**1.3**	66	0.18 U	3.7 U	0.18 U	17,000	2.2	1.4	2.7	3,900	3.2	4.4	1,900	210	0.0018 J	0.45 J	1.9 J	180	520	**0.98**	0.37 U	150	74	0.43 U	3.7	10	11
CW-SS-69-170424	04/24/2017	Duplicate of CW-04	4045547.649	655393.8806	1,600	0.76 U	**2**	32	0.19 U	3.8 U	0.19 U	3,800	0.53 J	0.76 J	1 J	2,400	1.8	1.7	680	120	0.0018 J	0.38 U	0.96 J	58	250	0.19 U	0.38 U	38 U	23	0.45 U	0.35	4.1	4.9
CW-SS-70-170419	04/19/2017	Cove Wash Middle 3F	4044525.919	659043.2268	3,500	0.74 U	**0.65 J**	**100**	0.22 J	3.9 J	0.18 U	23,000	3.6	1.6	1.8	3,700	3.8	6.5	5,100	180	0.0018 J	0.37 U	3.6	210	770	0.18 U	0.37 U	100 J	64	0.43 U	4.1	10	7.9
CW-SS-71-170420	04/20/2017	Duplicate of CW-37	4044377.806	657955.4587	2,900	0.73 U	**1.5**	87 J	0.2 J	3.6 U	0.18 U	25,000	2.5	1.3	2	3,400	3.4	5.5	2,100	290	0.0036 J	0.36 U	2.3 J	150	630	0.3 J	0.36 U	71 J	63	0.43 U	8.9 J	52	8
CW-SS-72-170421	04/21/2017	Duplicate of CW-11	4046373.007	657265.4893	2800 J	0.69 U	**1.3 J**	100 J	0.18 J	3.5 U	0.17 U	6,800	2.5	0.95 J	1.2	2900 J	2.7	4.6	2,000	120	0.0019 J	0.35 U	1.9 J	120	470 J	0.17 U	0.35 U	49 J	28	0.4 U	0.52	30 J	6.1
CW-SS-73-170422	04/22/2017	Cove Wash Middle 3D	4042208.541	658769.5923	2,400	0.73 U	**2.1**	75	0.18 U	3.7 U	0.18 U	13,000	2.2	1.4	2.7	4,600	3.7	3.8	1,700	170	0.0013 J	0.37 U	2 J	180	510	0.18 U	0.37 U	67 J	67	0.43 U	1.4	10	9.5
CW-SS-74-170422	04/22/2017	Cove Wash Middle 3D	4041604.376	658745.2414	3,400	0.61 UJ	**2.3**	67	0.27 J	3.1 U	0.15 U	17,000	2.7	2.3	4.9	5,400	5.1	6.4	2,700	240	0.0046 J	0.31 U	2.9	230	760	**0.32 J**	0.31 U	39 J	76	0.36 U	3	13	13
CW-SS-75-170422	04/22/2017	Cove Wash Middle 3D	4041201.219	658764.5801	2,000	0.75 U	**1.4**	43	0.19 U	3.7 U	0.19 U	9,200	2.1	1.4	2.5	3,500	3.8	4	1,600	110	0.0056 J	0.37 U	2.5 J	170	570	0.19 U	0.37 U	70 J	50	0.44 U	3.4	11	8.7
CW-SS-76-170422	04/22/2017	Duplicate of CW-19	4042075.979	657975.2607	2,300	0.77 U	**2.1**	49	0.19 U	3.9 U	0.19 U	8,400	1.5	1.6	2.9	4,000	3.2	3.2	1,300	150	0.0031 J	0.39 U	2.3 J	130	550	0.19	0.39 U	39 U	42	0.45 U	1.3	9.8	8.8
CW-SS-77-170418	04/18/2017	Cove Wash Middle 3D	4045656.58	658677.1375	2,300	0.68 U	**1.2**	**110**	0.17 U	3.4 U	0.17 U	22,000	2.4	1 J	1.2	2,800	2.8	4.3	2,200	170	0.0018 J	0.34 U	2 J	120	520	0.35 J	0.34 U	52 J	39	0.4 U	3.8	22	6.3
CW-SS-78-170426	04/26/2017	Duplicate of CW-03	4047985.628	659997.0959	4,700	0.7 U	**2.4**	**210**	0.4 J	4.3 J	0.17 U	110,000	8.7	3.6	5.3	5,700	7.5	8.7	10,000	640	0.0036 J	0.35 U	12	460	1,700	0.17 U	0.35 U	2,200	390	0.41 U	0.82	16	10
CW-SS-80-170426	04/26/2017	Duplicate of CW-08	4050235.456	657139.2197	8,600	0.63 U	**1.5**	**150**	0.31 J	12 J	0.16 U	63,000	5.4 J	3.1	4	6,300	5.5	11 J	11,000	290	0.017 J	0.32 U	7.1	350	2,900	0.16 U	0.32 U	3,500	290	0.37 U	0.35	10	12
CW-SS-81-170424	04/24/2017	Cove Wash North	4049882.052	658891.9138	9,000	0.84 U	**2.8**	**250**	0.36 J	8 J	0.21 U	88,000	4.8	4.2	4.8	8,500	7.9	12	12,000	530	0.004 J	0.42 U	8.1	390	2,500	0.21 U	0.42 U	4,900	470	0.49 U	0.5	18	11
CW-SS-82-170424	04/24/2017	Cove Wash Middle 2A	4044047.322	657766.4468	1,700	0.76 U	**1.8**	40	0.19 U	3.8 U	0.19 U	15,000	1.7	1.1 J	1.8	2,700	2.6	3.8	1,500	160	0.0026 J	0.38 U	1.6 J	100	390	0.19 U	0.38 U	71	36	0.45 U	2	20	6.2
CW-SS-83-170424	04/24/2017	Cove Wash Middle 2A	4044045.08	657643.9635	1,100	0.7 U	**0.55**	35	0.17 U	3.5 U	0.17 U	4,100	1.2	0.58 J	0.81 J	1,800	1.4	2.3	940	72	0.0022 J	0.35 U	0.9 J	72	240	0.17 U	0.35 U	35	15	0.41 U	0.23	5.3	4.1
CW-SS-84-170424	04/24/2017	Cove Wash Middle 2B	4043793.108	657816.7814	2,000	0.71 U	**0.88**	76	0.18 U	3.6 U	0.18 U	29,000	2	1.3	1.8	4,700	3.1	5	1,800	270	0.0029 J	0.36 U	1.8 J	160	450	0.18 U	0.36 U	66	46	0.42 U	2.1	100	8.3
CW-SS-85-170424	04/24/2017	Cove Wash Middle 2A	4043732.792	657461.944	1,800	0.77 U	**0.55**	**89**	0.19 U	3.8 U	0.19 U	8,100	1.9	1 J	1.5	2,700	2.3	3.7	1,600	130	0.003 J	0.38 U	1.5 J	150	380	0.19 U	0.38 U	44	29	0.45 U	0.42	6.7	6.4
CW-SS-89-170422	04/22/2017	Duplicate of CW-66	4042338.663	658652.0815	2,000	0.68 U	**1.8**	39	0.17 U	3.4 U	0.17 U	14,000	1.8	1.2	2.7	3,300	3.9	4.2	1,700	170	0.003 J	0.34 U	2 J	140	560	**0.52 J**	0.34 U	130	62	0.4 U	1.6	9.6	8.3
CW-SS-90-170426	04/26/2017	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	14,000	0.87 U	**3.8**	**170**	0.82	9.4 J	0.22 U	31,000	9.2	5.7	14	12,000	10	24	9,200	330	0.037 J	0.58 J	8.5	510	2,600	**0.77**	0.43 U	160	200	0.51 U	**17**	69	33

Notes:
EPA = Environmental Protection Agency
NA = Not Applicable
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
mg/kg = milligram per kilogram
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Cove Wash Watershed Assessment
2017 Spring Snowmelt Sampling Event
Sediment - Radium Results

Sample Location	Sample Date	Sample Information	Northing	Easting	Radium 226 (pCi/g)	Radium 228 (pCi/g)	Combined Radium 226/228 (pCi/g)
CW-SS-01-170426	04/26/2017	Cove Wash (Downstream)	4051637.55	663372.9034	0.8 J	0.2	1 J
CW-SS-02-170419	04/19/2017	Cove Wash (Downstream)	4053607.153	666731.839	0.55 J	0.99 J	1.5 J
CW-SS-03-170426	04/26/2017	Cove Wash South	4047985.628	659997.0959	0.86 J	0.75	1.6 J
CW-SS-04-170424	04/24/2017	Background (Upstream)	4045547.649	655393.8806	0.5 J	0.28 U	0.5 J
CW-SS-05-170418	04/18/2017	Dam (Historical)	4045709.002	658675.5894	1.34	0.22 U	1.34
CW-SS-06-170426	04/26/2017	Cove Wash (Downstream)	4050970.463	659839.728	0.44	0.62 U	0.44
CW-SS-07-170426	04/26/2017	Cove Wash Middle (Historical)	4047101.942	659123.9337	1.49	0.3 U	1.49
CW-SS-08-170426	04/26/2017	Background (Downstream)	4050235.456	657139.2197	0.49	0.84	1.3
CW-SS-09-170424	04/24/2017	Cove Wash North	4049315.64	658120.2201	0.58 J	0.75 J	1.3 J
CW-SS-10-170426	04/26/2017	Cottonwood Springs	4049594.436	660198.1416	0.89	0.36	1.3
CW-SS-11-170421	04/21/2017	Cove Wash North	4046373.007	657265.4893	0.43 J	0.37 U	0.43 J
CW-SS-12-170419	04/19/2017	Cove Wash Middle 3	4044603.441	658812.8183	1.22	0.19 U	1.22
CW-SS-15-170425	04/25/2017	Cove Wash North	4046035	656751.9991	1.45 J	0.65	2.1 J
CW-SS-16-170425	04/25/2017	Cove Wash North	4045602	656065.0033	0.5	0.37 U	0.5
CW-SS-17-170426	04/26/2017	Cove Wash South (Downstream)	4050338.789	662352.1776	0.92 J	0.67	1.6 J
CW-SS-18-170418	04/18/2017	Background (Cove Wash Middle 1)	4045597.485	658407.8511	0.62 J	0.29 U	0.62 J
CW-SS-19-12-170422	04/22/2017	Cove Wash Middle 3B - Subsurface	4042075.979	657975.2607	5.86	0.55 U	5.86
CW-SS-19-170422	04/22/2017	Cove Wash Middle 3B	4042075.979	657975.2607	1.34 J	0.55 J	1.89 J
CW-SS-20a-170422	04/22/2017	Cove Wash Middle 3C	4041601.022	658538.7969	1.26	0.73 J	1.99 J
CW-SS-21-12-170421	04/21/2017	Background (Mesa IV Springs) - Subsurface	4043108	655931.0041	0.71 J	0.58 U J	0.71 J
CW-SS-21-170421	04/21/2017	Background (Mesa IV Springs)	4043108	655931.0041	0.43 U J	0.23 U J	0.43 U J
CW-SS-26-170420	04/20/2017	Cove Wash Middle 2 (Historical)	4042501.621	657146.8765	1.62	0.82 J	2.44 J
CW-SS-27-170420	04/20/2017	Cove Wash Middle 2B	4042693.122	657319.2808	2.9	0.41 U	2.9
CW-SS-29-170420	04/20/2017	Cove Wash Middle 2C	4042595.541	658108.1172	2.52	0.62 U	2.52
CW-SS-30-170424	04/24/2017	Background (West Upstream)	4046867.444	654397.084	0.45 J	0.31 U	0.45 J
CW-SS-31-170424	04/24/2017	Background (Upstream)	4044527.019	655114.312	0.7 J	0.2 U	0.7 J
CW-SS-32-170421	04/21/2017	Cove Wash Middle 1E	4043933	655741.9975	2.66	0.91 J	3.57 J
CW-SS-36-170420	04/20/2017	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	1.58	0.22 U	1.58
CW-SS-37-170420	04/20/2017	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	4.73	0.07 U	4.73
CW-SS-38-170420	04/20/2017	Cove Wash Middle (Historical)	4044173	657897.9975	7.27	0.64 U	7.27
CW-SS-39-170418	04/18/2017	Cove Wash Middle 2	4045453.338	658432.5145	2.41	0.02 U	2.41
CW-SS-42-12-170419	04/19/2017	Irrigation Ditch - Subsurface	4045665.019	658693.5664	1.83	0.62 J	2.45 J
CW-SS-44-170419	04/19/2017	Pine Water Springs Drainage	4043806.688	661260.5257	1.32	1.27	2.59
CW-SS-45-170419	04/19/2017	Background (Deer Springs Drainage)	4042151.212	661078.7105	0.75 J	0.72 U	0.75 J
CW-SS-46-12-170419	04/19/2017	Pine Water Springs- Subsurface	4043788.61	661352.387	1.02	1.23	2.25
CW-SS-46-170419	04/19/2017	Pine Water Springs	4043788.61	661352.387	1.28	1.39 J	2.67 J
CW-SS-47-170419	04/19/2017	Cove Wash Middle 3F	4043774.185	659297.1492	12.7	0.44 U	12.7
CW-SS-48-170419	04/19/2017	Cove Wash Middle 3F	4044446.562	659271.0138	1.05	0.41 U	1.05
CW-SS-50-170421	04/21/2017	Cove Wash Middle 1	4044856.248	657463.1536	6.51	0.26 U	6.51
CW-SS-51-170421	04/21/2017	Cove Wash Middle 1A	4044944.041	657035.0523	16.7	0.65 U	16.7
CW-SS-52-170421	04/21/2017	Cove Wash Middle 1G	4044553.333	657329.5884	2.56	0.17 U	2.56
CW-SS-53a-170421	04/21/2017	Cove Wash Middle 3A	4044567	656816	6.41	0.4 U	6.41
CW-SS-54-170421	04/21/2017	Cove Wash Middle 1B	4044752.579	656806.108	1.45	0.22 U	1.45
CW-SS-55-170421	04/21/2017	Cove Wash Middle 1C	4044480.534	656337.5433	3.79	0.27 U	3.79
CW-SS-59-170420	04/20/2017	Background - Cove Wash Tributary 1 (Downstream)	4051574.576	664210.2048	0.89 J	0.84 J	1.7 J
CW-SS-60-170420	04/20/2017	Cove Wash between 01 and 02 (Downstream)	4051659.495	664274.984	0.64 J	0.5 J	1.14 J
CW-SS-61-170420	04/20/2017	Cove Wash Tributary 2 (Downstream)	4051575.939	663979.3813	0.71 J	0.42 U J	0.71 J
CW-SS-62-170425	04/25/2017	Downstream of Dam	4046378.374	658785.0735	0.73 J	0.42 U	0.73 J
CW-SS-64-170425	04/25/2017	Cove Wash North	4045877	656444	1.05	0.55 U	1.05
CW-SS-65-170422	04/22/2017	Cove Wash Middle 3A	4042362.589	658661.6744	0.92 J	0.42 U	0.92 J
CW-SS-66-170422	04/22/2017	Cove Wash Middle 3A	4042362.589	658661.6744	1.18	0.52 U	1.18
CW-SS-69-170424	04/24/2017	Duplicate of CW-04	4045547.649	655393.8806	0.5 J	0.58 U	0.5 J
CW-SS-70-170419	04/19/2017	Cove Wash Middle 3F	4044525.919	659043.2268	0.94 J	0.31 U	0.94 J
CW-SS-71-170420	04/20/2017	Duplicate of CW-37	4044377.806	657955.4587	4.64	0.27 U	4.64
CW-SS-72-170421	04/21/2017	Duplicate of CW-11	4046373.007	657265.4893	0.42 J	0.47 J	0.89 J
CW-SS-73-170422	04/22/2017	Cove Wash Middle 3D	4042208.541	658769.5923	1.53	0.56 U	1.53
CW-SS-74-170422	04/22/2017	Cove Wash Middle 3D	4041604.376	658745.2414	2.7	0.33 U	2.7
CW-SS-75-170422	04/22/2017	Cove Wash Middle 3D	4041201.219	658764.5801	1.1	0.08 U	1.1
CW-SS-76-12-170422	04/22/2017	Duplicate of CW-19 - Subsurface	4042075.979	657975.2607	0.44 J	0.62 U	0.44 J
CW-SS-76-170422	04/22/2017	Duplicate of CW-19	4042075.979	657975.2607	7.29 J	0.36 U	7.29 J
CW-SS-77-170418	04/18/2017	Cove Wash Middle 3D	4045656.58	658677.1375	3.36 J	0.24 U J	3.36 J
CW-SS-78-170426	04/26/2017	Duplicate of CW-03	4047985.628	659997.0959	0.77	0.83	1.6
CW-SS-80-170426	04/26/2017	Duplicate of CW-08	4050235.456	657139.2197	0.43 J	0.55 U J	0.43 J
CW-SS-81-170424	04/24/2017	Cove Wash North	4049882.052	658891.9138	3.98	0.04 U	3.98
CW-SS-82-170424	04/24/2017	Cove Wash Middle 2A	4044047.322	657766.4468	0.56 J	0.54 U	0.56 J
CW-SS-83-170424	04/24/2017	Cove Wash Middle 2A	4044045.08	657643.9635	6.27	0.27 U	6.27
CW-SS-84-170424	04/24/2017	Cove Wash Middle 2B	4043793.108	657816.7814	15.1	0.29 U	15.1
CW-SS-85-170424	04/24/2017	Cove Wash Middle 2A	4043732.792	657461.944	1.36	0.47 U	1.36
CW-SS-86-170419	04/19/2017	Background - Cove Wash Middle 3G	4044482.433	659284.4116	0.75 J	0.48 U	0.75 J
CW-SS-87-170419	04/19/2017	Background - Cove Wash Middle 3G	4044365.372	659573.3554	0.43 J	0.47 U	0.43 J
CW-SS-88-170422	04/22/2017	Background -Unnamed Tributary to Cove Wash Middle	4041663.506	658834.4595	0.75 J	0.55 J	1.3 J
CW-SS-89-170422	04/22/2017	Duplicate of CW-66	4042338.663	658652.0815	0.9 J	0.33 U	0.9 J
CW-SS-90-170426	04/26/2017	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	6.06	0.05 U	6.06

Notes:
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
pCi/g = picocurie per gram
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Cove Wash Watershed Assessment
2017 Spring Snowmelt Sampling Event
Sediment - Uranium Isotope Results

Sample Location	Sample Date	Sample Information	Northing	Easting	U-233/U-234 (pCi/g)	U-235/U-236 (pCi/g)	U-238 (pCi/g)	Total U Isotope Activity (pCi/g)
CW-SS-01-170426	04/26/2017	Cove Wash (Downstream)	4051637.55	663372.9034	0.57	0.024 U	0.7	1.3
CW-SS-02-170419	04/19/2017	Cove Wash (Downstream)	4053607.153	666731.839	0.61	0.051 J	0.64	1.3
CW-SS-03-170426	04/26/2017	Cove Wash South	4047985.628	659997.0959	0.58	0.068 J	0.53	1.2 J
CW-SS-04-170424	04/24/2017	Background (Upstream)	4045547.649	655393.8806	0.34	0.02 U	0.47	0.8
CW-SS-05-170418	04/18/2017	Dam (Historical)	4045709.002	658675.5894	1.08	0.054 J	0.97	2.1
CW-SS-06-170426	04/26/2017	Cove Wash (Downstream)	4050970.463	659839.728	0.62	0.021 U	0.49	1.1
CW-SS-07-170426	04/26/2017	Cove Wash Middle (Historical)	4047101.942	659123.9337	0.67	0.019 U	0.61	1.3
CW-SS-08-170426	04/26/2017	Background (Downstream)	4050235.456	657139.2197	0.39	0.021 U	0.4	0.8
CW-SS-09-170424	04/24/2017	Cove Wash North	4049315.64	658120.2201	0.54	0.047 J	0.58	1.1
CW-SS-10-170426	04/26/2017	Cottonwood Springs	4049594.436	660198.1416	0.69	0.016 U	0.52	1.2
CW-SS-11-170421	04/21/2017	Cove Wash North	4046373.007	657265.4893	0.49	0.025 J	0.4	0.9
CW-SS-12-170419	04/19/2017	Cove Wash Middle 3	4044603.441	658812.8183	0.47	0.019 J	0.47	0.9
CW-SS-15-170425	04/25/2017	Cove Wash North	4046035	656751.9991	1.48	0.081 J	1.28	2.8 J
CW-SS-16-170425	04/25/2017	Cove Wash North	4045602	656065.0033	0.349	0.032 J	0.41	0.79 J
CW-SS-17-170426	04/26/2017	Cove Wash South (Downstream)	4050338.789	662352.1776	0.76	0.037 J	0.76	1.6 J
CW-SS-18-170418	04/18/2017	Background (Cove Wash Middle 1)	4045597.485	658407.8511	0.44	0.015 J	0.43	0.9
CW-SS-19-12-170422	04/22/2017	Cove Wash Middle 3B - Subsurface	4042075.979	657975.2607	2.4	0.131	2.62	5.2
CW-SS-19-170422	04/22/2017	Cove Wash Middle 3B	4042075.979	657975.2607	0.66	0.025 U	0.76	1.4
CW-SS-20a-170422	04/22/2017	Cove Wash Middle 3C	4041601.022	658538.7969	0.8	0.043 J	0.66	1.5
CW-SS-21-12-170421	04/21/2017	Background (Mesa IV Springs) - Subsurface	4043108	655931.0041	0.71	0.033 J	0.56	1.3
CW-SS-21-170421	04/21/2017	Background (Mesa IV Springs)	4043108	655931.0041	0.7	0.035 J	0.42	1.1
CW-SS-26-170420	04/20/2017	Cove Wash Middle 2 (Historical)	4042501.621	657146.8765	1.37	0.089 J	1.33	2.7
CW-SS-27-170420	04/20/2017	Cove Wash Middle 2B	4042693.122	657319.2808	7.2	0.208	7	14.4
CW-SS-29-170420	04/20/2017	Cove Wash Middle 2C	4042595.541	658108.1172	1.93	0.103	1.93	4.0
CW-SS-30-170424	04/24/2017	Background (West Upstream)	4046867.444	654397.084	0.265	0.041 J	0.307	0.6
CW-SS-31-170424	04/24/2017	Background (Upstream)	4044527.019	655114.312	0.46	0.039 J	0.41	0.9
CW-SS-32-170421	04/21/2017	Cove Wash Middle 1E	4043933	655741.9975	1.46	0.066 J	1.26	2.7
CW-SS-36-170420	04/20/2017	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	0.96	0.058 J	0.93	1.9
CW-SS-37-170420	04/20/2017	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	2.62	0.059 J	2.55	5.2
CW-SS-38-170420	04/20/2017	Cove Wash Middle (Historical)	4044173	657897.9975	3.7	0.155	3.28	7.1
CW-SS-39-170418	04/18/2017	Cove Wash Middle 2	4045453.338	658432.5145	3.37	0.124	3.32	6.8
CW-SS-42-12-170419	04/19/2017	Irrigation Ditch	4045665.019	658693.5664	0.84	0.003 U	0.89	1.7
CW-SS-44-170419	04/19/2017	Pine Water Springs Drainage	4043806.688	661260.5257	0.85	0.041 J	0.98	1.8
CW-SS-45-170419	04/19/2017	Background (Deer Springs Drainage)	4042151.212	661078.7105	0.45	0.024 U	0.43	0.9
CW-SS-46-12-170419	04/19/2017	Pine Water Springs- Subsurface	4043788.61	661352.387	0.8	0.032 U	0.79	1.6
CW-SS-46-170419	04/19/2017	Pine Water Springs	4043788.61	661352.387	0.87	0.062 J	0.85	1.7
CW-SS-47-170419	04/19/2017	Cove Wash Middle 3F	4043774.185	659297.1492	8.6	0.41	8.8	17.8
CW-SS-48-170419	04/19/2017	Cove Wash Middle 3F	4044446.562	659271.0138	0.51	0.055 J	0.57	1.1
CW-SS-50-170421	04/21/2017	Cove Wash Middle 1	4044856.248	657463.1536	4.41	0.167	3.95	8.5
CW-SS-51-170421	04/21/2017	Cove Wash Middle 1A	4044944.041	657035.0523	7.6	0.333	8	16
CW-SS-52-170421	04/21/2017	Cove Wash Middle 1G	4044553.333	657329.5884	1.44	0.055 J	1.44	2.9
CW-SS-53a-170421	04/21/2017	Cove Wash Middle 3A	4044567	656816	2.99	0.138	2.66	5.8
CW-SS-54-170421	04/21/2017	Cove Wash Middle 1B	4044752.579	656806.108	0.63	0.039 J	0.59	1.2
CW-SS-55-170421	04/21/2017	Cove Wash Middle 1C	4044480.534	656337.5433	2.88	0.138	3	6.0
CW-SS-59-170420	04/20/2017	Background - Cove Wash Tributary 1 (Downstream)	4051574.576	664210.2048	0.67	0.012 U	0.61	1.3
CW-SS-60-170420	04/20/2017	Cove Wash between 01 and 02 (Downstream)	4051659.495	664274.984	0.46	0.045 J	0.56	1.0
CW-SS-61-170420	04/20/2017	Cove Wash Tributary 2 (Downstream)	4051575.939	663979.3813	0.79	0.018 U	0.69	3.1 J
CW-SS-62-170425	04/25/2017	Downstream of Dam	4046378.374	658785.0735	0.52	0.03 J	0.53	1.1
CW-SS-64-170425	04/25/2017	Cove Wash North	4045877	656444	1.55	0.083 J	1.48	3.1 J
CW-SS-65-170422	04/22/2017	Cove Wash Middle 3A	4042362.589	658661.6744	0.79	0.049 J	0.8	1.6
CW-SS-66-170422	04/22/2017	Cove Wash Middle 3A	4042362.589	658661.6744	1.03	0.018 U	1.06	2.1
CW-SS-69-170424	04/24/2017	Duplicate of CW-04	4045547.649	655393.8806	0.319	0.016 U	0.329	0.6
CW-SS-70-170419	04/19/2017	Cove Wash Middle 3F	4044525.919	659043.2268	3.1	0.151	2.94	6.2
CW-SS-71-170420	04/20/2017	Duplicate of CW-37	4044377.806	657955.4587	1.65	0.046 J	1.55	3.2
CW-SS-72-170421	04/21/2017	Duplicate of CW-11	4046373.007	657265.4893	0.4	0.021 U	0.41	0.8
CW-SS-73-170422	04/22/2017	Cove Wash Middle 3D	4042208.541	658769.5923	0.98	0.026 U	0.98	2.0
CW-SS-74-170422	04/22/2017	Cove Wash Middle 3D	4041604.376	658745.2414	1.24	0.062 J	1.44	2.7
CW-SS-75-170422	04/22/2017	Cove Wash Middle 3D	4041201.219	658764.5801	1.21	0.07 J	1.05	2.3
CW-SS-76-12-170422	04/22/2017	Duplicate of CW-19	4042075.979	657975.2607	3.74	0.211	3.71	7.7
CW-SS-76-170422	04/22/2017	Duplicate of CW-19	4042075.979	657975.2607	2.21	0.092 J	2.27	4.6 J
CW-SS-77-170418	04/18/2017	Cove Wash Middle 3D	4045656.58	658677.1375	2.03	0.074 J	1.62	3.7
CW-SS-78-170426	04/26/2017	Duplicate of CW-03	4047985.628	659997.0959	0.74	0.038 J	0.63	1.4
CW-SS-80-170426	04/26/2017	Duplicate of CW-08	4050235.456	657139.2197	0.4	0.014 J	0.45	0.9
CW-SS-81-170424	04/24/2017	Cove Wash North	4049882.052	658891.9138	0.59	0.019 J	0.47	1.1
CW-SS-82-170424	04/24/2017	Cove Wash Middle 2A	4044047.322	657766.4468	2.62	0.169	2.59	5.4
CW-SS-83-170424	04/24/2017	Cove Wash Middle 2A	4044045.08	657643.9635	0.322	0.019 J	0.33	0.67 J
CW-SS-84-170424	04/24/2017	Cove Wash Middle 2B	4043793.108	657816.7814	4.59	0.192	4.31	9.1
CW-SS-85-170424	04/24/2017	Cove Wash Middle 2A	4043732.792	657461.944	0.61	0.039 J	0.61	1.3 J
CW-SS-86-170419	04/19/2017	Background - Cove Wash Middle 3G	4044482.433	659284.4116	0.45	0.015 U	0.36	0.8
CW-SS-87-170419	04/19/2017	Background - Cove Wash Middle 3G	4044365.372	659573.3554	0.313	0.025 J	0.315	0.6
CW-SS-88-170422	04/22/2017	Background -Unnamed Tributary to Cove Wash Middle 3A	4041663.506	658834.4595	0.54	0.026 J	0.52	1.1 J
CW-SS-89-170422	04/22/2017	Duplicate of CW-66	4042338.663	658652.0815	1.13	0.03 U	0.95	2.1
CW-SS-90-170426	04/26/2017	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	3.41	0.122	3.31	6.8

Notes:
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
pCi/g = picocurie per gram
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

APPENDIX H:

SEDIMENT SAMPLES – SUMMARY OF RESULTS FOR ANALYTES EXCEEDING SCREENING LEVELS

Cove Wash Watershed Assessment
Appendix H-1
Uranium Results - Sediment

EPA Soil Screening Level - Protective of groundwater				14	14	14	14
Sample ID	Sample Information	Northing	Easting	2015 Low Flow Sampling Event	2016 Spring Snowmelt Sampling Event	2016 Low Flow Sampling Event	2017 Spring Snowmelt Sampling Event
CW-SS-01	Cove Wash (Downstream)	4051637.55	663372.9034	1	0.89	2.3	0.54
CW-SS-02	Cove Wash (Downstream)	4053607.153	666731.839	1.6	0.94	0.84	0.82
CW-SS-57	Duplicate of CW-02	4053607.153	666731.839	NC	1.3	NC	NC
CW-SS-03	Cove Wash South	4047985.628	659997.0959	1	0.82	0.93 J	0.61
CW-SS-78	Duplicate of CW-03	4047985.628	659997.0959	NC	NC	0.96	0.82
CW-SS-04	Background (Upstream)	4045547.649	655393.8806	8.1	0.4	0.6	0.33 J
CW-SS-69	Duplicate of CW-04	4045547.649	655393.8806	NC	NC	0.68	0.35
CW-SS-05	Dam (Historical)	4045709.002	658675.5894	5.3	11	4.5	1.9
CW-SS-06	Cove Wash (Downstream)	4050970.463	659839.728	2	0.56	0.51	0.81
CW-SS-07	Cove Wash Middle (Historical)	4047101.942	659123.9337	6.5	2.9	3.9	0.82
CW-SS-08	Background (Downstream)	4050235.456	657139.2197	0.35	0.26	0.34	0.23
CW-SS-80	Duplicate of CW-08	4050235.456	657139.2197	NC	NC	0.3	0.35
CW-SS-09	Cove Wash North	4049315.64	658120.2201	0.42	0.6	0.5	0.51
CW-SS-10	Cottonwood Springs	4049594.436	660198.1416	1.5	0.75	0.7	0.5
CW-SS-11	Cove Wash North	4046373.007	657265.4893	0.64	1	0.57	0.37
CW-SS-72	Duplicate of CW-11	4046373.007	657265.4893	NC	NC	0.52	0.52
CW-SS-12	Cove Wash Middle 3	4044603.441	658812.8183	3.5	5.4	1.1	0.59
CW-SS-13	Cove Wash Middle 3	4043160.908	658957.686	**39**	7	4.2	NC
CW-SS-14	Cove Wash Middle 3E	4042934	659222	**85**	2.9	2.9	NC
CW-SS-15	Cove Wash North	4046035	656751.9991	1.2	1.6	1.9	1.5
CW-SS-16	Cove Wash North	4045602	656065.0033	1.1	1.2	1.7	0.43
CW-SS-17	Cove Wash South (Downstream)	4050338.789	662352.1776	1.1	0.94	1.8	0.92
CW-SS-18	Background (Cove Wash Middle 1)	4045597.485	658407.8511	0.49	0.27	0.24	0.24
CW-SS-19	Cove Wash Middle 3B	4042075.979	657975.2607	2.9 J	8.6	2.1	0.99
CW-SS-76	Duplicate of CW-19	4042075.979	657975.2607	NC	NC	NC	1.3
CW-SS-19-12	Cove Wash Middle 3B - Subsurface	4042075.979	657975.2607	4.9	6	5.5	4.7
CW-SS-76-12	Duplicate of CW-19 - Subsurface	4042075.979	657975.2607	NC	NC	5.6	9.2
CW-SS-20	Cove Wash Middle 3C	4041480.197	658288.117	3.1	5.6	NC	NC
CW-SS-20a	Cove Wash Middle 3C	4041601.022	658538.7969	NC	NC	4.8	2
CW-SS-21	Background (Mesa IV Springs)	4043108	655931.0041	1.1	0.88	0.86	0.5
CW-SS-21-12	Background (Mesa IV Springs) - Subsurface	4043108	655931.0041	0.56	0.56	0.65	0.46
CW-SS-26	Cove Wash Middle 2 (Historical)	4042501.621	657146.8765	1.8	4.7	**14**	3.9
CW-SS-27	Cove Wash Middle 2B	4042693.122	657319.2808	9.3	**18**	**100**	1.6
CW-SS-28	Duplicate of CW-SS-27	4042693.122	657319.281	8.1	NC	NC	NC
CW-SS-63	Duplicate of CW-27	4042693.122	657319.281	NC	**20**	NC	NC
CW-SS-29	Cove Wash Middle 2C	4042595.541	658108.1172	1.6	3.4	1.1	1.8
CW-SS-30	Background (West Upstream)	4046867.444	654397.084	0.32	0.7	0.53	0.21
CW-SS-31	Background (Upstream)	4044527.019	655114.312	0.28	0.54	0.48	0.35
CW-SS-32	Cove Wash Middle 1E	4043933	655741.9975	1.3	2.1	2.3	2.5
CW-SS-36	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	6.1	2.9	1.9	3.4
CW-SS-37	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	**14**	2.9	3.7	4.1 J
CW-SS-71	Duplicate of CW-37	4044377.806	657955.4587	NC	NC	2.1	8.9 J
CW-SS-38	Cove Wash Middle (Historical)	4044173	657897.9975	4	4.3	2	4
CW-SS-39	Cove Wash Middle 2	4045453.338	658432.5145	8.6	2.2	3.7	2.5
CW-SS-41	Cove Wash Middle 1	4045552	658464	0.34	2.6	NC	NC
CW-SS-42-12	Irrigation Ditch - Subsurface	4045665.019	658693.5664	3.8	2.6	2.3	1.3
CW-SS-43-12	Dam Subsurface - Cove Middle	4045684.910	658673.278	2	NC	NC	NC
CW-SS-44	Pine Water Springs Drainage	4043806.688	661260.5257	1.9	0.59	0.83	1.4
CW-SS-45	Background (Deer Springs Drainage)	4042151.212	661078.7105	0.43	0.23	0.31	0.49
CW-SS-46	Pine Water Springs	4043788.61	661352.387	1.2	0.99	1.2	1.2
CW-SS-46-12	Pine Water Springs- Subsurface	4043788.61	661352.387	0.82	1.2	1.5	0.86
CW-SS-47	Cove Wash Middle 3F	4043774.185	659297.1492	**16**	1.7	**16**	**24**
CW-SS-48	Cove Wash Middle 3F	4044446.562	659271.0138	5.7	0.35	2.5	1.3
CW-SS-50	Cove Wash Middle 1	4044856.248	657463.1536	7.4	**65 J**	9.4	7.2
CW-SS-58	Duplicate of CW-50	4044856.247	657463.154	NC	**36 J**	NC	NC
CW-SS-51	Cove Wash Middle 1A	4044944.041	657035.0523	8.3	8	11	**14**
CW-SS-52	Cove Wash Middle 1G	4044553.333	657329.5884	1.2	2.7	5.5	**14**
CW-SS-53	Cove Wash Middle 1	4044478	656787	4.1	NC	NC	NC
CW-SS-53a	Cove Wash Middle 3A	4044567	656816	NC	**16**	11	9.4
CW-SS-54	Cove Wash Middle 1B	4044752.579	656806.108	**17**	5.2	**24**	0.89
CW-SS-55	Cove Wash Middle 1C	4044480.534	656337.5433	3.2	6.8	**14**	6.7
CW-SS-55a	Cove Wash Middle 2	4044480.534	656337.545	NC	1.7	NC	NC
CW-SS-56	Cove Wash Middle 3A	4042779	658775	4.1	NC	NC	NC
CW-SS-56a	Cove Wash Middle 3A	4043135	658979	NC	2	2.8	NC
CW-SS-59	Background - Cove Wash Tributary 1 (Downstream)	4051574.576	664210.2048	NC	1.5	1.5	1
CW-SS-60	Cove Wash between 01 and 02 (Downstream)	4051659.495	664274.984	NC	0.73	0.99	0.63
CW-SS-61	Cove Wash Tributary 2 (Downstream)	4051575.939	663979.3813	NC	1.3	1.7	0.99
CW-SS-62	Downstream of Dam	4046378.374	658785.0735	NC	0.62	1	0.61
CW-SS-64	Cove Wash North	4045877	656444	NC	4.2	1.5	2.2
CW-SS-65	Cove Wash Middle 3A	4042362.589	658661.6744	NC	2.5	2.8	1.2
CW-SS-66	Cove Wash Middle 3A	4042362.589	658661.6744	NC	0.97	5.2	3.7
CW-SS-89	Duplicate of CW-66	4042338.663	658652.0815	NC	NC	NC	1.6
CW-SS-67	Cove Wash Middle 3	4044603.441	658812.815	NC	2.2	NC	NC
CW-SS-68	Duplicate of CW-67	4044603.441	658812.815	NC	2.5	NC	NC
CW-SS-70	Cove Wash Middle 3F	4044525.919	659043.2268	NC	NC	1.3	4.1
CW-SS-73	Cove Wash Middle 3D	4042208.541	658769.5923	NC	NC	0.41	1.4
CW-SS-74	Cove Wash Middle 3D	4041604.376	658745.2414	NC	NC	0.99	3
CW-SS-75	Cove Wash Middle 3D	4041201.219	658764.5801	NC	NC	0.84	3.4
CW-SS-77	Cove Wash Middle 3D	4045656.58	658677.1375	NC	NC	1.5	3.8
CW-SS-77-12	Cove Wash Middle 3D - Subsurface	4045656.58	658677.1375	NC	NC	2.2	NC
CW-SS-81	Cove Wash North	4049882.052	658891.9138	NC	NC	0.43	0.5
CW-SS-82	Cove Wash Middle 2A	4044047.322	657766.4468	NC	NC	NC	2
CW-SS-83	Cove Wash Middle 2A	4044045.08	657643.9635	NC	NC	NC	0.23
CW-SS-84	Cove Wash Middle 2B	4043793.108	657816.7814	NC	NC	NC	2.1
CW-SS-85	Cove Wash Middle 2A	4043732.792	657461.944	NC	NC	NC	0.42
CW-SS-86	Background - Cove Wash Middle 3G	4044482.433	659284.4116	NC	NC	NC	0.38
CW-SS-87	Background - Cove Wash Middle 3G	4044365.372	659573.3554	NC	NC	NC	0.41
CW-SS-88	Background -Unnamed Tributary to Cove Wash Middle 3A	4041663.506	658834.4595	NC	NC	NC	0.77
CW-SS-90	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	NC	NC	NC	**17**

Notes:
EPA = Environmental Protection Agency
NA = Not Applicable
NC = Not Collected
NRWQC = Navajo Recommended Water Quality Criteria
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Cove Wash Watershed Assessment
Appendix H-2
Antimony Results - Sediment

EPA Soil Screening Level - Protective of groundwater				0.27	0.27	0.27	0.27
Sample ID	Sample Information	Northing	Easting	2015 Low Flow Sampling Event	2016 Spring Snowmelt Sampling Event	2016 Low Flow Sampling Event	2017 Spring Snowmelt Sampling Event
CW-SS-01	Cove Wash (Downstream)	4051637.55	663372.9034	0.9 U	0.62 U	0.89 U	0.73 U
CW-SS-02	Cove Wash (Downstream)	4053607.153	666731.839	0.8 U	0.58 U	0.83 U	0.77 U
CW-SS-57	Duplicate of CW-02	4053607.153	666731.839	NC	0.6 U	NC	NC
CW-SS-03	Cove Wash South	4047985.628	659997.0959	0.72 U	0.55 U	0.72 U	0.71 U
CW-SS-78	Duplicate of CW-03	4047985.628	659997.0959	NC	NC	0.72 U	0.7 U
CW-SS-04	Background (Upstream)	4045547.649	655393.8806	**2.8 J**	0.59 U	1 U	0.71 U
CW-SS-69	Duplicate of CW-04	4045547.649	655393.8806	NC	NC	0.96 U	0.76 U
CW-SS-05	Dam (Historical)	4045709.002	658675.5894	0.86 U	0.62 U	0.85 U	0.69 U
CW-SS-06	Cove Wash (Downstream)	4050970.463	659839.728	0.84 U	0.5 U	0.75 U	0.81 U
CW-SS-07	Cove Wash Middle (Historical)	4047101.942	659123.9337	0.81 U	0.62 U	0.9 U	0.76 U
CW-SS-08	Background (Downstream)	4050235.456	657139.2197	0.68 U	0.5 U	0.75 U	0.63 U
CW-SS-80	Duplicate of CW-08	4050235.456	657139.2197	NC	NC	0.74 U	0.63 U
CW-SS-09	Cove Wash North	4049315.64	658120.2201	0.7 U	**0.71 J**	0.71 U	**0.74 J**
CW-SS-10	Cottonwood Springs	4049594.436	660198.1416	0.93 U	0.73 U	0.96 U	0.77 U
CW-SS-11	Cove Wash North	4046373.007	657265.4893	0.84 U	0.63 U	0.96 U	0.76 U
CW-SS-72	Duplicate of CW-11	4046373.007	657265.4893	NC	NC	0.89 U	0.69 U
CW-SS-12	Cove Wash Middle 3	4044603.441	658812.8183	0.89 U	0.6 U	0.86 U	0.76 U
CW-SS-13	Cove Wash Middle 3	4043160.908	658957.686	0.82 U	0.69 U	0.97 U	NC
CW-SS-14	Cove Wash Middle 3E	4042934	659222	0.72 U	0.68 U	0.93 U	NC
CW-SS-15	Cove Wash North	4046035	656751.9991	0.74 U	0.52 U	0.91 U	0.81 U
CW-SS-16	Cove Wash North	4045602	656065.0033	0.67 U	0.52 U	0.82 U	0.76 U
CW-SS-17	Cove Wash South (Downstream)	4050338.789	662352.1776	0.68 U	**0.66 J**	0.8 U	0.62 U
CW-SS-18	Background (Cove Wash Middle 1)	4045597.485	658407.8511	0.87 U	0.66 U	0.72 U	0.75 U
CW-SS-19	Cove Wash Middle 3B	4042075.979	657975.2607	0.69 U	0.65 U	0.8 U	0.61 U
CW-SS-76	Duplicate of CW-19	4042075.979	657975.2607	NC	NC	NC	0.77 U
CW-SS-19-12	Cove Wash Middle 3B - Subsurface	4042075.979	657975.2607	0.76 U	**0.62 J**	0.83 U	0.65 U
CW-SS-76-12	Duplicate of CW-19 - Subsurface	4042075.979	657975.2607	NC	NC	0.92 U	0.65 U
CW-SS-20	Cove Wash Middle 3C	4041480.197	658288.117	0.74 U	0.63 U	NC	NC
CW-SS-20a	Cove Wash Middle 3C	4041601.022	658538.7969	NC	NC	0.89 U	0.64 U
CW-SS-21	Background (Mesa IV Springs)	4043108	655931.0041	0.92 U	0.8 U	1.2 U	0.73 U
CW-SS-21-12	Background (Mesa IV Springs) - Subsurface	4043108	655931.0041	0.77 U	0.57 U	0.81 U	0.69 U
CW-SS-26	Cove Wash Middle 2 (Historical)	4042501.621	657146.8765	0.87 UJ	0.66 U	0.91 U	0.76 U
CW-SS-27	Cove Wash Middle 2B	4042693.122	657319.2808	0.75 U	0.56 U	0.77 U	0.72 U
CW-SS-63	Duplicate of CW-27	4042693.122	657319.281	NC	0.7 U	NC	NC
CW-SS-28	Duplicate of CW-SS-27	4042693.122	657319.281	0.78 U	NC	NC	NC
CW-SS-29	Cove Wash Middle 2C	4042595.541	658108.1172	0.7 U	**0.68 J**	0.77 U	0.59 U
CW-SS-30	Background (West Upstream)	4046867.444	654397.084	0.69 U	0.78 U	0.76 U	0.62 U
CW-SS-31	Background (Upstream)	4044527.019	655114.312	0.68 U	0.62 U	0.72 U	0.61 U
CW-SS-32	Cove Wash Middle 1E	4043933	655741.9975	0.68 U	0.64 U	1.1 U	0.72 U
CW-SS-36	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	0.86 U	0.6 U	0.92 U	0.7 U
CW-SS-37	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	0.84 U	0.62 U	0.96 U	0.73 U
CW-SS-71	Duplicate of CW-37	4044377.806	657955.4587	NC	NC	0.89 U	0.73 U
CW-SS-38	Cove Wash Middle (Historical)	4044173	657897.9975	0.85 U	0.61 U	0.85 U	0.78 U
CW-SS-39	Cove Wash Middle 2	4045453.338	658432.5145	0.94 U	0.57 U	0.83 U	0.78 U
CW-SS-41	Cove Wash Middle 1	4045552	658464	0.71 U	0.59 U	NC	NC
CW-SS-42-12	Irrigation Ditch - Subsurface	4045665.019	658693.5664	0.77 U	0.56 U	0.78 U	0.6 U
CW-SS-43-12	Dam Subsurface - Cove Middle	4045684.910	658673.278	0.7 U	NC	NC	NC
CW-SS-44	Pine Water Springs Drainage	4043806.688	661260.5257	**0.84 J**	0.71 U	0.72 U	0.74 U
CW-SS-45	Background (Deer Springs Drainage)	4042151.212	661078.7105	0.65 U	0.56 U	0.73 U	0.75 U
CW-SS-46	Pine Water Springs	4043788.61	661352.387	0.82 U	0.58 U	0.82 U	0.78 U
CW-SS-46-12	Pine Water Springs- Subsurface	4043788.61	661352.387	0.72 U	0.58 U	0.89 U	0.73 U
CW-SS-47	Cove Wash Middle 3F	4043774.185	659297.1492	0.73 U	0.65 U	1.2 U	0.79 U
CW-SS-48	Cove Wash Middle 3F	4044446.562	659271.0138	0.91 U	0.58 U	0.73 U	0.75 U
CW-SS-50	Cove Wash Middle 1	4044856.248	657463.1536	0.79 U	0.61 U	0.94 U	0.8 U
CW-SS-58	Duplicate of CW-50	4044856.247	657463.154	NC	**0.92 J**	NC	NC
CW-SS-51	Cove Wash Middle 1A	4044944.041	657035.0523	0.47 U	0.52 U	0.74 U	0.76 U
CW-SS-52	Cove Wash Middle 1G	4044553.333	657329.5884	0.68 U	0.54 U	0.73 U	0.61 U
CW-SS-53	Cove Wash Middle 1	4044478	656787	0.82 U	NC	NC	NC
CW-SS-53a	Cove Wash Middle 3A	4044567	656816	NC	0.56 U	0.85 U	0.76 U
CW-SS-54	Cove Wash Middle 1B	4044752.579	656806.108	0.78 U	0.62 U	0.86 U	0.71 U
CW-SS-55	Cove Wash Middle 1C	4044480.534	656337.5433	0.82 U	0.59 U	0.95 U	0.68 U
CW-SS-55a	Cove Wash Middle 2	4044480.534	656337.545	NC	0.56 U	NC	NC
CW-SS-56	Cove Wash Middle 3A	4042779	658775	0.84 U	NC	NC	NC
CW-SS-56a	Cove Wash Middle 3A	4043135	658979	NC	0.62 U	0.9 U	NC
CW-SS-59	Background - Cove Wash Tributary 1 (Downstream)	4051574.576	664210.2048	NC	0.57 U	0.9 U	0.65 U
CW-SS-60	Cove Wash between 01 and 02 (Downstream)	4051659.495	664274.984	NC	0.64 U	0.91 U	0.67 U
CW-SS-61	Cove Wash Tributary 2 (Downstream)	4051575.939	663979.3813	NC	0.63 U	0.84 U	0.6 U
CW-SS-62	Downstream of Dam	4046378.374	658785.0735	NC	0.61 U	0.75 U	0.7 U
CW-SS-64	Cove Wash North	4045877	656444	NC	0.7 U	0.93 U	0.79 U
CW-SS-65	Cove Wash Middle 3A	4042362.589	658661.6744	NC	0.61 U	0.85 U	0.77 U
CW-SS-66	Cove Wash Middle 3A	4042362.589	658661.6744	NC	0.59 U	0.86 U	0.74 U
CW-SS-89	Duplicate of CW-66	4042338.663	658652.0815	NC	NC	NC	0.68 U
CW-SS-67	Cove Wash Middle 3	4044603.441	658812.815	NC	0.62 U	NC	NC
CW-SS-68	Duplicate of CW-67	4044603.441	658812.815	NC	0.62 U	NC	NC
CW-SS-70	Cove Wash Middle 3F	4044525.919	659043.2268	NC	NC	1 U	0.74 U
CW-SS-73	Cove Wash Middle 3D	4042208.541	658769.5923	NC	NC	0.78 U	0.73 U
CW-SS-74	Cove Wash Middle 3D	4041604.376	658745.2414	NC	NC	0.73 U	0.61 UJ
CW-SS-75	Cove Wash Middle 3D	4041201.219	658764.5801	NC	NC	0.91 U	0.75 U
CW-SS-77	Cove Wash Middle 3D	4045656.58	658677.1375	NC	NC	0.88 U	0.68 U
CW-SS-77-12	Cove Wash Middle 3D - Subsurface	4045656.58	658677.1375	NC	NC	0.78 U	NC
CW-SS-81	Cove Wash North	4049882.052	658891.9138	NC	NC	0.82 U	0.84 U
CW-SS-82	Cove Wash Middle 2A	4044047.322	657766.4468	NC	NC	NC	0.76 U
CW-SS-83	Cove Wash Middle 2A	4044045.08	657643.9635	NC	NC	NC	0.7 U
CW-SS-84	Cove Wash Middle 2B	4043793.108	657816.7814	NC	NC	NC	0.71 U
CW-SS-85	Cove Wash Middle 2A	4043732.792	657461.944	NC	NC	NC	0.77 U
CW-SS-86	Background - Cove Wash Middle 3G	4044482.433	659284.4116	NC	NC	NC	0.83 U
CW-SS-87	Background - Cove Wash Middle 3G	4044365.372	659573.3554	NC	NC	NC	0.78 U
CW-SS-88	Background -Unnamed Tributary to Cove Wash Middle 3A	4041663.506	658834.4595	NC	NC	NC	0.6 U
CW-SS-90	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	NC	NC	NC	0.87 U

Notes:
EPA = Environmental Protection Agency
NA = Not Applicable
NC = Not Collected
NRWQC = Navajo Recommended Water Quality Criteria
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Cove Wash Watershed Assessment
Appendix H-3
Arsenic Results - Sediment

EPA Soil Screening Level - Protective of groundwater				0.29	0.29	0.29	0.29
Sample ID	Sample Information	Northing	Easting	2015 Low Flow Sampling Event	2016 Spring Snowmelt Sampling Event	2016 Low Flow Sampling Event	2017 Spring Snowmelt Sampling Event
CW-SS-01	Cove Wash (Downstream)	4051637.55	663372.9034	**3.1**	**2.1**	**0.96 J**	**1.4**
CW-SS-02	Cove Wash (Downstream)	4053607.153	666731.839	**3.5**	**2.5**	**2.6**	**1.4**
CW-SS-57	Duplicate of CW-02	4053607.153	666731.839	NC	**2.2**	NC	NC
CW-SS-03	Cove Wash South	4047985.628	659997.0959	**3.8**	**1.6**	**2.1**	**1.9**
CW-SS-78	Duplicate of CW-03	4047985.628	659997.0959	NC	NC	**2.6**	**2.4**
CW-SS-04	Background (Upstream)	4045547.649	655393.8806	**45**	**1.1 J**	**1.8**	**1.8**
CW-SS-69	Duplicate of CW-04	4045547.649	655393.8806	NC	NC	**2**	**2**
CW-SS-05	Dam (Historical)	4045709.002	658675.5894	**1.3**	**1.1 J**	**0.85 J**	0.48 J
CW-SS-06	Cove Wash (Downstream)	4050970.463	659839.728	**1.4**	**1.8**	**1.7**	**1.6**
CW-SS-07	Cove Wash Middle (Historical)	4047101.942	659123.9337	**1.7**	**1.1 J**	**1.3**	**1.1**
CW-SS-08	Background (Downstream)	4050235.456	657139.2197	**1.8**	**0.95 J**	**2.1**	**1.7**
CW-SS-80	Duplicate of CW-08	4050235.456	657139.2197	NC	NC	**1.6**	**1.5**
CW-SS-09	Cove Wash North	4049315.64	658120.2201	**2.1**	**1.7**	**1.7**	**2**
CW-SS-10	Cottonwood Springs	4049594.436	660198.1416	**2.6**	**2.3**	**2.1**	**1.5**
CW-SS-11	Cove Wash North	4046373.007	657265.4893	**1.5**	**1.3**	**0.87 J**	0.38 U
CW-SS-72	Duplicate of CW-11	4046373.007	657265.4893	NC	NC	**1.4**	**1.3 J**
CW-SS-12	Cove Wash Middle 3	4044603.441	658812.8183	**1.4**	**1.1 J**	**0.91 J**	**2**
CW-SS-13	Cove Wash Middle 3	4043160.908	658957.686	**3.3**	**1.3**	0.46 U	NC
CW-SS-14	Cove Wash Middle 3E	4042934	659222	**2.5**	**1.1 J**	**0.96 J**	NC
CW-SS-15	Cove Wash North	4046035	656751.9991	**3.2**	**3**	**2.1**	**3.1**
CW-SS-16	Cove Wash North	4045602	656065.0033	**2.4**	**2.4**	**3**	**1.6**
CW-SS-17	Cove Wash South (Downstream)	4050338.789	662352.1776	**2.1**	**1.8**	**1.9**	**1.4**
CW-SS-18	Background (Cove Wash Middle 1)	4045597.485	658407.8511	**1.7**	**0.52 J**	**1.7**	**1.5**
CW-SS-19	Cove Wash Middle 3B	4042075.979	657975.2607	**3.6**	**5.3**	**2.4**	**2.5**
CW-SS-76	Duplicate of CW-19	4042075.979	657975.2607	NC	NC	NC	**2.1**
CW-SS-19-12	Cove Wash Middle 3B - Subsurface	4042075.979	657975.2607	**6.7**	**8.6**	**3.3**	**3**
CW-SS-76-12	Duplicate of CW-19 - Subsurface	4042075.979	657975.2607	NC	NC	**2.8**	**4.1**
CW-SS-20	Cove Wash Middle 3C	4041480.197	658288.117	**5.2**	**4.5**	NC	NC
CW-SS-20a	Cove Wash Middle 3C	4041601.022	658538.7969	NC	NC	**0.81 J**	**2.1**
CW-SS-21	Background (Mesa IV Springs)	4043108	655931.0041	**2.2**	**1.1**	**0.88 J**	**0.73 J**
CW-SS-21-12	Background (Mesa IV Springs) - Subsurface	4043108	655931.0041	**2.7**	**1.2 J**	**1.8**	**1.7**
CW-SS-26	Cove Wash Middle 2 (Historical)	4042501.621	657146.8765	**4.3**	**4.3**	**5.3**	**3.2**
CW-SS-27	Cove Wash Middle 2B	4042693.122	657319.2808	**2.5**	**1.6**	**4.7**	**1.2**
CW-SS-28	Duplicate of CW-SS-27	4042693.122	657319.281	**2.2**	NC	NC	NC
CW-SS-63	Duplicate of CW-27	4042693.122	657319.281	NC	**4.6**	NC	NC
CW-SS-29	Cove Wash Middle 2C	4042595.541	658108.1172	**1.4**	**1.6**	**1.3**	**1**
CW-SS-30	Background (West Upstream)	4046867.444	654397.084	**0.67 J**	**1.2 J**	**2.3**	**0.71 J**
CW-SS-31	Background (Upstream)	4044527.019	655114.312	0.48U	**1.4**	**1.4**	**1.1**
CW-SS-32	Cove Wash Middle 1E	4043933	655741.9975	**0.99**	**1.3**	**2.7**	**2.7**
CW-SS-36	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	**2.1**	**0.53 J**	**2.3**	0.35 U
CW-SS-37	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	**2.2**	**0.57 J**	**2 J**	**1.8**
CW-SS-71	Duplicate of CW-37	4044377.806	657955.4587	NC	NC	**0.89 J**	**1.5**
CW-SS-38	Cove Wash Middle (Historical)	4044173	657897.9975	**1.8**	**1 J**	**1.9**	**1.7**
CW-SS-39	Cove Wash Middle 2	4045453.338	658432.5145	**2**	**1.1**	**2**	**1.5**
CW-SS-41	Cove Wash Middle 1	4045552	658464	0.77J	**1.6**	NC	NC
CW-SS-42-12	Irrigation Ditch - Subsurface	4045665.019	658693.5664	**1.4**	**1.5**	**1.3**	**0.47 J**
CW-SS-43-12	Dam Subsurface - Cove Middle	4045684.910	658673.278	0.56J	NC	NC	NC
CW-SS-44	Pine Water Springs Drainage	4043806.688	661260.5257	**1.9**	**1.4**	**1.3**	**2.2**
CW-SS-45	Background (Deer Springs Drainage)	4042151.212	661078.7105	**1.2**	**0.74 J**	**0.89 J**	**1 J**
CW-SS-46	Pine Water Springs	4043788.61	661352.387	**1.9**	**1.4 J**	**1.6**	**0.95 J**
CW-SS-46-12	Pine Water Springs- Subsurface	4043788.61	661352.387	**1.3**	**1.1**	**2**	**1.2 J**
CW-SS-47	Cove Wash Middle 3F	4043774.185	659297.1492	**2**	**0.79 J**	**3.2**	**1.1 J**
CW-SS-48	Cove Wash Middle 3F	4044446.562	659271.0138	**1.8**	**1.2**	**2.2**	**1.4**
CW-SS-50	Cove Wash Middle 1	4044856.248	657463.1536	**1.7**	**2.8 J**	**1.1 J**	**2.7**
CW-SS-58	Duplicate of CW-50	4044856.247	657463.154	NC	**5.3 J**	NC	NC
CW-SS-51	Cove Wash Middle 1A	4044944.041	657035.0523	**1.3**	**3.8**	**2.7**	**5.1**
CW-SS-52	Cove Wash Middle 1G	4044553.333	657329.5884	**1.5**	**3.7**	**3.4**	**2.4**
CW-SS-53	Cove Wash Middle 1	4044478	656787	0.75J	NC	NC	NC
CW-SS-53a	Cove Wash Middle 3A	4044567	656816	NC	**1.2**	**2.9**	**1.2 J**
CW-SS-54	Cove Wash Middle 1B	4044752.579	656806.108	**1.6**	**1.3**	**3.2**	**0.84 J**
CW-SS-55	Cove Wash Middle 1C	4044480.534	656337.5433	**3**	**1.2**	**5.4**	**3.2**
CW-SS-55a	Cove Wash Middle 2	4044480.534	656337.545	NC	**1.4**	NC	NC
CW-SS-56	Cove Wash Middle 3A	4042779	658775	**2**	NC	NC	NC
CW-SS-56a	Cove Wash Middle 3A	4043135	658979	NC	**1.8**	**3.1**	NC
CW-SS-59	Background - Cove Wash Tributary 1 (Downstream)	4051574.576	664210.2048	NC	**2.1**	**3.4**	**2.9**
CW-SS-60	Cove Wash between 01 and 02 (Downstream)	4051659.495	664274.984	NC	**2.1**	**2.1**	**1.4**
CW-SS-61	Cove Wash Tributary 2 (Downstream)	4051575.939	663979.3813	NC	**1.8**	**2.4**	**2.2**
CW-SS-62	Downstream of Dam	4046378.374	658785.0735	NC	**1.3**	**2**	**1.5**
CW-SS-64	Cove Wash North	4045877	656444	NC	**1 J**	**1.5**	**2.1**
CW-SS-65	Cove Wash Middle 3A	4042362.589	658661.6744	NC	**1.7**	**2**	**2**
CW-SS-66	Cove Wash Middle 3A	4042362.589	658661.6744	NC	**1.4**	**3.2**	**1.3**
CW-SS-89	Duplicate of CW-66	4042338.663	658652.0815	NC	NC	NC	**1.8**
CW-SS-67	Cove Wash Middle 3	4044603.441	658812.815	NC	**1.2**	NC	NC
CW-SS-68	Duplicate of CW-67	4044603.441	658812.815	NC	**0.89 J**	NC	NC
CW-SS-70	Cove Wash Middle 3F	4044525.919	659043.2268	NC	NC	**1.2 J**	**0.65 J**
CW-SS-73	Cove Wash Middle 3D	4042208.541	658769.5923	NC	NC	**1.5**	**2.1**
CW-SS-74	Cove Wash Middle 3D	4041604.376	658745.2414	NC	NC	**3**	**2.3**
CW-SS-75	Cove Wash Middle 3D	4041201.219	658764.5801	NC	NC	**1.6**	**1.4**
CW-SS-77	Cove Wash Middle 3D	4045656.58	658677.1375	NC	NC	**1.4**	**1.2**
CW-SS-77-12	Cove Wash Middle 3D - Subsurface	4045656.58	658677.1375	NC	NC	**2**	NC
CW-SS-81	Cove Wash North	4049882.052	658891.9138	NC	NC	**1.6**	**2.8**
CW-SS-82	Cove Wash Middle 2A	4044047.322	657766.4468	NC	NC	NC	**1.8**
CW-SS-83	Cove Wash Middle 2A	4044045.08	657643.9635	NC	NC	NC	**0.55**
CW-SS-84	Cove Wash Middle 2B	4043793.108	657816.7814	NC	NC	NC	**0.88**
CW-SS-85	Cove Wash Middle 2A	4043732.792	657461.944	NC	NC	NC	**0.55**
CW-SS-86	Background - Cove Wash Middle 3G	4044482.433	659284.4116	NC	NC	NC	**1.4 J**
CW-SS-87	Background - Cove Wash Middle 3G	4044365.372	659573.3554	NC	NC	NC	**1.4**
CW-SS-88	Background -Unnamed Tributary to Cove Wash Middle 3A	4041663.506	658834.4595	NC	NC	NC	**2.3**
CW-SS-90	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	NC	NC	NC	**3.8**

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Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
μg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Barium Results - Sediment

EPA Soil Screening Level - Protective of groundwater				82	82	82	82
Sample ID	Sample Information	Northing	Easting	2015 Low Flow Sampling Event	2016 Spring Snowmelt Sampling Event	2016 Low Flow Sampling Event	2017 Spring Snowmelt Sampling Event
CW-SS-01	Cove Wash (Downstream)	4051637.55	663372.9034	**280**	**220**	**340**	**130**
CW-SS-02	Cove Wash (Downstream)	4053607.153	666731.839	**800**	**660**	**250**	**260**
CW-SS-57	Duplicate of CW-02	4053607.153	666731.839	NC	**420**	NC	NC
CW-SS-03	Cove Wash North	4047985.628	659997.0959	**1900**	**240**	**320 J**	**220**
CW-SS-78	Cove Wash South	4047985.628	659997.0959	NC	NC	**210 J**	**210**
CW-SS-04	Background (Upstream)	4045547.649	655393.8806	**510**	63	75	34
CW-SS-69	Duplicate of CW-04	4045547.649	655393.8806	NC	NC	**110**	32
CW-SS-05	Dam (Historical)	4045709.002	658675.5894	**85**	**87**	76	60
CW-SS-06	Cove Wash (Downstream)	4050970.463	659839.728	**100**	**180**	**190**	**160**
CW-SS-07	Cove Wash Middle (Historical)	4047101.942	659123.9337	**130**	70	**82**	42
CW-SS-08	Background (Downstream)	4050235.456	657139.2197	**160**	**120**	**120**	**110**
CW-SS-80	Duplicate of CW-08	4050235.456	657139.2197	NC	NC	**120**	**150**
CW-SS-09	Cove Wash North	4049315.64	658120.2201	**270**	**390**	**710**	**320**
CW-SS-10	Cottonwood Springs	4049594.436	660198.1416	**240**	**160**	**150**	**150**
CW-SS-11	Cove Wash North	4046373.007	657265.4893	**120**	81	53	45 J
CW-SS-72	Duplicate of CW-11	4046373.007	657265.4893	NC	NC	41	**100 J**
CW-SS-12	Cove Wash Middle 3	4044603.441	658812.8183	**91**	**88**	**110**	**91**
CW-SS-13	Cove Wash Middle 3	4043160.908	658957.686	**150**	81	65	NC
CW-SS-14	Cove Wash Middle 3E	4042934	659222	**210**	**96**	**97**	NC
CW-SS-15	Cove Wash North	4046035	656751.9991	**110**	54	**120**	**120**
CW-SS-16	Cove Wash North	4045602	656065.0033	**210**	53	**100**	44
CW-SS-17	Cove Wash South (Downstream)	4050338.789	662352.1776	**570**	**280**	**260**	**210**
CW-SS-18	Background (Cove Wash Middle 1)	4045597.485	658407.8511	70	44	44	57
CW-SS-19	Cove Wash Middle 3B	4042075.979	657975.2607	**150**	**100**	**140**	60
CW-SS-76	Duplicate of CW-19	4042075.979	657975.2607	NC	NC	NC	49
CW-SS-19-12	Cove Wash Middle 3B - Subsurface	4042075.979	657975.2607	**150**	65	**120**	67
CW-SS-76-12	Duplicate of CW-19 - Subsurface	4042075.979	657975.2607	NC	NC	**100 J**	**95**
CW-SS-20	Cove Wash Middle 3C	4041480.197	658288.117	**200**	58	NC	NC
CW-SS-20a	Cove Wash Middle 3C	4041601.022	658538.7969	NC	NC	32	67
CW-SS-21	Background (Mesa IV Springs)	4043108	655931.0041	**170**	**94**	**85**	79
CW-SS-21-12	Background (Mesa IV Springs) - Subsurface	4043108	655931.0041	**110**	**83**	81	**87**
CW-SS-26	Cove Wash Middle 2 (Historical)	4042501.621	657146.8765	**150**	64	80	51
CW-SS-27	Cove Wash Middle 2B	4042693.122	657319.2808	**96**	76	**120**	70
CW-SS-28	Duplicate of CW-SS-27	4042693.122	657319.281	**93**	NC	NC	NC
CW-SS-63	Duplicate of CW-27	4042693.122	657319.281	NC	57	NC	NC
CW-SS-29	Cove Wash Middle 2C	4042595.541	658108.1172	**180**	53	**100**	47
CW-SS-30	Background (West Upstream)	4046867.444	654397.084	56	79	63	21
CW-SS-31	Background (Upstream)	4044527.019	655114.312	29	64	45	51
CW-SS-32	Cove Wash Middle 1E	4043933	655741.9975	63	**89**	**110**	**110**
CW-SS-36	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	**220**	**92**	**85**	59
CW-SS-37	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	**130**	72	**170 J**	38 J
CW-SS-71	Duplicate of CW-37	4044377.806	657955.4587	NC	NC	**90 J**	87 J
CW-SS-38	Cove Wash Middle (Historical)	4044173	657897.9975	**110**	69	**84**	63
CW-SS-39	Cove Wash Middle 2	4045453.338	658432.5145	**130**	65	44	58
CW-SS-41	Cove Wash Middle 1	4045552	658464	71	68	NC	NC
CW-SS-42-12	Irrigation Ditch - Subsurface	4045665.019	658693.5664	**300**	**140**	**100**	77
CW-SS-43-12	Dam Subsurface - Cove Middle	4045684.910	658673.278	**180**	NC	NC	NC
CW-SS-44	Pine Water Springs Drainage	4043806.688	661260.5257	**230**	**100**	**110**	**150**
CW-SS-45	Background (Deer Springs Drainage)	4042151.212	661078.7105	59	28	31	81
CW-SS-46	Pine Water Springs	4043788.61	661352.387	**140**	**95**	**110**	**83**
CW-SS-46-12	Pine Water Springs- Subsurface	4043788.61	661352.387	71	78	**120**	65
CW-SS-47	Cove Wash Middle 3F	4043774.185	659297.1492	**250**	33	**100**	66
CW-SS-48	Cove Wash Middle 3F	4044446.562	659271.0138	**120**	**150**	**140**	**92**
CW-SS-50	Cove Wash Middle 1	4044856.248	657463.1536	63	74 J	**120**	65
CW-SS-58	Duplicate of CW-50	4044856.247	657463.154	NC	**110 J**	NC	NC
CW-SS-51	Cove Wash Middle 1A	4044944.041	657035.0523	65	72	**94**	63
CW-SS-52	Cove Wash Middle 1G	4044553.333	657329.5884	59	48	81 J	52
CW-SS-53	Cove Wash Middle 1	4044478	656787	**90**	NC	NC	NC
CW-SS-53a	Cove Wash Middle 3A	4044567	656816	NC	**130**	**87**	55
CW-SS-54	Cove Wash Middle 1B	4044752.579	656806.108	81	75	**95**	26
CW-SS-55	Cove Wash Middle 1C	4044480.534	656337.5433	**82**	69	76	73
CW-SS-55a	Cove Wash Middle 2	4044480.534	656337.545	NC	**110**	NC	NC
CW-SS-56	Cove Wash Middle 3A	4042779	658775	**84**	NC	NC	NC
CW-SS-56a	Cove Wash Middle 3A	4043135	658979	NC	58	62	NC
CW-SS-59	Background - Cove Wash Tributary 1 (Downstream)	4051574.576	664210.2048	NC	**350**	**310**	**250**
CW-SS-60	Cove Wash between 01 and 02 (Downstream)	4051659.495	664274.984	NC	**270**	**290**	**190**
CW-SS-61	Cove Wash Tributary 2 (Downstream)	4051575.939	663979.3813	NC	**330**	**460**	**230**
CW-SS-62	Downstream of Dam	4046378.374	658785.0735	NC	78	**110**	**150**
CW-SS-64	Cove Wash North	4045877	656444	NC	**98**	**82**	**93**
CW-SS-65	Cove Wash Middle 3A	4042362.589	658661.6744	NC	51	69	38
CW-SS-66	Cove Wash Middle 3A	4042362.589	658661.6744	NC	50	71	66
CW-SS-89	Duplicate of CW-66	4042338.663	658652.0815	NC	NC	NC	39
CW-SS-67	Cove Wash Middle 3	4044603.441	658812.815	NC	**110**	NC	NC
CW-SS-68	Duplicate of CW-67	4044603.441	658812.815	NC	**84**	NC	NC
CW-SS-70	Cove Wash Middle 3F	4044525.919	659043.2268	NC	NC	**100**	**100**
CW-SS-73	Cove Wash Middle 3D	4042208.541	658769.5923	NC	NC	53	75
CW-SS-74	Cove Wash Middle 3D	4041604.376	658745.2414	NC	NC	33	67
CW-SS-75	Cove Wash Middle 3D	4041201.219	658764.5801	NC	NC	27	43
CW-SS-77	Cove Wash Middle 3D	4045656.58	658677.1375	NC	NC	**92**	**110**
CW-SS-77-12	Cove Wash Middle 3D - Subsurface	4045656.58	658677.1375	NC	NC	**170**	NC
CW-SS-81	Cove Wash North	4049882.052	658891.9138	NC	NC	**380**	**250**
CW-SS-82	Cove Wash Middle 2A	4044047.322	657766.4468	NC	NC	NC	40
CW-SS-83	Cove Wash Middle 2A	4044045.08	657643.9635	NC	NC	NC	35
CW-SS-84	Cove Wash Middle 2B	4043793.108	657816.7814	NC	NC	NC	76
CW-SS-85	Cove Wash Middle 2A	4043732.792	657461.944	NC	NC	NC	**89**
CW-SS-86	Background - Cove Wash Middle 3G	4044482.433	659284.4116	NC	NC	NC	**120**
CW-SS-87	Background - Cove Wash Middle 3G	4044365.372	659573.3554	NC	NC	NC	**130**
CW-SS-88	Background -Unnamed Tributary to Cove Wash Middle 3A	4041663.506	658834.4595	NC	NC	NC	76
CW-SS-90	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	NC	NC	NC	**170**

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J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Beryllium Results - Sediment

EPA Soil Screening Level - Protective of groundwater				3.2	3.2	3.2	3.2
Sample ID	Sample Information	Northing	Easting	2015 Low Flow Sampling Event	2016 Spring Snowmelt Sampling Event	2016 Low Flow Sampling Event	2017 Spring Snowmelt Sampling Event
CW-SS-01	Cove Wash (Downstream)	4051637.55	663372.9034	0.4 J	0.34 J	0.51 J	0.19
CW-SS-02	Cove Wash (Downstream)	4053607.153	666731.839	0.47 J	0.3 J	0.16 J	0.3 J
CW-SS-57	Duplicate of CW-02	4053607.153	666731.839	NC	0.42 J	NC	NC
CW-SS-03	Cove Wash South	4047985.628	659997.0959	0.5 J	0.35 J	0.24 J	0.36
CW-SS-78	Duplicate of CW-03	4047985.628	659997.0959	NC	NC	0.13 J	0.4 J
CW-SS-04	Background (Upstream)	4045547.649	655393.8806	**<u>3.8</u>**	0.19 J	0.17 J	0.18 U
CW-SS-69	Duplicate of CW-04	4045547.649	655393.8806	NC	NC	0.28 J	0.19 U
CW-SS-05	Dam (Historical)	4045709.002	658675.5894	0.22 J	0.11 J	0.05 U	0.17 U
CW-SS-06	Cove Wash (Downstream)	4050970.463	659839.728	0.2 J	0.29 J	0.16 J	0.21
CW-SS-07	Cove Wash Middle (Historical)	4047101.942	659123.9337	0.21 J	0.07 J	0.052 U	0.19
CW-SS-08	Background (Downstream)	4050235.456	657139.2197	0.34 J	0.17 J	0.13 J	0.18 J
CW-SS-80	Duplicate of CW-08	4050235.456	657139.2197	NC	NC	0.17 J	0.31 J
CW-SS-09	Cove Wash North	4049315.64	658120.2201	0.35 J	0.37 J	0.17 J	0.38 J
CW-SS-10	Cottonwood Springs	4049594.436	660198.1416	0.47 J	0.24 J	0.13 J	0.22 J
CW-SS-11	Cove Wash North	4046373.007	657265.4893	0.18 J	0.17 J	0.21 J	0.19 U
CW-SS-72	Duplicate of CW-11	4046373.007	657265.4893	NC	NC	0.21 J	0.18 J
CW-SS-12	Cove Wash Middle 3	4044603.441	658812.8183	0.25 J	0.14 J	0.29 J	0.19 U
CW-SS-13	Cove Wash Middle 3	4043160.908	658957.686	0.062 U	0.24 J	0.17 J	NC
CW-SS-14	Cove Wash Middle 3E	4042934	659222	0.25 J	0.28 J	0.24 J	NC
CW-SS-15	Cove Wash North	4046035	656751.9991	0.4 J	0.11 J	0.29 J	0.43 J
CW-SS-16	Cove Wash North	4045602	656065.0033	0.16 J	0.19 J	0.11 J	0.19 U
CW-SS-17	Cove Wash South (Downstream)	4050338.789	662352.1776	0.43 J	0.44 J	0.26 J	0.35 J
CW-SS-18	Background (Cove Wash Middle 1)	4045597.485	658407.8511	0.28 J	0.093 J	0.18 J	0.19 U
CW-SS-19	Cove Wash Middle 3B	4042075.979	657975.2607	0.39 J	0.35 J	0.27 J	0.22 J
CW-SS-76	Duplicate of CW-19	4042075.979	657975.2607	NC	NC	NC	0.19 U
CW-SS-19-12	Cove Wash Middle 3B - Subsurface	4042075.979	657975.2607	0.51 J	0.37 J	0.1 J	0.31 J
CW-SS-76-12	Duplicate of CW-19 - Subsurface	4042075.979	657975.2607	NC	NC	0.34 J	0.36 J
CW-SS-20	Cove Wash Middle 3C	4041480.197	658288.117	0.41 J	0.22 J	NC	NC
CW-SS-20a	Cove Wash Middle 3C	4041601.022	658538.7969	NC	NC	0.28 J	0.19 J
CW-SS-21	Background (Mesa IV Springs)	4043108	655931.0041	0.44 J	0.15 J	0.31 J	0.18 U
CW-SS-21-12	Background (Mesa IV Springs) - Subsurface	4043108	655931.0041	0.42 J	0.28 J	0.25 J	0.24 J
CW-SS-26	Cove Wash Middle 2 (Historical)	4042501.621	657146.8765	0.24 J	0.18 J	0.053 U	0.19 J
CW-SS-27	Cove Wash Middle 2B	4042693.122	657319.2808	0.34 J	0.18 J	0.045 U	0.24 J
CW-SS-63	Duplicate of CW-27	4042693.122	657319.281	NC	0.22 J	NC	NC
CW-SS-28	Duplicate of CW-SS-27	4042693.122	657319.281	0.31 J	NC	NC	NC
CW-SS-29	Cove Wash Middle 2C	4042595.541	658108.1172	0.23 J	0.33 J	0.19 J	0.2 J
CW-SS-30	Background (West Upstream)	4046867.444	654397.084	0.14 J	0.24 J	0.44 J	0.15 U
CW-SS-31	Background (Upstream)	4044527.019	655114.312	0.1 J	0.22 J	0.042 U	0.17 J
CW-SS-32	Cove Wash Middle 1E	4043933	655741.9975	0.28 J	0.25 J	0.36 J	0.42 J
CW-SS-36	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	0.27 J	0.029 U	0.15 J	0.18 U
CW-SS-37	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	0.22 J	0.057 J	0.17 J	0.18 U
CW-SS-71	Duplicate of CW-37	4044377.806	657955.4587	NC	NC	0.14 J	0.2 J
CW-SS-38	Cove Wash Middle (Historical)	4044173	657897.9975	0.24 J	0.06 J	0.098 J	0.2 U
CW-SS-39	Cove Wash Middle 2	4045453.338	658432.5145	0.4 J	0.073 J	0.097 J	0.2 U
CW-SS-41	Cove Wash Middle 1	4045552	658464	0.21 J	0.06 J	NC	NC
CW-SS-42-12	Irrigation Ditch - Subsurface	4045665.019	658693.5664	0.16 J	0.16 J	0.12 J	0.15 U
CW-SS-43-12	Dam Subsurface - Cove Middle	4045684.910	658673.278	0.16 J	NC	NC	NC
CW-SS-44	Pine Water Springs Drainage	4043806.688	661260.5257	1.3	0.43 J	0.24 J	1.3
CW-SS-45	Background (Deer Springs Drainage)	4042151.212	661078.7105	0.21 J	0.14 J	0.14 J	0.23 J
CW-SS-46	Pine Water Springs	4043788.61	661352.387	0.69	0.54 J	0.048 U	0.7
CW-SS-46-12	Pine Water Springs- Subsurface	4043788.61	661352.387	0.36 J	0.44 J	0.48 J	0.38 J
CW-SS-47	Cove Wash Middle 3F	4043774.185	659297.1492	0.39 J	0.15 J	0.32 J	0.21 J
CW-SS-48	Cove Wash Middle 3F	4044446.562	659271.0138	0.27 J	0.17 J	0.11 J	0.19 U
CW-SS-50	Cove Wash Middle 1	4044856.248	657463.1536	0.26 J	0.16 J	0.055 U	0.2 U
CW-SS-58	Duplicate of CW-50	4044856.247	657463.154	NC	0.14 J	NC	NC
CW-SS-51	Cove Wash Middle 1A	4044944.041	657035.0523	0.17 J	0.17 J	0.043 U	0.24 J
CW-SS-52	Cove Wash Middle 1G	4044553.333	657329.5884	0.28 J	0.14 J	0.042 U	0.19 J
CW-SS-53	Cove Wash Middle 1	4044478	656787	0.23 J	NC	NC	NC
CW-SS-53a	Cove Wash Middle 3A	4044567	656816	NC	0.2 J	0.11 J	0.19 U
CW-SS-54	Cove Wash Middle 1B	4044752.579	656806.108	0.31 J	0.24 J	0.4 J	0.18 U
CW-SS-55	Cove Wash Middle 1C	4044480.534	656337.5433	0.56 J	0.07 J	0.37 J	0.25 J
CW-SS-55a	Cove Wash Middle 2	4044480.534	656337.545	NC	0.22 J	NC	NC
CW-SS-56	Cove Wash Middle 3A	4042779	658775	0.36 J	NC	NC	NC
CW-SS-56a	Cove Wash Middle 3A	4043135	658979	NC	0.17 J	0.17 J	NC
CW-SS-59	Background - Cove Wash Tributary 1 (Downstream)	4051574.576	664210.2048	NC	0.52 J	0.41 J	0.39 J
CW-SS-60	Cove Wash between 01 and 02 (Downstream)	4051659.495	664274.984	NC	0.35 J	0.33 J	0.19 J
CW-SS-61	Cove Wash Tributary 2 (Downstream)	4051575.939	663979.3813	NC	0.42 J	0.35 J	0.29 J
CW-SS-62	Downstream of Dam	4046378.374	658785.0735	NC	0.23 J	0.25 J	0.33 J
CW-SS-64	Cove Wash North	4045877	656444	NC	0.29 J	0.17 J	0.32 J
CW-SS-65	Cove Wash Middle 3A	4042362.589	658661.6744	NC	0.14 J	0.17 J	0.19 U
CW-SS-66	Cove Wash Middle 3A	4042362.589	658661.6744	NC	0.081 J	0.24 J	0.18 U
CW-SS-89	Duplicate of CW-66	4042338.663	658652.0815	NC	NC	NC	0.17 U
CW-SS-67	Cove Wash Middle 3	4044603.441	658812.815	NC	0.15 J	NC	NC
CW-SS-68	Duplicate of CW-67	4044603.441	658812.815	NC	0.15 J	NC	NC
CW-SS-70	Cove Wash Middle 3F	4044525.919	659043.2268	NC	NC	0.17 J	0.22 J
CW-SS-73	Cove Wash Middle 3D	4042208.541	658769.5923	NC	NC	0.046 J	0.18 U
CW-SS-74	Cove Wash Middle 3D	4041604.376	658745.2414	NC	NC	0.17 J	0.27 J
CW-SS-75	Cove Wash Middle 3D	4041201.219	658764.5801	NC	NC	0.13 J	0.19 U
CW-SS-77	Cove Wash Middle 3D	4045656.58	658677.1375	NC	NC	0.051 U	0.17 U
CW-SS-77-12	Cove Wash Middle 3D - Subsurface	4045656.58	658677.1375	NC	NC	0.046 U	NC
CW-SS-81	Cove Wash North	4049882.052	658891.9138	NC	NC	0.16 J	0.36 J
CW-SS-82	Cove Wash Middle 2A	4044047.322	657766.4468	NC	NC	NC	0.19 U
CW-SS-83	Cove Wash Middle 2A	4044045.08	657643.9635	NC	NC	NC	0.17 U
CW-SS-84	Cove Wash Middle 2B	4043793.108	657816.7814	NC	NC	NC	0.18 U
CW-SS-85	Cove Wash Middle 2A	4043732.792	657461.944	NC	NC	NC	0.19 U
CW-SS-86	Background - Cove Wash Middle 3G	4044482.433	659284.4116	NC	NC	NC	0.22 J
CW-SS-87	Background - Cove Wash Middle 3G	4044365.372	659573.3554	NC	NC	NC	0.25 J
CW-SS-88	Background -Unnamed Tributary to Cove Wash Middle 3A	4041663.506	658834.4595	NC	NC	NC	0.21 J
CW-SS-90	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	NC	NC	NC	0.82

Notes:
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NC = Not Collected
NRWQC = Navajo Recommended Water Quality Criteria
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
µg/L = microgram per liter
<u>Bold, Underlined and Highlighted</u> = Analytical result exceeds screening levels

Cadmium Results - Sediment

Sample ID	Sample Information	Northing	Easting	2015 Low Flow Sampling Event	2016 Spring Snowmelt Sampling Event	2016 Low Flow Sampling Event	2017 Spring Snowmelt Sampling Event
EPA Soil Screening Level - Protective of groundwater				0.38	0.38	0.38	0.38
CW-SS-01	Cove Wash (Downstream)	4051637.55	663372.9034	0.098 U	0.099 U	0.082 J	0.18 U
CW-SS-02	Cove Wash (Downstream)	4053607.153	666731.839	0.087 U	0.092 U	0.059 J	0.19 U
CW-SS-57	Duplicate of CW-02	4053607.153	666731.839	NC	0.11 J	NC	NC
CW-SS-03	Cove Wash South	4047985.628	659997.0959	0.078 U	0.089 U	0.085 J	0.18 U
CW-SS-78	Duplicate of CW-03	4047985.628	659997.0959	NC	NC	0.043 U	0.17 U
CW-SS-04	Background (Upstream)	4045547.649	655393.8806	**<u>0.38 J</u>**	0.095 U	0.062 U	0.18 U
CW-SS-69	Duplicate of CW-04	4045547.649	655393.8806	NC	NC	0.057 U	0.19 U
CW-SS-05	Dam (Historical)	4045709.002	658675.5894	0.093 U	0.098 U	0.058 J	0.17 U
CW-SS-06	Cove Wash (Downstream)	4050970.463	659839.728	0.091 U	0.08 U	0.11 J	0.2 U
CW-SS-07	Cove Wash Middle (Historical)	4047101.942	659123.9337	0.088 U	0.099 U	0.054 U	0.19 U
CW-SS-08	Background (Downstream)	4050235.456	657139.2197	0.074 U	0.079 U	0.1 J	0.16 U
CW-SS-80	Duplicate of CW-08	4050235.456	657139.2197	NC	NC	0.052 J	0.16 U
CW-SS-09	Cove Wash North	4049315.64	658120.2201	0.076 U	0.13 J	0.12 J	0.15 U
CW-SS-10	Cottonwood Springs	4049594.436	660198.1416	0.1 U	0.12 U	0.081 J	0.19 U
CW-SS-11	Cove Wash North	4046373.007	657265.4893	0.091 U	0.1 U	0.057 U	0.19 U
CW-SS-72	Duplicate of CW-11	4046373.007	657265.4893	NC	NC	0.053 U	0.17 U
CW-SS-12	Cove Wash Middle 3	4044603.441	658812.8183	0.096 U	0.095 U	0.12 J	0.19 U
CW-SS-13	Cove Wash Middle 3	4043160.908	658957.686	0.089 U	0.11 U	0.058 U	NC
CW-SS-14	Cove Wash Middle 3E	4042934	659222	0.078 U	0.11 U	0.056 U	NC
CW-SS-15	Cove Wash North	4046035	656751.9991	0.08 U	0.084 U	0.054 U	0.2 U
CW-SS-16	Cove Wash North	4045602	656065.0033	0.073 U	0.083 U	0.13 J	0.19 U
CW-SS-17	Cove Wash South (Downstream)	4050338.789	662352.1776	0.075 J	0.11 J	0.094 J	0.15 U
CW-SS-18	Background (Cove Wash Middle 1)	4045597.485	658407.8511	0.094 U	0.11 U	0.043 U	0.19 U
CW-SS-19	Cove Wash Middle 3B	4042075.979	657975.2607	0.074 U	0.1 U	0.073 J	0.15 U
CW-SS-76	Duplicate of CW-19	4042075.979	657975.2607	NC	NC	NC	0.19 U
CW-SS-19-12	Cove Wash Middle 3B - Subsurface	4042075.979	657975.2607	0.083 U	0.089 U	0.059 J	0.16 U
CW-SS-76-12	Duplicate of CW-19 - Subsurface	4042075.979	657975.2607	NC	NC	0.067 J	0.16 U
CW-SS-20	Cove Wash Middle 3C	4041480.197	658288.117	0.081 U	0.1 U	NC	NC
CW-SS-20a	Cove Wash Middle 3C	4041601.022	658538.7969	NC	NC	0.053 U	0.16 U
CW-SS-21	Background (Mesa IV Springs)	4043108	655931.0041	0.1 U	0.13 U	0.07 U	0.18 U
CW-SS-21-12	Background (Mesa IV Springs) - Subsurface	4043108	655931.0041	0.083 U	0.092 U	0.072 J	0.17 U
CW-SS-26	Cove Wash Middle 2 (Historical)	4042501.621	657146.8765	0.095 U	0.11 U	0.06 J	0.19 U
CW-SS-27	Cove Wash Middle 2B	4042693.122	657319.2808	0.082 U	0.089 U	0.082 J	0.18 U
CW-SS-63	Duplicate of CW-27	4042693.122	657319.281	NC	0.11 U	NC	NC
CW-SS-28	Duplicate of CW-SS-27	4042693.122	657319.281	0.084 U	NC	NC	NC
CW-SS-29	Cove Wash Middle 2C	4042595.541	658108.1172	0.076 U	0.099 J	0.047 J	0.15 U
CW-SS-30	Background (West Upstream)	4046867.444	654397.084	0.075 U	0.12 U	0.045 U	0.15 U
CW-SS-31	Background (Upstream)	4044527.019	655114.312	0.073 U	0.1 U	0.043 U	0.15 U
CW-SS-32	Cove Wash Middle 1E	4043933	655741.9975	0.074 U	0.1 U	0.13 J	0.18 U
CW-SS-36	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	0.093 U	0.096 U	0.055 U	0.18 U
CW-SS-37	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	0.091 U	0.099 U	0.058 U	0.18 U
CW-SS-71	Duplicate of CW-37	4044377.806	657955.4587	NC	NC	0.053 U	0.18 U
CW-SS-38	Cove Wash Middle (Historical)	4044173	657897.9975	0.093 U	0.097 U	0.051 U	0.2 U
CW-SS-39	Cove Wash Middle 2	4045453.338	658432.5145	0.1 U	0.092 U	0.089 J	0.2 U
CW-SS-41	Cove Wash Middle 1	4045552	658464	0.077 U	0.094 U	NC	NC
CW-SS-42-12	Irrigation Ditch - Subsurface	4045665.019	658693.5664	0.083 U	0.09 U	0.065 J	0.15 U
CW-SS-43-12	Dam Subsurface - Cove Middle	4045684.910	658673.278	0.076 U	NC	NC	NC
CW-SS-44	Pine Water Springs Drainage	4043806.688	661260.5257	0.073 U	0.11 U	0.043 U	0.18 U
CW-SS-45	Background (Deer Springs Drainage)	4042151.212	661078.7105	0.071 U	0.09 U	0.043 U	0.19 U
CW-SS-46	Pine Water Springs	4043788.61	661352.387	0.092 J	0.093 U	0.067 J	0.19 U
CW-SS-46-12	Pine Water Springs- Subsurface	4043788.61	661352.387	0.078 U	0.093 U	0.13 J	0.18 U
CW-SS-47	Cove Wash Middle 3F	4043774.185	659297.1492	0.079 U	0.1 U	0.079 J	0.2 U
CW-SS-48	Cove Wash Middle 3F	4044446.562	659271.0138	0.099 U	0.093 U	0.094 J	0.19 U
CW-SS-50	Cove Wash Middle 1	4044856.248	657463.1536	0.13 J	0.097 U	0.056 U	0.2 U
CW-SS-58	Duplicate of CW-50	4044856.247	657463.154	NC	0.094 U	NC	NC
CW-SS-51	Cove Wash Middle 1A	4044944.041	657035.0523	0.066 J	0.082 U	0.044 U	0.19 U
CW-SS-52	Cove Wash Middle 1G	4044553.333	657329.5884	0.14 J	0.087 U	0.044 U	0.15 U
CW-SS-53	Cove Wash Middle 1	4044478	656787	0.16 J	NC	NC	NC
CW-SS-53a	Cove Wash Middle 3A	4044567	656816	NC	0.089 U	0.051 U	0.19 U
CW-SS-54	Cove Wash Middle 1B	4044752.579	656806.108	0.1 J	0.1 U	0.078 J	0.18 U
CW-SS-55	Cove Wash Middle 1C	4044480.534	656337.5433	0.17 J	0.095 U	0.057 U	0.17 U
CW-SS-55a	Cove Wash Middle 2	4044480.534	656337.545	NC	0.089 U	NC	NC
CW-SS-56	Cove Wash Middle 3A	4042779	658775	0.18 J	NC	NC	NC
CW-SS-56a	Cove Wash Middle 3A	4043135	658979	NC	0.099 U	0.054 U	NC
CW-SS-59	Background - Cove Wash Tributary 1 (Downstream)	4051574.576	664210.2048	NC	0.092 U	0.15 J	0.16 U
CW-SS-60	Cove Wash between 01 and 02 (Downstream)	4051659.495	664274.984	NC	0.1 U	0.12 J	0.17 U
CW-SS-61	Cove Wash Tributary 2 (Downstream)	4051575.939	663979.3813	NC	0.1 U	0.13 J	0.15 U
CW-SS-62	Downstream of Dam	4046378.374	658785.0735	NC	0.098 U	0.082 J	0.18 U
CW-SS-64	Cove Wash North	4045877	656444	NC	0.11 U	0.056 U	0.2 U
CW-SS-65	Cove Wash Middle 3A	4042362.589	658661.6744	NC	0.098 U	0.051 U	0.19 U
CW-SS-66	Cove Wash Middle 3A	4042362.589	658661.6744	NC	0.095 U	0.052 U	0.18 U
CW-SS-89	Duplicate of CW-66	4042338.663	658652.0815	NC	NC	NC	0.17 U
CW-SS-67	Cove Wash Middle 3	4044603.441	658812.815	NC	0.1 U	NC	NC
CW-SS-68	Duplicate of CW-67	4044603.441	658812.815	NC	0.1 U	NC	NC
CW-SS-70	Cove Wash Middle 3F	4044525.919	659043.2268	NC	NC	0.087 J	0.18 U
CW-SS-73	Cove Wash Middle 3D	4042208.541	658769.5923	NC	NC	0.046 U	0.18 U
CW-SS-74	Cove Wash Middle 3D	4041604.376	658745.2414	NC	NC	0.044 J	0.15 U
CW-SS-75	Cove Wash Middle 3D	4041201.219	658764.5801	NC	NC	0.054 U	0.19 U
CW-SS-77	Cove Wash Middle 3D	4045656.58	658677.1375	NC	NC	0.052 U	0.17 U
CW-SS-77-12	Cove Wash Middle 3D - Subsurface	4045656.58	658677.1375	NC	NC	0.061 J	NC
CW-SS-81	Cove Wash North	4049882.052	658891.9138	NC	NC	0.06 J	0.21 U
CW-SS-82	Cove Wash Middle 2A	4044047.322	657766.4468	NC	NC	NC	0.19 U
CW-SS-83	Cove Wash Middle 2A	4044045.08	657643.9635	NC	NC	NC	0.17 U
CW-SS-84	Cove Wash Middle 2B	4043793.108	657816.7814	NC	NC	NC	0.18 U
CW-SS-85	Cove Wash Middle 2A	4043732.792	657461.944	NC	NC	NC	0.19 U
CW-SS-86	Background - Cove Wash Middle 3G	4044482.433	659284.4116	NC	NC	NC	0.21 U
CW-SS-87	Background - Cove Wash Middle 3G	4044365.372	659573.3554	NC	NC	NC	0.2 U
CW-SS-88	Background -Unnamed Tributary to Cove Wash Middle 3A	4041663.506	658834.4595	NC	NC	NC	0.15 U
CW-SS-90	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	NC	NC	NC	0.22 U

Notes:
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U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
µg/L = microgram per liter
<u>Bold, Underlined and Highlighted</u> = Analytical result exceeds screening levels

Lead Results - Sediment

EPA Soil Screening Level - Protective of groundwater				14	14	14	14
Sample ID	Sample Information	Northing	Easting	2015 Low Flow Sampling Event	2016 Spring Snowmelt Sampling Event	2016 Low Flow Sampling Event	2017 Spring Snowmelt Sampling Event
CW-SS-01	Cove Wash (Downstream)	4051637.55	663372.9034	6.7	9.2	7.2	4.7
CW-SS-02	Cove Wash (Downstream)	4053607.153	666731.839	7.1	5.4	4.6	4.6
CW-SS-57	Duplicate of CW-02	4053607.153	666731.839	NC	6.9	NC	NC
CW-SS-03	Cove Wash South	4047985.628	659997.0959	8.3	6.3	5.2	6.9
CW-SS-78	Duplicate of CW-03	4047985.628	659997.0959	NC	NC	5.5	7.5
CW-SS-04	Background (Upstream)	4045547.649	655393.8806	**32**	3.5	3.9	1.8
CW-SS-69	Duplicate of CW-04	4045547.649	655393.8806	NC	NC	3.6	1.8
CW-SS-05	Dam (Historical)	4045709.002	658675.5894	3.7	3.4	2.5	1.9
CW-SS-06	Cove Wash (Downstream)	4050970.463	659839.728	3.2	8.3	5.8	4.8
CW-SS-07	Cove Wash Middle (Historical)	4047101.942	659123.9337	4.4	2.4	2.1	2.2
CW-SS-08	Background (Downstream)	4050235.456	657139.2197	6.3	4.3	6.8	5.4
CW-SS-80	Duplicate of CW-08	4050235.456	657139.2197	NC	NC	5.5	5.5
CW-SS-09	Cove Wash North	4049315.64	658120.2201	6.2	7.9	5.5	8.5
CW-SS-10	Cottonwood Springs	4049594.436	660198.1416	6.7	4.2	3.5	4.4
CW-SS-11	Cove Wash North	4046373.007	657265.4893	2.6	3.2	3.2	1.8
CW-SS-72	Duplicate of CW-11	4046373.007	657265.4893	NC	NC	3.1	2.7
CW-SS-12	Cove Wash Middle 3	4044603.441	658812.8183	4.2	3.2	5.2	4.5
CW-SS-13	Cove Wash Middle 3	4043160.908	658957.686	5.9	3.2	2.7	NC
CW-SS-14	Cove Wash Middle 3E	4042934	659222	5.9	4.1	4.2	NC
CW-SS-15	Cove Wash North	4046035	656751.9991	4.8	3.5	6.3	6.9
CW-SS-16	Cove Wash North	4045602	656065.0033	4.7	3.5	7.3	3.4
CW-SS-17	Cove Wash South (Downstream)	4050338.789	662352.1776	5.9	7.5	4.9	5.4
CW-SS-18	Background (Cove Wash Middle 1)	4045597.485	658407.8511	4.5	3	2.7	3.8
CW-SS-19	Cove Wash Middle 3B	4042075.979	657975.2607	5.3	7.7	5.4	3.7
CW-SS-76	Duplicate of CW-19	4042075.979	657975.2607	NC	NC	NC	3.2
CW-SS-19-12	Cove Wash Middle 3B - Subsurface	4042075.979	657975.2607	7.5	7.6	21 J	5.4
CW-SS-76-12	Duplicate of CW-19 - Subsurface	4042075.979	657975.2607	NC	NC	8.3 J	6.9
CW-SS-20	Cove Wash Middle 3C	4041480.197	658288.117	5.9	5.3	NC	NC
CW-SS-20a	Cove Wash Middle 3C	4041601.022	658538.7969	NC	NC	2.8	3.9
CW-SS-21	Background (Mesa IV Springs)	4043108	655931.0041	5.6	4	4.1	3
CW-SS-21-12	Background (Mesa IV Springs) - Subsurface	4043108	655931.0041	4.2	4.5	3.9	4.2
CW-SS-26	Cove Wash Middle 2 (Historical)	4042501.621	657146.8765	4.8	5.6	5.3	4.1
CW-SS-27	Cove Wash Middle 2B	4042693.122	657319.2808	5.4	3.9	6.3	4.9
CW-SS-28	Duplicate of CW-SS-27	4042693.122	657319.281	5.3	NC	NC	NC
CW-SS-63	Duplicate of CW-27	4042693.122	657319.281	NC	5.9	NC	NC
CW-SS-29	Cove Wash Middle 2C	4042595.541	658108.1172	4.3	5.7	3.1	3.6
CW-SS-30	Background (West Upstream)	4046867.444	654397.084	2.4	4.7	5.2	1.9
CW-SS-31	Background (Upstream)	4044527.019	655114.312	2.2	4.2	4.3	3.4
CW-SS-32	Cove Wash Middle 1E	4043933	655741.9975	3.3	5.2	7.2	7.6
CW-SS-36	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	4.3	2.1	2.4	3.1
CW-SS-37	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	4	2.2	2.5	3.4
CW-SS-71	Duplicate of CW-37	4044377.806	657955.4587	NC	NC	1.9	3.4
CW-SS-38	Cove Wash Middle (Historical)	4044173	657897.9975	4.1	2.6	2.6	3.9
CW-SS-39	Cove Wash Middle 2	4045453.338	658432.5145	5.7	2.4	2.4	3.6
CW-SS-41	Cove Wash Middle 1	4045552	658464	3.4	2.4	NC	NC
CW-SS-42-12	Irrigation Ditch - Subsurface	4045665.019	658693.5664	3.2	2.5	3.1	2.6
CW-SS-43-12	Dam Subsurface - Cove Middle	4045684.910	658673.278	2.6	NC	NC	NC
CW-SS-44	Pine Water Springs Drainage	4043806.688	661260.5257	9.5	6.1	5.4	11
CW-SS-45	Background (Deer Springs Drainage)	4042151.212	661078.7105	3.3	2.3	2.8	5.1
CW-SS-46	Pine Water Springs	4043788.61	661352.387	11	4.4	5.7	6.3
CW-SS-46-12	Pine Water Springs- Subsurface	4043788.61	661352.387	4.4	5	6.2	4.7
CW-SS-47	Cove Wash Middle 3F	4043774.185	659297.1492	6.2	2.5	7.2	4.4
CW-SS-48	Cove Wash Middle 3F	4044446.562	659271.0138	4.4	5.1	4.5	4.6
CW-SS-50	Cove Wash Middle 1	4044856.248	657463.1536	3	4.5	3.6	3.6
CW-SS-58	Duplicate of CW-50	4044856.247	657463.154	NC	4.7	NC	NC
CW-SS-51	Cove Wash Middle 1A	4044944.041	657035.0523	2.2	3.8	3.9	4.8
CW-SS-52	Cove Wash Middle 1G	4044553.333	657329.5884	3.7	3.2	4.4	3.8
CW-SS-53	Cove Wash Middle 1	4044478	656787	2.8	NC	NC	NC
CW-SS-53a	Cove Wash Middle 3A	4044567	656816	NC	4.5	6.6	3.6
CW-SS-54	Cove Wash Middle 1B	4044752.579	656806.108	3.7	4.1	5	2.6
CW-SS-55	Cove Wash Middle 1C	4044480.534	656337.5433	5.4	2.4	4.5	4.1
CW-SS-55a	Cove Wash Middle 2	4044480.534	656337.545	NC	3.7	NC	NC
CW-SS-56	Cove Wash Middle 3A	4042779	658775	4.7	NC	NC	NC
CW-SS-56a	Cove Wash Middle 3A	4043135	658979	NC	2.9	3.8	NC
CW-SS-59	Background - Cove Wash Tributary 1 (Downstream)	4051574.576	664210.2048	NC	7	6.2	6.3
CW-SS-60	Cove Wash between 01 and 02 (Downstream)	4051659.495	664274.984	NC	8	6.3	4.4
CW-SS-61	Cove Wash Tributary 2 (Downstream)	4051575.939	663979.3813	NC	7.1	13	4.8
CW-SS-62	Downstream of Dam	4046378.374	658785.0735	NC	4.3	5.6	7
CW-SS-64	Cove Wash North	4045877	656444	NC	4.5	2.7	5.2
CW-SS-65	Cove Wash Middle 3A	4042362.589	658661.6744	NC	2.9	2.2	2.7
CW-SS-66	Cove Wash Middle 3A	4042362.589	658661.6744	NC	2.1	3.7	3.2
CW-SS-89	Duplicate of CW-66	4042338.663	658652.0815	NC	NC	NC	3.9
CW-SS-67	Cove Wash Middle 3	4044603.441	658812.815	NC	2.5	NC	NC
CW-SS-68	Duplicate of CW-67	4044603.441	658812.815	NC	3	NC	NC
CW-SS-70	Cove Wash Middle 3F	4044525.919	659043.2268	NC	NC	4.9	3.8
CW-SS-73	Cove Wash Middle 3D	4042208.541	658769.5923	NC	NC	2.9	3.7
CW-SS-74	Cove Wash Middle 3D	4041604.376	658745.2414	NC	NC	2.8	5.1
CW-SS-75	Cove Wash Middle 3D	4041201.219	658764.5801	NC	NC	1.8	3.8
CW-SS-77	Cove Wash Middle 3D	4045656.58	658677.1375	NC	NC	2.8	2.8
CW-SS-77-12	Cove Wash Middle 3D - Subsurface	4045656.58	658677.1375	NC	NC	2.4	NC
CW-SS-81	Cove Wash North	4049882.052	658891.9138	NC	NC	5.9	7.9
CW-SS-82	Cove Wash Middle 2A	4044047.322	657766.4468	NC	NC	NC	2.6
CW-SS-83	Cove Wash Middle 2A	4044045.08	657643.9635	NC	NC	NC	1.4
CW-SS-84	Cove Wash Middle 2B	4043793.108	657816.7814	NC	NC	NC	3.1
CW-SS-85	Cove Wash Middle 2A	4043732.792	657461.944	NC	NC	NC	2.3
CW-SS-86	Background - Cove Wash Middle 3G	4044482.433	659284.4116	NC	NC	NC	4.5
CW-SS-87	Background - Cove Wash Middle 3G	4044365.372	659573.3554	NC	NC	NC	4.8
CW-SS-88	Background -Unnamed Tributary to Cove Wash Middle 3A	4041663.506	658834.4595	NC	NC	NC	4.1
CW-SS-90	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	NC	NC	NC	10

Notes:
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NRWQC = Navajo Recommended Water Quality Criteria
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

Selenium Results - Sediment

EPA Soil Screening Level - Protective of groundwater				0.26	0.26	0.26	0.26
Sample ID	Sample Information	Northing	Easting	2015 Low Flow Sampling Event	2016 Spring Snowmelt Sampling Event	2016 Low Flow Sampling Event	2017 Spring Snowmelt Sampling Event
CW-SS-09	Cove Wash North	4049315.64	658120.2201	0.46 U	0.62 U	1.4 U	**0.35 J**
CW-SS-10	Cottonwood Springs	4049594.436	660198.1416	**2.8**	**0.88**	0.39 U	**0.31 J**
CW-SS-19	Cove Wash Middle 3B	4042075.979	657975.2607	**0.88**	**3.2**	0.32 U	**0.37 J**
CW-SS-76-12	Duplicate of CW-19 - Subsurface	4042075.979	657975.2607	NC	NC	**1.1 J**	**2.1**
CW-SS-26	Cove Wash Middle 2 (Historical)	4042501.621	657146.8765	**1.2**	**5.6**	**16**	**6.1**
CW-SS-29	Cove Wash Middle 2C	4042595.541	658108.1172	**0.62**	0.49 U	0.31 U	**0.33 J**
CW-SS-31	Background (Upstream)	4044527.019	655114.312	0.45 U	0.58 U	0.29 U	**0.43 J**
CW-SS-32	Cove Wash Middle 1E	4043933	655741.9975	**0.5**	0.59 U	0.43 U	**0.56 J**
CW-SS-71	Duplicate of CW-37	4044377.806	657955.4587	NC	NC	**0.4 J**	**0.3 J**
CW-SS-47	Cove Wash Middle 3F	4043774.185	659297.1492	0.48 U	0.6 U	**5.8**	**0.54 J**
CW-SS-50	Cove Wash Middle 1	4044856.248	657463.1536	0.52 U	0.56 U	0.38 U	**1.4**
CW-SS-51	Cove Wash Middle 1A	4044944.041	657035.0523	**0.32 J**	0.47 U	**0.52**	**0.98**
CW-SS-55	Cove Wash Middle 1C	4044480.534	656337.5433	**1.3**	**1.2**	**20**	**1.8**
CW-SS-59	Background - Cove Wash Tributary 1 (Downstream)	4051574.576	664210.2048	NC	0.53 U	1.8 U	**0.3 J**
CW-SS-64	Cove Wash North	4045877	656444	NC	**1**	**0.73**	**0.51 J**
CW-SS-66	Cove Wash Middle 3A	4042362.589	658661.6744	NC	0.55 U	**1.2**	**0.98**
CW-SS-89	Duplicate of CW-66	4042338.663	658652.0815	NC	NC	NC	**0.52 J**
CW-SS-74	Cove Wash Middle 3D	4041604.376	658745.2414	NC	NC	**0.4 J**	**0.32 J**
CW-SS-77	Cove Wash Middle 3D	4045656.58	658677.1375	NC	NC	0.35 U	**0.35 J**
CW-SS-90	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	NC	NC	NC	**0.77**
CW-SS-01	Cove Wash (Downstream)	4051637.55	663372.9034	0.6 U	0.57 U	**0.64**	0.18 U
CW-SS-02	Cove Wash (Downstream)	4053607.153	666731.839	0.53 U	0.53 U	**0.51 J**	0.19 U
CW-SS-57	Duplicate of CW-02	4053607.153	666731.839	NC	0.55 U	NC	NC
CW-SS-03	Cove Wash South	4047985.628	659997.0959	0.48 U	0.51 U	1.5 U	0.18 U
CW-SS-78	Duplicate of CW-03	4047985.628	659997.0959	NC	NC	1.4 U	0.17 U
CW-SS-04	Background (Upstream)	4045547.649	655393.8806	**5.2**	0.55 U	**0.64 J**	0.18 U
CW-SS-69	Duplicate of CW-04	4045547.649	655393.8806	NC	NC	**0.53 J**	0.19 U
CW-SS-05	Dam (Historical)	4045709.002	658675.5894	0.56 U	0.57 U	0.34 U	0.17 U
CW-SS-06	Cove Wash (Downstream)	4050970.463	659839.728	0.55 U	0.46 U	1.5 U	0.2 U
CW-SS-07	Cove Wash Middle (Historical)	4047101.942	659123.9337	0.53 U	0.57 U	**0.66**	0.19 U
CW-SS-08	Background (Downstream)	4050235.456	657139.2197	**0.49**	0.46 U	1.5 U	0.16 U
CW-SS-80	Duplicate of CW-08	4050235.456	657139.2197	NC	NC	1.5 U	0.16 U
CW-SS-11	Cove Wash North	4046373.007	657265.4893	0.55 U	0.58 U	0.39 U	0.19 U
CW-SS-72	Duplicate of CW-11	4046373.007	657265.4893	NC	NC	0.36 U	0.17 U
CW-SS-12	Cove Wash Middle 3	4044603.441	658812.8183	0.58 U	0.55 U	0.35 U	0.19 U
CW-SS-13	Cove Wash Middle 3	4043160.908	658957.686	**2.2**	0.63 U	0.39 U	NC
CW-SS-14	Cove Wash Middle 3E	4042934	659222	**1.1**	0.63 U	0.37 U	NC
CW-SS-15	Cove Wash North	4046035	656751.9991	**0.5 J**	0.48 U	0.36 U	0.2 U
CW-SS-16	Cove Wash North	4045602	656065.0033	0.44 U	0.48 U	0.33 U	0.19 U
CW-SS-17	Cove Wash South (Downstream)	4050338.789	662352.1776	0.45 U	0.59 U	1.6 U	0.15 U
CW-SS-18	Background (Cove Wash Middle 1)	4045597.485	658407.8511	0.57 U	0.61 U	**0.45 J**	0.19 U
CW-SS-76	Duplicate of CW-19	4042075.979	657975.2607	NC	NC	NC	0.19
CW-SS-19-12	Cove Wash Middle 3B - Subsurface	4042075.979	657975.2607	**0.98**	**7**	**0.46 J**	0.26 J
CW-SS-20	Cove Wash Middle 3C	4041480.197	658288.117	**0.99**	0.58 U	NC	0.16 U
CW-SS-20a	Cove Wash Middle 3C	4041601.022	658538.7969	NC	NC	**0.63**	NC
CW-SS-21	Background (Mesa IV Springs)	4043108	655931.0041	**0.68**	**0.74**	**0.67 J**	0.18 U
CW-SS-21-12	Background (Mesa IV Springs) - Subsurface	4043108	655931.0041	**0.57**	0.53 U	0.33 U	0.2 J
CW-SS-27	Cove Wash Middle 2B	4042693.122	657319.2808	**1**	0.51 U	**3.2**	0.18 U
CW-SS-63	Duplicate of CW-27	4042693.122	657319.281	NC	**0.87**	NC	NC
CW-SS-28	Duplicate of CW-SS-27	4042693.122	657319.281	**0.66**	NC	NC	NC
CW-SS-30	Background (West Upstream)	4046867.444	654397.084	0.45 U	0.72 U	0.3 U	0.15 U
CW-SS-36	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	0.57 U	0.55 U	**0.61 J**	0.18 U
CW-SS-37	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	0.55 U	0.57 U	**0.52 J**	0.18 U
CW-SS-38	Cove Wash Middle (Historical)	4044173	657897.9975	0.56 U	0.56 U	0.34 U	0.2 U
CW-SS-39	Cove Wash Middle 2	4045453.338	658432.5145	**0.87**	0.53 U	**0.76**	0.2 U
CW-SS-41	Cove Wash Middle 1	4045552	658464	0.47 U	**13**	NC	NC
CW-SS-42-12	Irrigation Ditch - Subsurface	4045665.019	658693.5664	0.5 U	0.52 U	0.31 U	0.15 U
CW-SS-43-12	Dam Subsurface - Cove Middle	4045684.910	658673.278	0.46 U	NC	NC	NC
CW-SS-44	Pine Water Springs Drainage	4043806.688	661260.5257	**0.86**	0.66 U	0.29 U	0.18 U
CW-SS-45	Background (Deer Springs Drainage)	4042151.212	661078.7105	0.43 U	0.52 U	0.29 U	0.19 U
CW-SS-46	Pine Water Springs	4043788.61	661352.387	**0.69**	0.54 U	0.33 U	0.19 U
CW-SS-46-12	Pine Water Springs- Subsurface	4043788.61	661352.387	0.47 U	0.53 U	0.36 U	0.18 U
CW-SS-48	Cove Wash Middle 3F	4044446.562	659271.0138	0.6 U	0.53 U	**0.65**	0.19 U
CW-SS-58	Duplicate of CW-50	4044856.247	657463.154	NC	**0.63**	NC	NC
CW-SS-52	Cove Wash Middle 1G	4044553.333	657329.5884	0.45 U	0.5 U	0.29 U	0.15 U
CW-SS-53	Cove Wash Middle 1	4044478	656787	0.54 U	NC	NC	NC
CW-SS-53a	Cove Wash Middle 3A	4044567	656816	NC	**1.3**	**0.89**	0.23 J
CW-SS-54	Cove Wash Middle 1B	4044752.579	656806.108	**0.86**	**0.73**	**6.3**	0.24 J
CW-SS-55a	Cove Wash Middle 2	4044480.534	656337.545	NC	0.51 U	NC	NC
CW-SS-56	Cove Wash Middle 3A	4042779	658775	0.55 U	NC	NC	NC
CW-SS-56a	Cove Wash Middle 3A	4043135	658979	NC	0.57 U	**0.43 J**	NC
CW-SS-60	Cove Wash between 01 and 02 (Downstream)	4051659.495	664274.984	NC	0.59 U	0.37 U	0.17 U
CW-SS-61	Cove Wash Tributary 2 (Downstream)	4051575.939	663979.3813	NC	0.58 U	1.7 U	0.15 U
CW-SS-62	Downstream of Dam	4046378.374	658785.0735	NC	0.57 U	0.3 U	0.24 J
CW-SS-65	Cove Wash Middle 3A	4042362.589	658661.6744	NC	0.56 U	**1**	0.19 U
CW-SS-67	Cove Wash Middle 3	4044603.441	658812.815	NC	0.57 U	NC	NC
CW-SS-68	Duplicate of CW-67	4044603.441	658812.815	NC	0.57 U	NC	NC
CW-SS-70	Cove Wash Middle 3F	4044525.919	659043.2268	NC	NC	**0.72**	0.18 U
CW-SS-73	Cove Wash Middle 3D	4042208.541	658769.5923	NC	NC	0.31 U	0.18 U
CW-SS-75	Cove Wash Middle 3D	4041201.219	658764.5801	NC	NC	0.36 U	0.19 U
CW-SS-77-12	Cove Wash Middle 3D - Subsurface	4045656.58	658677.1375	NC	NC	0.31 U	NC
CW-SS-81	Cove Wash North	4049882.052	658891.9138	NC	NC	1.6 U	0.21 U
CW-SS-82	Cove Wash Middle 2A	4044047.322	657766.4468	NC	NC	NC	0.19 U
CW-SS-83	Cove Wash Middle 2A	4044045.08	657643.9635	NC	NC	NC	0.17 U
CW-SS-84	Cove Wash Middle 2B	4043793.108	657816.7814	NC	NC	NC	0.18 U
CW-SS-85	Cove Wash Middle 2A	4043732.792	657461.944	NC	NC	NC	0.19 U
CW-SS-86	Background - Cove Wash Middle 3G	4044482.433	659284.4116	NC	NC	NC	0.21 U
CW-SS-87	Background - Cove Wash Middle 3G	4044365.372	659573.3554	NC	NC	NC	0.2 U
CW-SS-88	Background -Unnamed Tributary to Cove Wash Middle 3A	4041663.506	658834.4595	NC	NC	NC	0.15 U

Notes:
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NRWQC = Navajo Recommended Water Quality Criteria
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

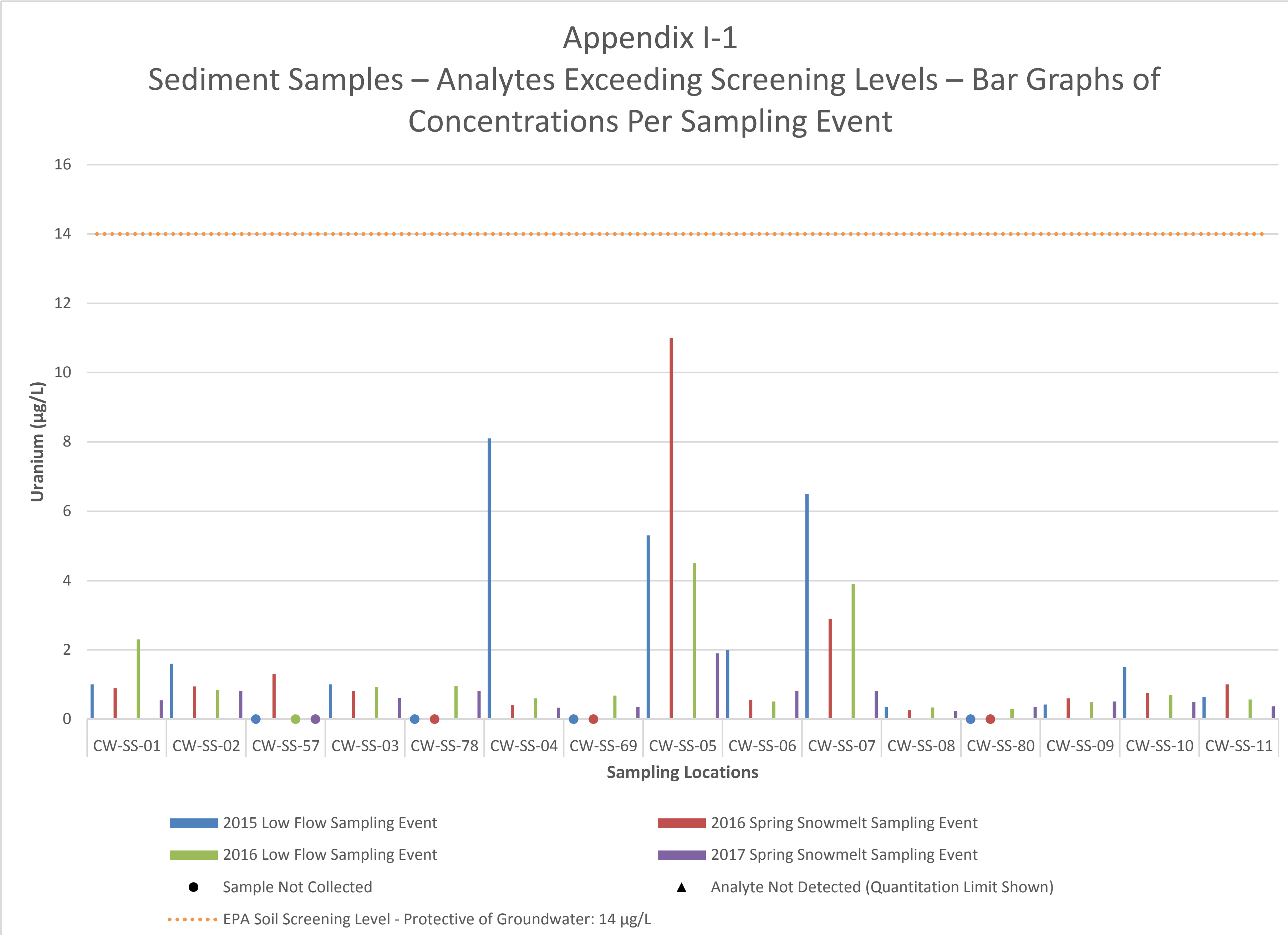
Thallium Results - Sediment

EPA Soil Screening Level - Protective of groundwater				0.14	0.14	0.14	0.14
Sample ID	Sample Information	Northing	Easting	2015 Low Flow Sampling Event	2016 Spring Snowmelt Sampling Event	2016 Low Flow Sampling Event	2017 Spring Snowmelt Sampling Event
CW-SS-01	Cove Wash (Downstream)	4051637.55	663372.9034	0.92 U	0.42 U	0.39 U	0.43 U
CW-SS-02	Cove Wash (Downstream)	4053607.153	666731.839	0.82 U	0.39 U	0.37 U	**0.71 J**
CW-SS-57	Duplicate of CW-02	4053607.153	666731.839	NC	0.4 U	NC	NC
CW-SS-03	Cove Wash South	4047985.628	659997.0959	0.74 U	0.38 U	0.32 U	0.41 U
CW-SS-78	Duplicate of CW-03	4047985.628	659997.0959	NC	NC	0.32 U	0.41 U
CW-SS-04	Background (Upstream)	4045547.649	655393.8806	3.3 U	0.4 U	0.46 U	0.41 U
CW-SS-69	Duplicate of CW-04	4045547.649	655393.8806	NC	NC	0.42 U	0.45 U
CW-SS-05	Dam (Historical)	4045709.002	658675.5894	0.87 U	0.42 U	0.38 U	0.4 U
CW-SS-06	Cove Wash (Downstream)	4050970.463	659839.728	0.85 U	0.34 U	0.33 U	0.47 U
CW-SS-07	Cove Wash Middle (Historical)	4047101.942	659123.9337	0.82 U	0.42 U	0.4 U	0.45 U
CW-SS-08	Background (Downstream)	4050235.456	657139.2197	0.7 U	0.34 U	0.33 U	0.37 U
CW-SS-80	Duplicate of CW-08	4050235.456	657139.2197	NC	NC	0.33 U	0.37 U
CW-SS-09	Cove Wash North	4049315.64	658120.2201	0.72 U	0.46 U	0.31 U	0.36 U
CW-SS-10	Cottonwood Springs	4049594.436	660198.1416	0.95 U	0.5 U	0.42 U	0.45 U
CW-SS-11	Cove Wash North	4046373.007	657265.4893	0.85 U	0.42 U	0.42 U	**0.63 J**
CW-SS-72	Duplicate of CW-11	4046373.007	657265.4893	NC	NC	0.39 U	0.4 U
CW-SS-12	Cove Wash Middle 3	4044603.441	658812.8183	0.9 U	0.4 U	0.38 U	**0.53 J**
CW-SS-13	Cove Wash Middle 3	4043160.908	658957.686	0.84 U	0.47 U	0.43 U	NC
CW-SS-14	Cove Wash Middle 3E	4042934	659222	0.74 U	0.46 U	0.41 U	NC
CW-SS-15	Cove Wash North	4046035	656751.9991	0.75 U	0.36 U	0.4 U	0.47 U
CW-SS-16	Cove Wash North	4045602	656065.0033	0.68 U	0.35 U	0.36 U	0.44 U
CW-SS-17	Cove Wash South (Downstream)	4050338.789	662352.1776	0.7 U	0.43 U	0.35 U	0.36 U
CW-SS-18	Background (Cove Wash Middle 1)	4045597.485	658407.8511	0.89 U	0.45 U	0.32 U	0.44 U
CW-SS-19	Cove Wash Middle 3B	4042075.979	657975.2607	0.7 U	0.44 U	0.35 U	0.36 U
CW-SS-76	Duplicate of CW-19	4042075.979	657975.2607	NC	NC	NC	0.45 U
CW-SS-19-12	Cove Wash Middle 3B - Subsurface	4042075.979	657975.2607	0.78 U	0.38 U	0.37 U	0.38 U
CW-SS-76-12	Duplicate of CW-19 - Subsurface	4042075.979	657975.2607	NC	NC	**0.88 J**	0.38 U
CW-SS-20	Cove Wash Middle 3C	4041480.197	658288.117	0.76 U	0.43 U	NC	NC
CW-SS-20a	Cove Wash Middle 3C	4041601.022	658538.7969	NC	NC	0.39 U	0.37 U
CW-SS-21	Background (Mesa IV Springs)	4043108	655931.0041	0.94 U	0.54 U	0.52 U	0.42 U
CW-SS-21-12	Background (Mesa IV Springs) - Subsurface	4043108	655931.0041	0.78 U	0.39 U	0.36 U	0.4 U
CW-SS-26	Cove Wash Middle 2 (Historical)	4042501.621	657146.8765	0.89 U	0.45 U	0.4 U	0.45 U
CW-SS-27	Cove Wash Middle 2B	4042693.122	657319.2808	0.77 U	0.38 U	0.34 U	0.42 U
CW-SS-63	Duplicate of CW-27	4042693.122	657319.281	NC	0.47 U	NC	NC
CW-SS-28	Duplicate of CW-SS-27	4042693.122	657319.281	0.79 U	NC	NC	NC
CW-SS-29	Cove Wash Middle 2C	4042595.541	658108.1172	0.71 U	0.36 U	0.34 U	0.35 U
CW-SS-30	Background (West Upstream)	4046867.444	654397.084	0.7 U	0.53 U	0.33 U	0.36 U
CW-SS-31	Background (Upstream)	4044527.019	655114.312	0.69 U	0.42 U	0.32 U	0.36 U
CW-SS-32	Cove Wash Middle 1E	4043933	655741.9975	0.69 U	0.44 U	0.47 U	0.42 U
CW-SS-36	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	0.88 U	0.41 U	0.41 U	0.41 U
CW-SS-37	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	0.86 U	0.42 U	0.43 U	0.43 U
CW-SS-71	Duplicate of CW-37	4044377.806	657955.4587	NC	NC	0.39 U	0.43 U
CW-SS-38	Cove Wash Middle (Historical)	4044173	657897.9975	0.87 U	0.41 U	0.38 U	0.46 U
CW-SS-39	Cove Wash Middle 2	4045453.338	658432.5145	0.96 U	0.39 U	0.37 U	0.46 U
CW-SS-41	Cove Wash Middle 1	4045552	658464	0.72 U	0.4 U	NC	NC
CW-SS-42-12	Irrigation Ditch - Subsurface	4045665.019	658693.5664	0.78 U	0.38 U	0.34 U	0.35 U
CW-SS-43-12	Dam Subsurface - Cove Middle	4045684.910	658673.278	0.71 U	NC	NC	NC
CW-SS-44	Pine Water Springs Drainage	4043806.688	661260.5257	0.69 U	0.48 U	0.32 U	0.43 U
CW-SS-45	Background (Deer Springs Drainage)	4042151.212	661078.7105	0.66 U	0.38 U	0.32 U	0.44 U
CW-SS-46	Pine Water Springs	4043788.61	661352.387	0.84 U	0.4 U	0.36 U	0.46 U
CW-SS-46-12	Pine Water Springs- Subsurface	4043788.61	661352.387	0.73 U	0.39 U	0.39 U	0.42 U
CW-SS-47	Cove Wash Middle 3F	4043774.185	659297.1492	0.74 U	0.44 U	0.53 U	0.46 U
CW-SS-48	Cove Wash Middle 3F	4044446.562	659271.0138	0.93 U	0.39 U	0.32 U	0.44 U
CW-SS-50	Cove Wash Middle 1	4044856.248	657463.1536	0.81 U	0.41 U	0.42 U	0.47 U
CW-SS-58	Duplicate of CW-50	4044856.247	657463.154	NC	0.4 U	NC	NC
CW-SS-51	Cove Wash Middle 1A	4044944.041	657035.0523	0.48 U	0.35 U	0.33 U	0.44 U
CW-SS-52	Cove Wash Middle 1G	4044553.333	657329.5884	0.7 U	0.37 U	0.32 U	0.35 U
CW-SS-53	Cove Wash Middle 1	4044478	656787	0.83 U	NC	NC	NC
CW-SS-53a	Cove Wash Middle 3A	4044567	656816	NC	0.38 U	0.37 U	0.44 U
CW-SS-54	Cove Wash Middle 1B	4044752.579	656806.108	0.79 U	0.42 U	0.38 U	0.41 U
CW-SS-55	Cove Wash Middle 1C	4044480.534	656337.5433	0.84 U	0.4 U	0.42 U	0.4 U
CW-SS-55a	Cove Wash Middle 2	4044480.534	656337.545	NC	0.38 U	NC	NC
CW-SS-56	Cove Wash Middle 3A	4042779	658775	0.86 U	NC	NC	NC
CW-SS-56a	Cove Wash Middle 3A	4043135	658979	NC	0.42 U	0.4 U	NC
CW-SS-59	Background - Cove Wash Tributary 1 (Downstream)	4051574.576	664210.2048	NC	0.39 U	0.4 U	0.38 U
CW-SS-60	Cove Wash between 01 and 02 (Downstream)	4051659.495	664274.984	NC	0.43 U	0.4 U	0.39 U
CW-SS-61	Cove Wash Tributary 2 (Downstream)	4051575.939	663979.3813	NC	0.43 U	0.37 U	0.35 U
CW-SS-62	Downstream of Dam	4046378.374	658785.0735	NC	0.42 U	0.33 U	0.41 U
CW-SS-64	Cove Wash North	4045877	656444	NC	0.47 U	0.41 U	0.46 U
CW-SS-65	Cove Wash Middle 3A	4042362.589	658661.6744	NC	0.42 U	0.38 U	0.45 U
CW-SS-66	Cove Wash Middle 3A	4042362.589	658661.6744	NC	0.4 U	0.38 U	0.43 U
CW-SS-89	Duplicate of CW-66	4042338.663	658652.0815	NC	NC	NC	0.4 U
CW-SS-67	Cove Wash Middle 3	4044603.441	658812.815	NC	0.42 U	NC	NC
CW-SS-68	Duplicate of CW-67	4044603.441	658812.815	NC	0.42 U	NC	NC
CW-SS-70	Cove Wash Middle 3F	4044525.919	659043.2268	NC	NC	0.45 U	0.43 U
CW-SS-73	Cove Wash Middle 3D	4042208.541	658769.5923	NC	NC	0.34 U	0.43 U
CW-SS-74	Cove Wash Middle 3D	4041604.376	658745.2414	NC	NC	0.32 U	0.36 U
CW-SS-75	Cove Wash Middle 3D	4041201.219	658764.5801	NC	NC	0.4 U	0.44 U
CW-SS-77	Cove Wash Middle 3D	4045656.58	658677.1375	NC	NC	0.39 U	0.4 U
CW-SS-77-12	Cove Wash Middle 3D - Subsurface	4045656.58	658677.1375	NC	NC	0.35 U	NC
CW-SS-81	Cove Wash North	4049882.052	658891.9138	NC	NC	0.36 U	0.49 U
CW-SS-82	Cove Wash Middle 2A	4044047.322	657766.4468	NC	NC	NC	0.45 U
CW-SS-83	Cove Wash Middle 2A	4044045.08	657643.9635	NC	NC	NC	0.41 U
CW-SS-84	Cove Wash Middle 2B	4043793.108	657816.7814	NC	NC	NC	0.42 U
CW-SS-85	Cove Wash Middle 2A	4043732.792	657461.944	NC	NC	NC	0.45 U
CW-SS-86	Background - Cove Wash Middle 3G	4044482.433	659284.4116	NC	NC	NC	0.48 U
CW-SS-87	Background - Cove Wash Middle 3G	4044365.372	659573.3554	NC	NC	NC	0.46 U
CW-SS-88	Background -Unnamed Tributary to Cove Wash Middle 3A	4041663.506	658834.4595	NC	NC	NC	0.35 U
CW-SS-90	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.445	NC	NC	NC	0.51 U

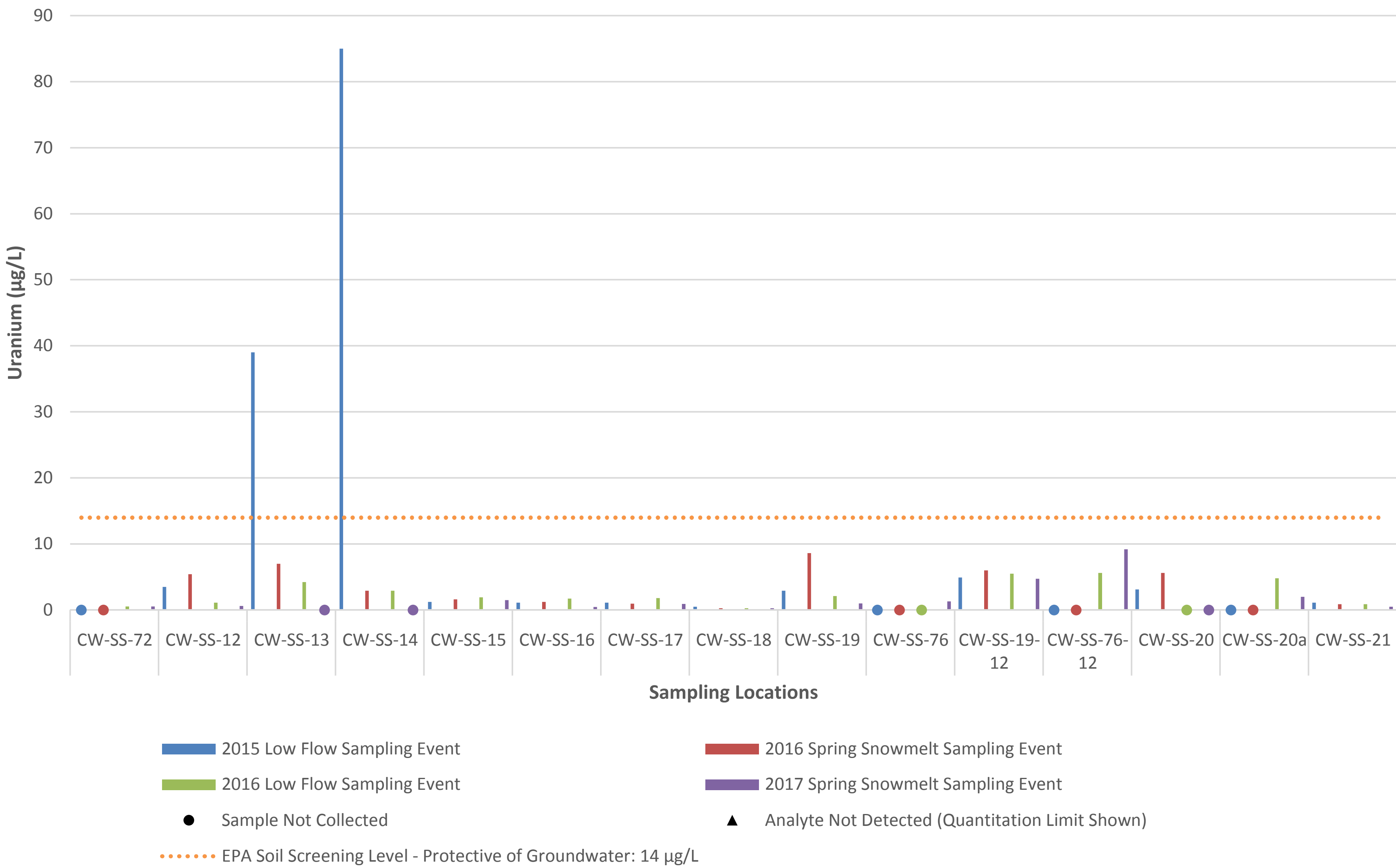
Notes:
EPA = Environmental Protection Agency
NA = Not Applicable
NC = Not Collected
NRWQC = Navajo Recommended Water Quality Criteria
Coordinates System for Northing/Easting is UTM Zone 12 NAD 83
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = Compound detected, but result value is approximate.
µg/L = microgram per liter
Bold, Underlined and Highlighted = Analytical result exceeds screening levels

APPENDIX I:

SEDIMENT SAMPLES – ANALYTES EXCEEDING SCREENING LEVELS – BAR GRAPHS OF CONCENTRATIONS PER SAMPLING EVENT

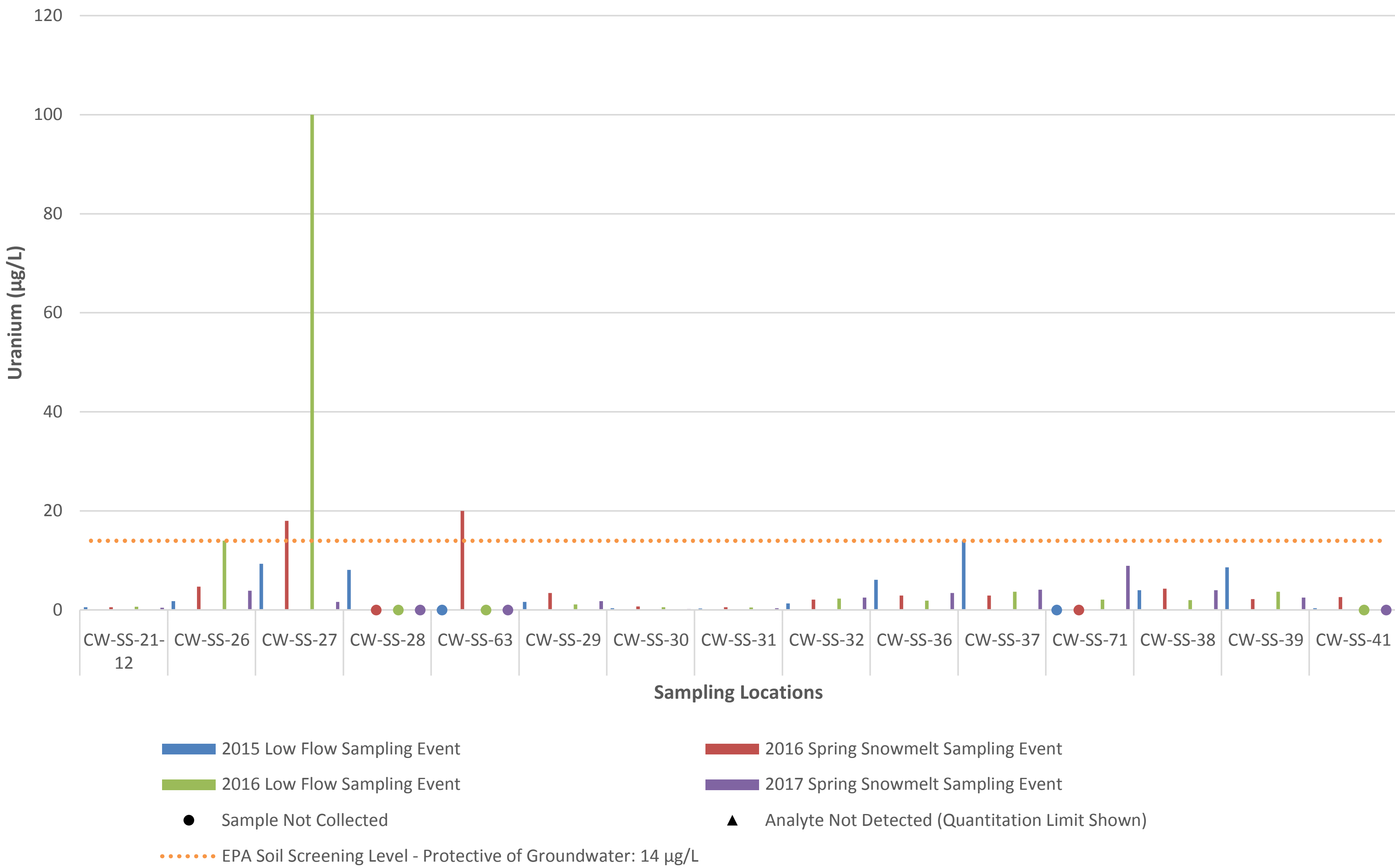

Appendix I-1
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Uranium (µg/L)
16
14
12
10
8
6
4
2
0
CW-SS-01
CW-SS-02
CW-SS-57
CW-SS-03
CW-SS-78
CW-SS-04
CW-SS-69
CW-SS-05
CW-SS-06
CW-SS-07
CW-SS-08
CW-SS-80
CW-SS-09
CW-SS-10
CW-SS-11
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 14 µg/L

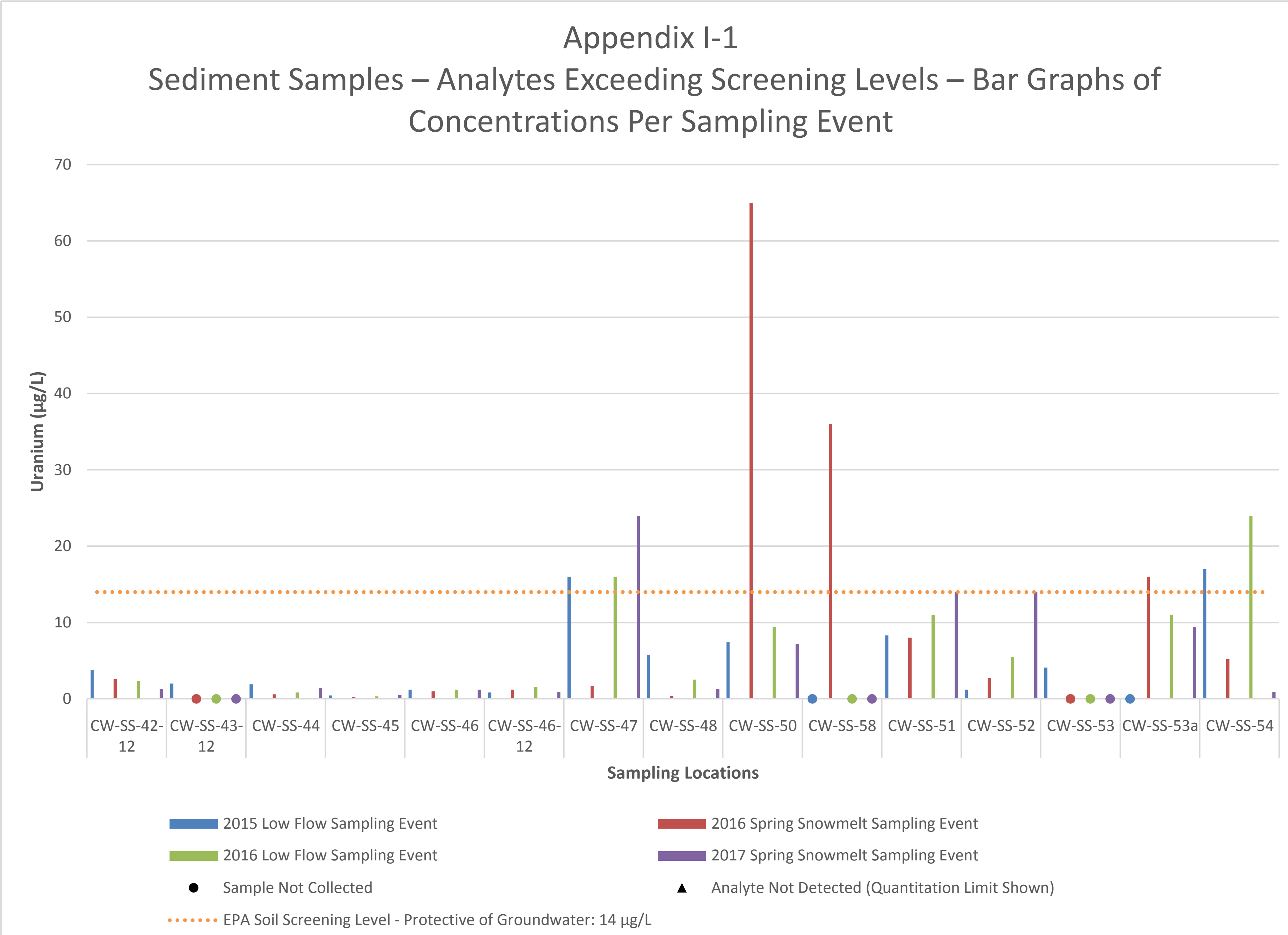
Appendix I-1
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event

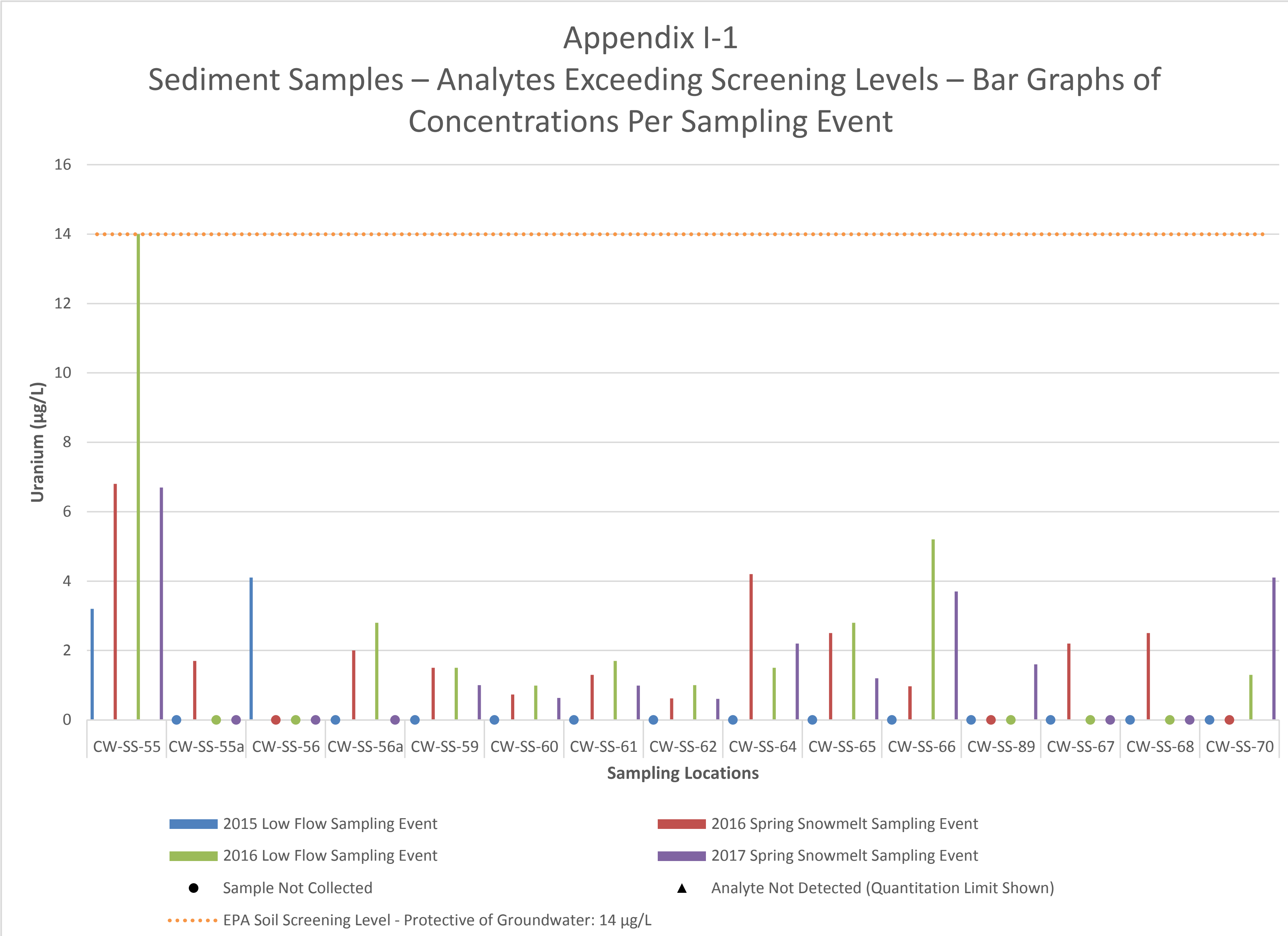


Appendix I-1

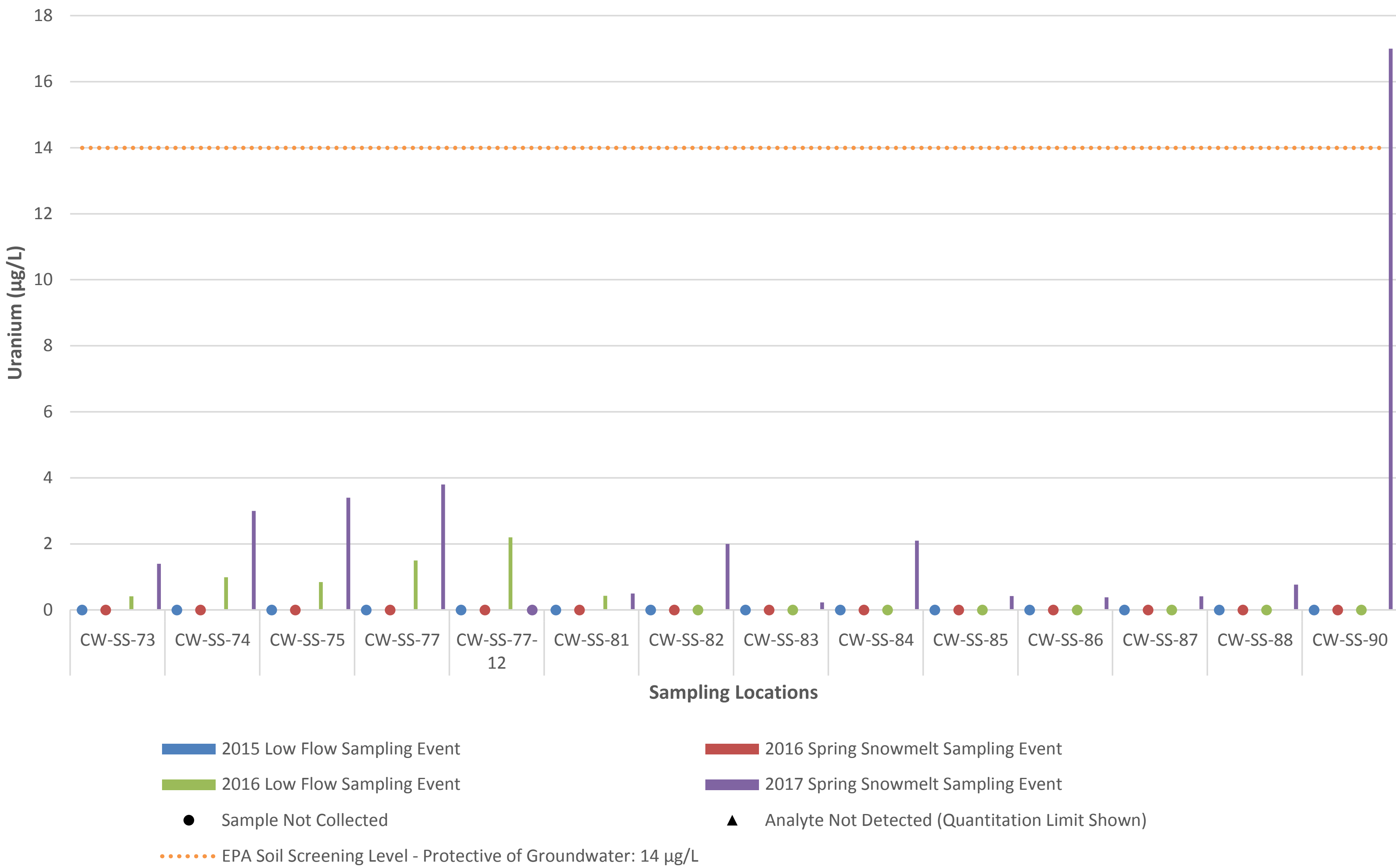
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event



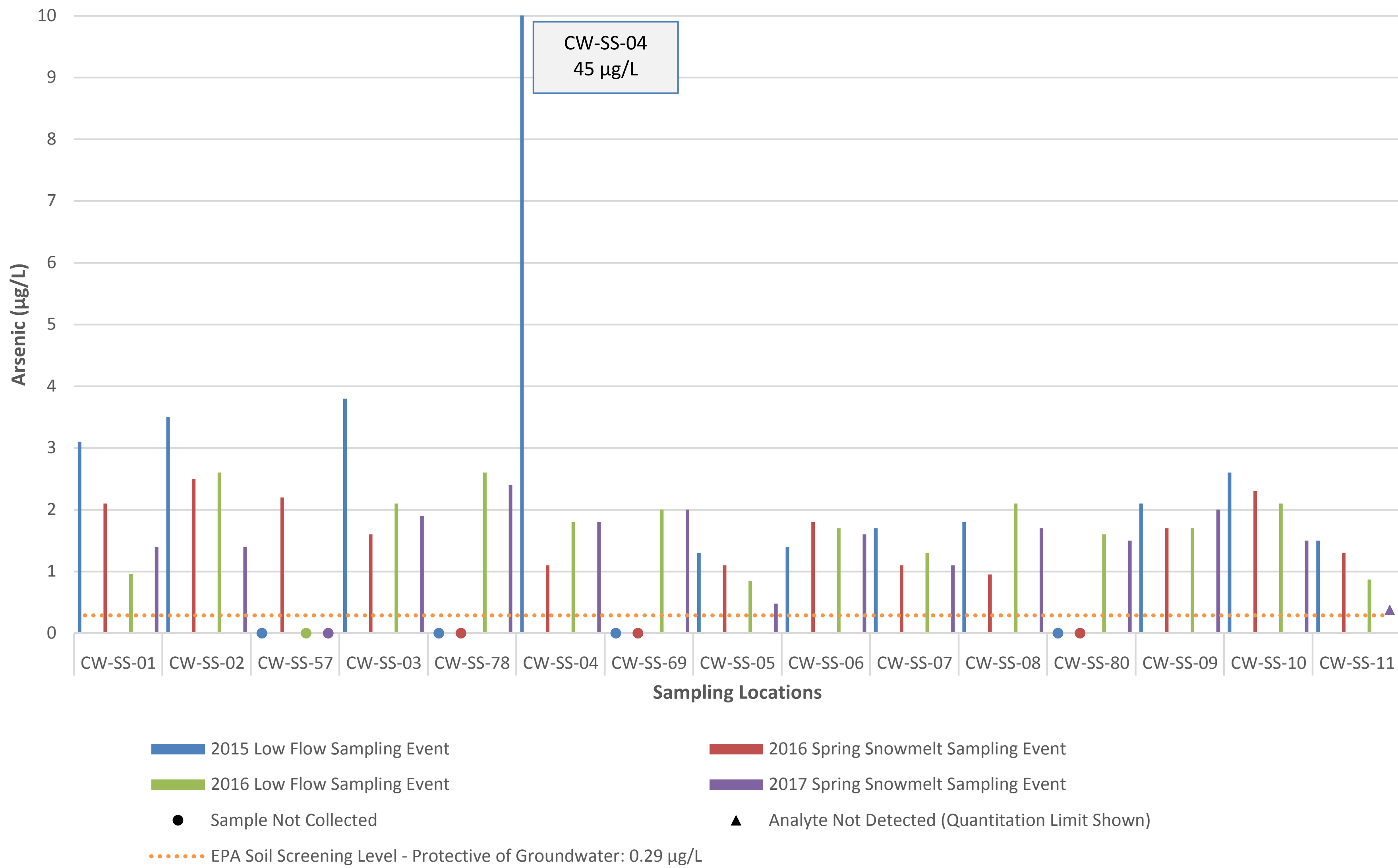

Appendix I-1
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Uranium (µg/L)
70
60
50
40
30
20
10
0
CW-SS-42-12
CW-SS-43-12
CW-SS-44
CW-SS-45
CW-SS-46
CW-SS-46-12
CW-SS-47
CW-SS-48
CW-SS-50
CW-SS-58
CW-SS-51
CW-SS-52
CW-SS-53
CW-SS-53a
CW-SS-54
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 14 µg/L

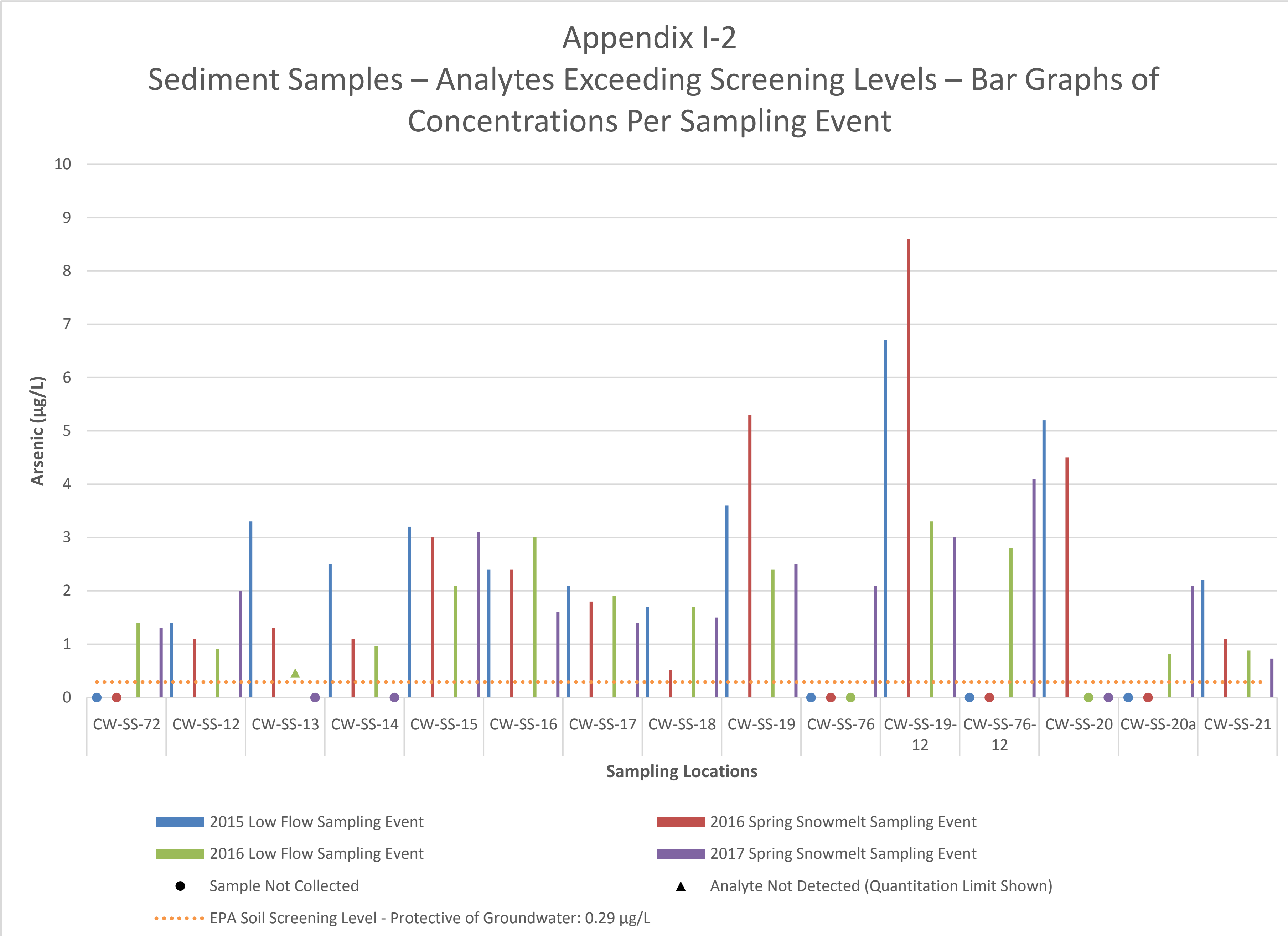

Appendix I-1
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Uranium (µg/L)
16
14
12
10
8
6
4
2
0
CW-SS-55
CW-SS-55a
CW-SS-56
CW-SS-56a
CW-SS-59
CW-SS-60
CW-SS-61
CW-SS-62
CW-SS-64
CW-SS-65
CW-SS-66
CW-SS-89
CW-SS-67
CW-SS-68
CW-SS-70
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 14 µg/L

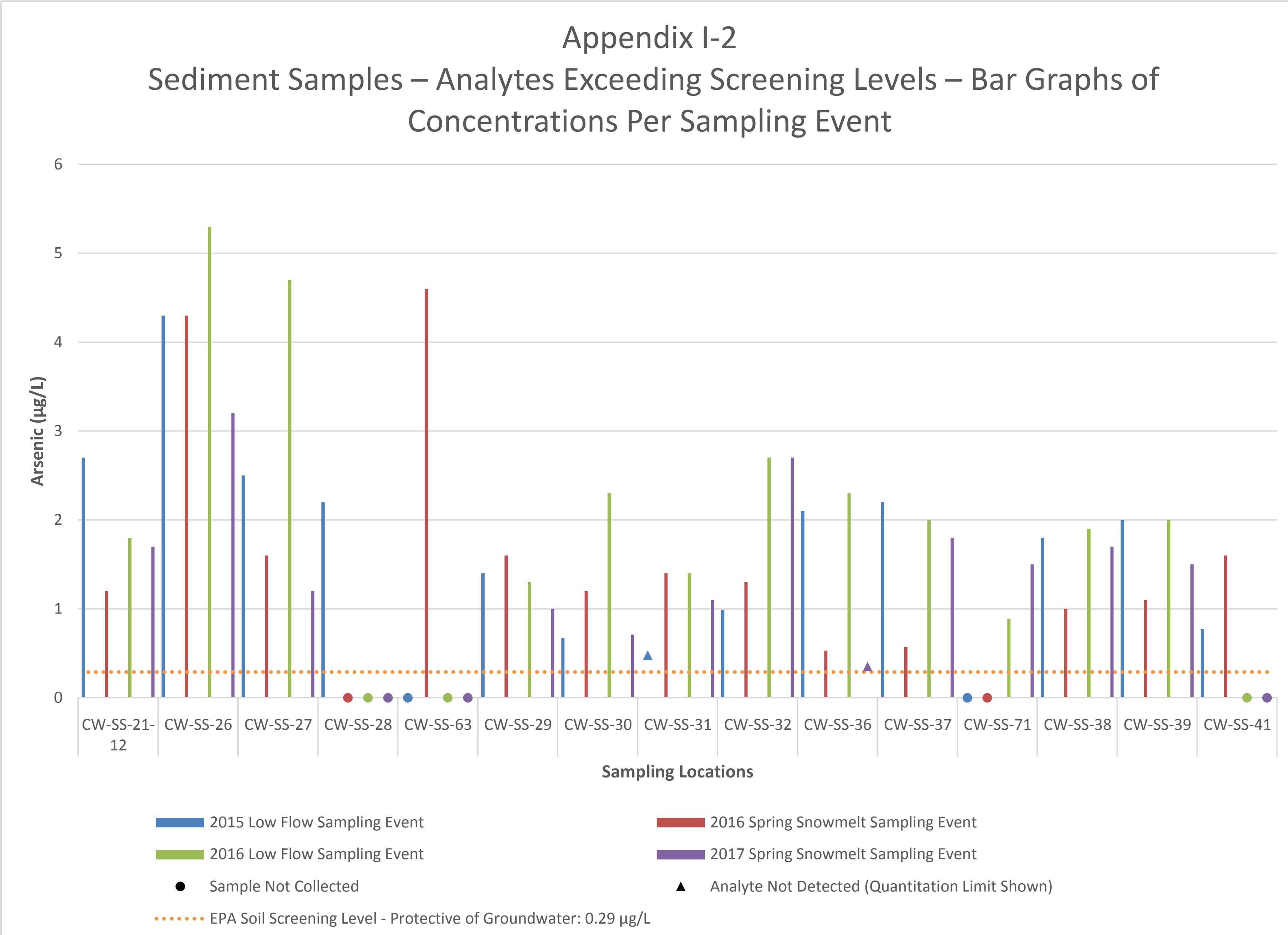
Appendix I-1
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event



Appendix I-2
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event

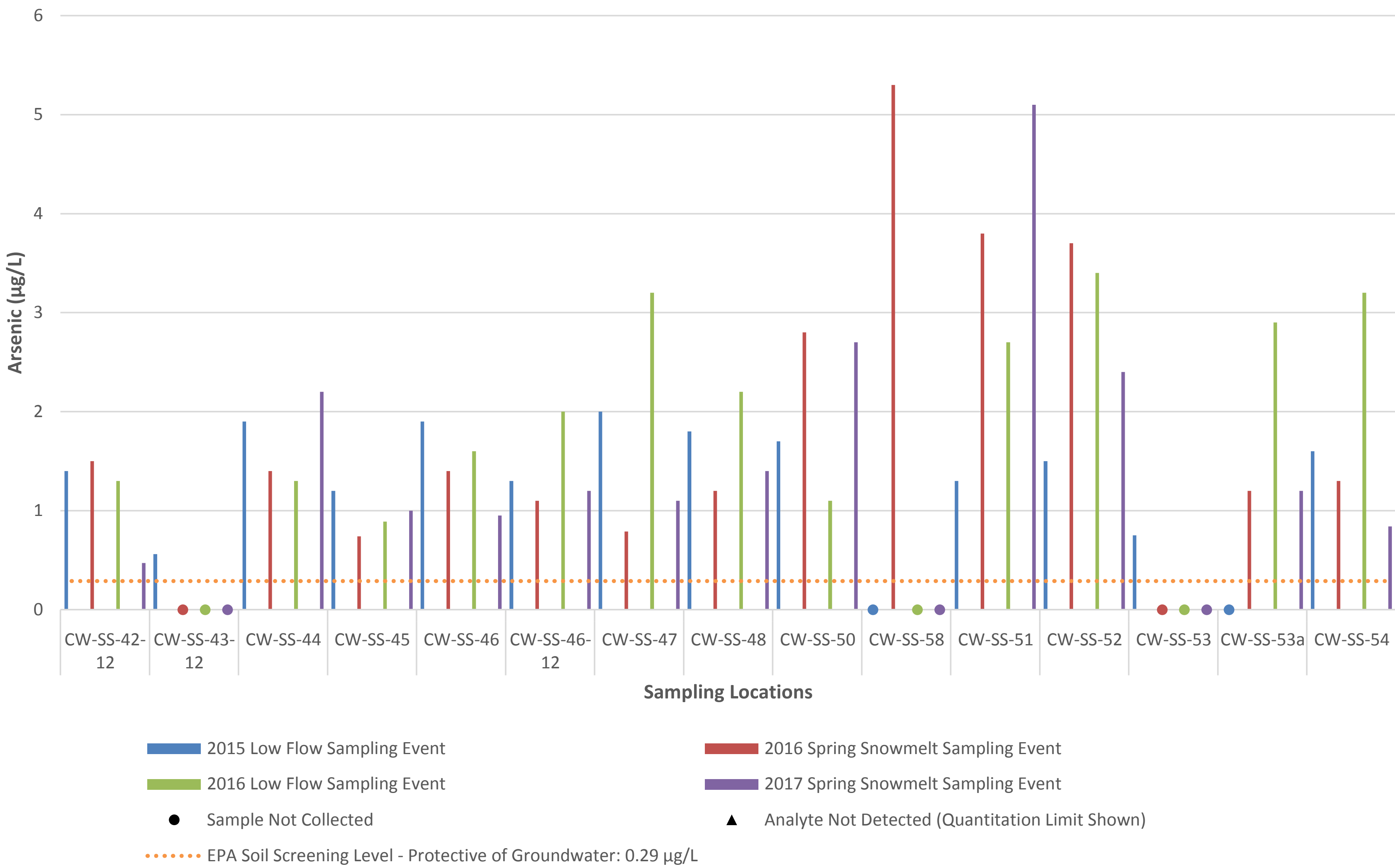



Appendix I-2
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Arsenic (µg/L)
10
9
8
7
6
5
4
3
2
1
0
CW-SS-72
CW-SS-12
CW-SS-13
CW-SS-14
CW-SS-15
CW-SS-16
CW-SS-17
CW-SS-18
CW-SS-19
CW-SS-76
CW-SS-19-12
CW-SS-76-12
CW-SS-20
CW-SS-20a
CW-SS-21
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 0.29 µg/L

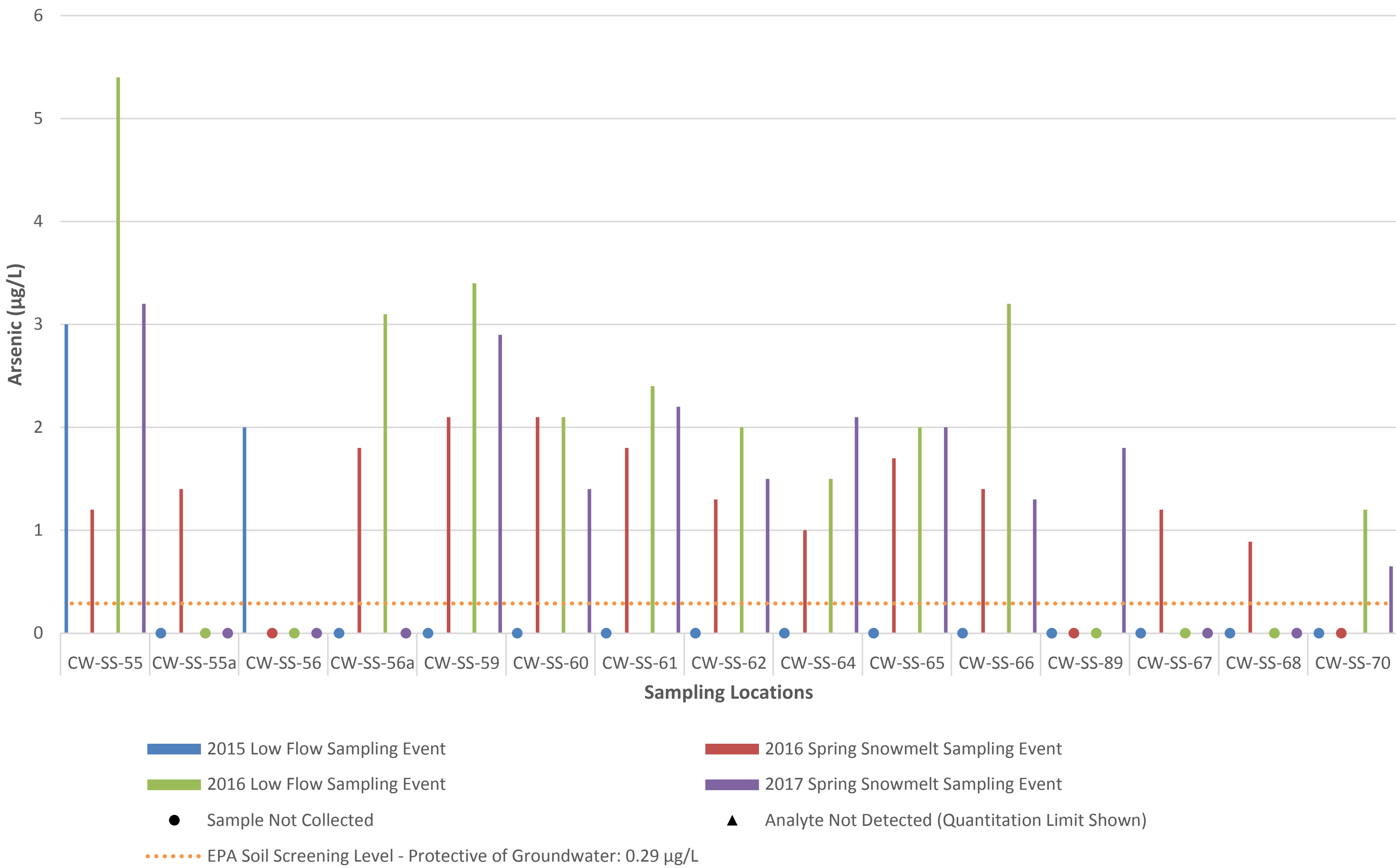

Appendix I-2
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
6
5
4
3
2
1
0
Arsenic (µg/L)
CW-SS-21-12
CW-SS-26
CW-SS-27
CW-SS-28
CW-SS-63
CW-SS-29
CW-SS-30
CW-SS-31
CW-SS-32
CW-SS-36
CW-SS-37
CW-SS-71
CW-SS-38
CW-SS-39
CW-SS-41
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 0.29 µg/L

Appendix I-2

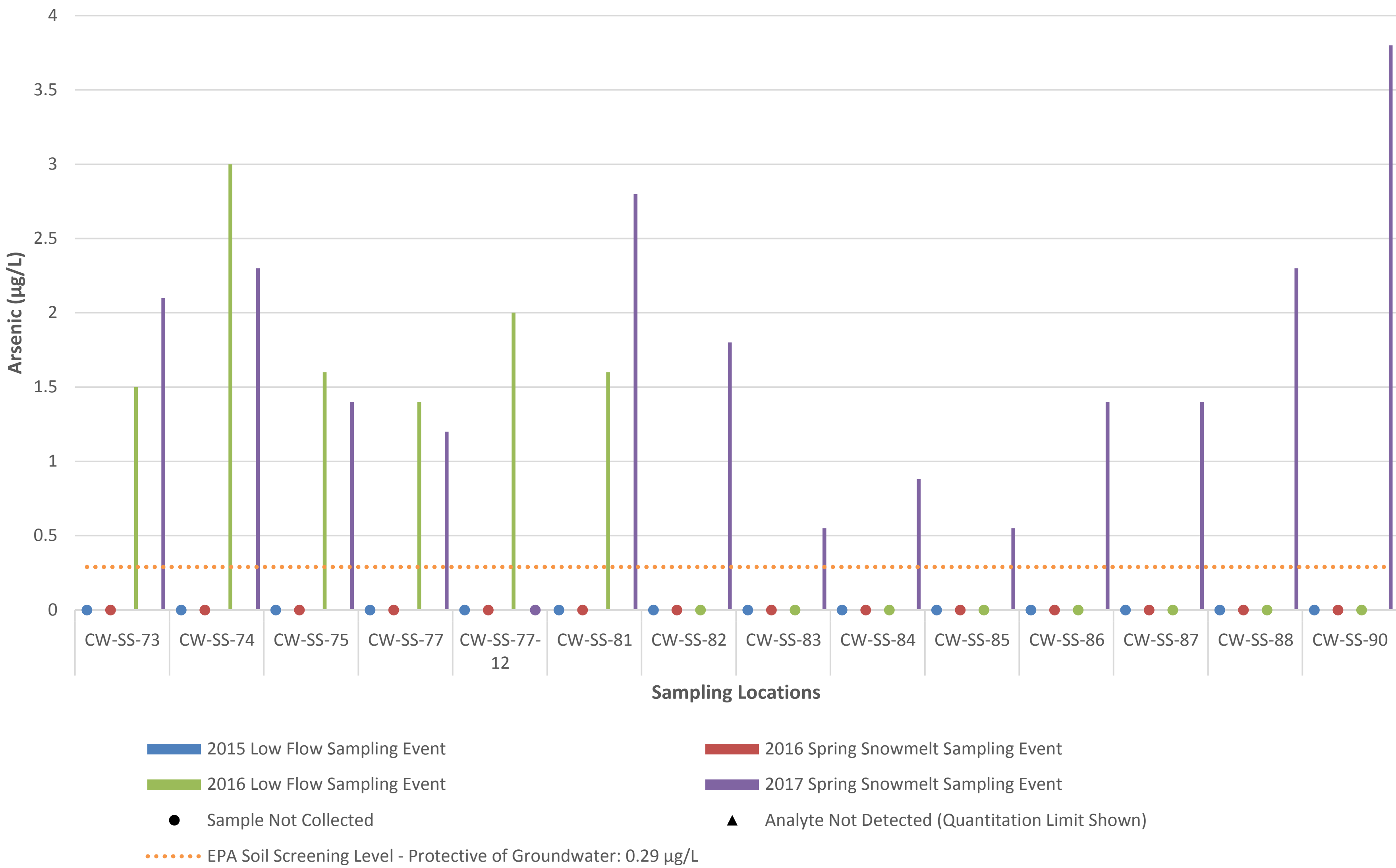
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event

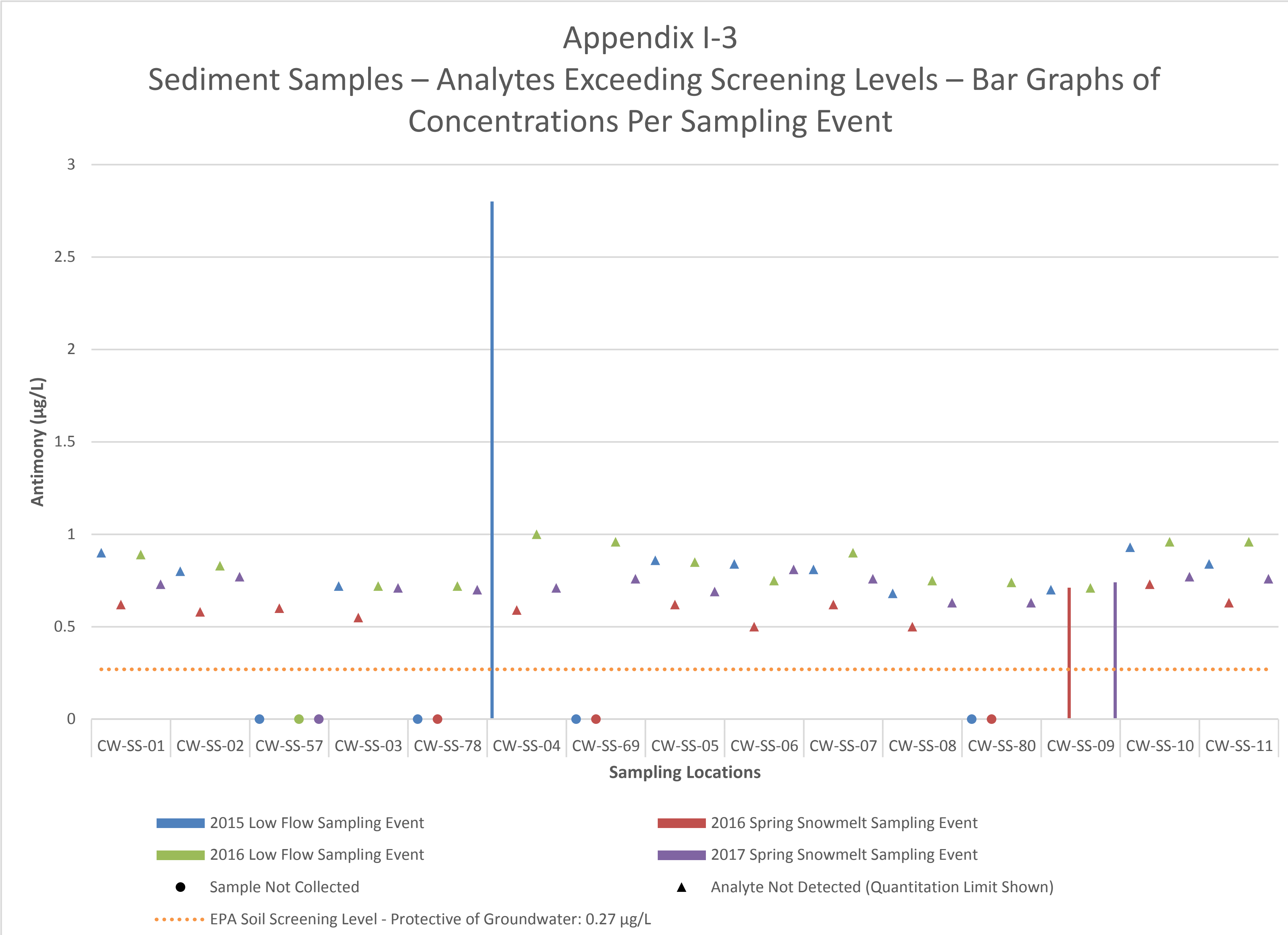


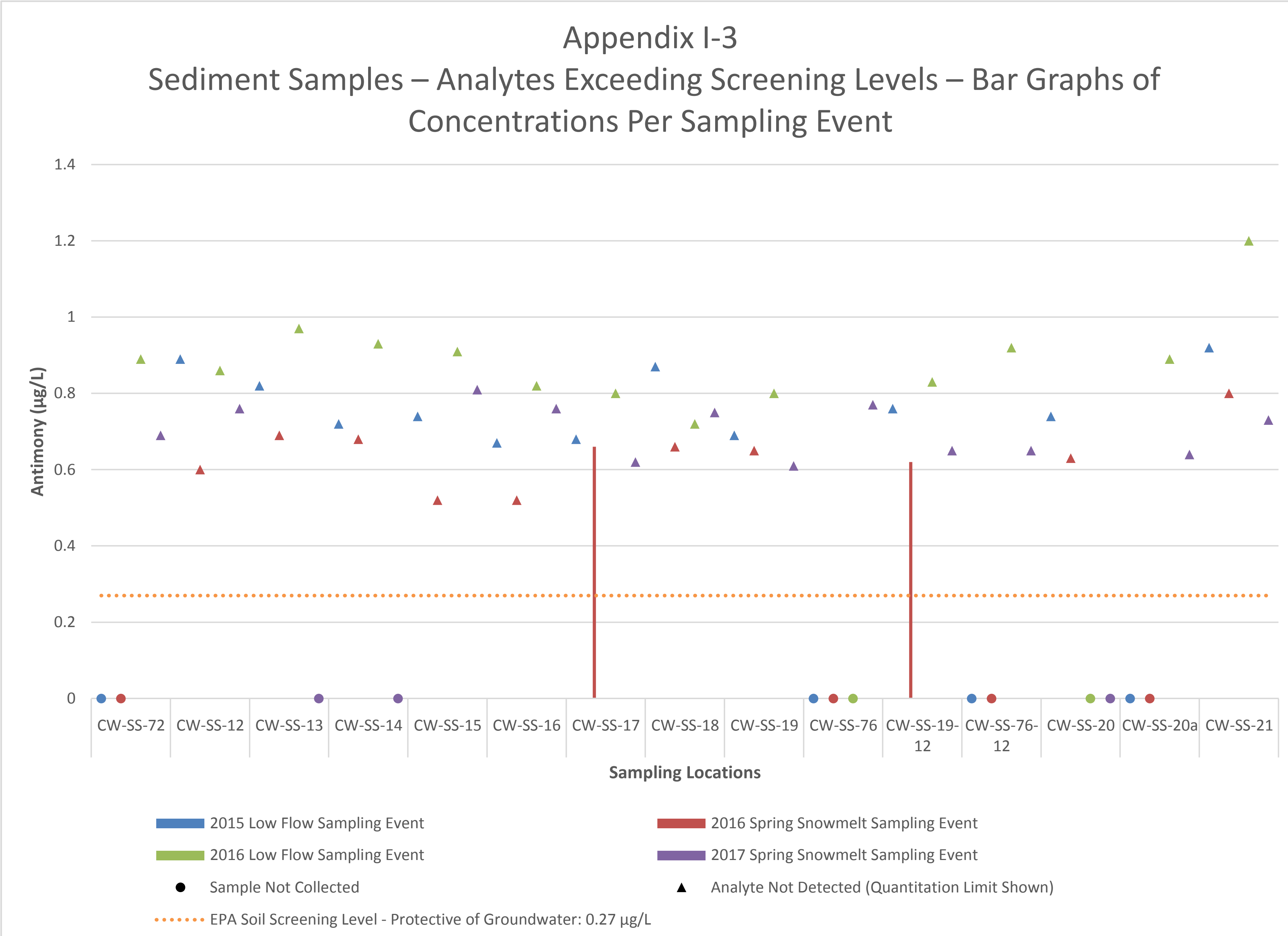
Appendix I-2
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event

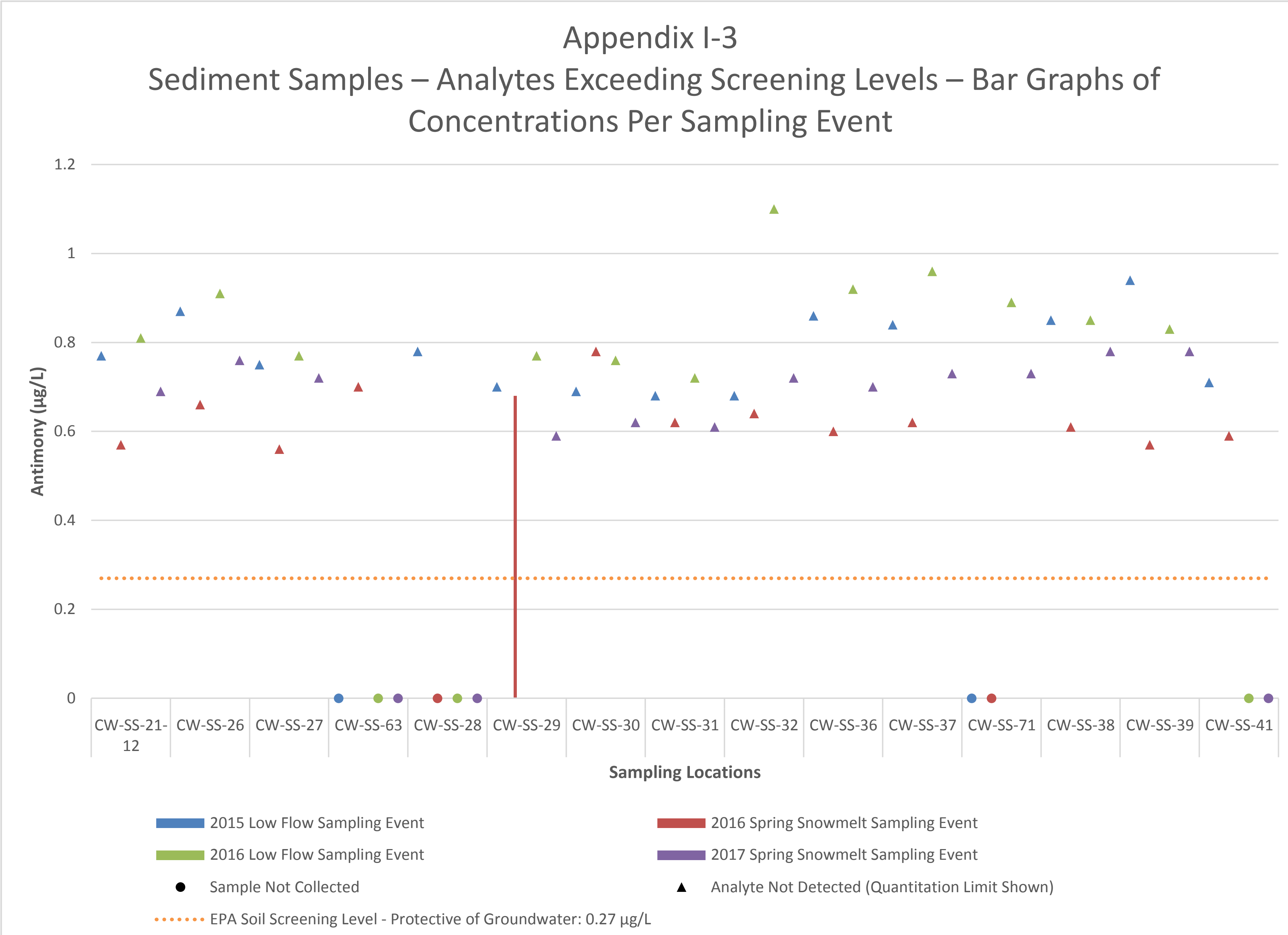


Appendix I-2
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event



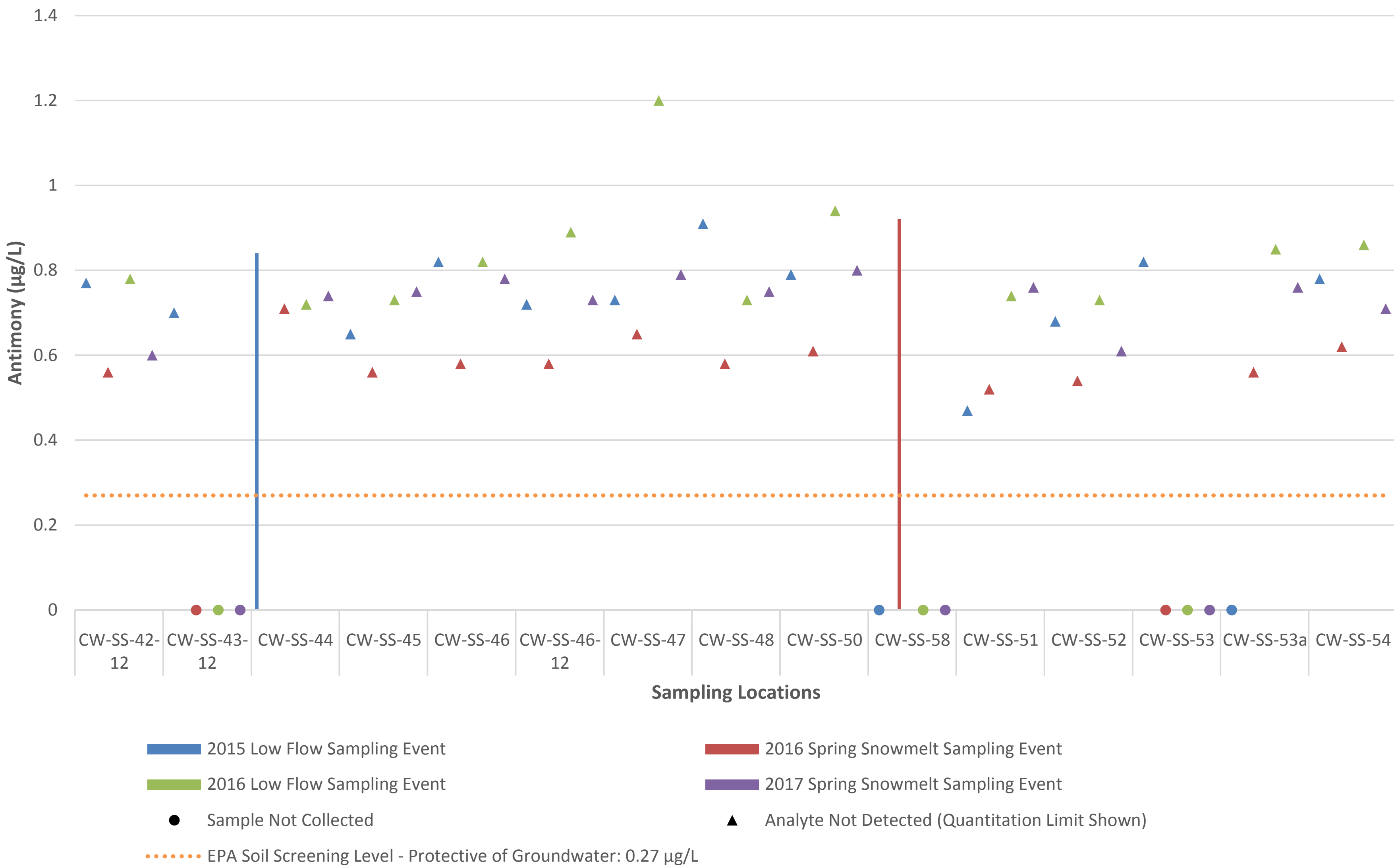

Appendix I-3
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Antimony (µg/L)
3
2.5
2
1.5
1
0.5
0
CW-SS-01
CW-SS-02
CW-SS-57
CW-SS-03
CW-SS-78
CW-SS-04
CW-SS-69
CW-SS-05
CW-SS-06
CW-SS-07
CW-SS-08
CW-SS-80
CW-SS-09
CW-SS-10
CW-SS-11
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 0.27 µg/L


Appendix I-3
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Antimony (µg/L)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
CW-SS-72
CW-SS-12
CW-SS-13
CW-SS-14
CW-SS-15
CW-SS-16
CW-SS-17
CW-SS-18
CW-SS-19
CW-SS-76
CW-SS-19-12
CW-SS-76-12
CW-SS-20
CW-SS-20a
CW-SS-21
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 0.27 µg/L

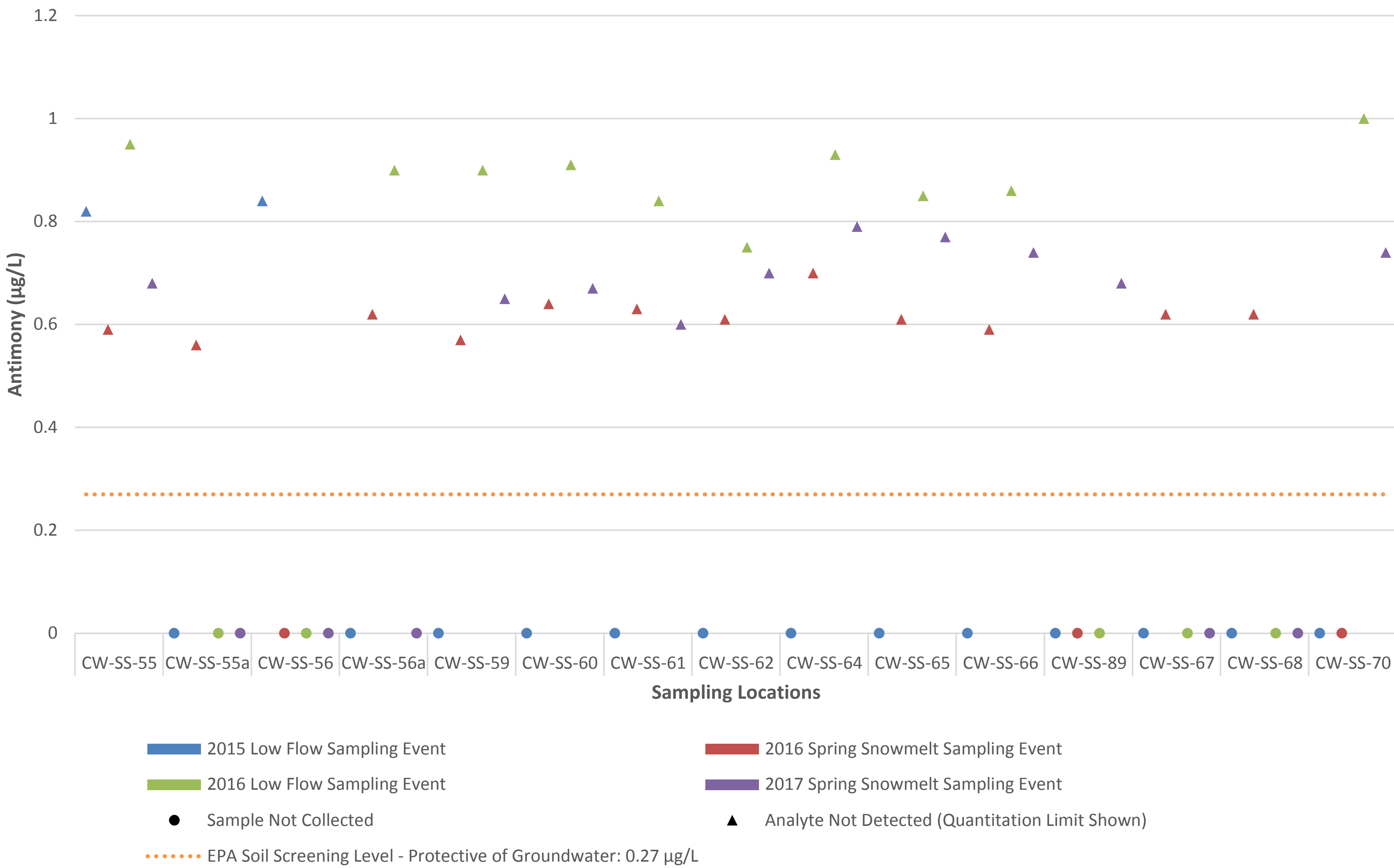

Appendix I-3
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Antimony (µg/L)
1.2
1
0.8
0.6
0.4
0.2
0
CW-SS-21-12
CW-SS-26
CW-SS-27
CW-SS-63
CW-SS-28
CW-SS-29
CW-SS-30
CW-SS-31
CW-SS-32
CW-SS-36
CW-SS-37
CW-SS-71
CW-SS-38
CW-SS-39
CW-SS-41
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 0.27 µg/L

Appendix I-3

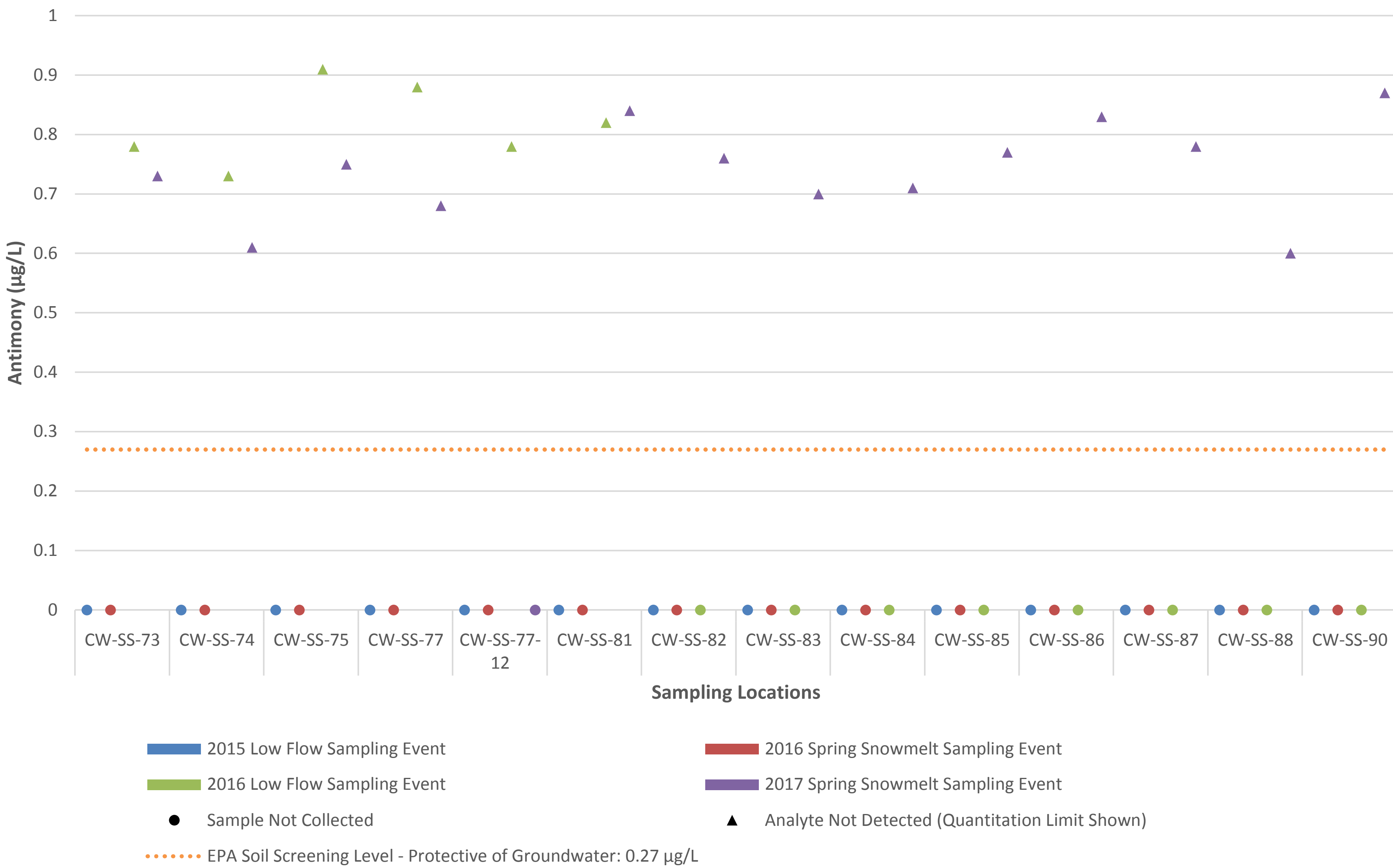
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event



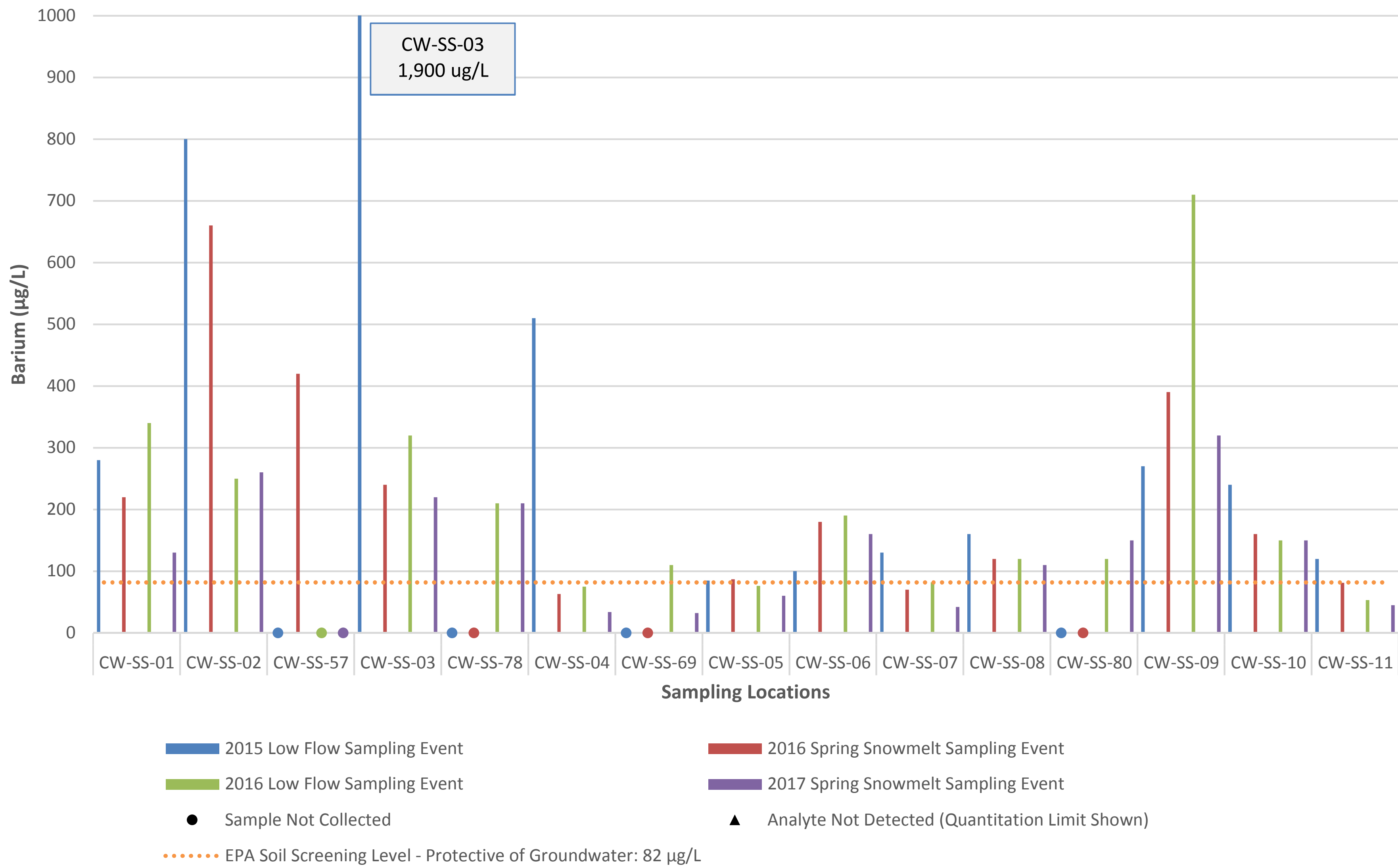
Appendix I-3
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event



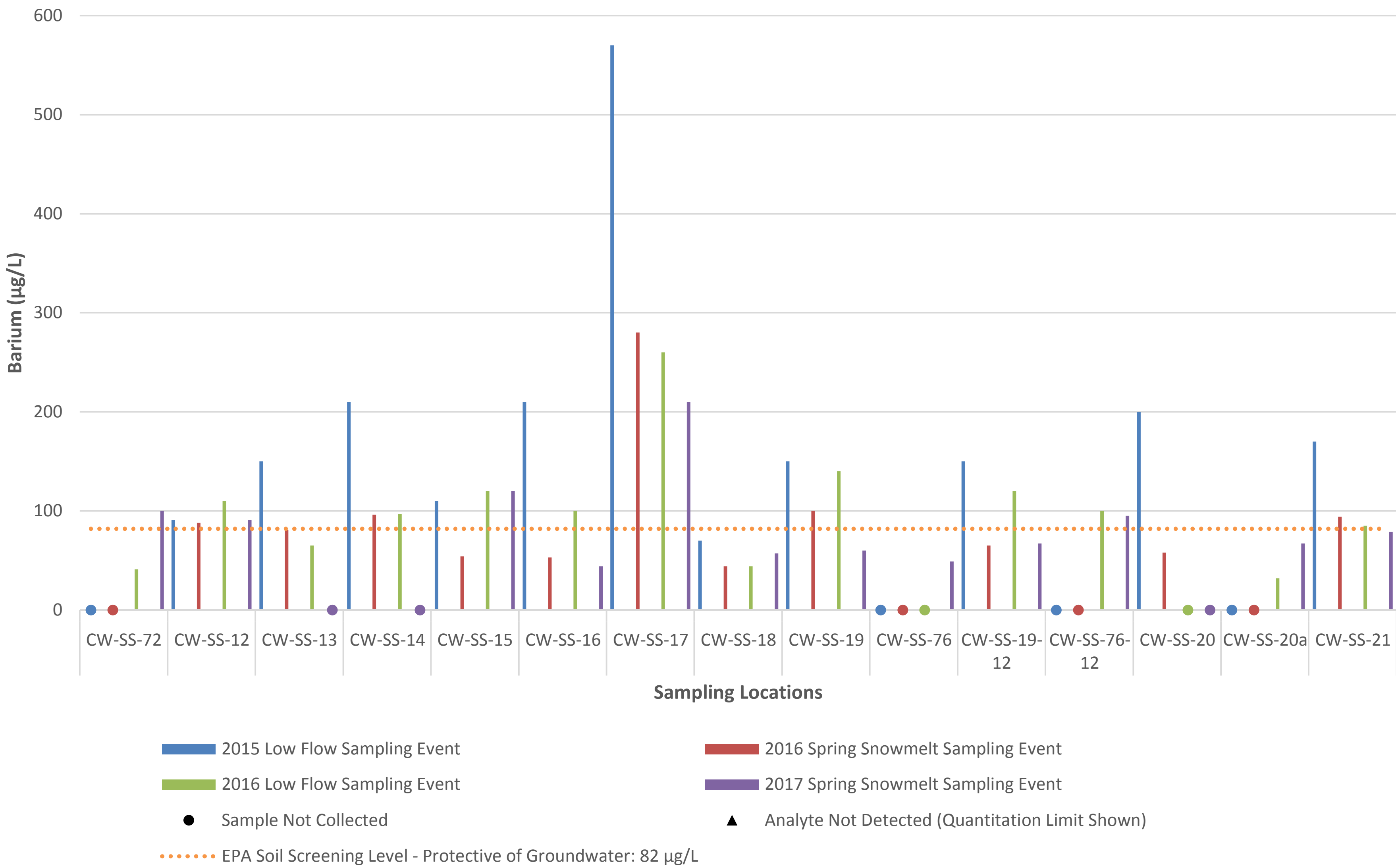
Appendix I-3
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event



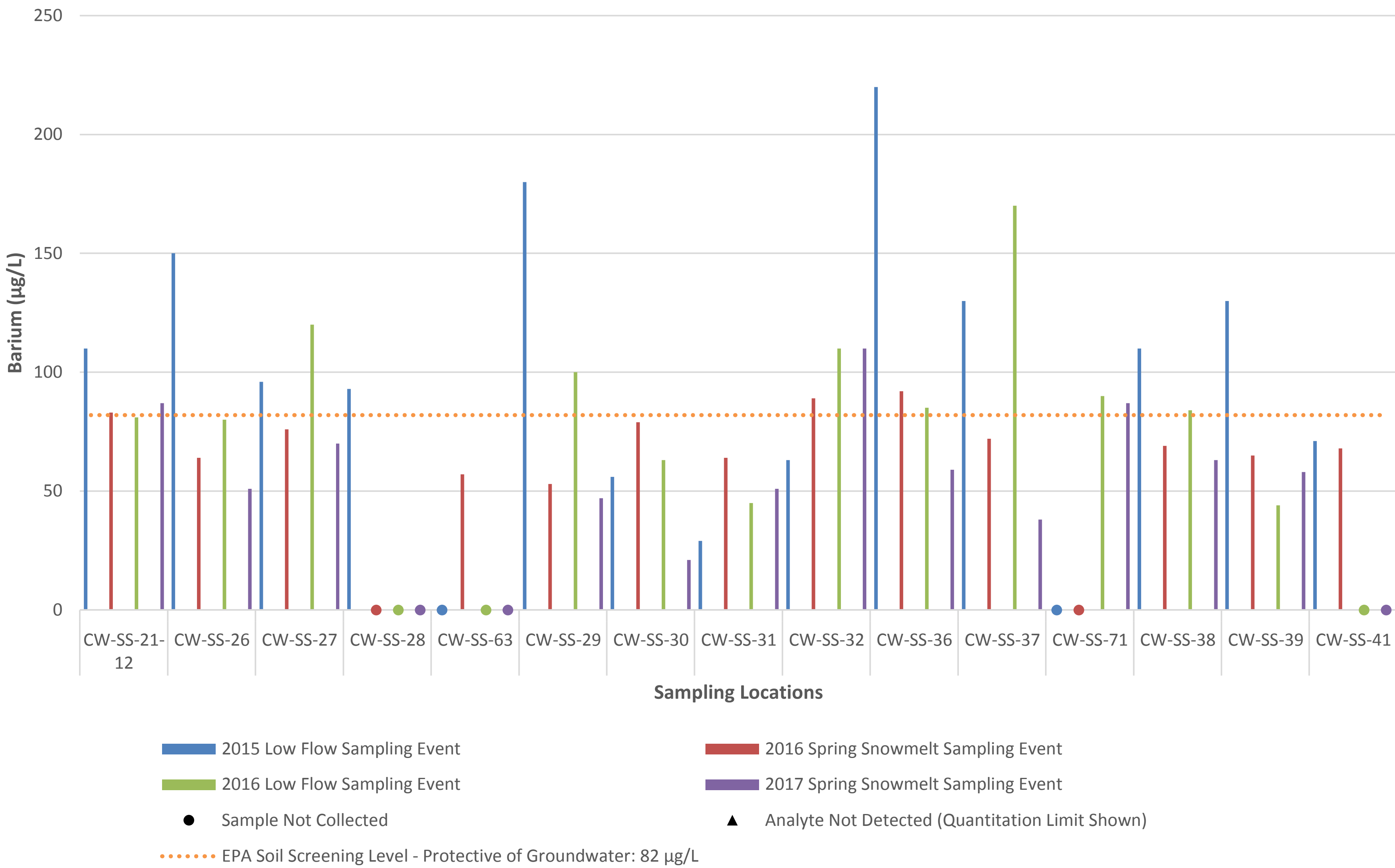
Appendix I-4
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event



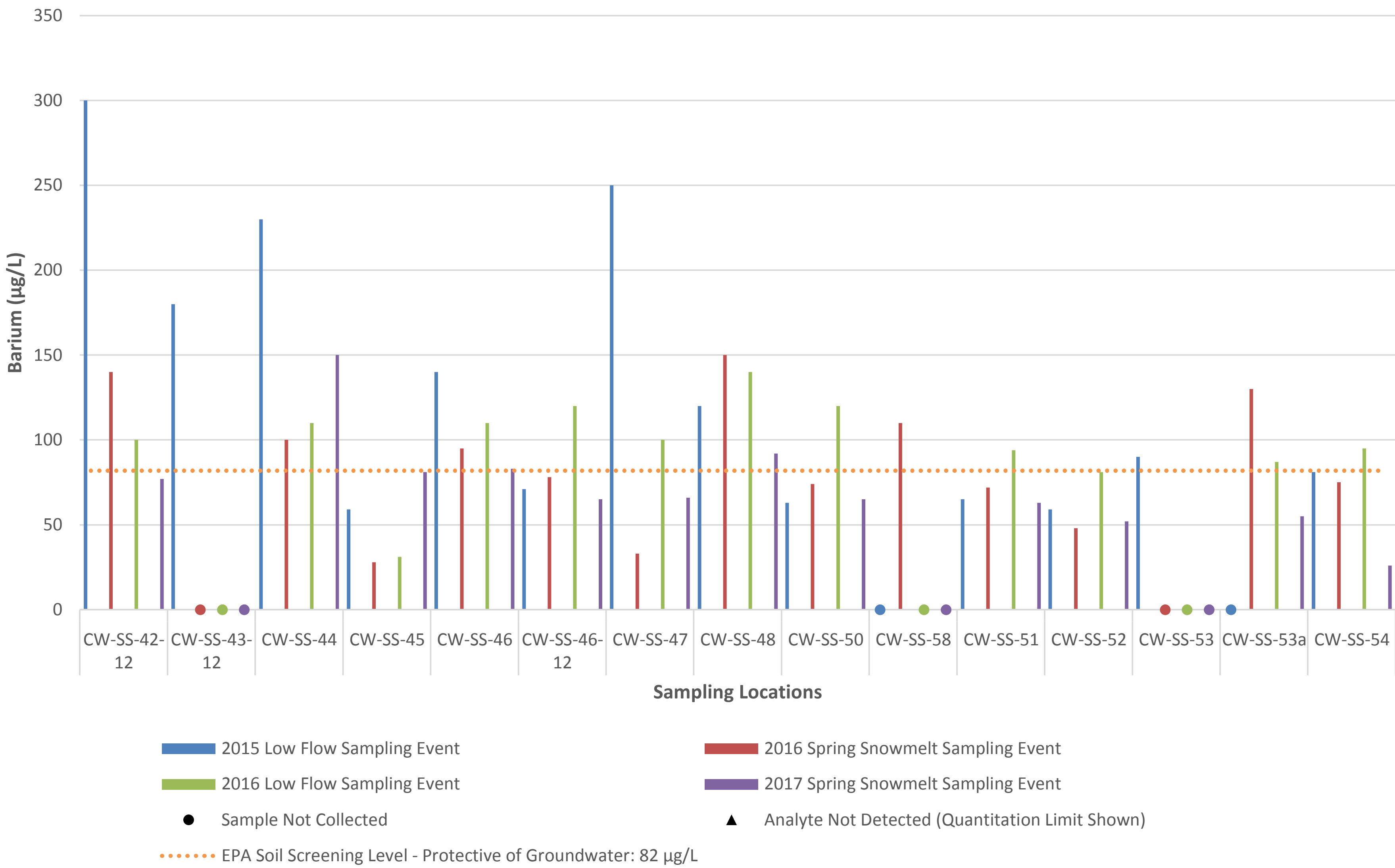
Appendix I-4
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event



Appendix I-4
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event

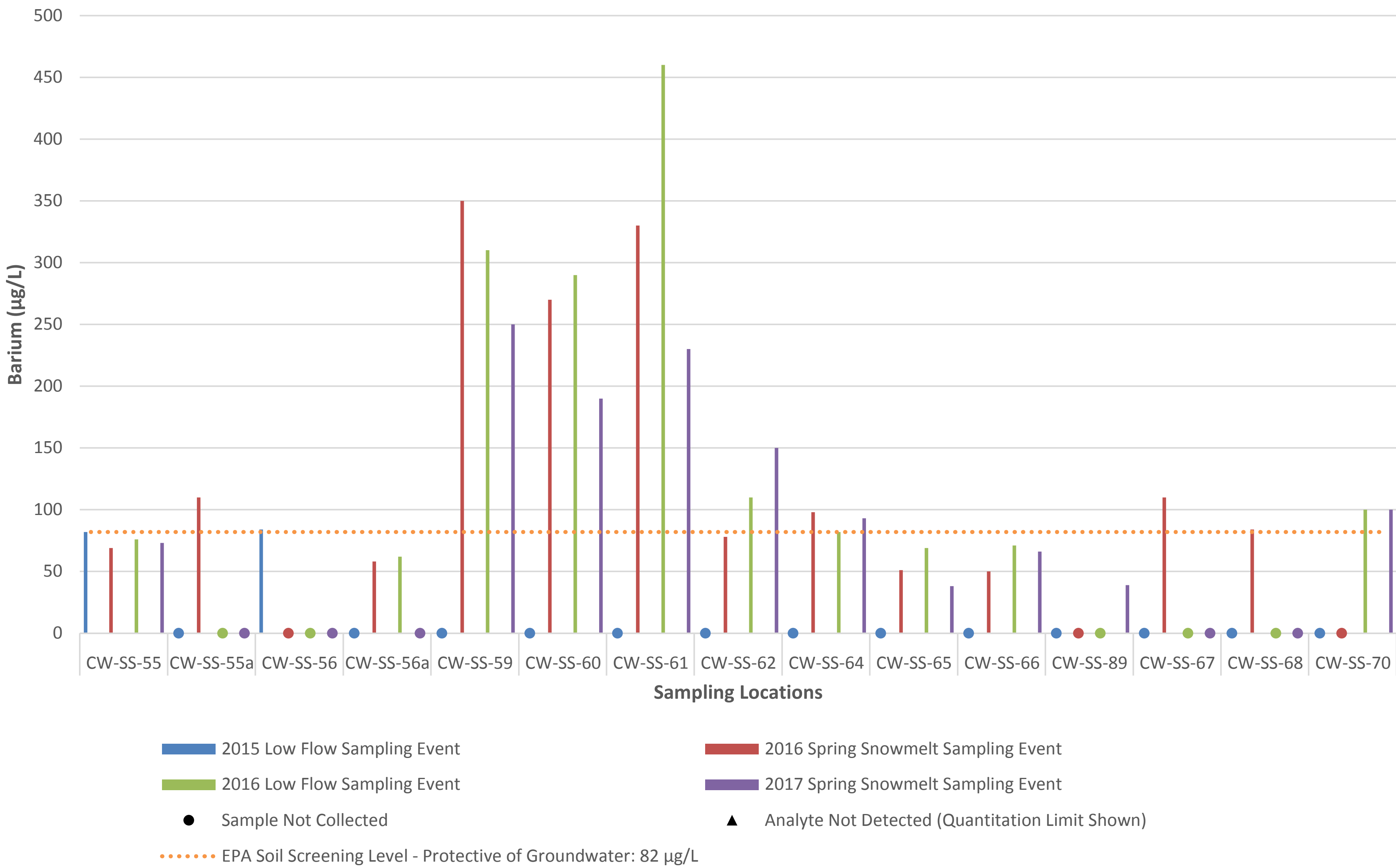


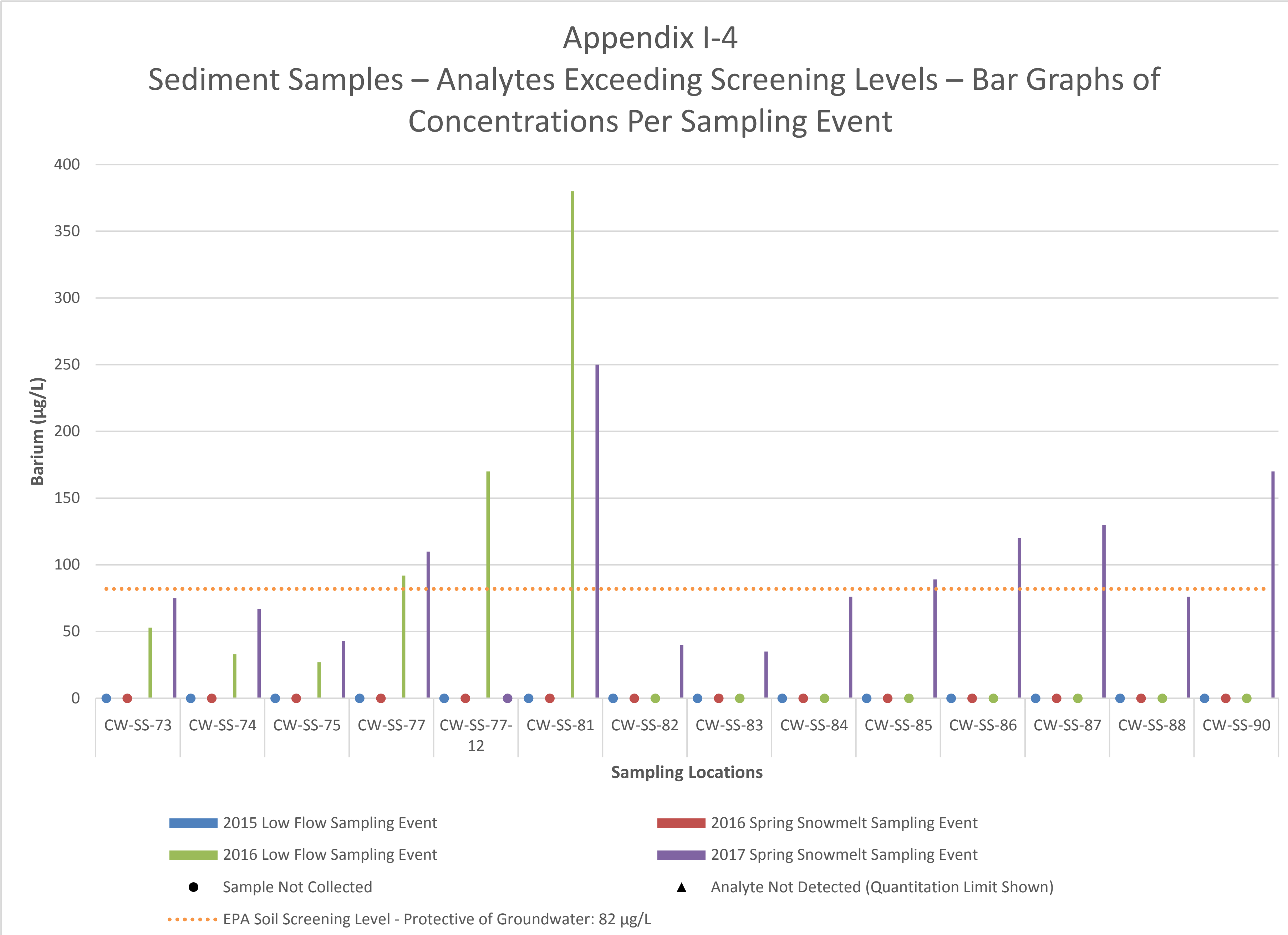
Appendix I-4
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event

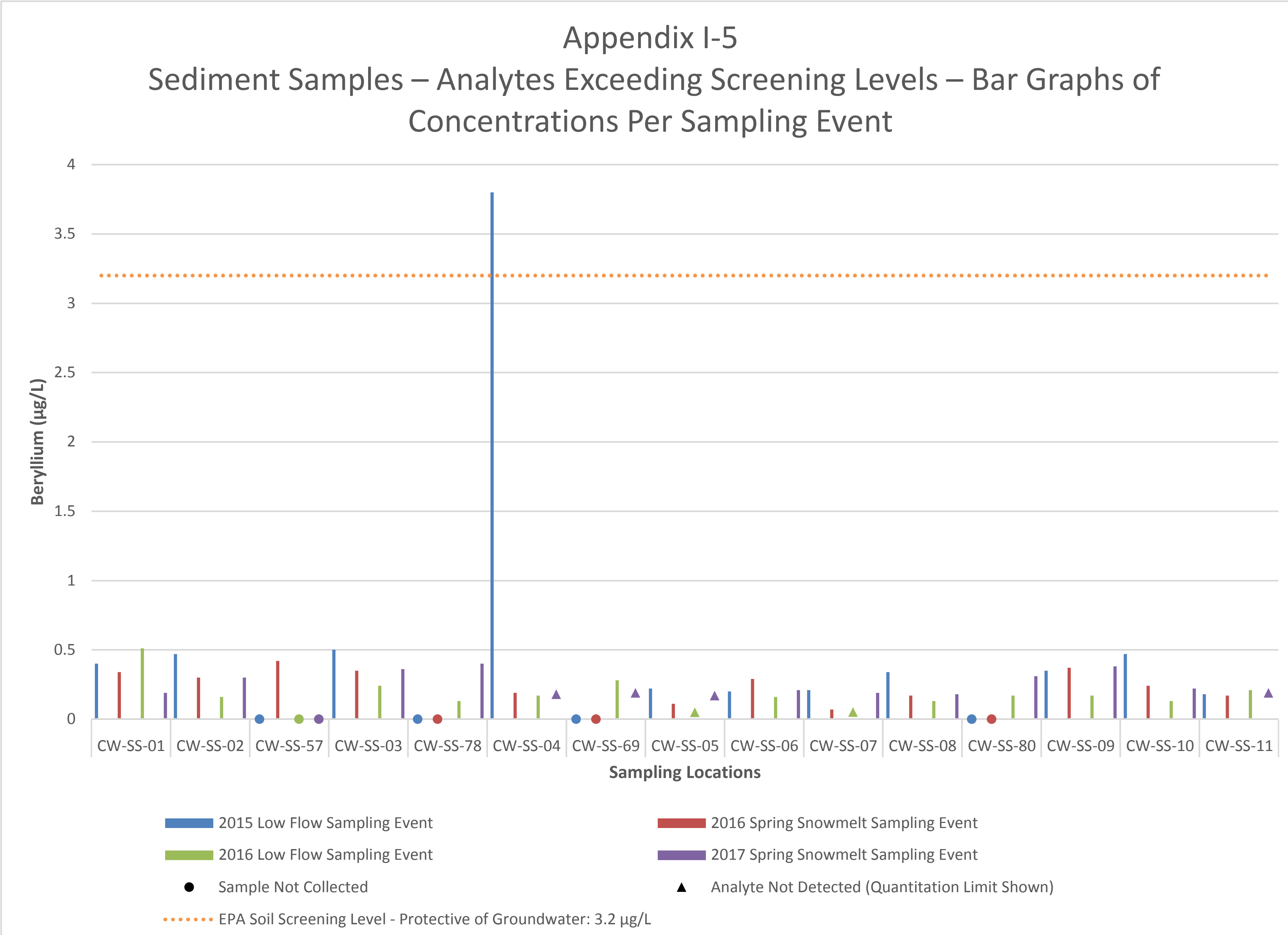


Appendix I-4

Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event

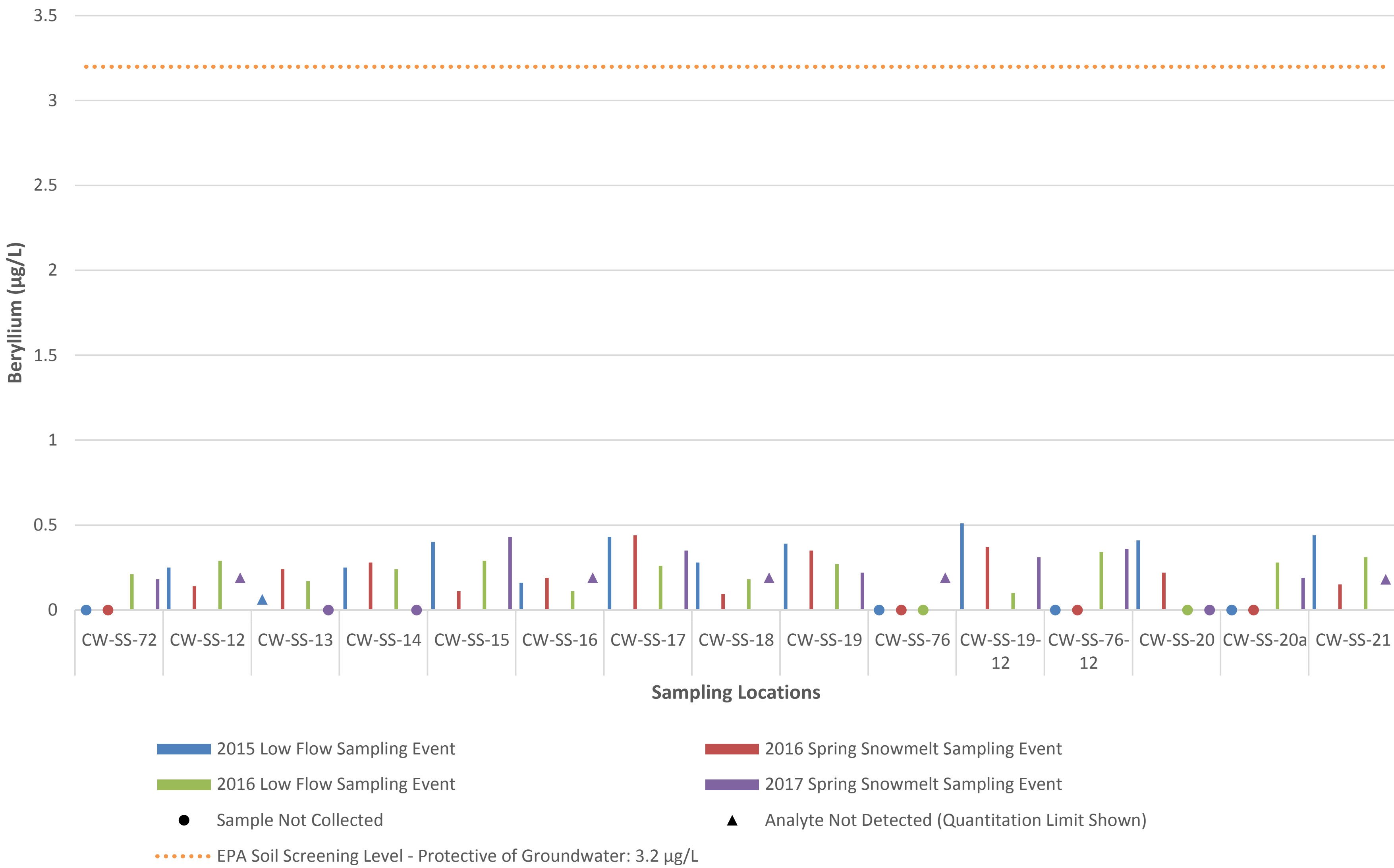



Appendix I-4
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Barium (µg/L)
400
350
300
250
200
150
100
50
0
CW-SS-73
CW-SS-74
CW-SS-75
CW-SS-77
CW-SS-77-12
CW-SS-81
CW-SS-82
CW-SS-83
CW-SS-84
CW-SS-85
CW-SS-86
CW-SS-87
CW-SS-88
CW-SS-90
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 82 µg/L

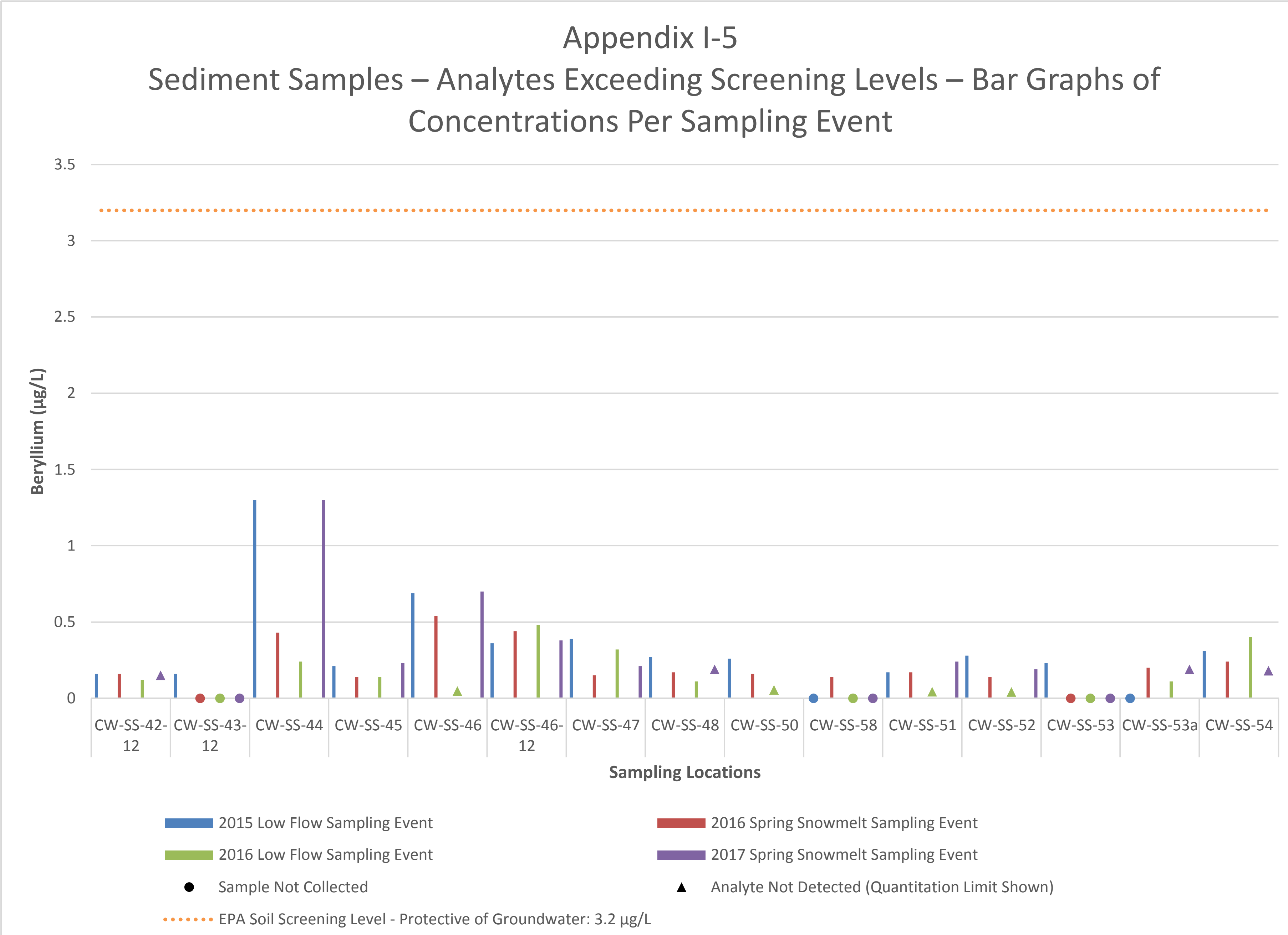

Appendix I-5
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Beryllium (µg/L)
4
3.5
3
2.5
2
1.5
1
0.5
0
CW-SS-01
CW-SS-02
CW-SS-57
CW-SS-03
CW-SS-78
CW-SS-04
CW-SS-69
CW-SS-05
CW-SS-06
CW-SS-07
CW-SS-08
CW-SS-80
CW-SS-09
CW-SS-10
CW-SS-11
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 3.2 µg/L

Appendix I-5

Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event

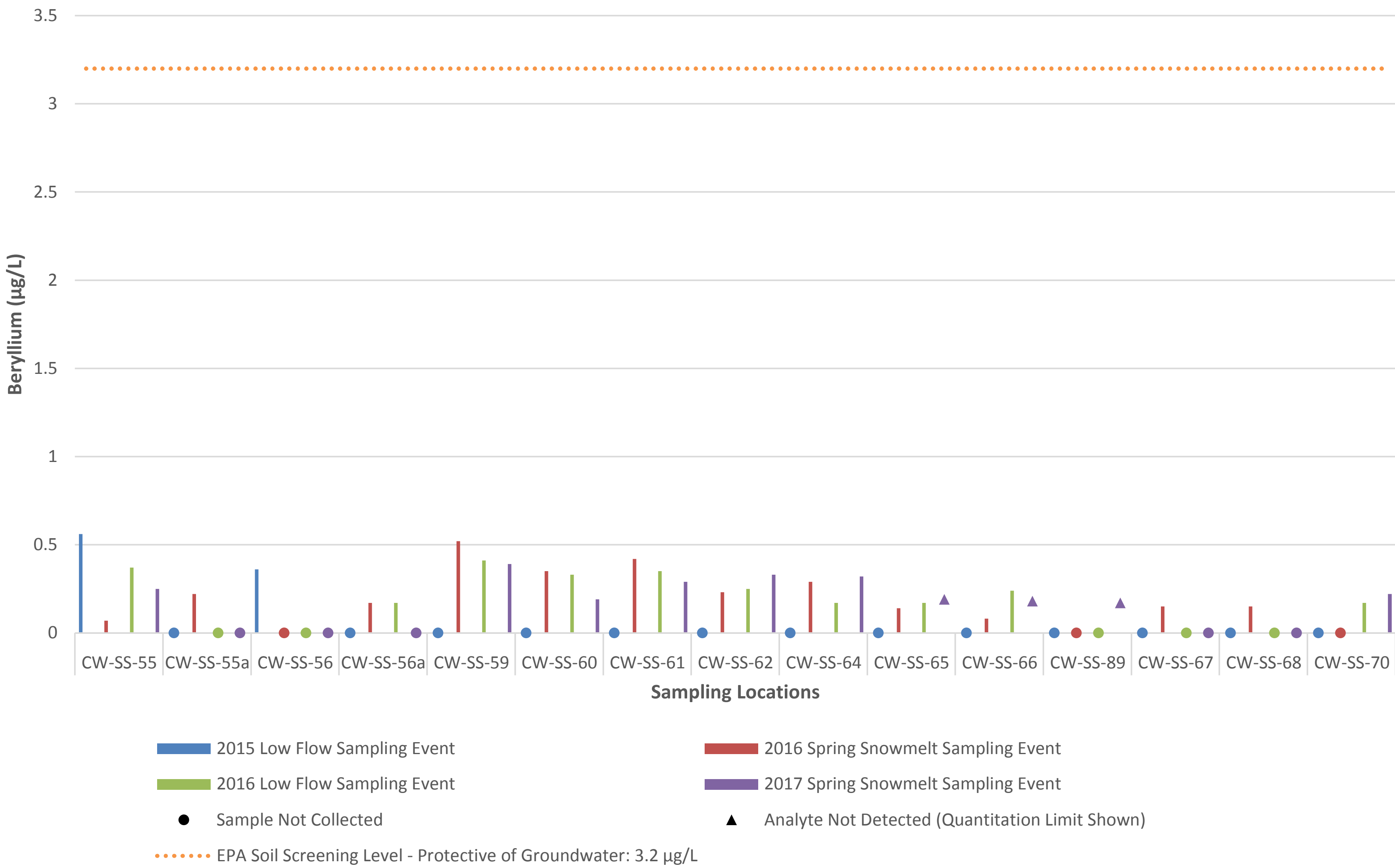


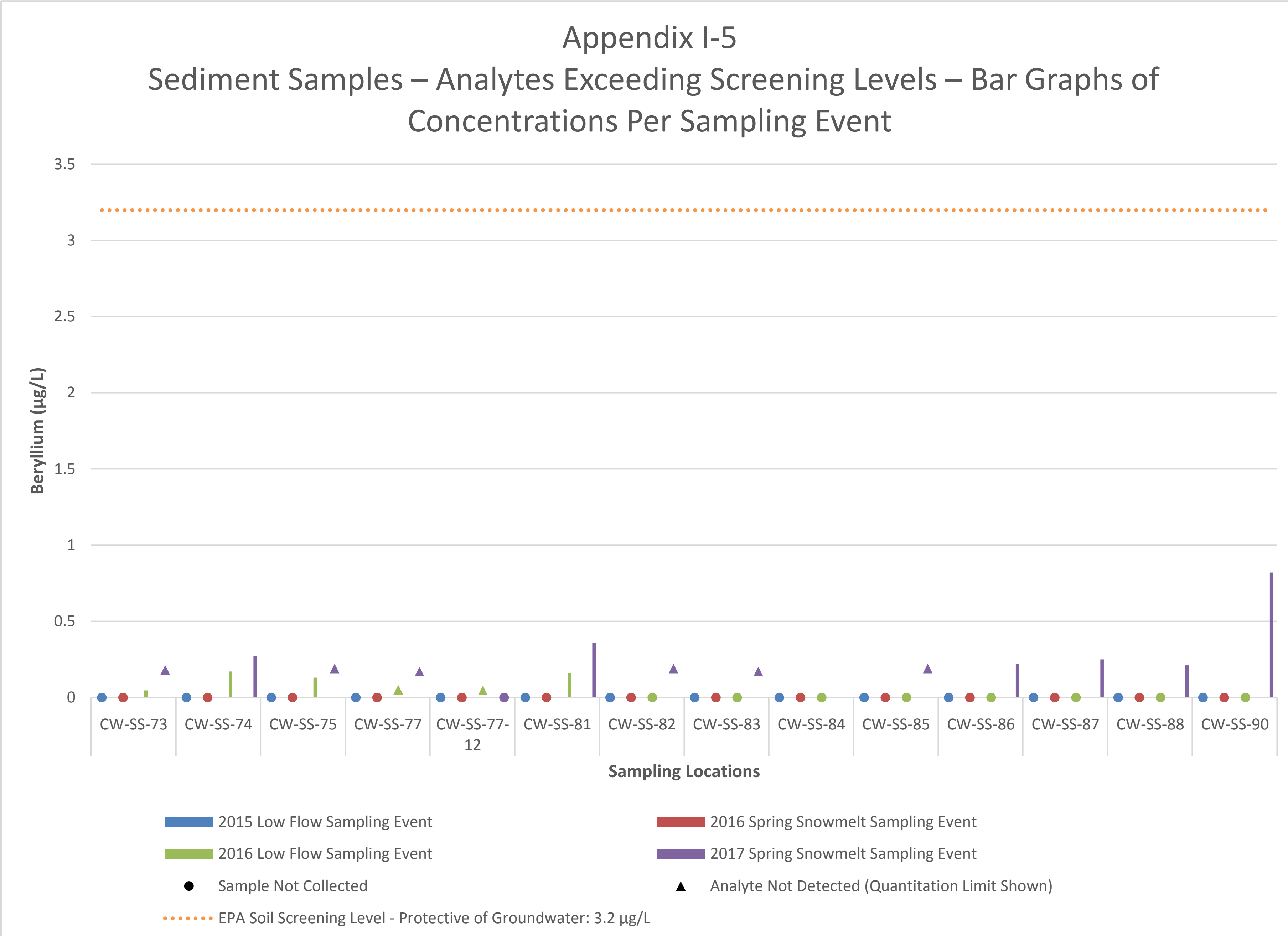
Appendix I-5
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event


Appendix I-5
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Beryllium (µg/L)
3.5
3
2.5
2
1.5
1
0.5
0
CW-SS-42-12
CW-SS-43-12
CW-SS-44
CW-SS-45
CW-SS-46
CW-SS-46-12
CW-SS-47
CW-SS-48
CW-SS-50
CW-SS-58
CW-SS-51
CW-SS-52
CW-SS-53
CW-SS-53a
CW-SS-54
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 3.2 µg/L

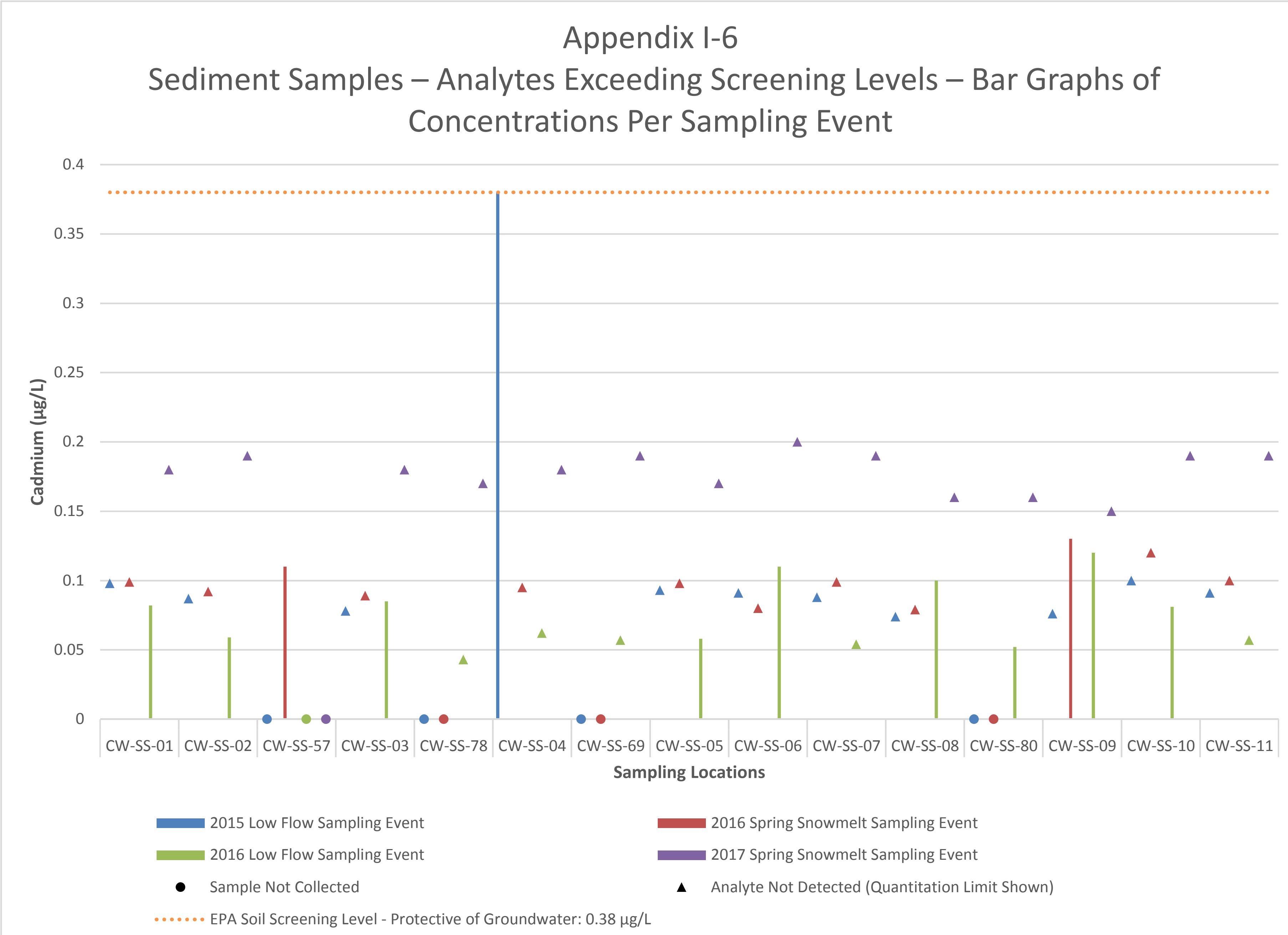
Appendix I-5

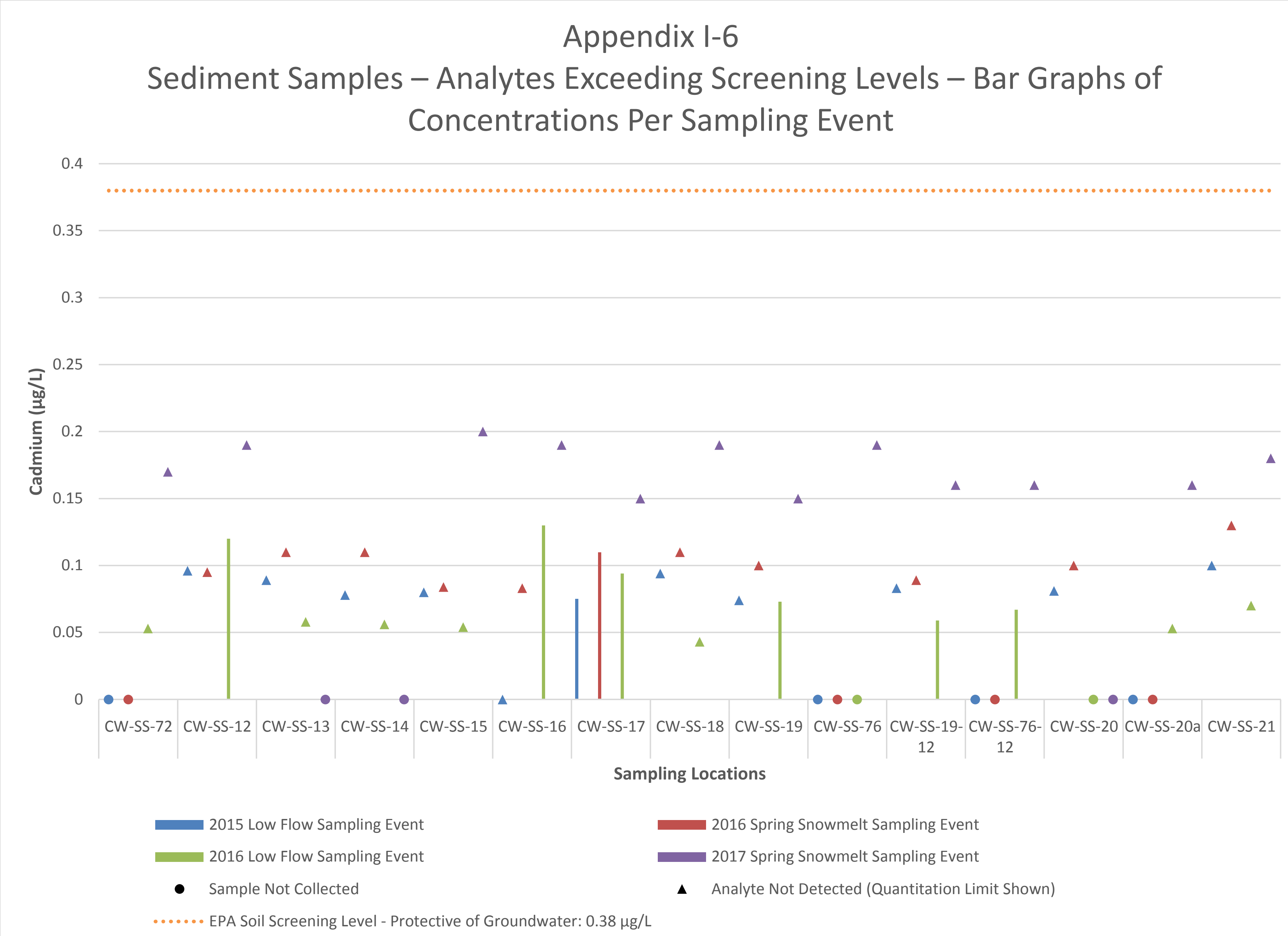
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event



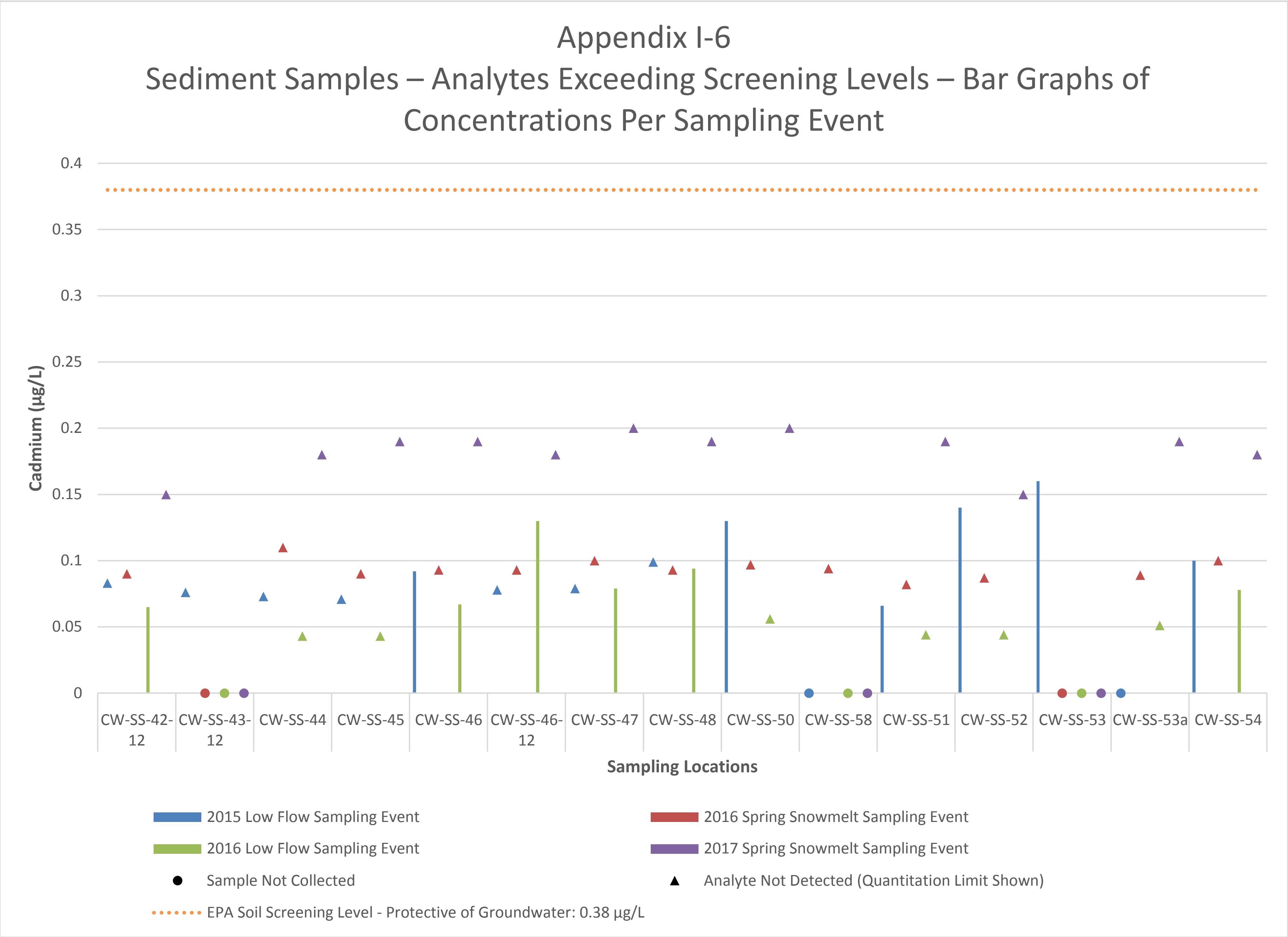


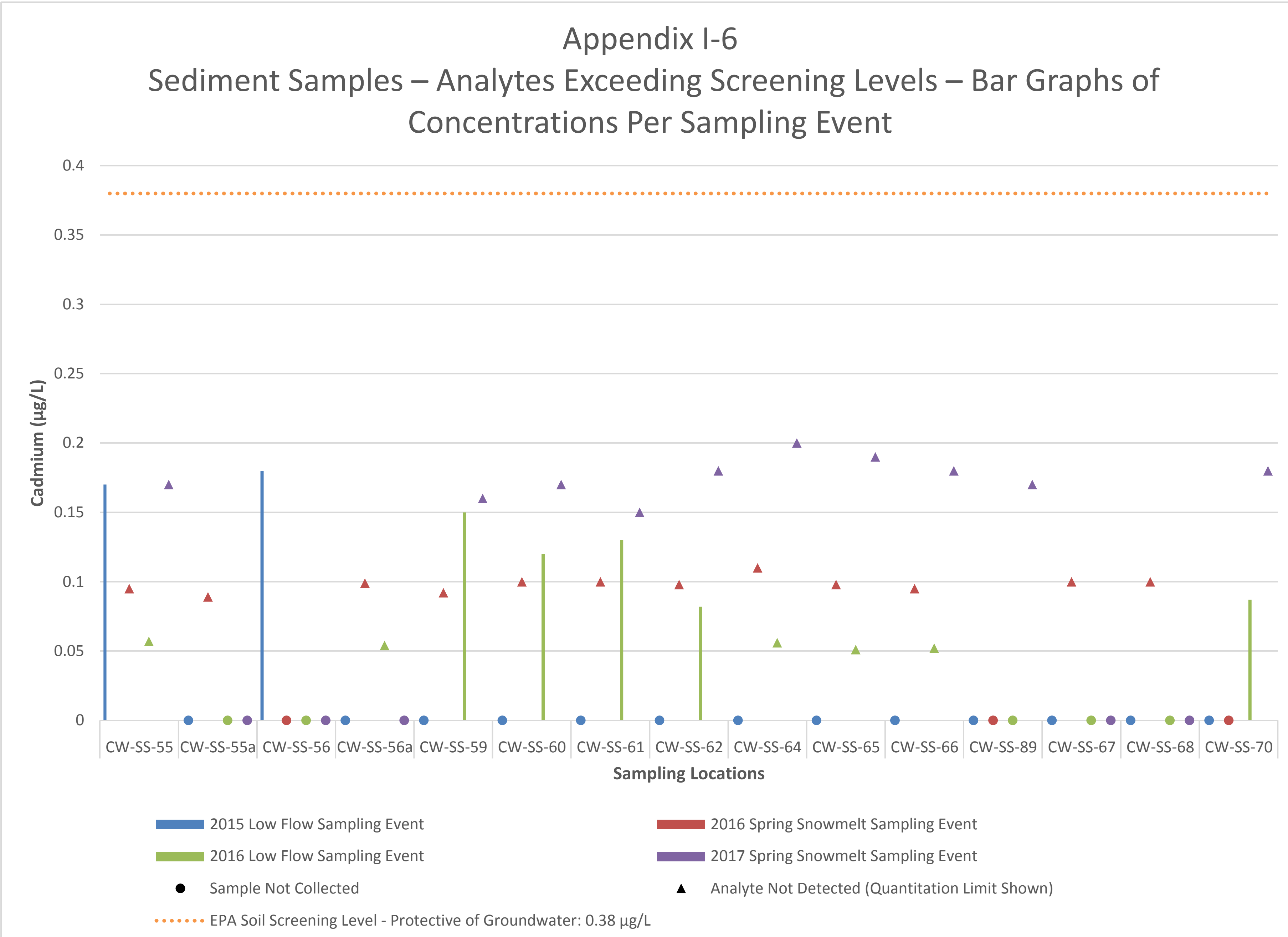
Appendix I-5
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
3.5
3
2.5
2
1.5
1
0.5
0
Beryllium (µg/L)
CW-SS-73
CW-SS-74
CW-SS-75
CW-SS-77
CW-SS-77-12
CW-SS-81
CW-SS-82
CW-SS-83
CW-SS-84
CW-SS-85
CW-SS-86
CW-SS-87
CW-SS-88
CW-SS-90
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 3.2 µg/L


Appendix I-6
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Cadmium (µg/L)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
CW-SS-01
CW-SS-02
CW-SS-57
CW-SS-03
CW-SS-78
CW-SS-04
CW-SS-69
CW-SS-05
CW-SS-06
CW-SS-07
CW-SS-08
CW-SS-80
CW-SS-09
CW-SS-10
CW-SS-11
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 0.38 µg/L


Appendix I-6
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Cadmium (µg/L)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
CW-SS-72
CW-SS-12
CW-SS-13
CW-SS-14
CW-SS-15
CW-SS-16
CW-SS-17
CW-SS-18
CW-SS-19
CW-SS-76
CW-SS-19-12
CW-SS-76-12
CW-SS-20
CW-SS-20a
CW-SS-21
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 0.38 µg/L

Appendix I-6
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event

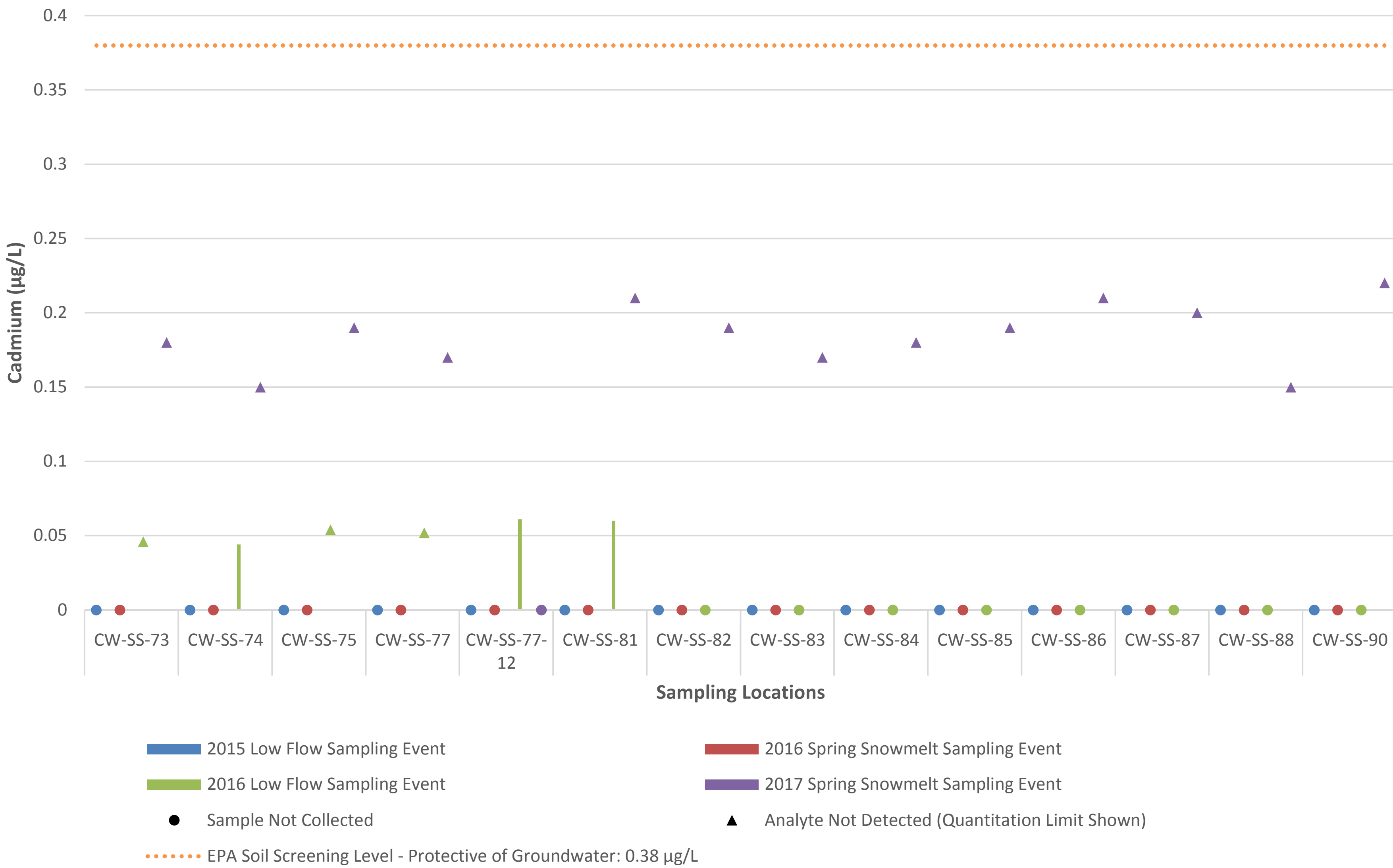

Appendix I-6
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Cadmium (µg/L)
CW-SS-42-12
CW-SS-43-12
CW-SS-44
CW-SS-45
CW-SS-46
CW-SS-46-12
CW-SS-47
CW-SS-48
CW-SS-50
CW-SS-58
CW-SS-51
CW-SS-52
CW-SS-53
CW-SS-53a
CW-SS-54
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 0.38 µg/L

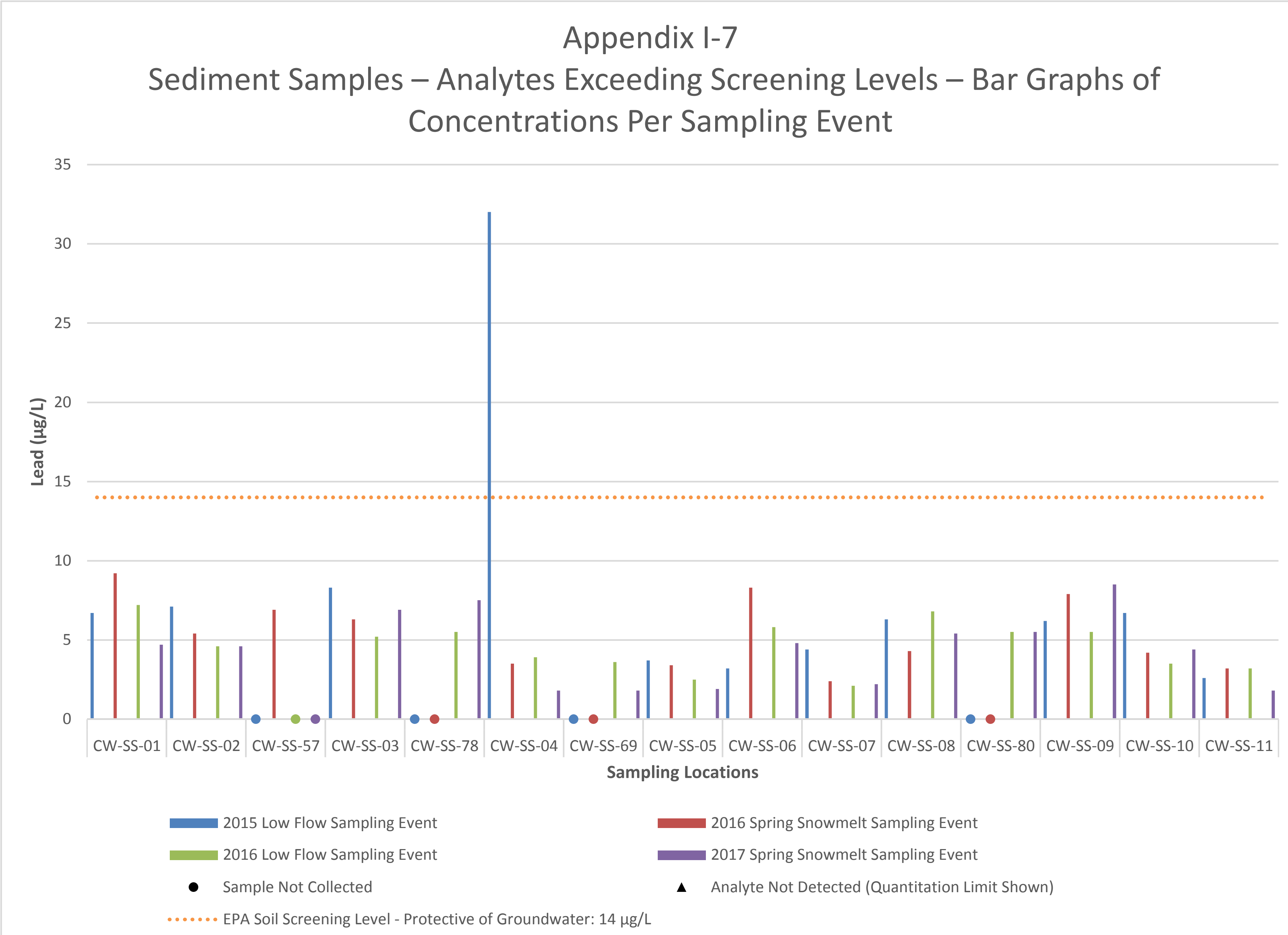


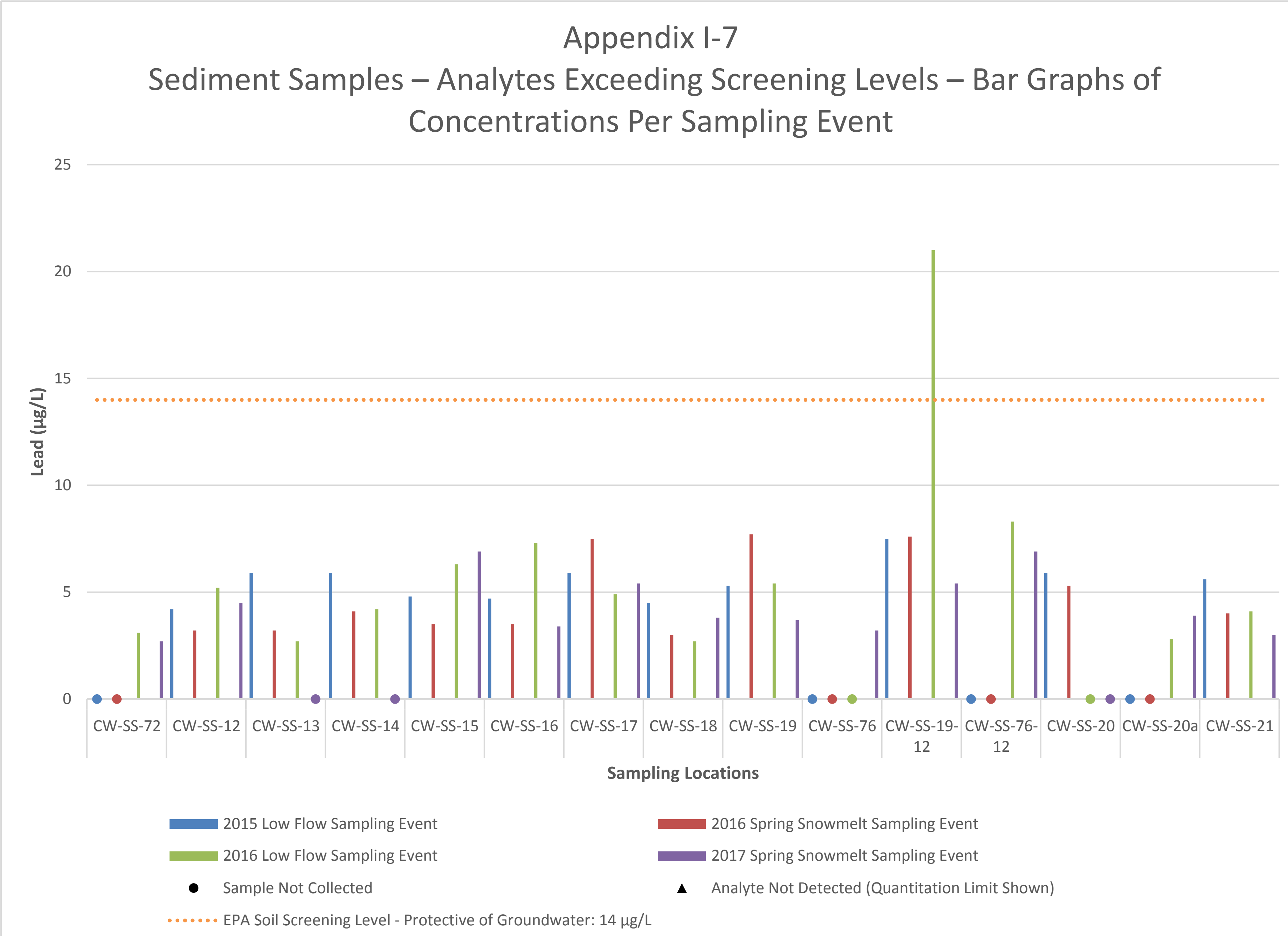
Appendix I-6
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Cadmium (µg/L)
CW-SS-55
CW-SS-55a
CW-SS-56
CW-SS-56a
CW-SS-59
CW-SS-60
CW-SS-61
CW-SS-62
CW-SS-64
CW-SS-65
CW-SS-66
CW-SS-89
CW-SS-67
CW-SS-68
CW-SS-70
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 0.38 µg/L

Appendix I-6

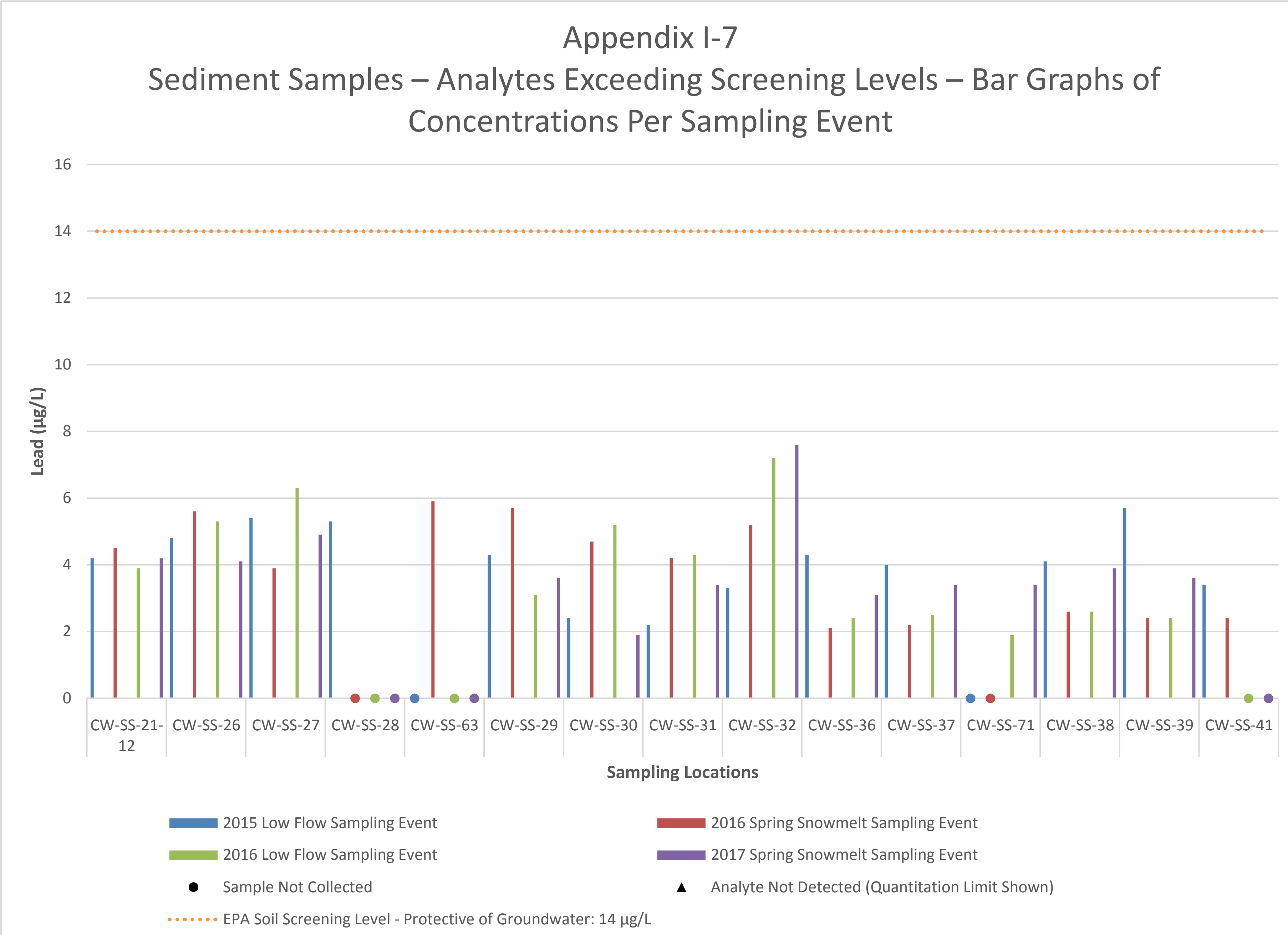
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event

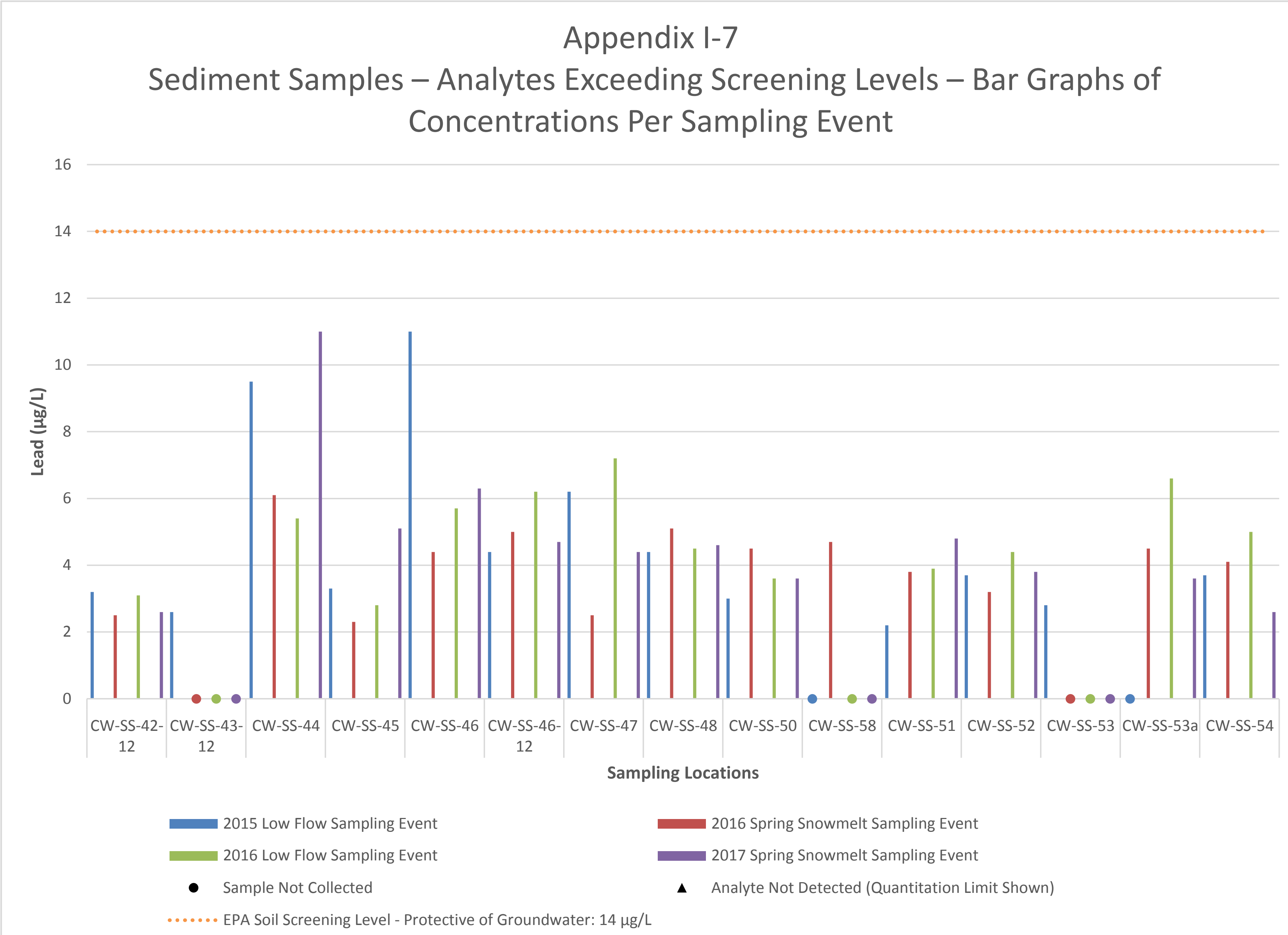


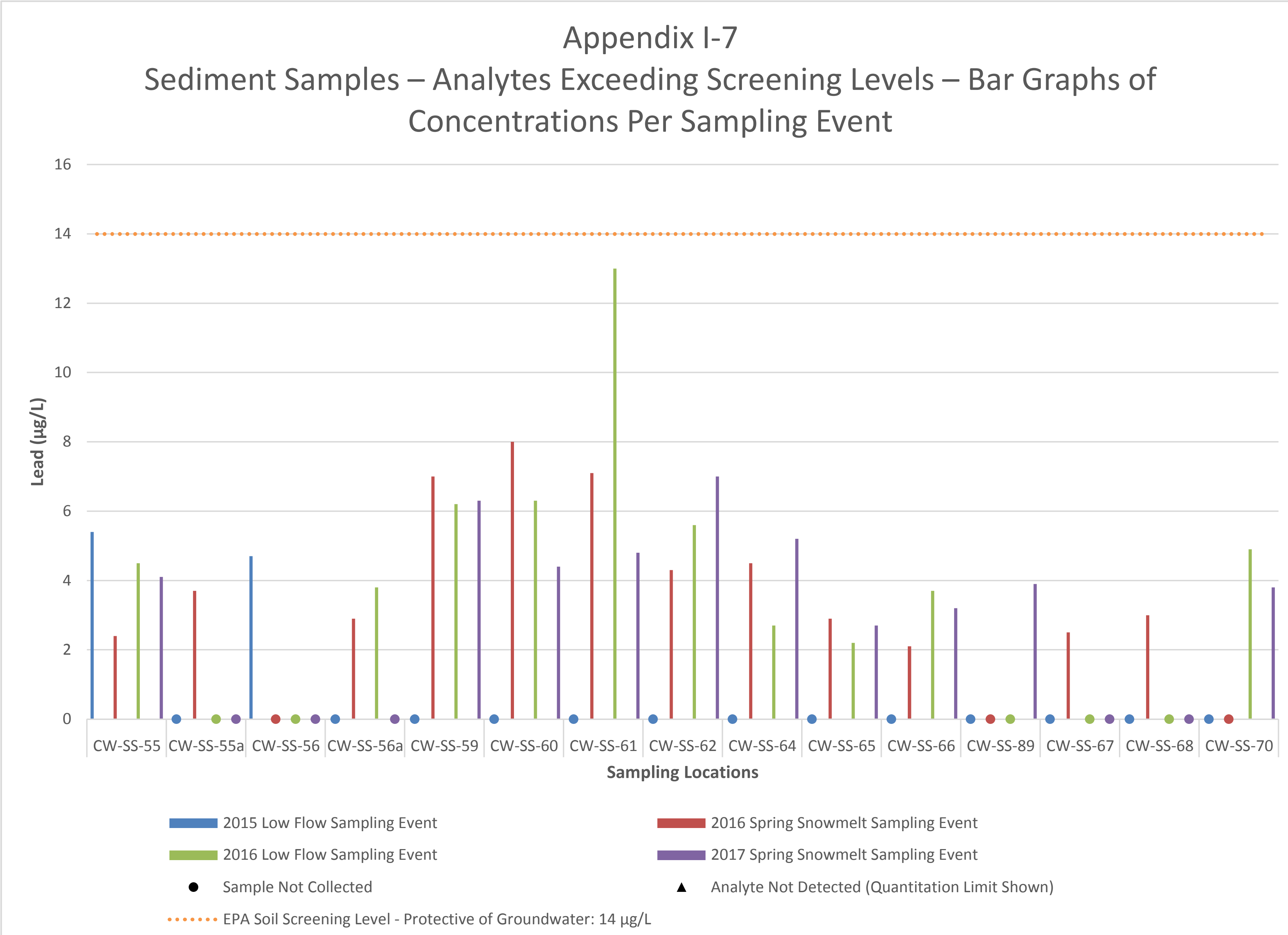

Appendix I-7
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Lead (µg/L)
35
30
25
20
15
10
5
0
CW-SS-01
CW-SS-02
CW-SS-57
CW-SS-03
CW-SS-78
CW-SS-04
CW-SS-69
CW-SS-05
CW-SS-06
CW-SS-07
CW-SS-08
CW-SS-80
CW-SS-09
CW-SS-10
CW-SS-11
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 14 µg/L



Appendix I-7
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Lead (µg/L)
25
20
15
10
5
0
CW-SS-72
CW-SS-12
CW-SS-13
CW-SS-14
CW-SS-15
CW-SS-16
CW-SS-17
CW-SS-18
CW-SS-19
CW-SS-76
CW-SS-19-12
CW-SS-76-12
CW-SS-20
CW-SS-20a
CW-SS-21
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 14 µg/L


Appendix I-7
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Lead (µg/L)
0
2
4
6
8
10
12
14
16
CW-SS-21-12
CW-SS-26
CW-SS-27
CW-SS-28
CW-SS-63
CW-SS-29
CW-SS-30
CW-SS-31
CW-SS-32
CW-SS-36
CW-SS-37
CW-SS-71
CW-SS-38
CW-SS-39
CW-SS-41
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 14 µg/L

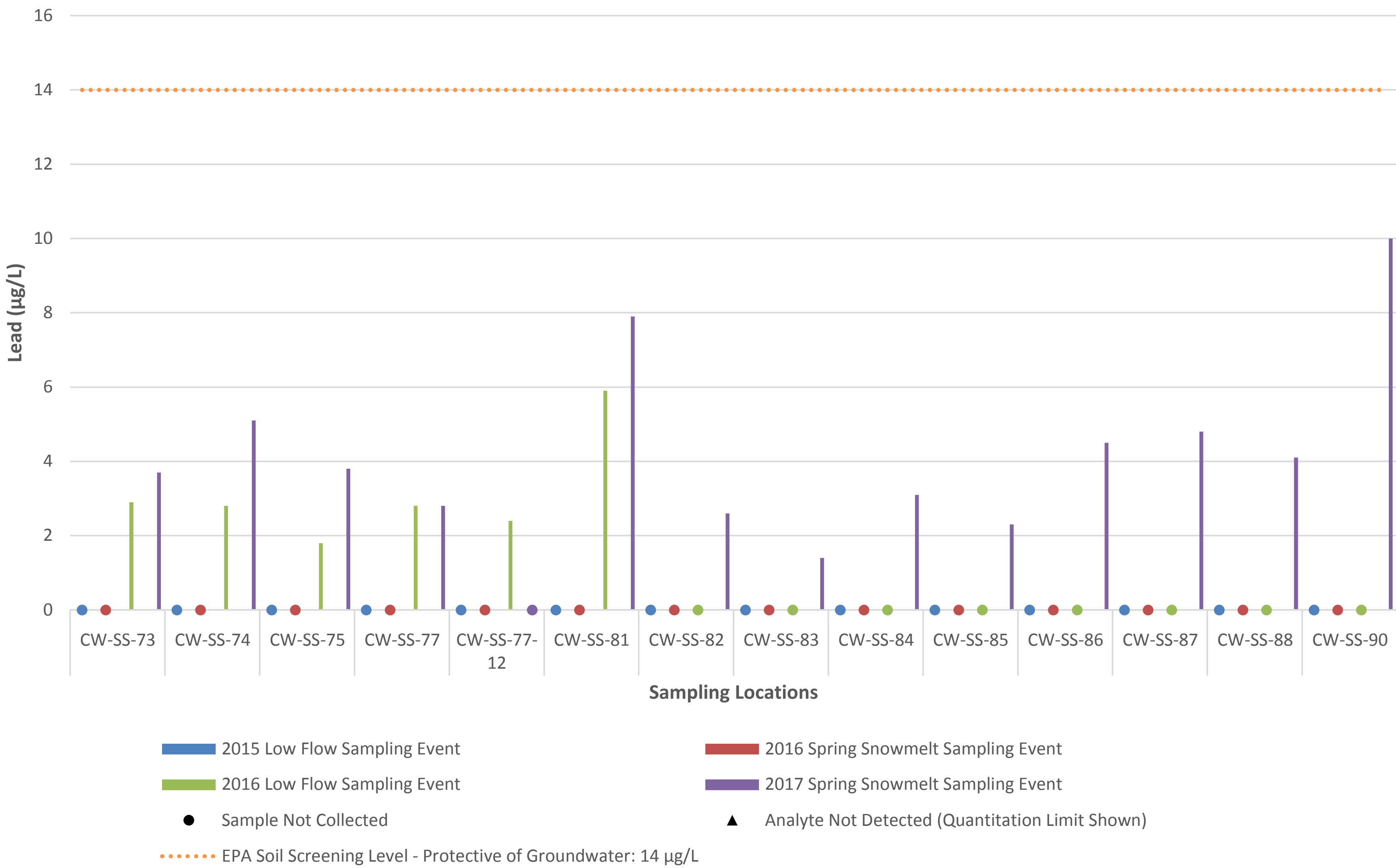

Appendix I-7
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
16
14
12
10
8
6
4
2
0
Lead (µg/L)
CW-SS-42-12
CW-SS-43-12
CW-SS-44
CW-SS-45
CW-SS-46
CW-SS-46-12
CW-SS-47
CW-SS-48
CW-SS-50
CW-SS-58
CW-SS-51
CW-SS-52
CW-SS-53
CW-SS-53a
CW-SS-54
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 14 µg/L



Appendix I-7
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Lead (µg/L)
16
14
12
10
8
6
4
2
0
CW-SS-55
CW-SS-55a
CW-SS-56
CW-SS-56a
CW-SS-59
CW-SS-60
CW-SS-61
CW-SS-62
CW-SS-64
CW-SS-65
CW-SS-66
CW-SS-89
CW-SS-67
CW-SS-68
CW-SS-70
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 14 µg/L

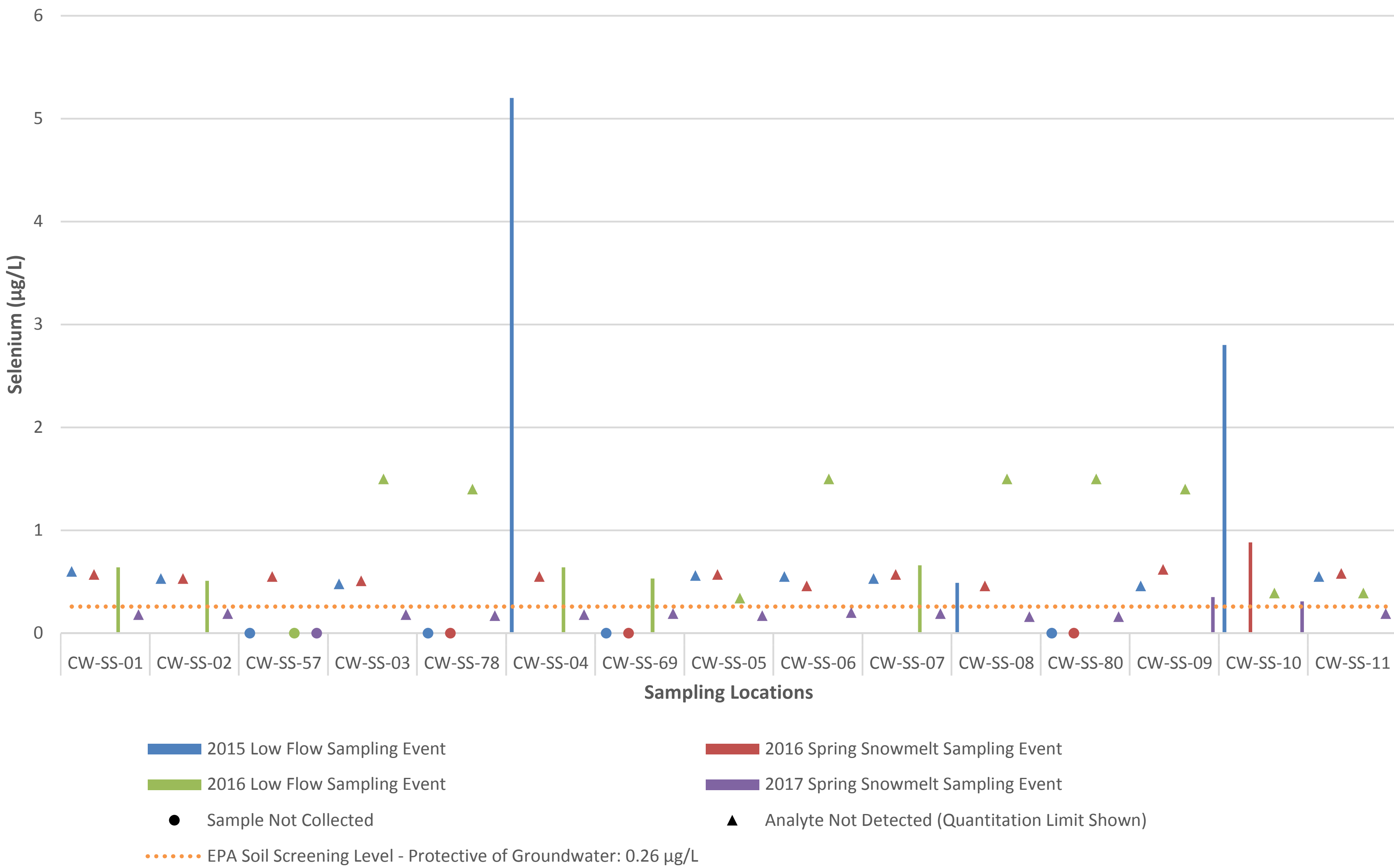
Appendix I-7

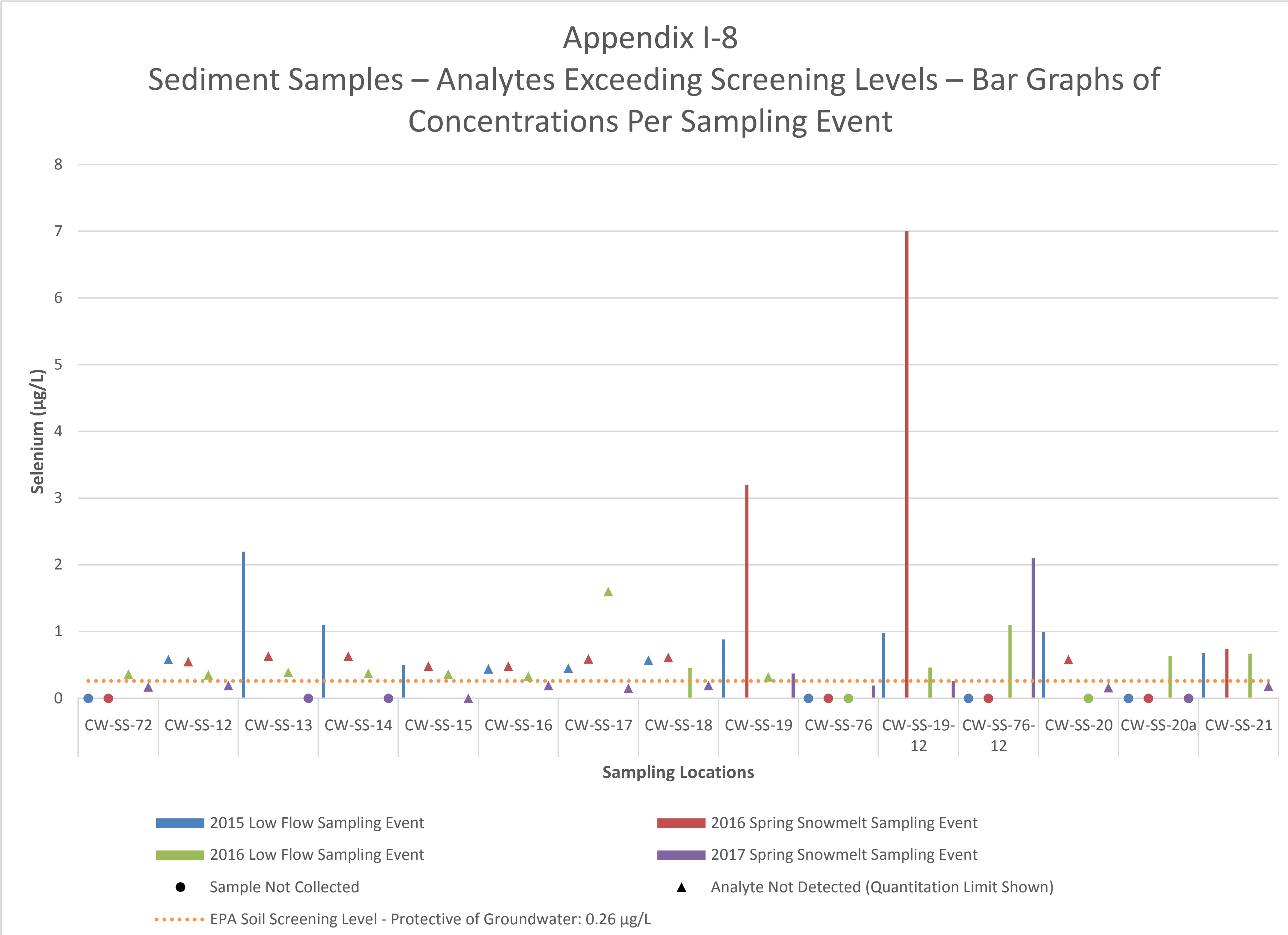
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event



Appendix I-8

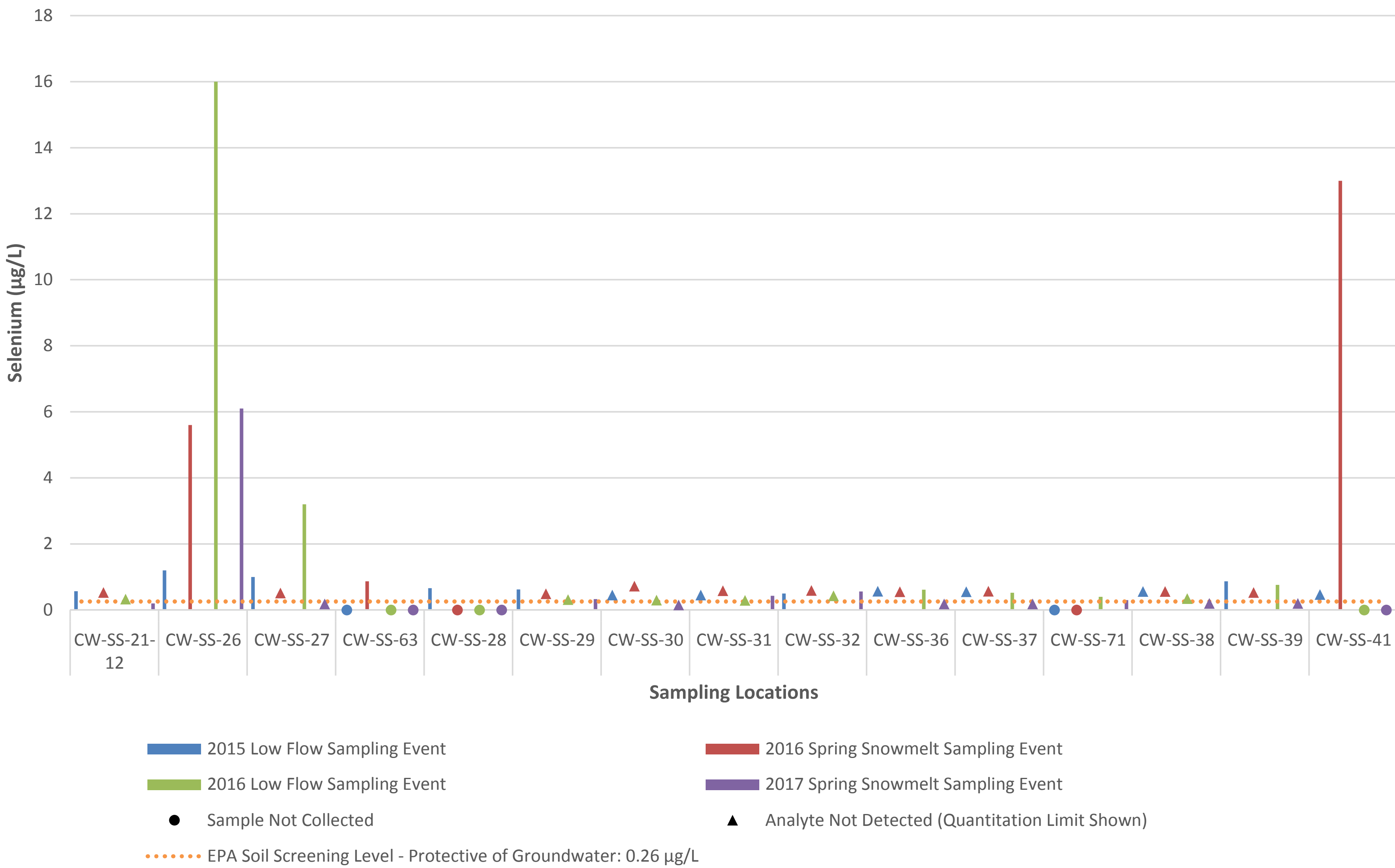
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event

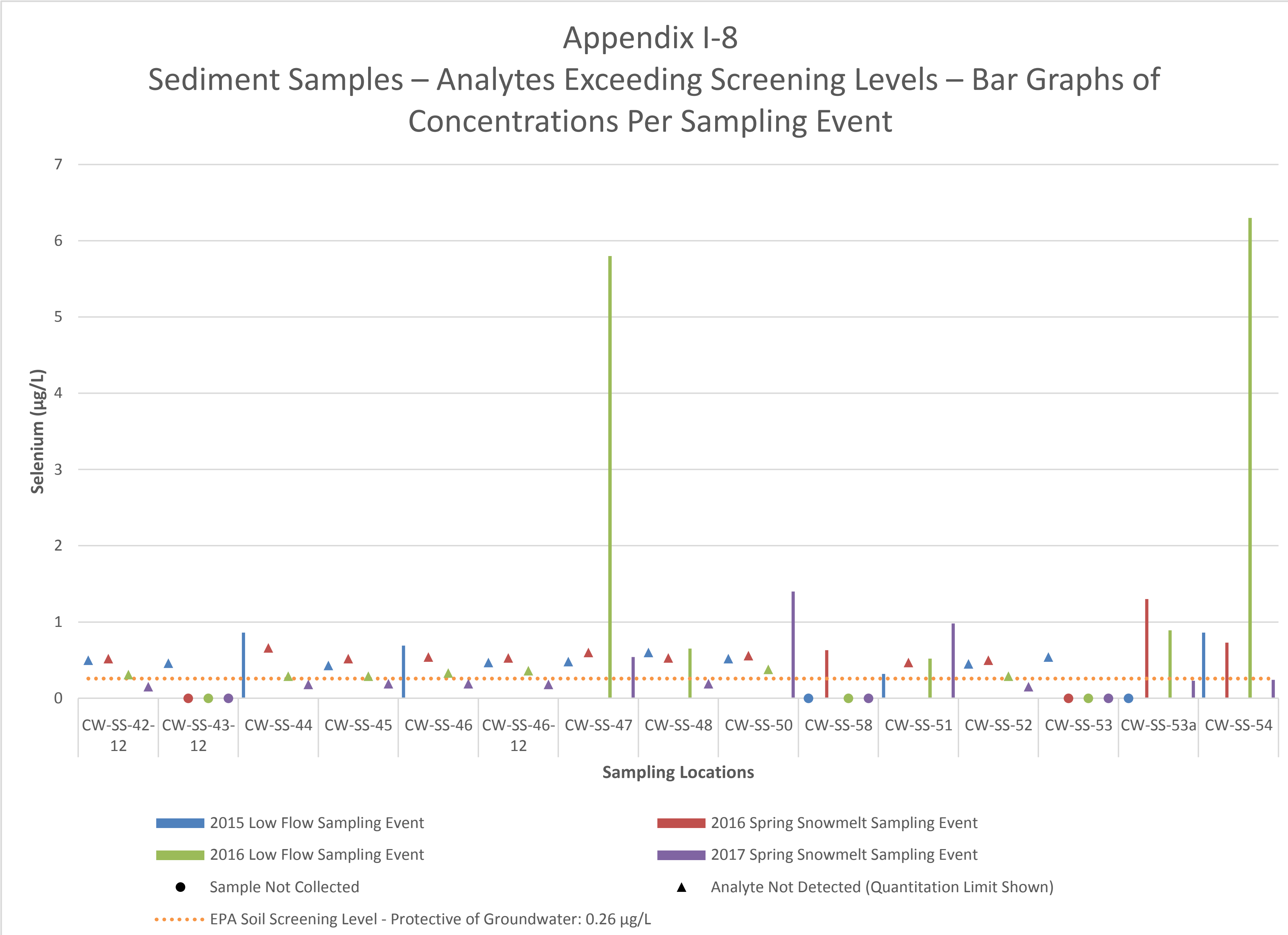


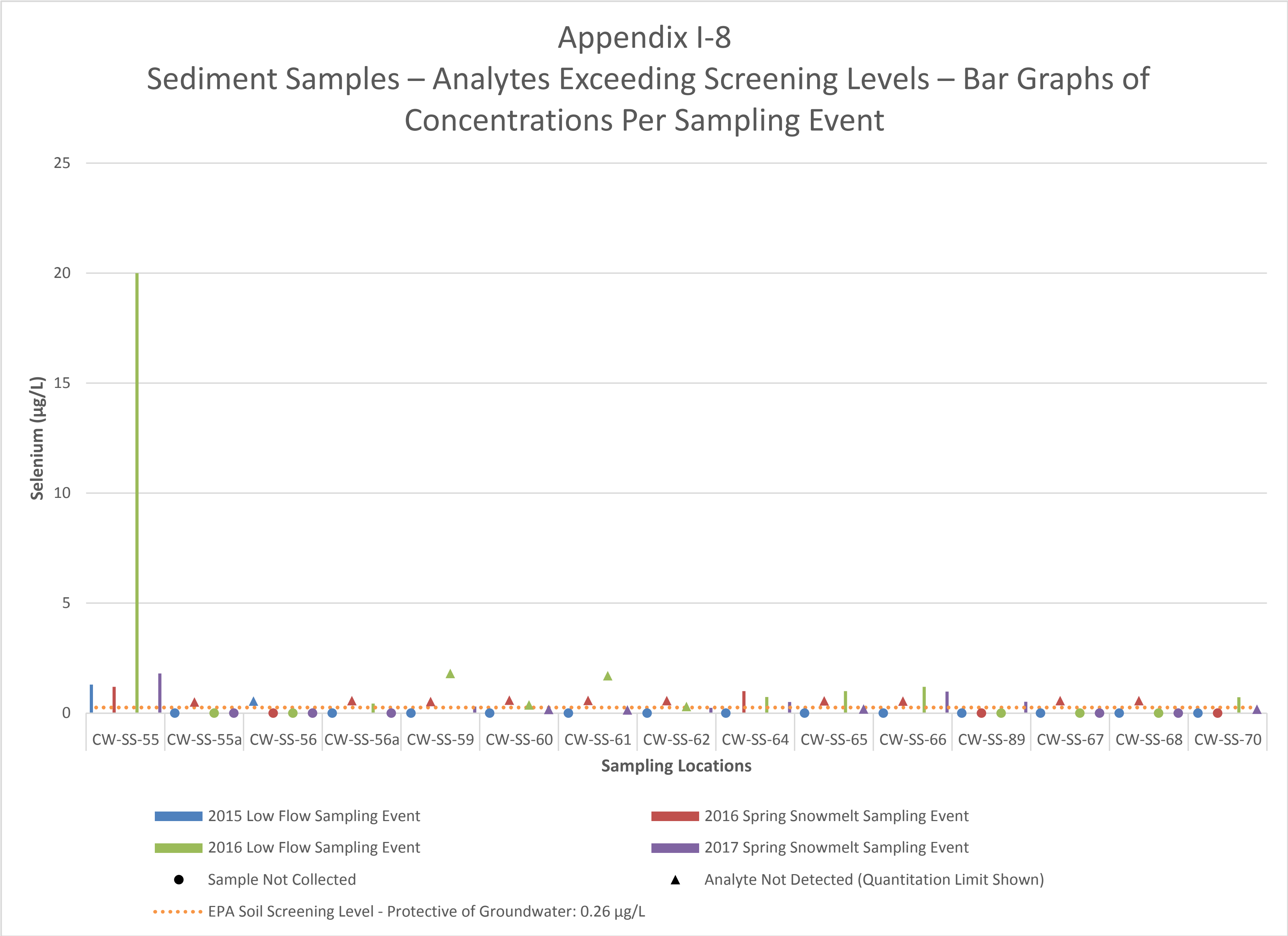


Appendix I-8
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Selenium (µg/L)
8
7
6
5
4
3
2
1
0
CW-SS-72
CW-SS-12
CW-SS-13
CW-SS-14
CW-SS-15
CW-SS-16
CW-SS-17
CW-SS-18
CW-SS-19
CW-SS-76
CW-SS-19-12
CW-SS-76-12
CW-SS-20
CW-SS-20a
CW-SS-21
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 0.26 µg/L

Appendix I-8
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event



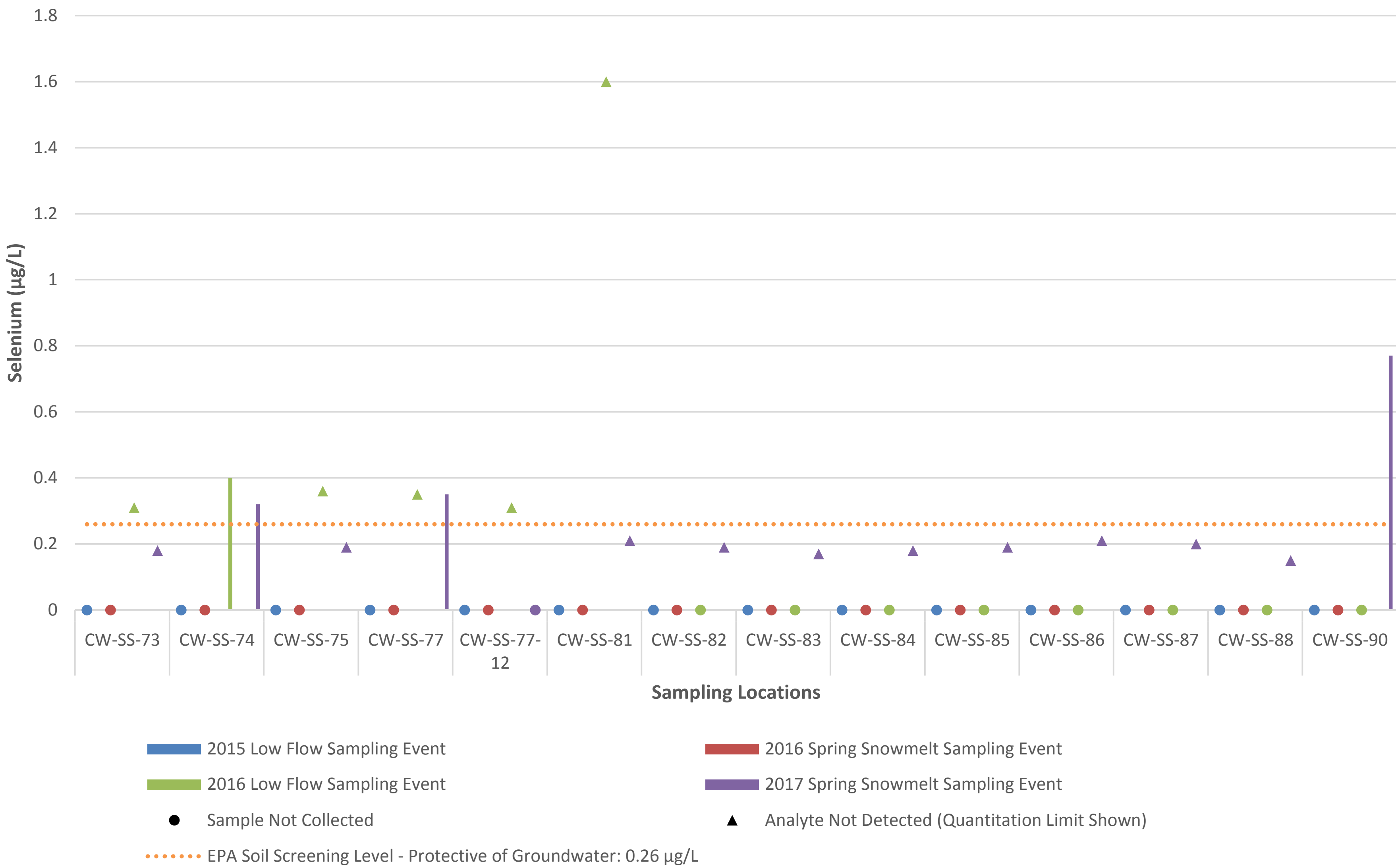

Appendix I-8
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Selenium (µg/L)
0
1
2
3
4
5
6
7
CW-SS-42-12
CW-SS-43-12
CW-SS-44
CW-SS-45
CW-SS-46
CW-SS-46-12
CW-SS-47
CW-SS-48
CW-SS-50
CW-SS-58
CW-SS-51
CW-SS-52
CW-SS-53
CW-SS-53a
CW-SS-54
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 0.26 µg/L

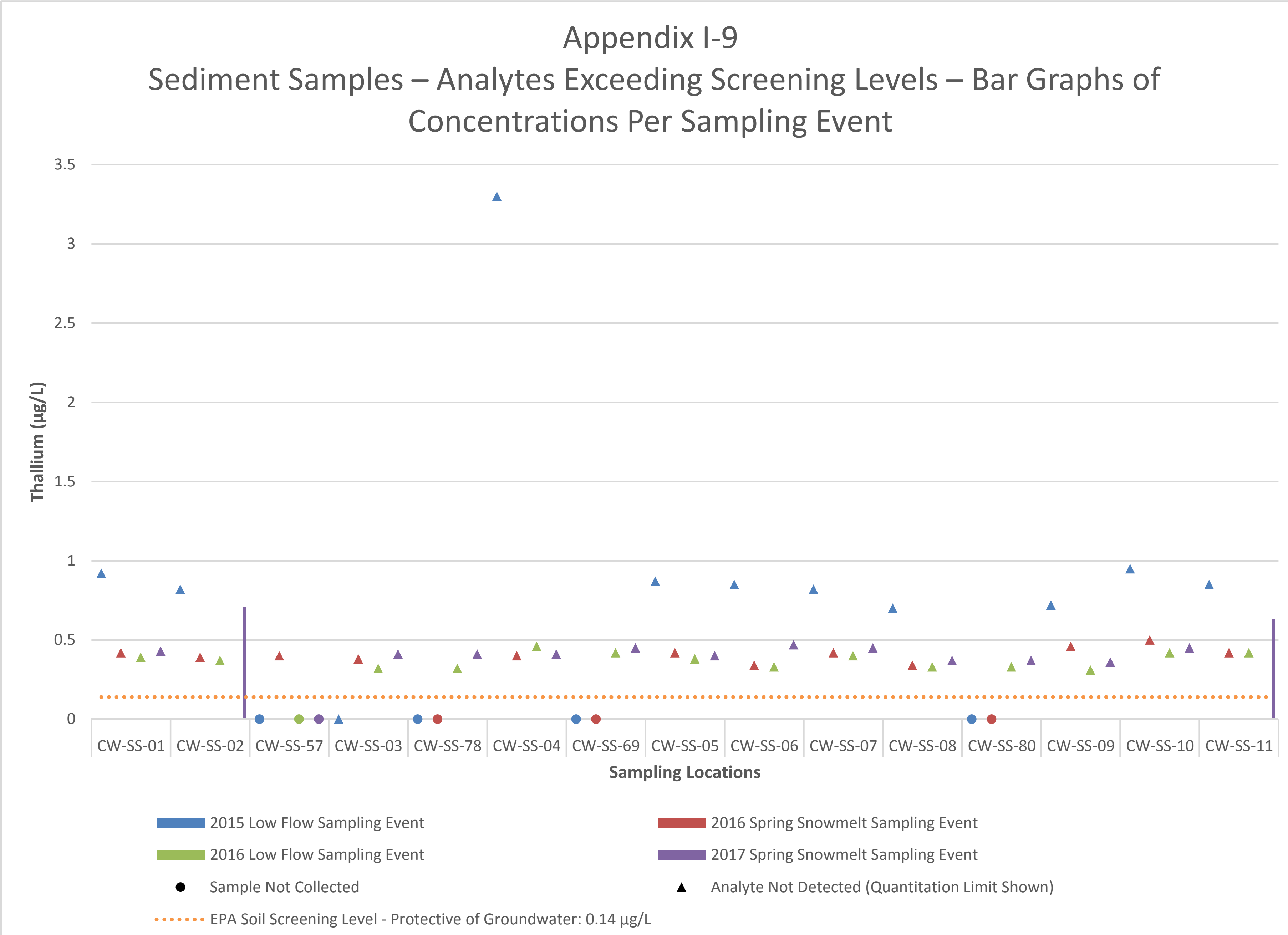


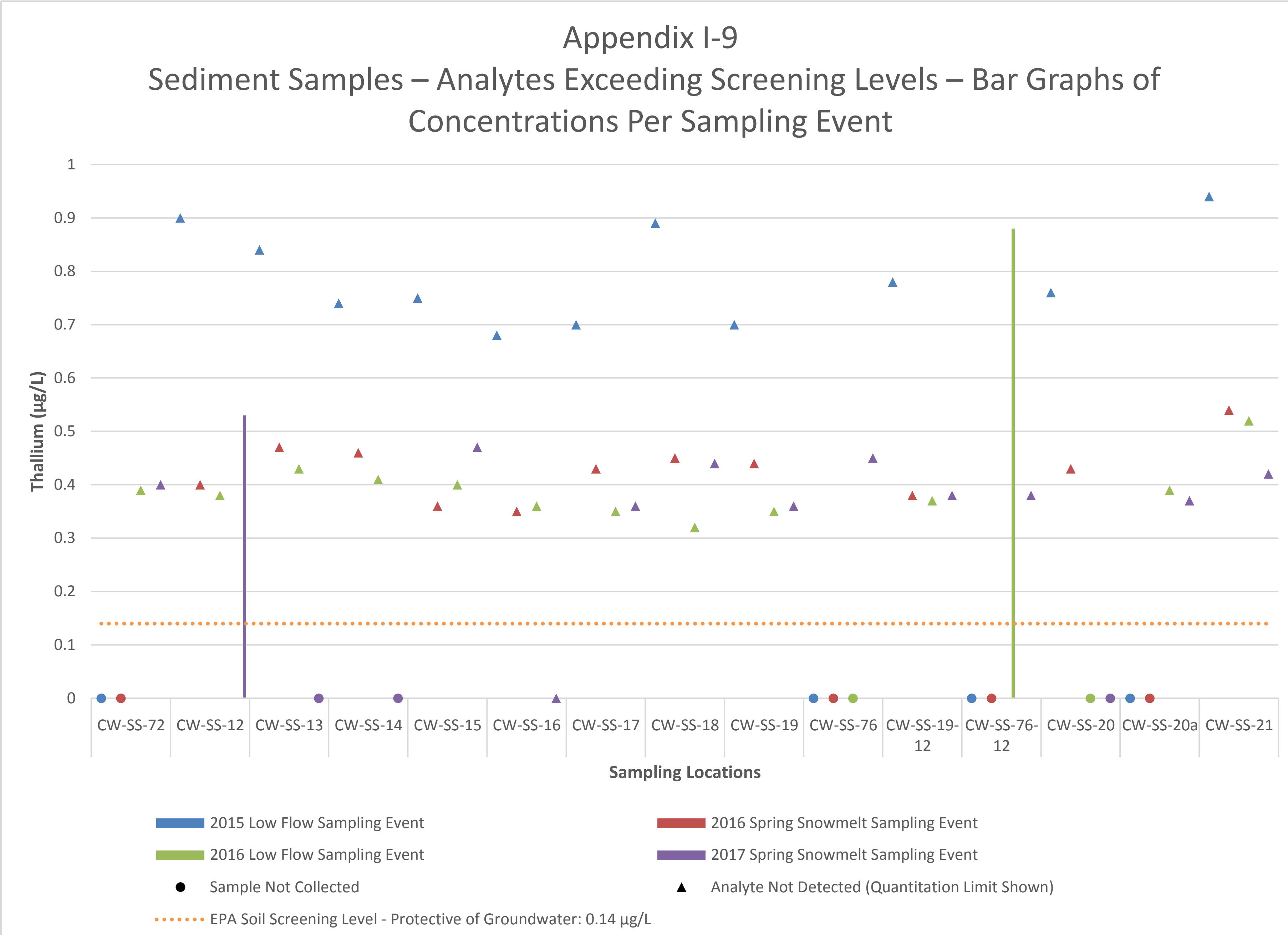
Appendix I-8
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
25
20
15
10
5
0
Selenium (µg/L)
CW-SS-55
CW-SS-55a
CW-SS-56
CW-SS-56a
CW-SS-59
CW-SS-60
CW-SS-61
CW-SS-62
CW-SS-64
CW-SS-65
CW-SS-66
CW-SS-89
CW-SS-67
CW-SS-68
CW-SS-70
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 0.26 µg/L

Appendix I-8

Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event

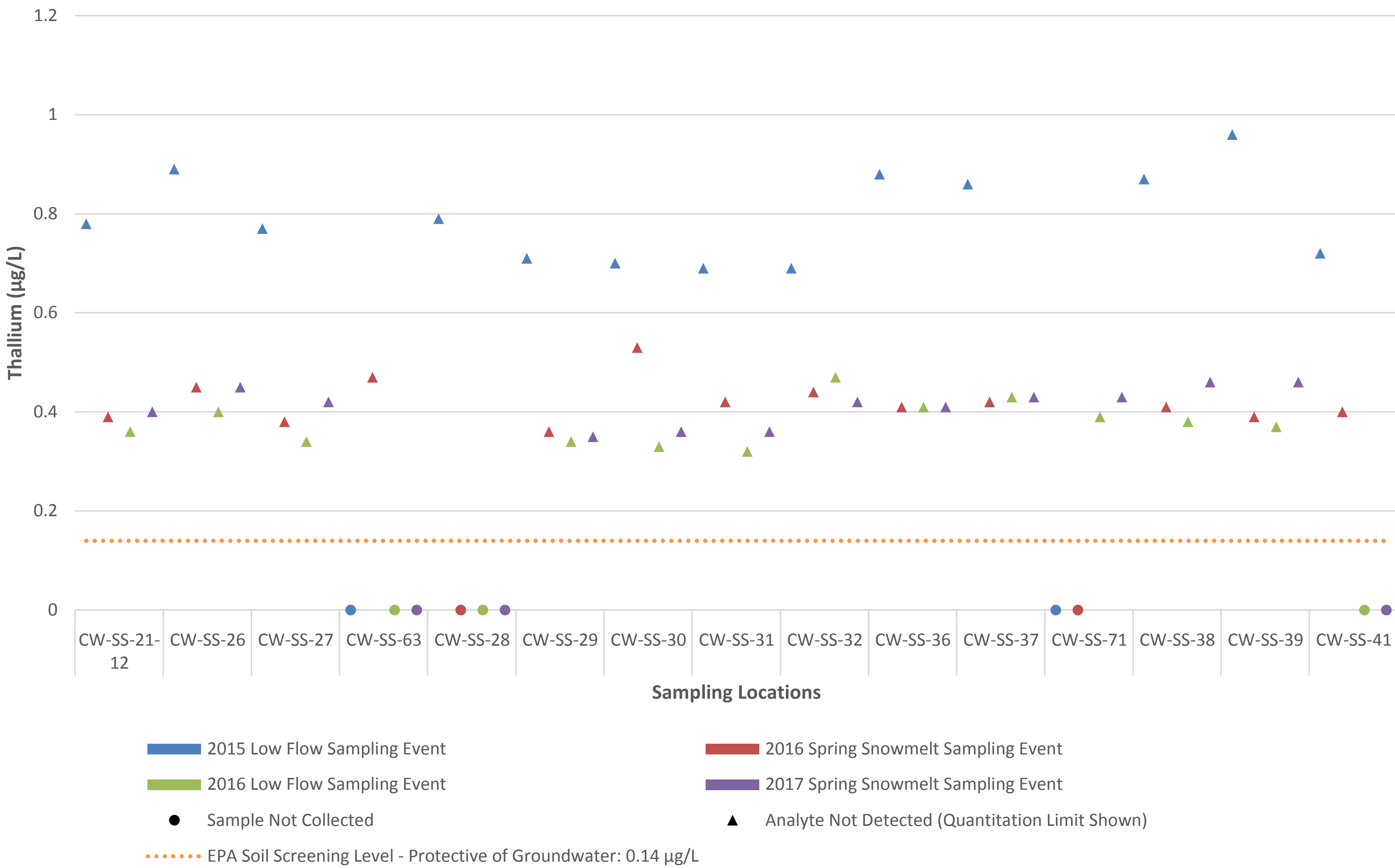


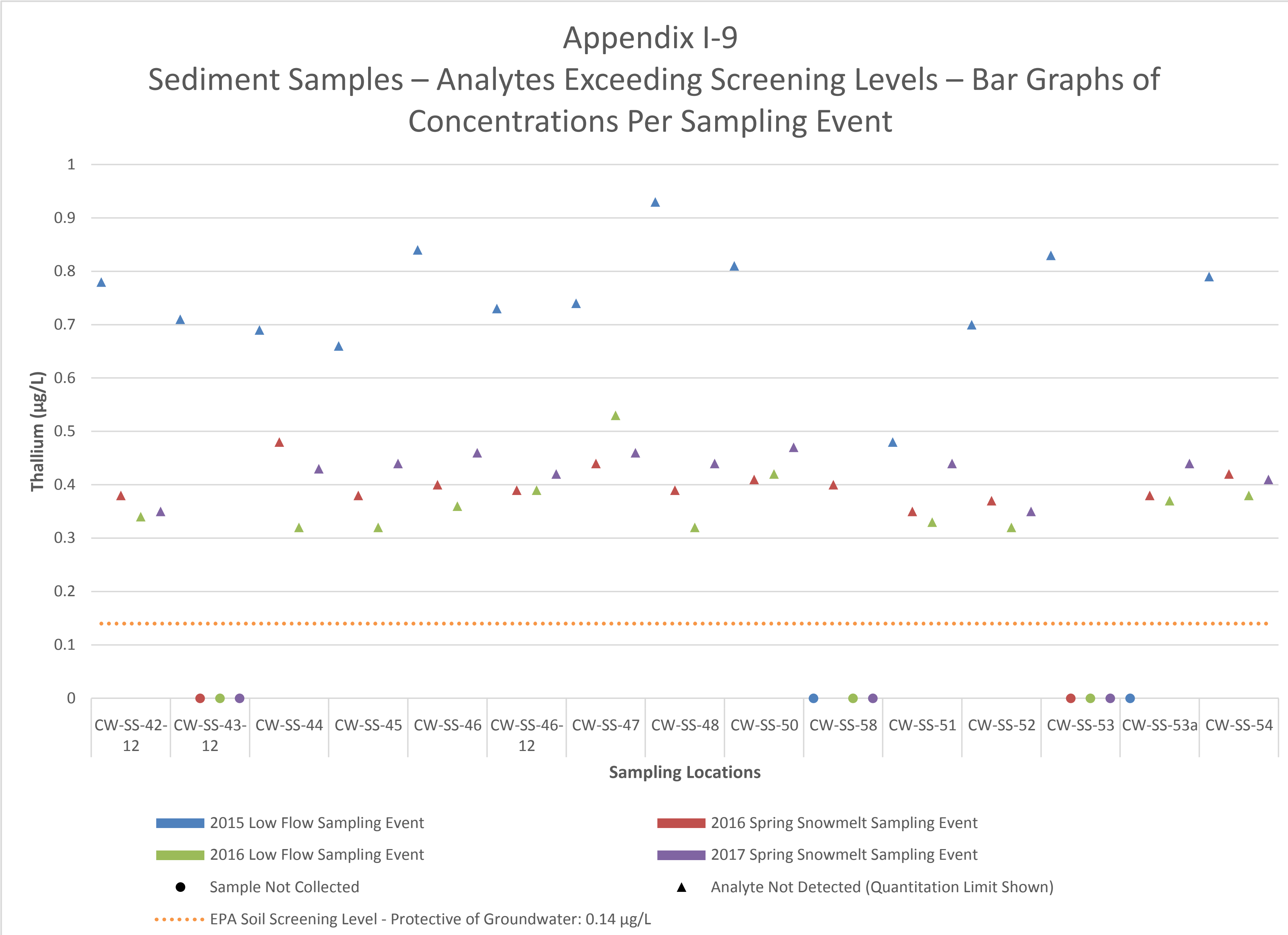

Appendix I-9
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Thallium (µg/L)
3.5
3
2.5
2
1.5
1
0.5
0
CW-SS-01
CW-SS-02
CW-SS-57
CW-SS-03
CW-SS-78
CW-SS-04
CW-SS-69
CW-SS-05
CW-SS-06
CW-SS-07
CW-SS-08
CW-SS-80
CW-SS-09
CW-SS-10
CW-SS-11
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 0.14 µg/L



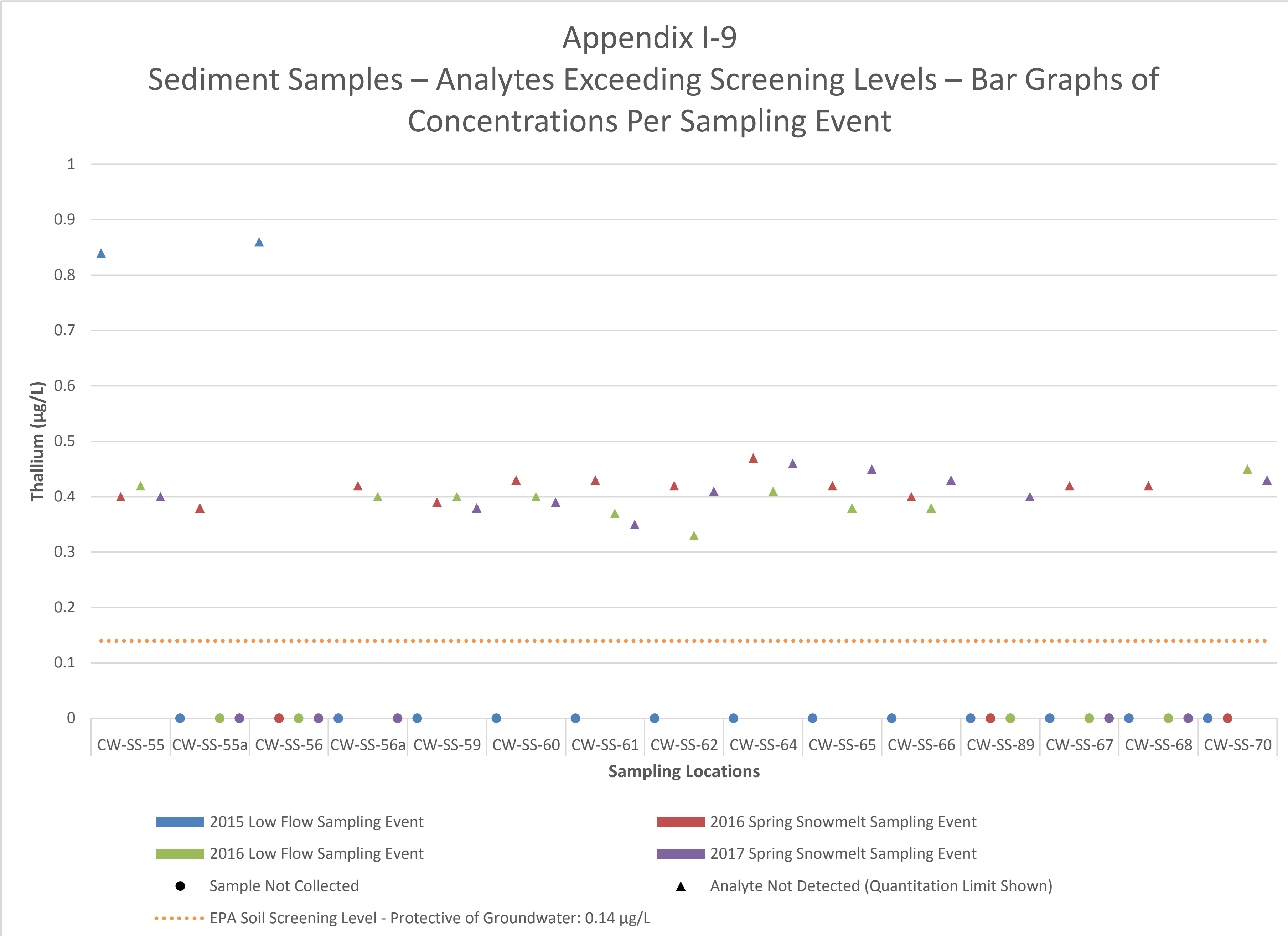
Appendix I-9
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Thallium (µg/L)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
CW-SS-72
CW-SS-12
CW-SS-13
CW-SS-14
CW-SS-15
CW-SS-16
CW-SS-17
CW-SS-18
CW-SS-19
CW-SS-76
CW-SS-19-12
CW-SS-76-12
CW-SS-20
CW-SS-20a
CW-SS-21
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 0.14 µg/L

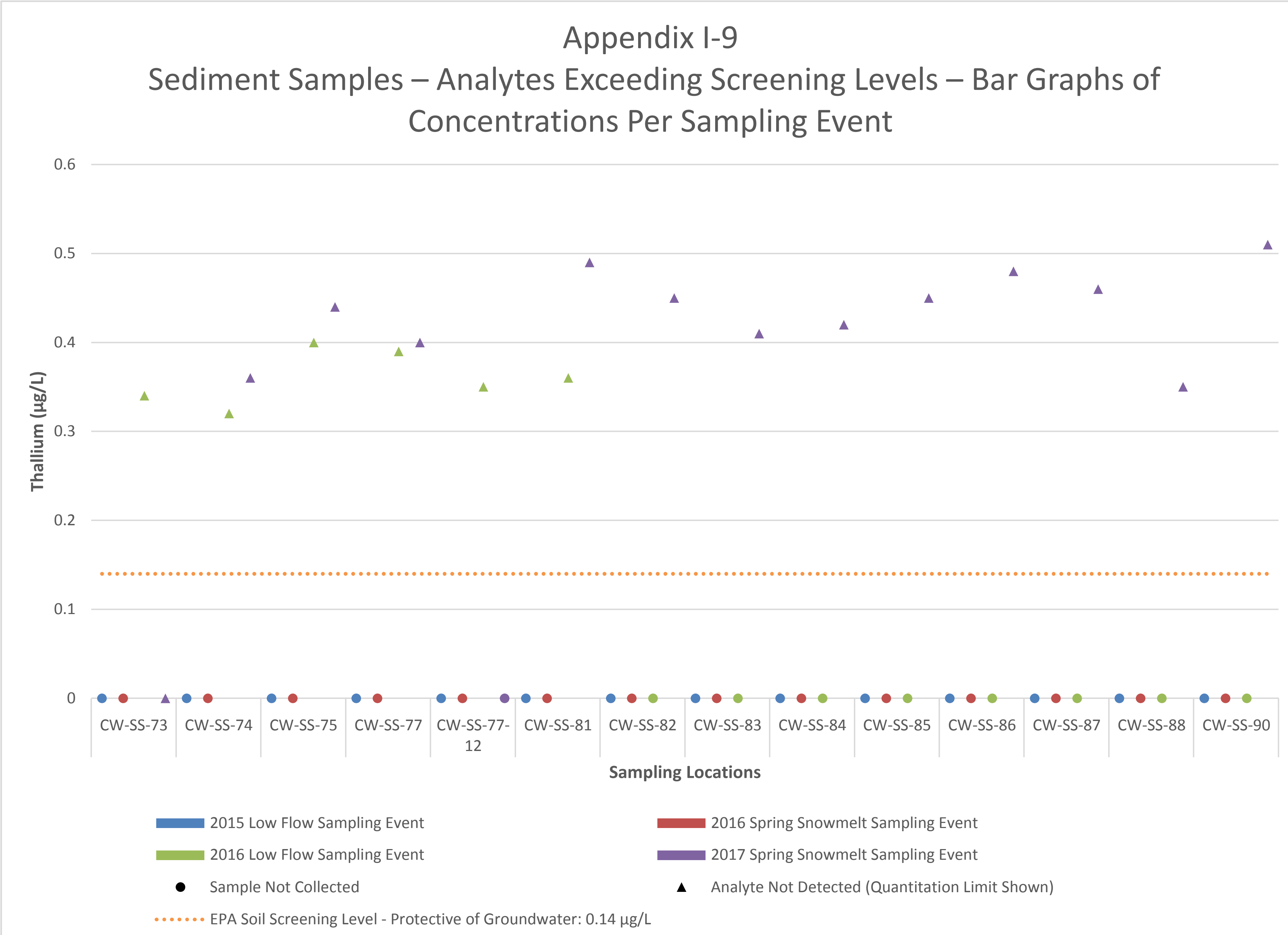
Appendix I-9
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event





Appendix I-9
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Thallium (µg/L)
CW-SS-42-12
CW-SS-43-12
CW-SS-44
CW-SS-45
CW-SS-46
CW-SS-46-12
CW-SS-47
CW-SS-48
CW-SS-50
CW-SS-58
CW-SS-51
CW-SS-52
CW-SS-53
CW-SS-53a
CW-SS-54
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 0.14 µg/L


Appendix I-9
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Thallium (µg/L)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
CW-SS-55
CW-SS-55a
CW-SS-56
CW-SS-56a
CW-SS-59
CW-SS-60
CW-SS-61
CW-SS-62
CW-SS-64
CW-SS-65
CW-SS-66
CW-SS-89
CW-SS-67
CW-SS-68
CW-SS-70
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 0.14 µg/L


Appendix I-9
Sediment Samples – Analytes Exceeding Screening Levels – Bar Graphs of Concentrations Per Sampling Event
Thallium (µg/L)
0
0.1
0.2
0.3
0.4
0.5
0.6
CW-SS-73
CW-SS-74
CW-SS-75
CW-SS-77
CW-SS-77-12
CW-SS-81
CW-SS-82
CW-SS-83
CW-SS-84
CW-SS-85
CW-SS-86
CW-SS-87
CW-SS-88
CW-SS-90
Sampling Locations
2015 Low Flow Sampling Event
2016 Spring Snowmelt Sampling Event
2016 Low Flow Sampling Event
2017 Spring Snowmelt Sampling Event
Sample Not Collected
Analyte Not Detected (Quantitation Limit Shown)
EPA Soil Screening Level - Protective of Groundwater: 0.14 µg/L

APPENDIX J:

STATIONARY 1-MINUTE GAMMA MEASUREMENT RESULTS

Cove Wash Watershed Assessment
Stationary 1-Minute Gamma Measurements - 2015 Low Flow Sampling Event

Sample Location	Sample Date	Sample Type	Northing	Easting	Stationary 1-Minute Gamma Measurement (counts per minute)
CW-SS-01	6/16/2015	Cove Wash	4051637.550	663372.902	10324
CW-SS-02	6/16/2015	Cove Wash	4053607.153	666731.839	10,733
CW-SS-03	6/16/2015	Cove Wash North	4047985.628	659997.097	11,870
CW-SS-04	6/17/2015	Background	4045556.747	655368.538	9,155
CW-SS-05	6/18/2015	Historical Sample - Area 1 - Dam Surface Sample - Cove Wash Middle	4045709.002	658675.587	14,517
CW-SS-06	6/17/2015	Cove Wash	4050970.463	659839.731	12,068
CW-SS-07	6/17/2015	Historical Sample - W07 - Cove Wash Middle	4047101.942	659123.933	23,000
CW-SS-08	6/17/2015	Background	4050235.455	657139.219	10,158
CW-SS-09	6/17/2015	Cove Wash North	4049315.640	658120.219	9,405
CW-SS-10	6/17/2015	Cottonwood Springs	4049586.881	660202.988	9,866
CW-SS-11	6/19/2015	Cove Wash North	4046369.715	657266.457	14,829
CW-SS-12	6/18/2015	Cove Wash Middle 3	4044617.964	658818.118	21,276
CW-SS-13	6/18/2015	Cove Wash Middle 3	4043160.908	658957.686	71,128
CW-SS-14	6/18/2015	Cove Wash Middle 3E	4042934	659222	15,124
CW-SS-15	6/19/2015	Cove Wash North	4046035	656752	11,394
CW-SS-16	6/19/2015	Cove Wash North	4045602	656065	19,944
CW-SS-17	6/20/2015	Cove Wash South	4050338.789	662352.178	12,327
CW-SS-18	6/20/2015	Background - Cove Wash Middle 1 BKG	4045597.485	658407.848	12,321
CW-SS-19	6/22/2015	Historical Sample - Cove Mesa 2	4042075.375	657976.189	27,565
CW-SS-19-12	6/22/2015	Cove Wash Middle 3B Subsurface	4042071.484	657962.307	23,353
CW-SS-20	6/22/2015	Cove Wash Middle 3C	4041480.197	658288.117	54,364
CW-SS-21	6/20/2015	Background - Mesa IV Springs	4043108	655931	Not Recorded
CW-SS-21-12	6/20/2015	Background - Mesa IV Springs Subsurface	4043108	655931	Not Recorded
CW-SS-26	6/22/2015	Cove Wash Middle 2B	4042501.621	657146.877	42,243
CW-SS-27	6/22/2015	Cove Wash Middle 2B	4042693.122	657319.281	12,242
CW-SS-28	6/22/2015	Duplicate of CW-SS-27	4042693.122	657319.281	12,242
CW-SS-29	6/22/2015	Cove Wash Middle 2C	4042595.541	658108.120	21,248
CW-SS-30	6/23/2015	Background	4046867.444	654397.08	9,412
CW-SS-31	6/23/2015	Background	4044527.019	655114.311	11,417
CW-SS-32	6/23/2015	Cove Wash Middle 1E	4043933	655742	20,428
CW-SS-36	6/23/2015	Historical Sample - W005 - Cove Wash Middle 2	4044602.301	658113.531	30,068
CW-SS-37	6/23/2015	Historical Sample - W004 - Middle 2	4044377.806	657955.461	19,475
CW-SS-38	6/23/2015	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	25,545
CW-SS-39	6/23/2015	Cove Wash Middle 2	4045453.339	658432.518	14,495
CW-SS-41	6/23/2015	Cove Wash Middle 1	4045552	658464	13,541
CW-SS-42-14	6/23/2015	Irrigation Ditch Subsurface - Cove Middle	4045665.019	658693.563	16,800
CW-SS-43-12	6/23/2015	Dam Subsurface - Cove Middle	4045684.910	658673.278	14,864
CW-SS-44	6/24/2015	Pine Water Springs Drainage	4043806.688	661260.528	29,378
CW-SS-45	6/24/2015	Background - Deer Springs Drainage	4042151.211	661078.707	14,634
CW-SS-46	6/24/2015	Pine Water Springs	4043788.61	661352.387	14,938
CW-SS-46-14	6/24/2015	Pine Water Springs - Subsurface	4043788.61	661352.387	18,835
CW-SS-47	6/24/2015	Cove Wash Middle 3F	4043727.086	659295.820	175,215
CW-SS-48	6/24/2015	Cove Wash Middle 3F	4044751.928	656807.090	48,467
CW-SS-49	6/18/2015	Duplicate of CW-SS-10	4049586.881	660202.988	9,866
CW-SS-50	6/25/2015	Cove Wash Middle 1	4044856.247	657463.154	37,908
CW-SS-51	6/25/2015	Cove Wash Middle 1A	4044944.041	657035.048	30,727
CW-SS-52	6/25/2015	Cove Wash Middle 1G	4044553.333	657329.590	14,373
CW-SS-53	6/25/2015	Cove Wash Middle 1	4044478	656787	Not Recorded
CW-SS-54	6/25/2015	Cove Wash Middle 1B	4044751.928	656807.09	19,859
CW-SS-55	6/25/2015	Cove Wash Middle 1C	4044480.534	656337.545	39,456
CW-SS-56	6/25/2015	Cove Wash Middle 3A	4042779	658775	15,124

Sample Location	Sample Date	Sample Information	Northing	Easting	Stationary 1-Minute Gamma Measurement (counts per minute)
CW-SS-01	3/28/2016	Cove Wash	4051637.55	663372.9	12099
CW-SS-02	3/26/2016	Cove Wash	4053607.15	666731.84	9974
CW-SS-03	3/30/2016	Cove Wash North	4047985.63	659997.1	12659
CW-SS-04	4/27/2016	Background	4045556.75	655368.54	6737
CW-SS-05	3/25/2016	cal Sample - Area 1 - Dam Surface Sample - Cove Wash	4045700.3	658683.86	12973
CW-SS-06	3/28/2016	Cove Wash	4050970.46	659839.73	9636
CW-SS-07	3/25/2016	Historical Sample - W07 - Cove Wash Middle	4047101.94	659123.93	14181
CW-SS-08	3/28/2016	Background	4050235.46	657139.22	9740
CW-SS-09	3/30/2016	Cove Wash North	4049315.64	658120.22	7444
CW-SS-10	3/30/2016	Cottonwood Spring	4049586.88	660202.99	9152
CW-SS-11	3/30/2016	Cove Wash North	4046369.72	657266.46	17791
CW-SS-12	3/30/2016	Cove Wash Middle 3	4044603.44	658812.82	15418
CW-SS-13	5/2/2016	Cove Wash Middle 3	4043160.91	658957.69	26149
CW-SS-14	5/2/2016	Cove Wash Middle 3E	4042934	659222	21220
CW-SS-15	4/29/2016	Cove Wash North	4046035	656752	11764
CW-SS-16	4/29/2016	Cove Wash North	4045602	656065	14395
CW-SS-17	3/30/2016	Cove Wash South	4050338.79	662352.18	11000
CW-SS-18	3/30/2016	Background - Cove Wash Middle 1 BKG	4045597.49	658407.85	10638
CW-SS-19	4/28/2016	Cove Mesa 2 (Historical)	4042075.38	657976.19	29742
CW-SS-19-12	4/27/2016	Cove Mesa 2 (Historical)	4042075.38	657976.19	Not Recorded
CW-SS-20	4/28/2016	Cove Wash Middle 3C	4041480.2	658288.12	17465
CW-SS-21	4/29/2016	Background - Mesa IV Springs	4043108	655931	6494
CW-SS-21-12	4/30/2016	Background - Mesa IV Springs	4043108	655931	15170
CW-SS-26	4/28/2016	Historical Sample-W0006-Cove Wash Middle 2B	4042501.62	657146.88	25271
CW-SS-27	4/29/2016	Cove Wash Middle 2B	4042693.12	657319.28	34845
CW-SS-29	4/29/2016	Cove Wash Middle 2C	4042595.54	658108.12	11391
CW-SS-30	4/27/2016	Background	4046867.44	654397.08	8819
CW-SS-31	4/27/2016	Background	4044527.02	655114.31	7197
CW-SS-32	4/29/2016	Cove Wash Middle 1E	4043933	655742	12830
CW-SS-36	3/26/2016	Historical Sample - W005 - Cove Wash Middle 2	4044602.3	658113.53	13690
CW-SS-37	3/26/2016	Historical Sample - W004 - Cove Wash Middle 2	4044377.81	657955.46	14787
CW-SS-38	3/26/2016	Historical Sample Area 4 - Cove Wash Middle	4044173	657898	19216
CW-SS-39	3/25/2016	Cove Wash Middle 2	4045453.34	658432.52	14879
CW-SS-41	3/25/2016	Cove Wash Middle 1	4045552	658464	62501
CW-SS-42-10	3/28/2016	Irrigation Ditch Subsurface - Cove Middle	4045665.02	658693.56	11346
CW-SS-44	5/3/2016	Pine Water Springs Drainage	4043806.69	661260.53	10117
CW-SS-45	5/3/2016	Background - Deer Springs Drainage	4042151.21	661078.71	15418
CW-SS-46	5/3/2016	Pine Water Springs	4043788.61	661352.39	12988
CW-SS-46-12	5/3/2016	Pine Water Springs - Subsurface	4043788.61	661352.39	16164
CW-SS-47	5/3/2016	Cove Wash Middle 3F	4043727.09	659295.82	23286
CW-SS-48	3/26/2016	Cove Wash Middle 3F	4044751.93	656807.09	10149
CW-SS-49	3/26/2016	Background - Cove Wash Middle 1 BKG	4049586.88	660202.99	10638
CW-SS-50	3/29/2016	Cove Wash Middle 1	4044856.25	657463.15	30882
CW-SS-51	3/29/2016	Cove Wash Middle 1A	4044944.04	657035.05	30116
CW-SS-52	3/29/2016	Cove Wash Middle 1G	4044553.33	657329.59	18511
CW-SS-53a	5/2/2016	Cove Wash Middle 1	4044478	656787	24328
CW-SS-54	5/2/2016	Cove Wash Middle 1B	4044751.93	656807.09	19128
CW-SS-55	3/25/2016	Cove Wash Middle 2	4044480.53	656337.55	28047
CW-SS-55a	5/3/2016	Cove Wash Middle 2	4044480.53	656337.55	Not Recorded
CW-SS-56a	5/2/2016	Cove Wash Middle 3A	4043135	658979	14121
CW-SS-57	3/26/2016	Cove Wash	4053607.15	666731.84	9974
CW-SS-58	3/29/2016	Cove Wash Middle 1	4044856.25	657463.15	30882
CW-SS-59	3/30/2016	Cove Wash Tributary 1	4051574	664210	14749
CW-SS-60	3/30/2016	Cove Wash between 01 and 02	4051659	664274	11553
CW-SS-61	3/30/2016	Cove Wash Tributary 2 (Downstream)	4051575	663979	Not Recorded
CW-SS-62	5/3/2016	Downstream of Dam	4046378	658785	7014
CW-SS-63	5/3/2016	Cove Wash Middle 2B	4042693.12	657319.28	Not Recorded
CW-SS-64	4/29/2016	Cove Wash North between CW-15 and CW-16	4045877	656444	11970
CW-SS-65	4/30/2016	Cove Wash Middle 3A downstream of 3B	4042357.62	658662.93	20579
CW-SS-66	4/30/2016	Cove Wash Middle 3A downstream of 3D	4042352.49	658661.59	11393
CW-SS-67	5/2/2016	Cove Wash Middle 3	4044603.44	658812.82	12871
CW-SS-68	5/2/2016	Cove Wash Middle 3	4044603.44	658812.82	12871

Cove Wash Watershed Asessment
Stationary 1-Minute Gamma Measurements - 2016 Low Flow Sampling Event

Sample Location	Sample Date	Sample Information	Northing	Easting	Stationary 1-Minute Gamma Measurement (counts per minute)
CW-SS-01-160627	6/27/2016	Cove Wash (Downstream)	4051637.55	663372.9034	12712
CW-SS-02-160627	6/27/2016	Cove Wash (Downstream)	4053607.153	666731.839	11148
CW-SS-03-160628	6/28/2016	Cove Wash North	4047985.628	659997.0959	11972
CW-SS-04-160618	6/18/2016	Background (Upstream)	4045547.649	655393.8806	9220
CW-SS-05-160627	6/27/2016	Dam (Historical)	4045709.002	658675.5894	15176
CW-SS-06-160628	6/28/2016	Cove Wash (Downstream)	4050970.463	659839.728	9506
CW-SS-07-160628	6/28/2016	Cove Wash Middle (Historical)	4047101.942	659123.9337	14350
CW-SS-08-160628	6/28/2016	Background (Downstream)	4050235.456	657139.2197	9972
CW-SS-09-160627	6/27/2016	Cove Wash North	4049315.64	658120.2201	9222
CW-SS-10-160628	6/28/2016	Cottonwood Spring (Seeping capped well)	4049594.436	660198.1416	10357
CW-SS-11-160621	6/21/2016	Cove Wash North	4046373.007	657265.4893	11023
CW-SS-12-160627	6/27/2016	Cove Wash Middle 3	4044603.441	658812.8183	16379
CW-SS-13-160623	6/23/2016	Cove Wash Middle 3	4043160.908	658957.6858	23403
CW-SS-14-160623	6/23/2016	Cove Wash Middle 3E	4042934	659222.0031	33700
CW-SS-15-160625	6/25/2016	Cove Wash North	4046035	656751.9991	10199
CW-SS-16-160621	6/21/2016	Cove Wash North	4045602	656065.0033	13999
CW-SS-17-160627	6/27/2016	Cove Wash South (Downstream)	4050338.789	662352.1776	12031
CW-SS-18-160625	6/25/2016	Background (Cove Wash Middle 1)	4045597.485	658407.8511	10486
CW-SS-19-10-160622	6/22/2016	Cove Mesa 2 (Historical) - Subsurface	4042075.979	657975.2607	22655
CW-SS-19-160622	6/22/2016	Cove Mesa 2 (Historical)	4042075.979	657975.2607	22655
CW-SS-20a-160622	6/22/2016	Cove Wash Middle 3C (Downstream of CW-20)	4041601.022	658538.7969	11642
CW-SS-21-12-160628	6/28/2016	Background (Mesa IV Springs) - Subsurface	4043108	655931.0041	9357
CW-SS-21-160620	6/20/2016	Background (Mesa IV Springs)	4043108	655931.0041	9965
CW-SS-26-160620	6/20/2016	Cove Wash Middle 2 (Historical)	4042501.621	657146.8765	51083
CW-SS-27-160620	6/20/2016	Cove Wash Middle 2B	4042693.122	657319.2808	36924
CW-SS-29-160622	6/22/2016	Cove Wash Middle 2C	4042595.541	658108.1172	28987
CW-SS-30-160618	6/18/2016	Background (West Upstream)	4046867.444	654397.084	11835
CW-SS-31-160618	6/18/2016	Background (Upstream)	4044527.019	655114.312	11008
CW-SS-32-160620	6/20/2016	Cove Wash Middle 1E	4043933	655741.9975	19238
CW-SS-36-160618	6/18/2016	Cove Wash Middle 2 (Historical)	4044602.301	658113.5333	Not Recorded
CW-SS-37-160618	6/18/2016	Cove Wash Middle 2 (Historical)	4044377.806	657955.4587	Not Recorded
CW-SS-38-160618	6/18/2016	Cove Wash Middle (Historical)	4044173	657897.9975	18287
CW-SS-39-160627	6/27/2016	Cove Wash Middle 2	4045453.338	658432.5145	17646
CW-SS-42-12-160627	6/27/2016	Irrigation Ditch	4045665.7	658700.6	13233
CW-SS-44-160621	6/21/2016	Pine Water Springs Drainage	4043806.688	661260.5257	15415
CW-SS-45-160621	6/21/2016	Background (Deer Springs Drainage)	4042151.212	661078.7105	12627
CW-SS-46-12-160621	6/21/2016	Pine Water Springs	4043788.61	661352.387	15811
CW-SS-46-160621	6/21/2016	Pine Water Springs - Subsurface	4043788.61	661352.387	15134
CW-SS-47-160617	6/17/2016	Cove Wash Middle 3F	4043774.185	659297.1492	25781
CW-SS-48-160617	6/17/2016	Cove Wash Middle 3F	4044446.562	659271.0138	13367
CW-SS-50-160624	6/24/2016	Cove Wash Middle 1	4044856.248	657463.1536	29065
CW-SS-51-160624	6/24/2016	Cove Wash Middle 1A	4044944.041	657035.0523	24304
CW-SS-52-160624	6/24/2016	Cove Wash Middle 1G	4044553.333	657329.5884	19666
CW-SS-53a-160624	6/24/2016	Cove Wash Middle 1 (Near original location)	4044567	656816	32738
CW-SS-54-160624	6/24/2016	Cove Wash Middle 1B	4044752.579	656806.108	24708
CW-SS-55-160625	6/25/2016	Cove Wash Middle 1C	4044480.534	656337.5433	36000
CW-SS-56a-160623	6/23/2016	Cove Wash Middle 3A (Near original location)	4043135	658979	18627
CW-SS-59-160627	6/27/2016	Cove Wash Tributary 1 (Downstream)	4051574.576	664210.2048	13996
CW-SS-60-160627	6/27/2016	Cove Wash between 01 and 02 (Downstream)	4051659.495	664274.984	11824
CW-SS-61-160627	6/27/2016	Cove Wash Tributary 2 (Downstream)	4051575.939	663979.3813	14027
CW-SS-62-160628	6/28/2016	Downstream of Dam	4046378.374	658785.0735	12337
CW-SS-64-160621	6/21/2016	Cove Wash North	4045877	656444	12095
CW-SS-65-160622	6/22/2016	Cove Wash Middle 3A	4042362.589	658661.6744	32224
CW-SS-66-160622	6/22/2016	Cove Wash Middle 3A	4042362.589	658661.6744	11128
CW-SS-69-160618	6/18/2016	Duplicate of CW-04	4045547.649	655393.8806	9220
CW-SS-70-160617	6/17/2016	Cove Wash Middle 3F	4044525.919	659043.2268	14875
CW-SS-71-160618	6/18/2016	Duplicate of CW-37	4044602.301	658113.5333	Not Recorded
CW-SS-72-160621	6/21/2016	Duplicate of CW-11	4045547.649	655393.8806	11023
CW-SS-73-160622	6/22/2016	Cove Wash Middle 3D	4042208.541	658769.5923	13019
CW-SS-74-160622	6/22/2016	Cove Wash Middle 3D	4041604.376	658745.2414	13772
CW-SS-75-160622	6/22/2016	Cove Wash Middle 3D	4041201.219	658764.5801	Not Recorded
CW-SS-76-10-160622	6/22/2016	Duplicate of CW-19	4042075.979	657975.2607	11642
CW-SS-77-12-160627	6/27/2016	Cove Wash Middle 3D	4045656.58	658677.1375	15236
CW-SS-77-160627	6/27/2016	Cove Wash Middle 3D - Subsurface	4045656.58	658677.1375	13962
CW-SS-78-160628	6/28/2016	Duplicate of CW-03	4047985.628	659997.0959	11972
CW-SS-80-160628	6/28/2016	Duplicate of CW-08	4050235.456	657139.2197	9972
CW-SS-81-160627	6/27/2016	Cove Wash North	4049882.052	658891.9138	8598
CW-SW-70-160617	6/17/2016	Cove Wash Middle 3F	4044525.919	659043.2268	14875

Cove Wash Watershed Assessment

Stationary 1-Minute Gamma Measurements - 2017 Spring Snow Melt Sampling Event

Sample Location	Sample Date	Sample Information	Northing	Easting	Stationary 1-Minute
CW-SS-01-170426	04/26/2017	Cove Wash (Downstream)	4051637.55	663372.9	9977
CW-SS-02-170419	04/19/2017	Cove Wash (Downstream)	4053607.15	666731.84	6504
CW-SS-03-170426	04/26/2017	Cove Wash North	4047985.63	659997.1	12103
CW-SS-04-170424	04/24/2017	Background (Upstream)	4045547.65	655393.88	9115
CW-SS-05-170418	04/18/2017	Dam (Historical)	4045709	658675.59	9420
CW-SS-06-170426	04/26/2017	Cove Wash (Downstream)	4050970.46	659839.73	8989
CW-SS-07-170426	04/26/2017	Cove Wash Middle (Historical)	4047101.94	659123.93	13395
CW-SS-08-170426	04/26/2017	Background (Downstream)	4050235.46	657139.22	9002
CW-SS-09-170424	04/24/2017	Cove Wash North	4049315.64	658120.22	8556
CW-SS-10-170426	04/26/2017	Cottonwood Springs	4049594.44	660198.14	9640
CW-SS-11-170421	04/21/2017	Cove Wash North	4046373.01	657265.49	10514
CW-SS-12-170419	04/19/2017	Cove Wash Middle 3	4044603.44	658812.82	9496
CW-SS-15-170425	04/25/2017	Cove Wash North	4046035	656752	10835
CW-SS-16-170425	04/25/2017	Cove Wash North	4045602	656065	13847
CW-SS-17-170426	04/26/2017	Cove Wash South (Downstream)	4050338.79	662352.18	11151
CW-SS-18-170418	04/18/2017	Background (Cove Wash Middle 1)	4045597.49	658407.85	7118
CW-SS-19-12-170422	04/22/2017	Cove Wash Middle 3B - Subsurface	4042075.98	657975.26	25160
CW-SS-19-170422	04/22/2017	Cove Wash Middle 3B	4042075.98	657975.26	24101
CW-SS-20a-170422	04/22/2017	Cove Wash Middle 3C	4041601.02	658538.8	14053
CW-SS-21-170421	04/21/2017	Background (Mesa IV Springs)	4043108	655931	8653
CW-SS-21-12-170421	04/21/2017	Background (Mesa IV Springs) - Subsurface	4043108	655931	8653
CW-SS-26-170420	04/20/2017	Cove Wash Middle 2 (Historical)	4042501.62	657146.88	37649
CW-SS-27-170420	04/20/2017	Cove Wash Middle 2B	4042693.12	657319.28	14989
CW-SS-29-170420	04/20/2017	Cove Wash Middle 2C	4042595.54	658108.12	21616
CW-SS-30-170424	04/24/2017	Background (West Upstream)	4046867.44	654397.08	10418
CW-SS-31-170424	04/24/2017	Background (Upstream)	4044527.02	655114.31	10602
CW-SS-32-170421	04/21/2017	Cove Wash Middle 1E	4043933	655742	17397
CW-SS-36-170420	04/20/2017	Cove Wash Middle 2 (Historical)	4044602.3	658113.53	10755
CW-SS-37-170420	04/20/2017	Cove Wash Middle 2 (Historical)	4044377.81	657955.46	13390
Sample Location	Sample Date	Sample Information	Northing	Easting	Radioactivity (cpm)
CW-SS-01	4/26/2017	Cove Wash	4051637.55	663372.9	9977
CW-SS-02	4/19/2017	Cove Wash	4053607.15	666731.84	6504
CW-SS-03	4/26/2017	Cove Wash North	4047985.63	659997.1	12103
CW-SS-04	4/24/2017	Background	4045556.75	655368.54	9115
CW-SS-05	4/18/2017	Historical Sample - Area 1 - Dam Surface Sample - Cove Wash Middle	4045700.3	658683.86	9420
CW-SS-06	4/26/2017	Cove Wash	4050970.46	659839.73	8989
CW-SS-07	4/26/2017	Historical Sample - W07 - Cove Wash Middle	4047101.94	659123.93	13395
CW-SS-08	4/26/2017	Background	4050235.46	657139.22	9002
CW-SS-09	4/24/2017	Cove Wash North	4049315.64	658120.22	8556
CW-SS-10	4/26/2017	Cottonwood Spring	4049586.88	660202.99	9640
CW-SS-11	4/21/2017	Cove Wash North	4046369.72	657266.46	10514
CW-SS-12	4/19/2017	Cove Wash Middle 3	4044603.44	658812.82	9496
CW-SS-15	4/25/2017	Cove Wash North	4046035	656752	10835
CW-SS-16	4/25/2017	Cove Wash North	4045602	656065	13847
CW-SS-17	4/26/2017	Cove Wash South	4050338.79	662352.18	11151
CW-SS-18	4/18/2017	Background - Cove Wash Middle 1 BKG	4045597.49	658407.85	7118
CW-SS-19	4/22/2017	Cove Mesa 2 (Historical)	4042075.38	657976.19	25160
CW-SS-19-12	4/22/2017	Cove Mesa 2 (Historical)	4042075.38	657976.19	24101
CW-SS-20a	4/22/2017	Cove Wash Middle 3C	4041601.02	658538.8	14053
CW-SS-21	4/21/2017	Background - Mesa IV Springs	4043108	655931	8653
CW-SS-21-12	4/21/2017	Background - Mesa IV Springs	4043108	655931	8653
CW-SS-26	4/20/2017	Historical Sample-W0006-Cove Wash Middle 2B	4042501.62	657146.88	37649
CW-SS-27	4/20/2017	Cove Wash Middle 2B	4042693.12	657319.28	14989
CW-SS-29	4/20/2017	Cove Wash Middle 2C	4042595.54	658108.12	21616
CW-SS-30	4/24/2017	Background	4046867.44	654397.08	10418
CW-SS-31	4/24/2017	Background	4044527.02	655114.31	10602
CW-SS-32	4/21/2017	Cove Wash Middle 1E	4043933	655742	17397
CW-SS-36	4/20/2017	Historical Sample - W005 - Cove Wash Middle 2	4044602.3	658113.53	10755
CW-SS-37	4/20/2017	Historical Sample - W004 - Cove Wash Middle 2	4044377.81	657955.46	13390
CW-SS-38-170420	04/20/2017	Cove Wash Middle (Historical)	4044173	657898	15180
CW-SS-38	4/20/2017	Cove Wash Middle 2	4045453.34	658432.51	9286
CW-SS-39	4/18/2017	Irrigation Ditch	4045665.02	658693.57	8712
CW-SS-42-12	4/19/2017	Pine Water Springs Drainage	4043806.69	661260.53	25644
CW-SS-44	4/19/2017	Background (Deer Springs Drainage)	4042151.21	661078.71	14339
CW-SS-45	4/19/2017	Pine Water Springs	4043788.61	661352.39	15588
CW-SS-46	4/19/2017	Pine Water Springs - Subsurface	4043788.61	661352.39	15588
CW-SS-46-12	4/19/2017	Cove Wash Middle 3F	4043774.18	659297.15	36933
CW-SS-47	4/19/2017	Cove Wash Middle 3F	4044446.56	659271.01	8704
CW-SS-48	4/19/2017	Cove Wash Middle 1	4044856.25	657463.15	13892
CW-SS-50	4/21/2017	Cove Wash Middle 1A	4044944.04	657035.05	21392
CW-SS-51	4/21/2017	Cove Wash Middle 1G	4044553.33	657329.59	11532
CW-SS-52	4/21/2017	Cove Wash Middle 3A	4044567	656816	14022
CW-SS-53a	4/21/2017	Cove Wash Middle 1B	4044752.58	656806.11	14160
CW-SS-54	4/21/2017	Cove Wash Middle 1C	4044480.53	656337.54	29902
CW-SS-55	4/21/2017	Cove Wash Tributary 1 (Downstream)	4051574.58	664210.2	9500
CW-SS-59	4/20/2017	Cove Wash between 01 and 02 (Downstream)	4051659.49	664274.98	7159
CW-SS-60	4/20/2017	Cove Wash Tributary 2 (Downstream)	4051575.94	663979.38	9372
CW-SS-61	4/20/2017	Downstream of Dam	4046378.37	658785.07	11287
CW-SS-62	4/25/2017	Cove Wash North	4045877	656444	12790
CW-SS-64	4/25/2017	Cove Wash Middle 3A	4042362.59	658661.67	10939
CW-SS-65	4/22/2017	Cove Wash Middle 3A	4042362.59	658661.67	11172
CW-SS-66	4/22/2017	Duplicate of CW-04	4045547.65	655393.88	9115
CW-SS-69	4/24/2017	Cove Wash Middle 3F	4044525.92	659043.23	12549
CW-SS-70	4/19/2017	Duplicate of CW-37	4044377.81	657955.46	13390
CW-SS-71	4/20/2017	Duplicate of CW-11	4046373.01	657265.49	10514
CW-SS-72	4/21/2017	Cove Wash Middle 3D	4042208.54	658769.59	8244
CW-SS-73	4/22/2017	Cove Wash Middle 3D	4041604.38	658745.24	13699
CW-SS-74	4/22/2017	Cove Wash Middle 3D	4041201.22	658764.58	10694
CW-SS-75	4/22/2017	Duplicate of CW-19	4042075.98	657975.26	25160
CW-SS-76	4/22/2017	Duplicate of CW-19 - Subsurface	4042075.98	657975.26	24101
CW-SS-76-12	4/22/2017	Confluence of Middle 1, 2, and 3 - Subsurface	4045656.58	658677.14	Pit Saturated - Not
CW-SS-77-12	4/18/2017	Duplicate of CW-03	4047985.63	659997.1	12103
CW-SS-80	4/26/2017	Duplicate of CW-08	4050235.46	657139.22	9002
CW-SS-82	4/24/2017	Cove Wash North	4049882.05	658891.91	8133
CW-SS-83	4/24/2017	Cove Wash Middle 2A	4044047.32	657766.45	21252
CW-SS-84	4/24/2017	Cove Wash Middle 2A	4044045.08	657643.96	9818
CW-SS-85	4/24/2017	Cove Wash Middle 2B	4043793.11	657816.78	44435
CW-SS-86	4/19/2017	Cove Wash Middle 2A	4043732.79	657461.94	9680
CW-SS-87	4/19/2017	Cove Wash Middle 3 - Unnamed Tributary	4044482.43	659284.41	6629
CW-SS-88	4/22/2017	Cove Wash Middle 3 - Unnamed Tributary	4044365.37	659573.36	6950
CW-SS-89	4/22/2017	Cove Wash Middle 3 - Unnamed Tributary	4041663.51	658834.46	8886
CW-SS-90	4/26/2017	Duplicate of CW-66	4042338.66	658652.08	11172
CW-SS-90-170426	04/26/2017	Cove Wash Middle 3A - Rock Fall	4044745.6	657123.45	11847

APPENDIX K:

PHOTOGRAPHIC LOG

WESTON SOLUTIONS	**PHOTOGRAPH LOG**

Site Name: Cove Wash Watershed Assessment	**Project Location:** Navajo Nation, Cove Chapter, Arizona	**TDD No.:** 0025/1302-T25-R9-16-03-0001

Photo No. 1	**Date:** March 23, 2016
Direction Photo Taken: Southwest	
Description: Cove Watershed Mesas from the Cove Chapter House.	

Photo No. 2	**Date:** June 28, 2016
Direction Photo Taken: Southwest	
Description: Mine and waste rock pile on Cove Mesa V.	

PHOTOGRAPH LOG		
Site Name: Cove Wash Watershed Assessment	**Project Location:** Navajo Nation, Cove Chapter, Arizona	**TDD No.:** 0025/1302-T25-R9-16-03-0001

Photo No. 3	**Date:** March 30, 2016
Direction Photo Taken: East	
Description: The dam at the confluence of Cove Wash Middle 1, 2, and 3 drainages just after snowfall in 2016.	

Photo No. 4	**Date:** April 14, 2017
Direction Photo Taken: South	
Description: The dam at the end of the 2017 spring snowmelt sampling event.	

	PHOTOGRAPH LOG	
Site Name: Cove Wash Watershed Assessment	**Project Location:** Navajo Nation, Cove Chapter, Arizona	**TDD No.:** 0025/1302-T25-R9-16-03-0001

Photo No. 5	**Date:** June 18, 2015
Direction Photo Taken: Southeast	
Description: Surface water sample location CW-05, downstream from the dam during the 2015 low flow sampling event.	

Photo No. 6	**Date:** March 30, 2016
Direction Photo Taken: Southeast	
Description: Surface water sample location CW-05, downstream from the dam during the 2016 spring snowmelt sampling event.	

PHOTOGRAPH LOG		
Site Name: Cove Wash Watershed Assessment	**Project Location:** Navajo Nation, Cove Chapter, Arizona	**TDD No.:** 0025/1302-T25-R9-16-03-0001

Photo No. 7 — **Date:** June 27, 2016 **Direction Photo Taken:** North **Description:** Sample location CW-09 during the 2016 low flow sampling event. Since no surface water was present only a sediment sample was collected.	

Photo No. 8 — **Date:** March 30, 2016 **Direction Photo Taken:** East **Description:** Sample location CW-09 during the 2016 spring snowmelt sampling event. Water was present, so both surface water and sediments samples were collected.	

	PHOTOGRAPH LOG	
Site Name: Cove Wash Watershed Assessment	**Project Location:** Navajo Nation, Cove Chapter, Arizona	**TDD No.:** 0025/1302-T25-R9-16-03-0001

Photo No. 9	**Date:** June 18, 2016	
Direction Photo Taken: West		
Description: Seep sample location CW-04 during the 2016 low flow sampling event.		

Photo No. 10	**Date:** April 24, 2017	
Direction Photo Taken: West		
Description: Seep sample location CW-04, during 2017 spring snowmelt sampling event.		

PHOTOGRAPH LOG

Site Name: Cove Wash Watershed Assessment	**Project Location:** Navajo Nation, Cove Chapter, Arizona	**TDD No.:** 0025/1302-T25-R9-16-03-0001

Photo No. 11

Date: June 17, 2015

Direction Photo Taken:

South

Description:

Spring sample location CW-10 collected during the 2015 low flow sampling event.

Photo No. 12

Date: March 28, 2016

Direction Photo Taken:

Northwest

Description:

Groundwater sample location CW-01G during the 2016 spring snowmelt sampling event.

PHOTOGRAPH LOG		
Site Name: Cove Wash Watershed Assessment	**Project Location:** Navajo Nation, Cove Chapter, Arizona	**TDD No.:** 0025/1302-T25-R9-16-03-0001

Photo No. **13**

Date: April 28, 2016

Direction Photo Taken:

East

Description:

Sample location CW-19 near the top of Mesa II. Very steep terrain with no standing surface water. Only sediment samples were collected at this location for all four sampling events.

Photo No. **14**

Date: April 19, 2017

Direction Photo Taken:

Northwest

Description:

Spring sample location CW-46, sample collected from standing water in trough.

PHOTOGRAPH LOG

Site Name:	Project Location:	TDD No.:
Cove Wash Watershed Assessment	Navajo Nation, Cove Chapter, Arizona	0025/1302-T25-R9-16-03-0001

Photo No. 15

Date: March 29,, 2016

Direction Photo Taken:

East

Description:

Surface water seep sample location CW-51 during the 2016 spring snowmelt sampling event.

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Photo No. 16

Date: June 19, 2015

Direction Photo Taken:

West

Description:

Abandoned well in Cove, Arizona. The well was located with the help of a local resident.

PHOTOGRAPH LOG

Site Name:	Project Location:	TDD No.:
Cove Wash Watershed Assessment	Navajo Nation, Cove Chapter, Arizona	0025/1302-T25-R9-16-03-0001

Photo No.	Date:
17	May 3, 2016

Direction Photo Taken:

West

Description:

Measuring water quality parameters at surface water sample location CW-62.

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Photo No.	Date:
18	April 20, 2017

Direction Photo Taken:

North

Description:

Collecting a 1-minute gamma count at surface water sample location CW-36.

PHOTOGRAPH LOG

Site Name: Cove Wash Watershed Assessment	**Project Location:** Navajo Nation, Cove Chapter, Arizona	**TDD No.:** 0025/1302-T25-R9-16-03-0001

Photo No. 19	**Date:** May 2, 2016

Direction Photo Taken:

South

Description:

Hiking to sample locations CW-13 and CW-14 in waders.

Photo No. 20	**Date:** April 26, 2017

Direction Photo Taken:

South

Description:

Sampling team member hiking through deep water in waders to access sample locations CW-13, CW-14 and CW-56a. It was determined to be unsafe to move further upstream during the 2017 spring snowmelt sampling event.

PHOTOGRAPH LOG

Site Name:	Project Location:	TDD No.:
Cove Wash Watershed Assessment	Navajo Nation, Cove Chapter, Arizona	0025/1302-T25-R9-16-03-0001

Photo No.	Date:
21	March 30, 2016

Direction Photo Taken:

West

Description:

Hiking out of the drainages during inclement weather. The 2016 spring snowmelt sampling event had to be split between two mobilizations due the weather.

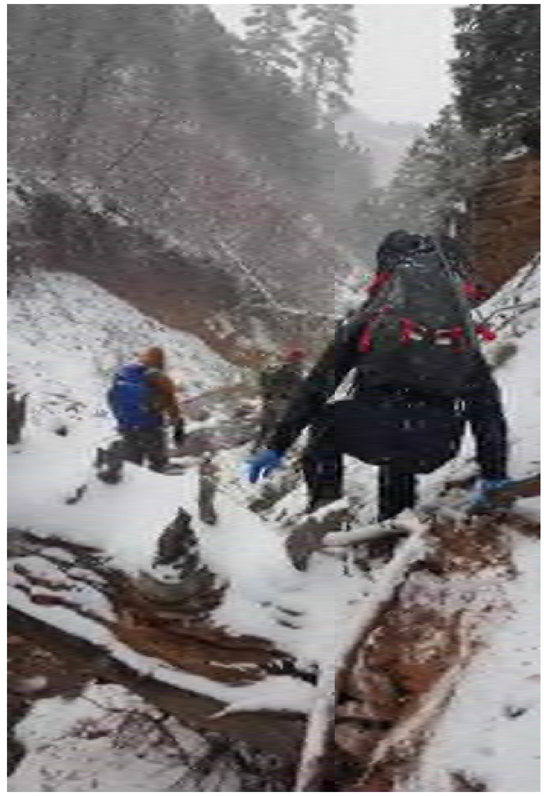

Photo No.	Date:
22	June 18, 2016

Direction Photo Taken:

West Uphill

Description:

A sampling team uses alternate transportation in order to access sample locations via difficult terrain.

PHOTOGRAPH LOG

Site Name:	Project Location:	TDD No.:
Cove Wash Watershed Assessment	Navajo Nation, Cove Chapter, Arizona	0025/1302-T25-R9-16-03-0001

Photo No.	Date:
23	March 24, 2016

Direction Photo Taken:

Down

Description:

Bear paw print observed during reconnaissance.

Photo No.	Date:
24	June 16, 2015

Direction Photo Taken:

Down

Description:

Rattlesnake encountered while hiking during the 2015 low flow sampling event.

PHOTOGRAPH LOG

Site Name:	Project Location:	TDD No.:
Cove Wash Watershed Assessment	Navajo Nation, Cove Chapter, Arizona	0025/1302-T25-R9-16-03-0001

Photo No.	Date:
25	April 20, 2017

Direction Photo Taken:

Southwest

Description:

Mobile office trailer located at the Cove Chapter House, used as a base station during the 2016 and 2017 spring snowmelt sampling events. Space was used to securely store equipment and samples, and to process samples.

Photo No.	Date:
26	April 20, 2017

Direction Photo Taken:

Northwest

Description:

Processing samples at the mobile base station located at Cove Chapter House.