FIFTH FIVE-YEAR REVIEW REPORT FOR
DIAMOND ALKALI SUPERFUND SITE
ESSEX COUNTY, NEW JERSEY

Prepared by

U.S. Environmental Protection Agency
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Contents

LIST OF ABBREVIATIONS & ACRONYMS

AOC	Administrative Orders on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
Bgs	below ground surface
CAG	Community Advisory Group
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLH	Chemical Land Holdings
DDT	p,p'-dichlorodiphenyltrichloroethane
EPA	United States Environmental Protection Agency
FYR	Five-Year Review
GWTS	Groundwater Treatment System
GWWS	Groundwater Withdrawal System
ICs	Institutional Controls
LPRSA	Lower Passaic River Study Area
ug/l	micrograms/liter
NBSA	Newark Bay Study Area
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NJDEP	New Jersey Department of Environmental Protection Agency
NJPDES	DSW New Jersey Pollutant Discharge Elimination System Discharge to Surface Water Permit Equivalent
NPL	National Priorities List
OCC	Occidental Chemical Corporation
O&M	Operation and Maintenance
PCBs	polychlorinated biphenyls
ppb	parts per billion
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation and Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
TBC	To be considered
TCDD	2,3,7,8-tetrachlorodibenzo-*p*-dioxin
TSI	Tierra Solutions, Inc.
VOCs	Volatile Organic Compounds

I. INTRODUCTION

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this FYR review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP)(40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the fifth five-year review for the Diamond Alkali Superfund Site, Operable Unit 1 (OU1), located in the City of Newark, Essex County, New Jersey. The purpose of this five-year review is to review information collected since the last five-year review to determine if the remedy is and will continue to be protective of human health and the environment. The triggering action for this statutory five-year review is the signature of the previous five-year review on June 23, 2016.

The site consists of four operable units. The 80-120 Lister Avenue properties are OU1; the sediment of the lower 8.3 miles of the Lower Passaic River is OU2; the 17-mile Lower Passaic River Study Area (LPRSA) is OU4; and the Newark Bay Study Area (NBSA) is OU3. The interim remedy for OU1 is currently in long term operation and maintenance. EPA issued a Record of Decision (ROD) for OU2 on March 3, 2016 and this OU is currently in the remedial design phase. OU3 and OU4 are still in the Remedial Investigation/Feasibility Study (RI/FS) phase. The ROD for the OU1 interim remedy did not address bedrock groundwater at the OU1 properties, and anticipated that the bedrock groundwater aquifer could be an additional OU at some time in the future. OU1 is the subject of this five-year review. EPA uses OU numbers for managing its investigation and remediation in phases. The second five-year review (June 8, 2011) identified the Lower Passaic River as OU2 and the Newark Bay Study as OU3. Subsequently, EPA renumbered the OUs to identify the NBSA as OU3 and the LPRSA as OU4, aligning the OU terminology with EPA's site management systems.

The Diamond Alkali Superfund Site FYR was led by the Environmental Protection Agency (EPA) Remedial Project Manager (RPM) Eugenia Naranjo. Participants included: Michael Scorca (hydrogeologist), Marian Olsen (Human Health Risk Assessor), Charles Nace (Ecological Risk Assessor), and Shereen Kandil, (Community Involvement Coordinator). Representatives from the New Jersey Department of Environmental Protection (NJDEP) include: Jay Nickerson, Anne Hayton and David VanEck. The relevant entities such as Glen Springs Holdings were notified of the initiation of the FYR. The review began on 1/27/2020.

Site Background

Physical Characteristics

OU1 of the Diamond Alkali site consists of two properties located at 80 and 120 Lister Avenue adjacent to the Passaic River in the Ironbound neighborhood of Newark, New Jersey. Newark is a city of more than 275,000 residents, located in Essex County, and the Ironbound is a neighborhood of approximately 50,000 residents, located in the East Ward of Newark. The Ironbound covers approximately four square miles and is home to a sizeable population of Portuguese-American and Brazilian-American ethnicity. The site

is bounded by industrial properties and the Passaic River. However, the surrounding area is also populated with residences, including Newark Public Housing. The two Diamond Alkali properties total approximately 5.8 acres and have been designated as OU1. The adjacent properties are also industrial and have their own contamination issues, but they are being investigated under cleanup programs overseen by the NJDEP. However, since site-related contamination extends beyond the OU1 property boundaries into the Passaic River, as described below the Diamond Alkali Superfund Site also includes the LPRSA (including the lower 8.3 miles) the NBSA,, and the areal extent of contamination, along with the upland OU1 properties. The LPRSA flows through Essex, Hudson, Passaic and Bergen Counties.

Site Geology/Hydrogeology

The geology of OU1 consists of non-indigenous fill, an organic silt layer comprising native wetland and river bottom sediments, and glaciofluvial deposits. The top of the fill layer was the former site grade before remediation. The thickness of the non-indigenous fill varies, and it is thickest where the organic silt layer is thinnest. The thickness of the native organic silt layer also varies, but it generally decreases from the south to the north. Results of recent investigations indicate that the silt layer is continuous beneath the property, although its upper surface varies by several feet. The organic silt layer is expected to reduce the hydraulic connection between the fill and the underlying sand layer. The glaciofluvial deposits underlying the organic silt layer include sands, silty sands, and silty gravels, with minor interbedded silt and clay, gravel, and sandy gravel.

The dominant groundwater flow direction is to the north towards the Passaic River. The groundwater at OU1 occurs in the fill layer above the organic silt layer and in the sand layer below the organic silt layer

Land and Resource Use

The Diamond Alkali facility was used for manufacturing by numerous industrial companies for over 100 years. From the mid-1940s to 1969, activities at 80 Lister Avenue included chemical and pesticides manufacturing. All manufacturing operations at the site ceased in 1983. The OU1 properties are currently fenced and have an electronic, automated security system. Contaminated soils and debris are contained within the fenced area under an impermeable cap. Current use of the property includes ongoing operations and maintenance activities associated with the interim remedy. There is a deed notice for OU1 to provide notice of conditions at the properties and protecting the interim remedy.

The current land use for the area is industrial, but neighboring areas have a dense residential population. The Ironbound section of Newark is both highly industrialized and densely populated and is burdened with numerous environmental justice concerns. The Passaic River is used for rowing and fishing. Although several properties in the area have been redeveloped since the last five-year review, the immediate area continues to be industrial and will continue to be so according to the 2015 Newark Zoning & Land Use Regulations. Due to the number of former manufacturing facilities in the area, there are area-wide contamination issues. The groundwater aquifer underlying the site is currently not used as a drinking water source. The City of Newark supplies public water throughout the City. There are no drinking water supply wells located in the vicinity of this site.

History of Contamination

The mid-1940s marked the beginning of the manufacturing operations related to the current site conditions, including the production of p,p'-dichlorodiphenyltrichloroethane (DDT) and phenoxy herbicides by Kolker Chemical Works, Inc. Kolker was acquired by the Diamond Alkali Company (subsequently known as the Diamond Shamrock Corporation and Diamond Shamrock Chemicals Company) in 1951, and from 1951 to 1969 Diamond Alkali owned and operated a pesticide manufacturing

plant at 80 Lister Avenue. Subsequent owners used the property until 1983. In 1983, as a result of EPA's National Dioxin Strategy targeting facilities that produced 2,4,5-trichlorophenol and/or its pesticide derivatives, EPA and NJDEP sampling at the site revealed high levels of dioxin. Dioxin, especially the dioxin congener known as 2,3,7,8-tetrachlorodibenzo-p-dioxin or TCDD, is an extremely toxic chemical and an unwanted byproduct of the manufacture of certain chemicals which were produced at the site. Operations at the site and an explosion in 1960 caused contamination of soils, sediments and groundwater. Dioxin, pesticides and other hazardous substances have been found in the soil at 80 Lister Avenue and, to a lesser extent, at 120 Lister Avenue. Other properties in the area also had dioxin-contaminated soils and debris. Dioxin, pesticides, volatile organic compounds (VOCs) and other hazardous substances have been found in groundwater at the site. The sediments of the Lower Passaic River and Newark Bay are contaminated with dioxins, polychlorinated biphenyls (PCBs), mercury, DDT, pesticides, metals and other hazardous substances from OU1 and from industrial activities of numerous companies in the area since the 1800s.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Diamond Alkali Company		
EPA ID: NJD980528996		
Region: 2	**State:** NJ	**City/County:** City of Newark/Essex County
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	**Has the site achieved construction completion?** No	
REVIEW STATUS		
Lead agency: EPA ***[If "Other Federal Agency", enter Agency name]*:**		
Author name (Federal or State Project Manager): Eugenia Naranjo		
Author affiliation: EPA		
Review period: 6/22/2016 - 6/1/2020		
Date of site inspection: 1/15/2020		
Type of review: Statutory		
Review number: 5		
Triggering action date: 6/22/2016		
Due date *(five years after triggering action date)*: 6/1/2021		

II. RESPONSE ACTION SUMMARY

Initial Response

The discovery of dioxin in 1983 led to the 80 Lister Avenue property being secured by a fence and by 24-hour security guard service. Exposed soils on the property were covered with geofabric to prevent potential migration of contamination. At other properties, dioxin-contaminated soils and debris were removed by excavation, vacuuming, and other means, and were transferred to 120 Lister Avenue for storage. This work was initiated by the EPA and NJDEP in 1983. EPA proposed the site for the National Priorities List (NPL) in September 1983, and it was finalized on the NPL on September 21, 1984. Also in 1984, NJDEP and Diamond Shamrock Chemicals Company entered into two Administrative Orders on Consent (AOC), the first for the investigations and immediate response work at 80 Lister Avenue and the second for investigations and response work at 120 Lister Avenue. On August 1, 1987, EPA published a notice of completion of the RI/FS and of the Proposed Plan identifying EPA's preferred interim remedy. This publication started the period for public comment.

Basis for Taking Action

The results of the Remedial Investigation for OU1 completed in 1987 indicated that the site was contaminated by a large number of hazardous substances including dioxin, semi-volatile compounds, VOCs, herbicides, pesticides, and metals. The contamination was widespread and affected most media, including soils, groundwater, air, surface water and building structures. The chemicals that were determined to present the greatest risks due to their toxicities and concentrations were TCDD and DDT. The greatest potential human health risk was to the worker from exposure to TCDD through direct contact with surface soils. Other routes of exposure to the hazardous substances included migration of hazardous substances to the Passaic River, migration of hazardous substances to deeper aquifers, and migration of airborne hazardous substances. A quantitative evaluation of direct on-site risks was not performed since these risks were controlled by the initial response actions taken. The total risks from exposure to groundwater were quantified for TCDD and DDT and the total combined risks exceeded the risk range of 10^{-4} to 10^{-6} (one in ten thousand to one in one million) identified in the NCP.

Response Actions

Remedy Selection

The Feasibility Study identified the following remedial action objectives for OU1:

- Eliminate, to the maximum extent practicable, potential exposures to on-site surface soils at the site.
- Reduce mass transport of chemicals in the groundwater to potential concentration levels less than 5×10^{-5} micrograms/liter (ug/l) for dioxin and 0.23 ug/l for DDT at the nearest off-site well at some time in the future. These values were identified at the time of the ROD as recommended exposure levels for ingestion of water.
- Remove the source of potential particulate dioxin emissions associated with existing buildings by containing or eliminating potential emissions of particulates by containing or demolishing buildings and structures.
- Reduce potential mass transport of chemicals from OU1 of the site to the Passaic River.
- Implement remediation without significant risk to site workers and off-site populations.

An interim remedy for OU1 was selected and documented in a September 30, 1987 ROD. The components of the ROD consisted of the following:

- Construct a slurry trench cutoff wall encircling the properties tying into the silt layer underlying the properties.
- Construct a flood wall to protect the properties from the 100-year flood.
- Disassemble and decontaminate all non-porous permanent structures and materials to the maximum extent practicable for off-site reuse, recycling or disposal.
- Transport off-site for treatment or disposal drums containing hazardous substances but containing less than 1 part per billion (ppb) of dioxin.
- Demolish all remaining structures on-site and secure all materials contaminated above 1 ppb of TCDD on-site. Secured materials shall be segregated to the maximum extent practicable to afford access to and facilitate removal of the more highly contaminated materials, should such removal be selected as a remedy at a later date.
- Stabilize and immobilize the contents of the remaining drums of dioxin-contaminated materials.
- Locate and plug inactive underground conduits and reroute active systems.
- Haul, empty, spread and compact the contaminated materials presently stored at 120 Lister Avenue, and decontaminate the shipping containers for off-site reuse, recycling or disposal.
- Install, operate, and maintain a groundwater withdrawal system designed to maintain a hydraulic gradient preventing the migration of groundwater within the slurry wall.
- Install, operate, and maintain a treatment system for groundwater and other aqueous liquids.
- Construct a surficial cap consisting of suitable materials designed to meet the requirements of the Resource Conservation and Recovery Act (RCRA).
- Implement suitable monitoring, contingency, operation and maintenance, and site security plans to ensure the protection of human health and the environment during and after the installation of the selected alternative.
- Place and cap on-site all sludge generated from the wastewater treatment processes until such time that an alternative method of sludge management is approved.
- Perform a Feasibility Study every 24 months following the installation of the selected interim remedy to develop, screen and assess remedial alternatives and to assess the performance of the selected remedy.

The remedy is considered an interim action because of the limited options at the time of the ROD for final disposition of dioxin-contaminated wastes that are listed as hazardous substances under RCRA, and strong opposition within the community to either treating the dioxin-listed wastes on-site or permanently disposing of them at 80-120 Lister Avenue. As discussed below, the remedy review cycle ("perform a Feasibility Study every 24 months") is meant to identify whether new disposal or treatment options are available that would allow EPA to evaluate a final remedy that includes removing the contained wastes from the site. Currently, the remedy review cycle is underway, with a revised Remedy Evaluation Report (RER), a Feasibility Study-like document, anticipated in January 2021. This RER will assess the current interim remedy (containment), as well as other alternatives based on technologies that can treat the material in the containment cell.

Status of Implementation

Remedy Implementation

A Consent Decree (CD) was filed on December 4, 1989 between Occidental Chemical Corporation (OCC), Chemical Land Holdings (CLH), NJDEP, and EPA requiring OCC to undertake cleanup activities

at the site. At that time, CLH held title to the OU1 properties and also performed remedial activities on behalf of OCC. The U.S. District Court approved the CD on November 19, 1990. OCC is a successor to the Diamond Shamrock Chemical Company. Therefore, OCC is a PRP for the site.

During development of the remedial design plans, OCC initiated activities at the site in 1995 by performing certain initial components of the remedy. These actions included removal of the steel pile from 120 Lister Avenue (structural material from the warehouse demolition, steel tanks and miscellaneous steel). This steel pile was sampled and material that met the EPA criteria for off-site disposal was disposed at an off-site facility. Any material that was not deemed acceptable by the receiving facility was placed on-site at the 80 Lister Avenue property for final disposal during future construction activities. In addition, of the 635 drums at the site, the contents of 261 drums were not listed dioxin wastes. The contents were processed through the temporary treatment plant and disposed off-site. The empty drums were returned to the warehouse, cut in half and staged. Disposal of these drums was addressed during future construction activities. The remaining 374 drums were considered listed dioxin waste. These drums were grouped into water-soluble liquids, non-aqueous liquids and solids/sludges and stored at the warehouse for disposal during future construction activities.

As required under the CD with EPA and the NJDEP, OCC submitted remedial design plans for construction of the interim remedy of OU1. Prior to approving the design plans, EPA, at the request of the Community Advisory Group (CAG), explored the potential for implementing an alternative to the interim remedy selected in 1987. EPA considered innovative technologies as well as on-site and off-site thermal treatment options. EPA met with the CAG extensively during the summer of 1998. Due to the nature of the material to be remediated (listed dioxin waste), new innovative technologies were deemed inappropriate and no off-site option was available. One alternative, on-site incineration, was deemed technically appropriate; however, the community preferred the on-site containment remedy to incineration.

On September 23, 1999, EPA and NJDEP approved the Final Modified (100%) Remedial Design Report, and CLH began construction in the spring of 2000. The flood wall and slurry trench cutoff wall were constructed. The warehouse and other structures at the site were demolished. The contents of the drums and shipping containers were stabilized and immobilized and then disposed in the contaminated area of the site. The empty drums and shipping containers were either recycled or crushed and disposed in the contaminated area of the site. The surficial cap, the stormwater management system, the groundwater withdrawal system and the groundwater treatment plant were constructed in accordance with the approved remedial design plans. Additionally, the CD required the use of institutional controls (ICs) to restrict the use of the property to industrial and/or commercial uses that will not alter or impact the remedy in place. The required deed notice was completed and filed on June 27, 2007.

On August 23, 2001, representatives from the New Jersey Division of Criminal Justice visited the site to inform Tierra Solutions, Inc. (TSI) (formerly CLH) of a high pH problem with water being discharged from the site's stormwater drainage channels to the Passaic River. TSI promptly took corrective measures to stop the discharge and, based upon an investigation, determined that contact of drainage water with the sand layer portion of the cap was causing the increase in pH. To resolve the situation, TSI submitted a proposed design modification to the surficial cap, which would restrict stormwater from percolating through the sand layer thereby reducing the volume of site drainage with elevated pH levels. EPA and NJDEP approved the proposal and implementation of the design modification was completed on September 13, 2002. Additionally, TSI implemented two phases of additional stormwater management controls to further segregate stormwater draining from the sand layer under the cap to prevent its flow into the drainage channels.

In November 2001, elevated zinc concentrations were found in treated effluent water from the groundwater treatment system. Again, TSI took corrective measures to reduce the zinc concentrations. It was determined that ferrous sulfate powder, a chemical used to adjust the pH of the treated groundwater, contained elevated concentrations of zinc. Therefore, TSI replaced the powder with a ferrous sulfate solution with low zinc concentrations which corrected the zinc exceedance problem.

In February 2002, the 24-hour security guard was replaced with an electronic, automated security system. In November 2003, TSI submitted the Supplemental Hydraulic Performance Evaluation Progress Report documenting the attainment of hydraulic gradients preventing the migration of groundwater from the materials contained within the slurry trench cutoff wall and the flood wall and the establishment of inward hydraulic gradients, in accordance with the CD. EPA agreed with the conclusions reached in this report at a May 12, 2004 meeting with TSI, thereby triggering TSI's notification to EPA of the completion of all construction activities at the site required by the CD. TSI submitted this notification on June 2, 2004.

Systems Operations/Operation & Maintenance

On April 27, 2017, EPA received a letter identifying a change in ownership of the OU1 properties from TSI to a corporation affiliated with OCC, Mariana Properties, Inc. Responsibility for managing OU1 transferred to Glenn Springs Holdings, Inc. (GSH), another OCC affiliate.

GSH, on behalf of OCC, is conducting long-term monitoring and maintenance activities according to the Operations and Maintenance Plan approved by EPA on September 23, 1999, and the interim update Operations and Maintenance Quality Assurance Project Plan approved by EPA on April 30, 2013. The required inspection and monitoring activities include performance of the following activities on a monthly basis unless noted otherwise:

- Inspection of the surface of the surficial cap.
- Inspection of the perimeter and interior drains.
- Inspection of the floodwall, curb wall and fencing along curb wall.
- Inspection of the paved and gravel roadways.
- Inspection of the entrance gate and perimeter fencing.
- Inspection of the piezometers, gas vents and extraction wells.
- Inspection of the interior rooms inside the groundwater treatment building.
- Inspection of the automated security system.
- Methane gas monitoring of the 14 gas vents.
- Groundwater depth measurements.

These efforts are documented in monthly progress reports submitted to EPA and NJDEP.

Since operations of the groundwater treatment system began, all treated effluent and process water was batched into storage tanks on site and sampled prior to discharge to the Passaic River as required. Upon receipt of validated data achieving the limitations of the New Jersey Pollutant Discharge Elimination System Discharge to Surface Water Permit Equivalent (NJPDES DSW) dated May 2, 2000, the treated groundwater was discharged. Starting April 1, 2014, the treated groundwater was directly discharged to the Passaic River. At the beginning of each month, the effluent is sampled and analyzed and the results are validated to confirm that the constituent concentrations are within the limitations of the NJPDES DSW Permit Equivalent. Also, in accordance with the NJPDES DSW Permit Equivalent a Discharge Monitoring Report is submitted monthly to both NJDEP and EPA.

To further evaluate the effectiveness of the groundwater withdrawal system, groundwater levels are measured and recorded monthly using the site piezometers. Due to variability in observed monthly water level elevations, annual average water level elevations are calculated to observe long-term trends that are not subject to short-term changes. An annual update report is provided detailing the groundwater level measurements, extraction rates, and extraction volumes associated with the groundwater withdrawal system.

As a result of the ongoing monitoring of system operations, several updates have been made to the system over time. In an effort to further control the pH problems encountered with the water drained from the sand layer under the cap, TSI implemented a pilot study including the use of a carbon dioxide pH adjustment system in the collection tank from October 2004 through January 2005. The results of the pilot were evaluated and it was determined to be effective; therefore, the final carbon dioxide pH adjustment system was installed and began full-time operations in January 2007. Because site conditions may change over time, monitoring of the system continues, to evaluate its effectiveness.

As part of a non-time critical removal action (Phase I Removal Action) performed by OCC in the Passaic River adjacent to OU1, a limited survey of the OU1 properties was conducted in August 2009. This survey found that the elevations of certain benchmarks, extraction wells, and piezometers had changed since the original 2001 survey, and it is expected that this condition occurred primarily due to natural settlement of the surficial cap. Four of the existing vibrating wire piezometers (IP-1 through IP-4) were determined to no longer be useable to monitor monthly groundwater levels because the measuring point elevations of these piezometers are inaccessible and cannot be resurveyed. The remaining piezometers continue to perform adequately, providing accurate and reliable data.

In June 2011, repairs were made to the groundwater treatment system (GWTS) of the sand layer drainage collection system. The groundwater withdrawal system (GWWS) was shut down in October 2011 and resumed normal operations in November 2011 during the installation of the tiebacks along the floodwall for the Phase 1 Removal Action. After the Phase 1 Removal Action, a video inspection was performed of three piezometers along the floodwall concluding that the inner casings were intact but that the steel outer casings needed to be straightened. In October 2012, the three casings were straightened and re-sealed to the cap with bentonite. A second video inspection was performed concluding that both the inner and outer casings were then in good condition. In April 2013, OCC performed redevelopment activities and replaced the extraction well pumps at eight of the GWWS extraction wells.

Beginning in June 2013, procedures were established, as outlined in the Waste Characterization Quality Assurance Project Plan, according to which residuals generated at OU1 are characterized and disposed of at off-site treatment and/or disposal facilities, as needed. Prior to disposal, the residual materials are placed in U.S. Department of Transportation-approved 55-gallon drums and stored in the groundwater treatment system warehouse storage.

Potential impacts from climate change have been assessed, and the performance of the remedy is currently not at risk due to the expected effects of climate change in the region and near the OU1 properties. The floodwall, constructed to an elevation of 15 feet above mean sea level, was designed to protect the site from a 100-year flood. Two examples of extreme storm events in recent history are Hurricane Irene in August of 2011 and Superstorm Sandy in October of 2012. The Passaic River did not breach the floodwall during either storm, preventing both flooding of and damage to the Site. During Superstorm Sandy, river

water entered the site from the northeastern property boundary, but did not cause damage to the cap or other site features.

III. PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the last FYR as well as the recommendations from the last FYR and the current status of those recommendations.

Table 1: Protectiveness Determinations/Statements from the 2016 FYR

OU #	Protectiveness Determination	Protectiveness Statement
1	Short-term Protective	The interim remedy at OU1 currently protects human health and the environment in the short term because all exposure pathways are addressed by engineering and access controls. However, in order for the remedy to be protective in the long-term, a plan to implement recommendations resulting from the review of the 2021 remedy evaluation report needs to be developed.

Table 2: Status of Recommendations from the 2016 FYR

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description*	Completion Date (if applicable)
1	Pursuant to the Consent Decree, an evaluation of the interim remedy was completed on 11/24/15 but next steps have not yet been identified.	Complete the review of the remedy evaluation report with the Partner Agencies (New Jersey Department of Environmental Protection, National Oceanic and Atmospheric Administration, U.S. Fish and Wildlife Service), and develop a plan to implement recommendations.	Ongoing	A draft Remedy Evaluation Report (RER) was submitted in 11/15. In conducting the 2016 FYR, several issues were identified, and information collected to addresses these issues was submitted in the Site Evaluation Report Addendum. As a result, the RER was put on hold while the Site Evaluation Report was being conducted. It was EPA's determination that the data being collected as part of the Site Evaluation Report would be important to add to the RER (so that the interim remedy could be reviewed with the most recent data). The revised RER, that includes comments on the 2015 report and this new data, is anticipated in 01/21.	Click here to enter a date

In addition, the following suggestions were included in the 2016 FYR that could improve the effectiveness of remedy while the review of the RER was ongoing:

Continue to investigate the malfunctions of EW-5, so that it can be repaired and put back into service and continue steps to optimize the flows and treatment of the extraction system.

Extraction Well EW-9 is functional but has been out of service since January 2014, since it restricts flow from the riverside extraction wells. Therefore, it will remain off-line to facilitate flow from the riverside extraction wells. Extraction Well EW-5 malfunctioned in October 2014 and was taken out of service to investigate the source. The cause of the malfunction was determined to be linked with the pump/controller. The unit was repaired and EW-5 returned to full pumping in April 2016. In April 2015, the Support Gravel and Lower Garnet layers of filter media were replaced with ¼" Flint media and the Upper Garnet and Anthracite layers were replaced with "Next^{TM} Sand" to improve removal of solids not captured in the Clarifier. The inclined plate clarifier component of the GWTS was replaced with a new one of higher capacity in June 2015.

Consider enhancing the monitoring well system to further assess the hydraulic containment system.

Decommissioning of monitoring wells gradient control pair GCP-1-1- and GCP-2-1

After further evaluation of soil boring data obtained from new wells installed in 2018, it was determined that monitoring wells GCP-1-1 and GCP-2-1 were screened incorrectly within and through the organic silt layer thereby preventing them from monitoring water levels within only the fill water bearing unit as intended. These two wells were decommissioned in September 2019 in accordance with New Jersey Administrative Code (N.J.A.C.) 7:9D by a New Jersey licensed well driller. Decommissioning involved overdrilling to remove each well's casing, screen, and gravel pack followed by grouting of the open boreholes to the ground surface.

As part of monthly hydraulic monitoring, groundwater elevations are measured in all of the monitoring wells. In place of GCP-1-1 and GCP-2-1, water levels are now measured monthly in nearby DNAPL gauging wells (DGW)-1, DGW-2, and DGW-6, which were installed in the fill in 2018. Additionally, DGW-2 and DGW-6 are sampled annually as part of the groundwater quality monitoring program as replacements for GCP-1-1 and GCP-2-1, respectively.

Soil boring installation in the northeast corner of the OU1 properties

A soil boring, GCP-3-3, was advanced near GCP-3-1 and GCP-3-2 to identify the elevation of the top of the organic silt layer on that area. Upon identifying the depth of the organic silt layer at approximately 18 feet below ground surface (bgs), the borehole was converted to a monitoring well (GCP-3-3) with the base of the screen positioned at the top of the organic silt layer.

Installation of DNAPL gauging wells below the organic silt layer

Two DNAPL gauging wells (DGW-7 and DGW-8) were installed in the deeper glaciofluvial sand below the organic silt layer in the northwestern and north-central areas of the OU1 properties to further characterize the vertical nature and extent of potential DNAPL below the organic silt layer. The wells were installed with the bottoms of the screened intervals coincident with the top of a glacial till deposit that mantles the underlying bedrock.

Stratigraphic mapping

The interpretation of the underlying stratigraphy was refined using the observations obtained during installation of the borings and wells, with particular focus on the depth and thickness of the organic silt layer, to increase understanding of the subsurface.

Update of the water budget

The water budget was updated to incorporate the refined stratigraphy and water level data collected since August 2019 to improve hydraulic modeling.

In May 2018, GSH submitted a report which included groundwater analytical chemistry results collected during the 2017 sampling event, and groundwater quality trends analysis from 2008 through 2017. In April 2019, GSH submitted a report summarizing analytical and hydraulic groundwater data collected from the Site in 2018. In December 2019, EPA approved OCC's Groundwater Quality Monitoring QAPP and proposed analytical methods. In March 2020, EPA approved OCC's QAPP modification to implement newly and approved analytical methods. Groundwater trends analysis are required every four years, and therefore the next update to the groundwater trend analysis will be performed following the 2021 groundwater sampling event. At the conclusion of the study, OCC collected all of this information in the Site Evaluation Report Addendum, which was finalized in November 2020.

Continue the chemical groundwater monitoring program.

A chemical groundwater monitoring program has been initiated since the completion of the previous five-year review. Three annual groundwater sampling events have been performed to date measuring water level elevations and analyzing for VOCs, metals, and 2,3,7,8-TCDD. Groundwater chemical monitoring data is collected and submitted annually from all monitoring well locations. Since the last Five-Year Review in 2016, the following groundwater chemical monitoring data has been submitted to EPA:

- Groundwater Sampling Event Report No. 6 was submitted in March 2016 which provided groundwater chemistry data collected in 2015.
- Groundwater Sampling Event Report No. 7 was submitted in March 2017 which provided groundwater chemistry data collected in 2016.

OU1 has ongoing operations, maintenance, and monitoring activities as part of the selected remedy. As anticipated by the decision document, these activities are subject to routine modification and adjustment. Since the remedy is an interim remedy, the Consent Decree requires a remedy review, documented in the Remedy Evaluation Report. This report, which is similar to a Feasibility Study in that it will assess the current remedy as well as other remedial technologies in order to meet the goals of the OU1 remedy, was initiated in 2015 but was delayed so that the information from the Site Evaluation Report Addendum could be included.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On October 2, 2019, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at 40 Superfund sites in New York and New Jersey, including the Diamond

Alkali site. The announcement can be found at the following web address: https://www.epa.gov/superfund/R2-fiveyearreviews#nj19 https://www.epa.gov/superfund/R2-fiveyearreviews. . The results of the review and the report will be made available at the Site information repository located at http://ourpassaic.org.

Data Review

Document Review

The documents, data and information which were reviewed in completing this five-year review are summarized in Table 2.

Data Review

The ROD states that the groundwater withdrawal and treatment system was designed to maintain a hydraulic gradient preventing the migration of groundwater from the volume contained within the slurry wall. Extraction (with treatment) of the groundwater was intended to lower groundwater levels within the wall and establish inward hydraulic gradients. Since the slurry wall was tied into the confining organic silt layer, separating the non-indigenous fill from the underlying sand layer, groundwater gradients have been measured both horizontally across the slurry wall and vertically through the silt layer.

The combined annual withdrawal of the individual extraction wells since 2002 (when full-time pumping began) has ranged from 671,696 to 1,375,455 gallons per year, which is an overall average flow rate of about 1.278 to 2.617 gallons per minute. The annual maximum total withdrawal of 1,375,455 gallons per year (2.617 gallons per minute) occurred in 2019.

Groundwater levels have been measured monthly in 21 monitoring wells and several new wells were added in 2019. Continuous water-level recorders have been installed in 13 selected wells. Review of water-level measurements indicates that the groundwater levels in the fill unit have declined several feet since pumping was started in 2001.

Horizontal hydraulic gradients across the slurry trench cutoff wall in the shallow fill unit wells have been monitored at six paired well clusters along the perimeter of the site. On an annual average basis, horizontal gradients have been directed inward across the slurry wall and floodwall, except in the northeast corner and a small portion of the northwest corner of the Site. While gradients in these limited areas suggest an outward gradient, the overall gradient across the containment cell is inward.

The slurry wall is considered effective in minimizing potential migration of groundwater because it continues to separate the hydraulic systems inside and outside the wall. This is demonstrated by differences in tidal responses -- groundwater in wells outside the slurry wall exhibit a much greater response to the tidal fluctuations in the Passaic River than wells inside the slurry wall, which exhibit much steadier water levels. During high tide conditions, horizontal head differences in groundwater outside the cell reach their maximum values and are directed inward along the entire Site perimeter (i.e., slurry wall and floodwall). During low tide conditions, horizontal head differences in groundwater outside the cell achieve their minimum values and are directed outward along much of the Site perimeter, but remain inward along approximately 400 feet of perimeter in the southeastern quadrant of the Site.

Since the confining silt layer is expected to reduce the hydraulic connection between the fill unit and the underlying glacial sand layer, vertical hydraulic gradients in the fill unit and sand layer wells have been monitored at five paired well clusters along the northern and southern boundaries of the site. On an annual

average basis during 2019, vertical head differences between the fill and underlying glaciofluvial sand were upward into the fill in the northwest and north-central portions of the Site but were downward into the glaciofluvial sand elsewhere beneath the Site. The vertical hydraulic gradients along the northern boundary (Passaic River) of the site, where the organic silt layer is thin, change direction with the tidal fluctuations, and the sand layer exhibits a greater response than the minor fluctuations in the fill unit.

During high tide conditions in the glaciofluvial sand, vertical head differences are largest and are directed upward into the fill in the northern portion of the Site and much of the Site interior. However, vertical head differences remain downward into the sand in southwestern and southeastern portions of the Site even under high tide conditions. The organic silt layer is thickest in the southern portion of the Site. During low tide conditions in the glaciofluvial sand, vertical head differences achieve their minimum values and are downward into the sand throughout the Site except for a very small area near the north-central part of site.

As part of the Site Evaluation Report, a water budget was developed for the containment cell. The hydraulic analysis included water level data, extraction system pumping rates, and the updated mapping of the organic silt layer elevation and thickness. The groundwater-level and Passaic River-stage data were used to calculate the average head differences in 2019 across the Site containment structures (i.e., the slurry wall, floodwall, organic silt layer, and the cap) at several points within the water budget domain.

The results of the water budget evaluation suggest that more water is being extracted from the fill layer by the pumping system (2.62 gpm in 2019) than is indicated by the hydraulic head of the fill, suggesting that additional water is being drawn from the glaciofluvial sand layer through wells screened across both zones.

Several modeling scenarios were evaluated to resolve the observed flow imbalance, including changing hydraulic conductivities of the slurry wall, organic silt layer, surficial cap, and reversing hydraulic gradients in some areas of the Site. No single scenario was able to account for the entire imbalance, indicating that there are multiple possible explanations that are contributing to the imbalance in the water budget model. The most likely primary explanation is that some extraction well screens extend into the glacial sand layer, which allows additional water to be pumped. Other reasons contributing to the imbalance include some unaccounted inflow into the containment area through the slurry wall, the organic silt layer, the surficial cap, or a combination of these. In summary, the additional water that is being extracted, as identified by the water budget analysis, has been accounted for.

Groundwater quality samples at individual monitoring wells were collected in 2015, 2016, 2017, 2018, and 2020. The VOC most frequently observed during the sampling rounds was chlorobenzene and other commonly detected VOCs included benzene, toluene, 1,2-dichlorobenzene, 1,3- dichlorobenzene, 1,4-dichlorobenzene, and 1,2,4-trichlorobenzene. Dioxin was also observed in groundwater at several wells.

The groundwater data from the sampling rounds following the previous five-year review collected between 2015 and 2020 were evaluated separately for wells inside the slurry wall and wells outside the slurry wall, as well as separately for the fill unit and the sand unit. Recent drilling investigations have better defined the stratigraphic layers beneath the site and the screened intervals of a few wells have been reclassified. Several fill unit wells were shown to have a part of their screen zone extend into the silt layer or into the sand layer.

Fill Unit inside the slurry wall
VOCs were observed in groundwater within the fill unit inside the slurry wall at wells GCP-1-1, GCP-2-1, GCP-5-1, GCP-6-1, and GCP-9-1, however, VOCs have never been detected at wells GCP-4-1, or GCP-8-1. VOCs were also observed at new wells GCP-3-3, DGW-2 and DGW-6. Chlorobenzene concentrations in most wells have shown some variability with no clear trend during the last five years. Well GCP-1-1 (23 feet deep), which is now considered to have its screen extend partially into the organic silt layer, had the maximum levels of chlorobenzene observed in the fill, ranging from 28,000 to 12,000 ug/L.

Dioxin has been detected within the fill unit inside the slurry wall at wells GCP-1-1, GCP-3-3, GCP-9-1, DGW-2, and DGW-6. Dioxin has never been detected at GCP-5-1, GCP-6-1, GCP-7-1 and only once at GCP-4-1 and GCP-8-1. Groundwater at newly installed well DGW-6 had the maximum dioxin concentration (29,200 picograms per liter).

Fill Unit outside the slurry wall
VOC were observed in four fill unit wells just outside the slurry wall (GCP-5-2, GCP-6-3, GCP-8-2, and GCP-9-2) and were not detected in GCP-4-2 and GCP-7-2. Chlorobenzene concentrations generally were lower outside the slurry wall at wells GCP-5-2 and GCP-9-2 than at their adjacent wells inside the wall GCP-5-1 and GCP-9-1. However, chlorobenzene concentrations at wells GCP-6-3 and GCP-8-2 (outside the slurry wall) were higher than at their adjacent wells inside the wall GCP-6-1 and GCP-8-1. Well GCP-6-3 also had high concentrations of several other VOCs (especially 1,4-Dichlorobenzene).

Dioxin was observed in well GCP-9-2 in the fill unit outside the wall and it shows a generally declining trend in concentration. Dioxin was not detected in groundwater at several other wells just outside the slurry wall (GCP-4-2, GCP-5-2, GCP-7-2, and GCP-8-2) and only once at well GCP-6-3.

Below the Fill - Silt layer and Sand Layer
VOCs were observed in several glacial sand unit wells. Newly installed well DGW-7 (97 feet deep) in the lower part of the sand unit had the maximum chlorobenzene concentration (74,500 ug/L). Several sand unit wells (especially GCP-1-2, GCP-3-2, GCP-8-3) had higher concentrations of chlorobenzene (and other VOCs) than the adjacent shallower wells screened in the fill unit or shallow part of the sand unit at the same cluster. The opposite condition was observed at sand unit well GCP-6-2 where VOC concentrations were lower than at the nearby fill unit wells GCP-6-1 and GCP-6-3.

Well GCP-2-1 (26.7 feet deep), which is now considered to have its screen extend partially into the upper part of the sand unit, had shown an increase in concentrations of VOCs during the previous five-year review period, but has shown declining VOC trends (especially toluene and benzene) during the last five years. Well GCP-3-1, which also is now considered to have its screen extend partially into the sand unit, continues to show a declining trend in chlorobenzene concentrations.

Dioxin has been observed consistently at well GCP-1-2, which is in the sand unit along the northern floodwall, at higher levels than its paired fill unit well GCP-1-1. Dioxin concentrations at GCP-2-1 (26.7 feet deep) during the last five years have ranged between 124 and 197 pg/L. The new well at that cluster (GCP-2-2, 45 feet deep) had dioxin concentrations of 4,790 and 3,600 pg/L in 2018 and 2020, respectively. Dioxin concentrations at well GCP-3-1 have demonstrated a noticeable declining trend over time, from as high as 2,330 pg/L in 2008 to 172 in 2018. Dioxin was detected only once at wells GCP-3-2, GCP-6-2, DGW-7, and twice at GCP-8-3.

Summary

Based on the data and observed trends, operations of the groundwater withdrawal system have resulted in a decrease in groundwater levels within the slurry wall since remedy construction was completed, generally inward horizontal gradients across the slurry wall, and a separation of hydraulic systems inside and outside of the slurry wall.

An additional review of the above data and trends is currently occurring through the remedy evaluation process. Since there were very few remedial options available at the time of the remedy selection, the ROD and the CD called for a periodic evaluation of the remedy. The primary purpose of this evaluation is to develop, screen and assess remedial alternatives and to assess the performance of the selected remedy.

The Remedy Evaluation Report will serve as a type of feasibility study, in which the interim remedy will be compared to other alternatives developed using technologies that are found to be appropriate to address the specific material at the site in order to meet the Remedial Action Objectives in the OU1 ROD. Should the interim remedy ultimately be selected, it will be evaluated to identify any improvements that would increase the performance of the remedy. The RER is expected to incorporate information gathered over the last five years that will assist in identifying any issues associated with the existing remedy.

Site Inspection

The inspection of OU1 was conducted on 1/15/2020. In attendance was Eugenia Naranjo from USEPA Region 2 and Brian Mickuki from Glenn Springs Holdings. The purpose of the inspection was to assess the protectiveness of the remedy. During the site inspection, the cap was observed to be well-maintained, with no obvious areas requiring repair. Additional observations include that the security fence was intact with no breaches, and the monitoring wells were in good shape and locked.

V. TECHNICAL ASSESSMENT

QUESTION A: Is the remedy functioning as intended by the decision documents?

The review of documents listed in Table 2, the inspection of the site, and the review of the existing data indicate that the remedy is functioning as intended by the 1987 ROD. The interim remedy is designed to provide protection of human health and the environment through the on-site containment of wastes. The remedy is functioning as intended and has eliminated, to the extent practicable, potential ecological exposure to on-site soils and dioxin releases from buildings and structures. The site is also being kept secure and the potential for transport of chemicals in the groundwater out of the containment area to adjacent properties and the Passaic River has been reduced via engineering controls including the surficial cap, the slurry trench cutoff wall and the flood wall around the properties, and the groundwater withdrawal and treatment system

Operation and maintenance activities, with routine evaluation and modification as needed, have been effective in addressing concerns raised in the last FYR. Monthly inspections ensure that any issues are timely noted and equipment updated as necessary. The cap and the surrounding area are undisturbed and the fence and security around the site have been repaired and are intact. These combined activities interrupt potential exposures. Additionally, institutional controls prohibiting any future disturbance of the remedy are in place and effective.

The groundwater data from the monitoring of the levels and the chemical contaminants demonstrate that there are separate hydraulic systems inside and outside the slurry wall, as shown by the tidal responses, and that the horizontal gradients across the wall are generally inward. While data do indicate that the inward gradient has not been fully established in the northeast and northwest corners of the slurry wall, the overall trend is inward. On an annual average basis during 2019, vertical head differences between the fill and underlying glaciofluvial sand were upward into the fill in the northwest and north-central portions of the Site but were downward into the glaciofluvial sand elsewhere beneath the Site. Since the slurry wall was tied into the confining organic silt layer, separating the non-indigenous fill from the underlying sand layer, groundwater gradients represent hydraulic potentials, but do not indicate active communication between the fill and the glaciofluvial sand. Therefore, the combination of the slurry wall, flood wall and the groundwater withdrawal system continue to be effective in minimizing potential migration of the groundwater from the volume contained within the slurry wall.

The Remedy Evaluation Report will serve as a type of feasibility study, in which the interim remedy will be compared to other alternatives developed using technologies that are found to be appropriate to address the specific material at the site in order to meet the Remedial Action Objectives in the OU1 ROD. Should the interim remedy ultimately be selected, it will be evaluated to identify any improvements that would increase the performance of the remedy. The RER is expected to incorporate information gathered over the last five years that will assist in identifying any issues associated with the existing remedy.

The City of Newark supplies public water throughout the City. There are no drinking water supply wells located in the vicinity of this site. The NJDEP requires approval of drinking water supply wells and will not allow groundwater, which has been contaminated by this site, to be used as a drinking water supply. The deed notice also requires any use of the site to allow for the continued operations and maintenance of the groundwater withdrawal and treatment systems.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

The remedial investigation indicated that hazardous substances were being released from the site to the Passaic River through the routes of groundwater migration and surface runoff of stormwater. These pathways have been eliminated through implementation of the selected remedy. The water that is pumped from the groundwater withdrawal system is treated in the on-site facility and the water is then discharged to the Passaic River. The water that is discharged is monitored to ensure that it meets current permitting requirements, which are protective of ecological receptors, prior to being discharged. As the groundwater withdrawal system is functioning as intended (i.e. Reducing potential mass transport of chemicals from OU1 of the site to the Passaic River), the contaminant pathway to the Passaic River has been eliminated to the extent practicable. Additionally, proposed system optimization will be implemented to optimize the performance of the existing remedy

There have been no changes in the physical conditions of OU1 over the past five years that affect the protectiveness of the remedy. The interim remedy for OU1 addressed risks related to on-site and off-site exposure to chemicals of concern (COCs) including TCDD- and DDT-contaminated debris, material, and soil by containment. Remedial actions addressed exposures to dioxin-contaminated buildings and particulate emissions from the buildings; ingestion of contaminated groundwater; and transport of contaminants from OU1 to the Lower Passaic River. The remedial actions mitigate migration of dioxin to the Passaic River and deeper aquifers through groundwater transport and surface water runoff by capturing

the runoff and pumping and treating the groundwater. In addition, the actions taken at OU1 to cover the soils at the property result in interruption of potential exposures.

The deed notice restricts use of the OU1 properties to industrial and/or commercial uses. The properties are currently being evaluated as part of the Lister Avenue Brownfields Development Area; however, any redevelopment opportunities considered will need to ensure that the protectiveness of the remedy is not impacted.

The remedial investigation also identified previous discharge of dioxin and other hazardous substances in the Passaic River sediments. The remedy that has been implemented has eliminated the on-site contamination that was a continuing source to the Passaic River, however it did not address the contamination that was already present in the Passaic River. This contamination is currently being addressed through additional remedial investigations that include the Passaic River and Newark Bay.

The risk assessment developed in 1985 evaluated direct human exposure to TCDD in soils where the surficial cap was employed to interrupt this pathway. The concentration in soil for TCDD of 1 ppb developed by the Centers for Disease Control (CDC) and the New Jersey Department of Health was applied. The remedial actions at the site have interrupted potential exposures. There have been no updates to the toxicity data for dioxin since the oral reference dose (RfD) for TCDD was updated in 2012, and dioxin is not currently listed on Agency toxicity databases for updates (e.g., the Integrated Risk Information System (IRIS) or Provisional Peer Review Toxicity Values (PPRTV). The industrial concentration at a Hazard Quotient = 1 is 7.2×10^{-4} ppm or 0.72 ppb, which is lower than the 1 ppb concentration applied in 1985. However, the capping of the facility has interrupted direct exposures to the soil.

Changes in Exposure Pathways. Toxicity, and Other Contaminant Characteristics
The ROD identified a cleanup level for TCDD of 1 ppb in soil based on recommendations from CDC and NJDEP in 1985. The dioxin oral Reference Dose has not changed since the last FYR and dioxin is not listed for update on the IRIS or PPRTV toxicity database for updates.

Other chemicals identified in the risk assessment as chemicals of concern included 2,4-dimethylphenol (2,4-D), DDT and 2,4,5-trichlorophenoxy acetic acid (2,4,5-T). The ROD did not identify specific remedial action levels for these chemicals. The toxicity information for site-related chemicals have not changed since the previous five-year review. Review of the toxicity databases e.g., IRIS and PPRTVs, did not identify any of these chemicals for update of toxicity information.

The remedy remains protective since the remedial actions at the site, prevent direct exposure to the contaminants through ingestion and dermal contact.

EPA will continue to monitor updates to COC toxicity values over the next five years, the period covered by the next five-year review.

In the future, if buildings are constructed on site, soil vapor extraction should be evaluated. The deed notice and other site controls will prohibit any future re-development of the site from interfering with the integrity of the cap and the other components of the interim remedy.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

There is no information that calls into question the protectiveness of the remedy. EPA continues to evaluate the hydraulic gradients that demonstrate the effectiveness of the interim remedy, along with the monitoring well data collected since 2009 as a secondary measure of remedy performance.

VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
NONE

Issues and Recommendations Identified in the Five-Year Review:				
OU(s): 1	**Issue Category: Remedy Performance**			
	Issue: Pursuant to the Consent Decree, an evaluation of the interim remedy is expected to be completed in January 2021. However, next steps have not yet been identified.			
	Recommendation: Complete the review of the Remedy Evaluation Report with the Partner Agencies (New Jersey Department of Environmental Protection, National Oceanic and Atmospheric Administration, U.S. Fish and Wildlife Service), and develop a plan to implement recommendations			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	12/1/2021

VII. PROTECTIVENESS STATEMENT

Protectiveness Statement(s)		
Operable Unit: 1	*Protectiveness Determination:* Short-term Protective	*Planned Addendum Completion Date:* 12/1/2021
The interim remedy at OU1 currently protects human health and the environment in the short-term because all exposure pathways are addressed by engineering and access controls. However, in order for the remedy to be protective in the long-term, a plan to implement recommendations resulting from the review of the 2021 Remedy Evaluation Report needs to be developed.		

VIII. NEXT REVIEW

The next five-year review report for OU1 of the Diamond Alkali Superfund Site is required five years from the completion date of this review.

Table 1: Chronology of Site Events	
Event	**Date(s)**
Manufacturing facility at 80 Lister Avenue, Newark, NJ began producing chemicals and pesticides.	1940s
Diamond Alkali Company (subsequently known as Diamond Shamrock Corporation and Diamond Shamrock Chemicals Company) owned and operated a pesticides manufacturing facility at 80 Lister Avenue. In 1960 an explosion occurred.	1951-1969
80 Lister Avenue went through a series of new ownerships and production processes.	1970-1983
NJDEP and EPA collected dioxin samples at the site; dioxin detected in the Passaic River and at 80 Lister Avenue. Diamond Alkali proposed by EPA for listing on the Superfund NPL. NJDEP instituted fish advisories for the Passaic River and Newark Bay.	1983
Pre-NPL responses taken to restrict access to the site and the contaminants.	1983
Final NPL listing.	1984
NJDEP and Diamond Shamrock Chemicals Company entered into two AOCs for investigation and immediate response work at 80 and 120 Lister Avenue, including excavation and vacuuming of dioxin-contaminated soils from nearby properties and securing exposed on-site soils under geofabric.	1984
Remedial Investigation/Feasibility Study complete.	1987
EPA selected an interim remedy for the 80 and 120 Lister Avenue portion of the site, documented in a ROD.	1987
Federal court approved a CD among OCC, CLH, EPA and NJDEP to implement the ROD.	1990
Remedial design start.	1993
EPA, at the request of the CAG, explored the potential for implementing an alternative to the interim remedy selected in the ROD. An alternative was not found.	1996-1999
Remedial design complete.	1999
On-site remedial action construction start.	2000
RA Construction completion.	2001
Construction completion date.	2004
Previous five-year reviews.	2001, 2006, 2011, 2016

Table 2: Documents, Data and Information Reviewed in Completing the Five-Year Review	
Document Title, Author	**Submittal Date**
Record of Decision for the Diamond Shamrock Superfund Site, Newark, NJ, EPA	1987
Consent Decree (Civil Action No. 89-5064 (JWB)), United States District Court District of New Jersey	1990
Final Report for Remedial Construction, Diamond Alkali Superfund Site, Newark, NJ, TSI/BBL	2004
Remedy Evaluation Work Plan, Diamond Alkali Superfund Site, Newark, NJ, TSI	2015
Monthly Progress Reports, Diamond Alkali Superfund Site, Newark, NJ, TSI	2011-2015
Discharge Monitoring Reports, Diamond Alkali Superfund Site, Newark, NJ, TSI	2011-2015
Current Groundwater Level Graphs and Extraction Rates Memos, Diamond Alkali Superfund Site, Newark, NJ, TSI	2011-2015
Final Quality Assurance Project Plan, Groundwater Quality Monitoring Program, Diamond Alkali Superfund Site, Newark, NJ, TSI/EDS	2008
Groundwater Sampling Event Reports, Diamond Alkali Superfund Site, Newark, NJ, TSI/ARCADIS	2011-2014
Operations and Maintenance Quality Assurance Project Plan, Diamond Alkali Superfund Site, Newark, NJ, TSI/EDS	2012
Remedy Evaluation Work Plan	2014
Site Evaluation Work Plan Addendum and QAPP	2018
Waste Disposal Tech memo	2018
Analytical recommendation memo	2019

Table 2: Documents, Data and Information Reviewed in Completing the Five-Year Review	
Site Evaluation Report Addendum	2020

APPENDIX A – FIGURES

Figure 1: Map of the area

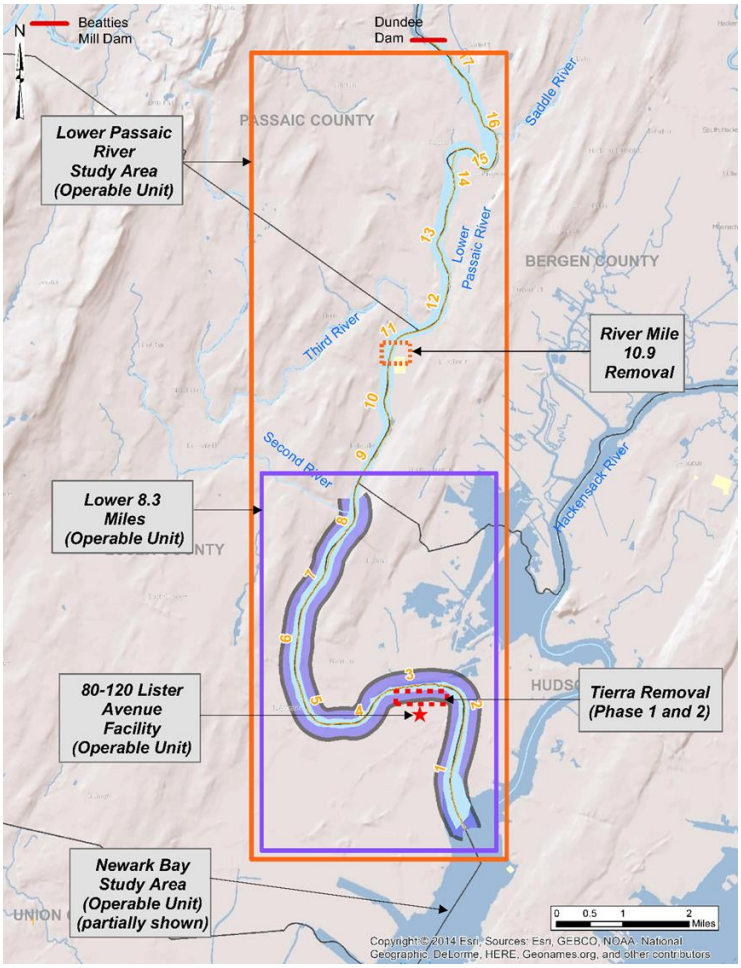

Figure 2: Engineered cap

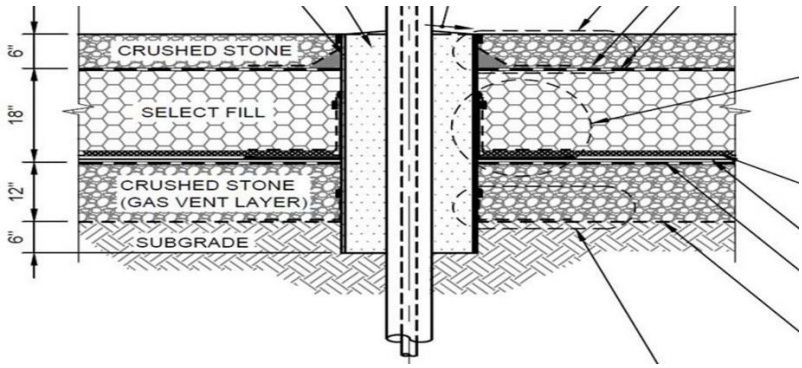

Figure 3: Site Plan