FIRST FIVE-YEAR REVIEW REPORT FOR
JOHNSON AND TOWERS SITE
MOUNT LAUREL, BURLINGTON COUNTY, NEW JERSEY

Prepared by

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Region 2
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Date

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LIST OF ACRONYMS

AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
ppb	Part Per Billion
CEA	Classification Exception Area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DL	Detection Limit
EPA	United States Environmental Protection Agency
FYR	Five-Year Review
HHRA	Human Health Risk Assessment
ICs	Institutional Controls
MCL	Maximum Contaminant Limit
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NJGWQS	New Jersey Groundwater Quality Standard
NPL	National Priorities List
O&M	Operation and Maintenance
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
ROD	Record of Decision
RPM	Remedial Project Manager
TBC	To be considered
TCE	Trichloroethylene
UST	Underground Storage Tank
VOC	Volatile Organic Compound

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 Contingency Plan (NCP)(40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the first FYR for the Johnson and Towers Site. The triggering action for this policy review is the start of the groundwater monitoring program. The FYR has been prepared due to the fact that the remedial action will not leave hazardous substances, pollutants or contaminants on site above levels that allow for unlimited use and unrestricted exposure, but requires five or more years to complete.

The Site consists of one operable unit (OU1) which will be addressed in this FYR. OU1 addresses groundwater.

The Johnson and Towers Site FYR was led by Grisell V. Díaz-Cotto, Remedial Project Manager from the Environmental Protection Agency (EPA). Other participants, also from EPA, included Diana Cutt, hydrogeologist; Abbey States, Human Health Risk Assessor; Michael Clemetson, Ecological Risk Assessor; and Shereen Kandil, Community Involvement Coordinator. The review began on June 18, 2019.

Site Background

The 7.5 acre Johnson and Towers site is located in Mount Laurel Township, in Burlington County, New Jersey. The site is bounded to the north by Route 38, to the east by Briggs Road, and to the south and west by fields and wooded areas. The site is an active facility of the Johnson and Towers Company, and is fenced on three sides. It includes a 54,000-square foot building for offices, engine repair shop, parking lots, driveways and lawns (Figure 1).

Johnson and Towers is in an area zoned for commercial/industrial use and the nearby properties are primarily commercial. There are residential developments within approximately one mile southeast of the site that are separated from Johnson and Towers by open fields and wooded areas.

State records indicate that no residents are currently drinking groundwater within one mile downgradient of the site, and a municipal water supply is available throughout the area. There are no potable wells at the site; the facility is connected to public water.

Johnson and Towers began remanufacturing and rebuilding diesel engines at this location in 1976. The facility primarily generated waste containing spent solvents, acids, caustics, and alcohols. Industrial wastewater was directed into a series of eight foot diameter concrete tanks, one of which was perforated to allow for percolation into the subsurface. The waste water handling system was expanded in 1978 to include a leach field located north of the building in the northwestern portion of the site. The leach field became overloaded due to the volume of wastewater, the low permeability of the soil, and the shallow water table. The overloading problem was periodically alleviated by removal of wastewater from the distribution pipes by an industrial wastewater hauler.

In 1983, the facility was connected to the Mount Laurel sewer system. After connection to the public sewer system, Johnson and Towers abandoned the leach field and removed a number of concrete tanks. Six-hundred tons of soil were removed from the seepage tank area. After soil removal, a 500-gallon fiberglass underground storage tank (UST) was installed in the excavation and the area was backfilled with clean soil. Waste oils generated by the facility were stored in the 500-gallon UST, and were periodically removed to an off-site facility. In 1995, the UST was removed. During the UST removal a 550 gallon steel and a concrete seepage tank and piping were uncovered and were also removed.

FIRST FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Johnson and Towers		
EPA ID: NJD002300051		
Region: 2	**State:** NJ	**City/County:** Mount Laurel, Burlington County
SITE STATUS		
NPL Status: Non-NPL		
Multiple OUs? No	**Has the site achieved construction completion?** No	
REVIEW STATUS		
Lead agency: EPA		
Author name (Federal or State Project Manager): Grisell V. Díaz-Cotto		
Author affiliation: EPA		
Review period: 6/18/2015 – 1/29/2020		
Date of site inspection: 7/2/2019		
Type of review: Policy		

Review number: 1
Triggering action date: 6/18/2015
Due date *(five years after triggering action date)*: 6/18/2020

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

Soils.

Initial soil sampling in 1986, in the area of the leach field and underground storage tanks, indicated contamination with VOCs, including methylene chloride and 2-butanone. Post removal soil sampling conducted in 1999 indicated no VOCs exceeded EPA's industrial soil risk-based screening levels. Arsenic was found above health-based screening levels in soils associated with the areas of volatile organic compound (VOC) contamination and at locations approximately 400 feet downgradient of the former UST area, ranging from non-detect to 34.1 ppm.

Groundwater

Methylene chloride was chosen as an indicator chemical for the presence of groundwater contamination since it was most frequently detected in groundwater samples with a maximum concentration of 127 parts per billion (127 ppb) prior to the completion of the leach field and UST removal in the mid-1980s. Trichloroethylene (TCE) was also found in groundwater at a the maximum concentration of 82.7 ppb. The New Jersey Groundwater Quality Standard (NJGWQS) for these contaminants are 3 ppb and 1 ppb, respectively.

Ground water sampling conducted in 1999, after completion of the removal action, detected arsenic exceeding the NJGWQS of 3 ppb in three wells, MW-1 (318 ppb) and MW-6 (258 ppb) and MW-9 (15 ppb). In 2006, groundwater samples indicated the highest arsenic concentration at MW-1 (270 ppb). MW-6 could not be sampled because it was temporarily inaccessible. Well (MW-9) had an arsenic concentration of 7 ppb.

As part of the remedial investigation and feasibility study, EPA conducted a human health risk assessment (HHRA) to estimate the current and future effects of contaminants on human health and the environment. The risk assessment evaluated health effects that could result from exposure to contaminated groundwater and soil by current and future site workers and trespassers, as well as hypothetical future construction workers. Hypothetical ingestion of groundwater by offsite residents (adult and child) was also evaluated.

The 2004 HHRA did not evaluate residential exposure to surface soils because land use was expected to remain commercial. A supplemental risk evaluation was performed to confirm that, should the site be developed residentially, exposure to surface soil would not be of concern. The site soils met the unrestricted use threshold.

In the evaluation of groundwater, cancer risks and noncancer health hazards from exposure to some metals exceeded EPA's thresholds from hypothetical future use of groundwater as a drinking water source. The evaluation identified arsenic as the primary contaminant of concern, and concluded that arsenic in groundwater

contributes to unacceptable hazards to receptor populations that may use the contaminated groundwater in the future.

Due to the lack of usable terrestrial habitat for ecological receptors at the site, risks to ecological receptors would be low. Therefore, a Screening Level Ecological Risk Assessment was not performed and ecologically based screening criteria were not presented and were not utilized to assist in the interpretation of the nature and extent of soil and groundwater contamination at the site.

Response Actions

In 1983, EPA issued an Administrative Order of Consent (AOC) to investigate the nature and extent of the contamination caused by the wastewater discharge (from the servicing and manufacturing operations) to the subsurface seepage pit system and leach field.

In 1985, Johnson and Towers submitted a report that indicated the presence of contamination in the leach field, and in groundwater monitoring wells downgradient from the leach field. A second AOC was issued that same year to develop and implement a plan to determine the full extent of contamination, and to formulate remedial steps to prevent further migration of hazardous wastes from the facility.

After issuance of the second AOC for the site in 1985, Johnson and Towers undertook a series of soil and groundwater investigations to characterize the full extent of the site contamination. During the course of these investigations, additional underground tanks and piping were discovered and removed. The last of these removal actions was completed in 1995. Field investigations that included installation of groundwater monitoring wells and collection of soil samples were completed in 1999.

In 2000, Johnson and Towers prepared a Remedial Investigation report, which summarized the nature and extent of the remaining contamination at the site, and EPA prepared a preliminary Human Health Risk Assessment. Additional data were collected to complete the HHRA, focusing on residual arsenic contamination in groundwater. With the collection of additional data, EPA completed the HHRA in 2004. In 2006, a subsequent groundwater sampling event was conducted to support a remedial decision for the Site.

Remedy Selection

In the 2008 Record of Decision for this site, EPA selected a No Further Action remedy for soils with monitoring for groundwater.

The remedy for groundwater employs long-term monitoring to assess the migration and attenuation of the contaminants in the groundwater over time. Earlier removal actions, that involved the excavation of contaminated soil, removed the source of the VOC groundwater contamination.

A groundwater monitoring program has been implemented as part of the remedy. The monitoring includes annual testing for arsenic until three years after the NJGWQS for arsenic has been met.

Several years of monitoring data demonstrated that the groundwater contamination was localized and did not appear to be migrating downgradient. Additionally, all nearby residents and businesses are served by public water. An institutional control, in the form of a groundwater Classification Exception Area (CEA), was established in 2017 for the site and will remain in place until contaminant concentrations are below NJGWQS.

Status of Implementation

Annual groundwater monitoring started in February 2015 with the sampling of six wells and a temporary piezometer. Three additional wells were installed in 2016 and a total of nine wells are sampled annually.

The data used for this Five-Year Review was collected during groundwater sampling events that occurred in 2015, 2016, 2017, and 2018.

IC Summary Table

Table 9: Summary of Implemented IC

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Groundwater	Yes	No	Encompassess and is bordered by the site property boundary and extends to a vertical depth of 25 feet below grade	Provide notice until contaminant concentrations are below groundwater quality standards.	Johnson and Towers, Inc. CEA, April 5, 2017

Systems Operations/Operation & Maintenance

The groundwater sampling requires monitoring of the extent of contaminants in groundwater..

Groundwater samples are collected annually from nine monitoring wells and analyzed for VOCs, metals (filtered and unfiltered), nitrates, sulfates and biological oxygen demand.

Potential site 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 site.

III. PROGRESS SINCE THE LAST REVIEW

This is the first review for the site.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On October 1, 2019, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at Superfund sites in New York, New Jersey, Puerto Rico and the U.S. Virgin Islands, including the Johnson and Towers site. The announcement can be found at the following web address: https://www.epa.gov/aboutepa/fiscal-year-2020-five-year-reviews. In addition to this notification, a public notice was made available by online posting on the website of the township Mount Laurel on 11/5/2019, stating that there was a FYR and inviting the public to submit any comments to the U.S. EPA. The results of the review and the report will be made available at the site information repository located at the Mount Laurel Library, 100 Walt Whitman Ave Mount Laurel, NJ and on the site website: https://www.epa.gov/superfund/johnson-towers.

Data Review

Data from four annual groundwater sampling events were evaluated as part of this five year review. Six monitoring wells were sampled in 2015, and nine monitoring wells were sampled in 2016, 2017 and 2018 for VOCs, metals (filtered and unfiltered), nitrates, sulfates, BOD, and one well (MW-1) for arsenic speciation (As III and As V).

Concentrations of arsenic, the primary contaminant of concern identified in the Record of Decision (ROD), exceeded the NJGWQS of 3 ppb in MW-1 for all four events, in MW-6R for two events, and in MW-7R for the 2018 event. The arsenic data from these three wells is summarized in the table below.

Total Arsenic Concentrations (ppb)

	2015	2016	2017	2018
MW-1	84.7	368	119	168
MW-6R	6.6	3.2	ND (10)	2.6
MW-7R	not installed	ND (10)	ND (10)	3.1

ND = non detect (detection limit)

With the exception of the 368 ppb concentration in 2016 from MW-1, which may be due to high turbidity in that well, the data indicate that arsenic concentrations remain stable at MW-1 and MW-6R (the two wells that have historically shown exceedances of arsenic criteria) with no indication that the arsenic is migrating downgradient from the former leach field area since the concentrations in the downgradient wells have not increased. However, the arsenic detection limit (DL) of 10 ppb for all other wells in all four events exceeded the NJGWQS of 3 ppb; therefore, it is unclear if low concentrations (below 10 ppb) exist in the downgradient wells. DLs that meet or are lower that the NJGWQS of 3 ppb will be used for future sampling events.

There were some NJDEP GWQS exceedances of other metals (aluminum, beryllium, cadmium, iron, manganese, sodium, and thallium) in some of the sampling events. (See Tables 1 and 2) The levels of these metals concentrations compared to the concentrations during the remedial investigation conducted in 2006 are similar or lower with the exception of an increase of iron and manganese in MWs 5 and 7. These concentrations will continue to be monitored to determine if there is an increasing trend.

The VOC analytical results indicate that no VOCs exceeded the NJGWQS or EPA Maximum Contaminant Levels for the period from 2015 to 2018.

SITE INSPECTION

The inspection of the site was conducted on July 7, 2019. In attendance were Grisell Díaz-Cotto, EPA RPM, Diana Cutt, EPA hydrogeologist, Wesley Fitchett, Curren Environmental, and David Johnson, Johnson and Towers CEO. The purpose of the inspection was to assess the protectiveness of the remedy.

At the inspection, the status of the monitoring program was discussed, a walk-through was performed to assess the condition of the wells in the monitoring program as well as the surrounding areas. During the inspection it was noted that several wells had malfunctioning caps. These caps have been already replaced by the PRP's contractor.

V. TECHNICAL ASSESSMENT

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

The remedy selected for the site was no further action for soil and no action with monitoring for groundwater. Soil from site was excavated and backfilled with clean material prior to the remedy. Further, due to the lack of usable terrestrial habitat for ecological receptors at the site, risks to ecological receptors would be low.

The VOC analytical results for groundwater indicate that no VOCs exceeded the NJGWQS or EPA MCLs for the period from 2015 to 2018. In general, the groundwater sampling data from the four sampling events indicate that arsenic concentrations remain stable at MW-1 and MW-6R (the two wells that have historically shown exceedances of arsenic criteria) with no indication that the arsenic is migrating downgradient from the former leach field area. However, the arsenic detection limit of 10 ppb for all other wells in all four events exceeded the NJGWQS of 3 ppb; therefore, it is unclear if low concentrations (below 10 ppb) exist in the downgradient wells. Detection Limits that meet or are lower that the NJGWQS of 3 ppb will be used for future sampling events in order to confirm that the arsenic is not migrating.

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 exposure assumptions and toxicity values that were used to estimate the potential cancer risks and noncancer hazards in the risk assessment summarized in the 2008 ROD followed the general risk assessment practice at the time. Although specific parameters and toxicity values may have changed, the risk assessment process that was used is still consistent with current practice and the need to implement a remedial action remains valid. Since No Further Action was selected for soils and No Action with monitoring was selected for groundwater in the 2008 ROD, there are no remedial action objectives for the site. Groundwater monitoring will continue until NJGWQS

are achieved. There are no changes in the physical conditions of the site or site uses that would affect the protectiveness of the selected remedy.

As observed in monitoring well data from the five-year review period, concentrations of arsenic and other metals in the northwestern portion of the site (MW-1 and MW-6R) continue to exceed their respective groundwater standards. However, concentrations are gradually decreasing and the plume does not appear to be migrating. There are no residents currently using groundwater as a potable water supply within one mile of the site and a municipal water supply is available throughout the area. A CEA is in place to prevent the installation of new wells within the contaminated area and groundwater use is not expected to change during the next review period. Therefore, the ingestion of groundwater pathway is incomplete and there is no exposure to remaining groundwater contamination.

The soil excavation and backfill eliminate any potential risk from surface soil contaminants to terrestrial receptors. Therefore, the exposure assumptions for ecological receptors are still valid.

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

No other information has come to light that could call into question the protectiveness of the remedy.

VI. ISSUES/RECOMMENDATIONS

There are no recommendations identified in the Five-Year Review. Long-term monitoring will continue until three years after the NJGWQS for arsenic has been met.

OTHER FINDINGS

The following actions will be performed as part of ongoing, routine O&M activities:

- Detection limits for analytes that currently exceed the NJGWQS will be modified to assure that they are below all established standards for site contaminants.
- Based on turbidity levels, well MW-1 will be redeveloped to assure accurate future sampling results

VII. PROTECTIVENESS STATEMENT

Protectiveness Statement(s)		
Operable Unit: 1	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date:* NA
Protectiveness Statement: The OU1 remedy is protective of human health and the environment.		

Sitewide Protectiveness Statement	
Protectiveness Determination: Protective	*Planned Addendum Completion Date:* NA
Protectiveness Statement: The sitewide remedy is protective of human health and the environment.	

VIII. NEXT REVIEW

The next FYR report for the Johnson and Towers site is required five years from the completion date of this review.

APPENDIX A – REFERENCE LIST

- Johnson and Towers 2008 Record of Decision
- Annual Ground Water Monitoring Well Sampling Report – 2015, 2016, 2017 and 2018
- 2004 Human Health Risk Assessment
- Johnson and Towers Final Remedial Investigation Report, December 15, 1998
- Johnson and Towers Final Groundwater Remedial Investigation Report, November 15, 1999

APPENDIX B – FIGURES AND TABLES

Figure 1

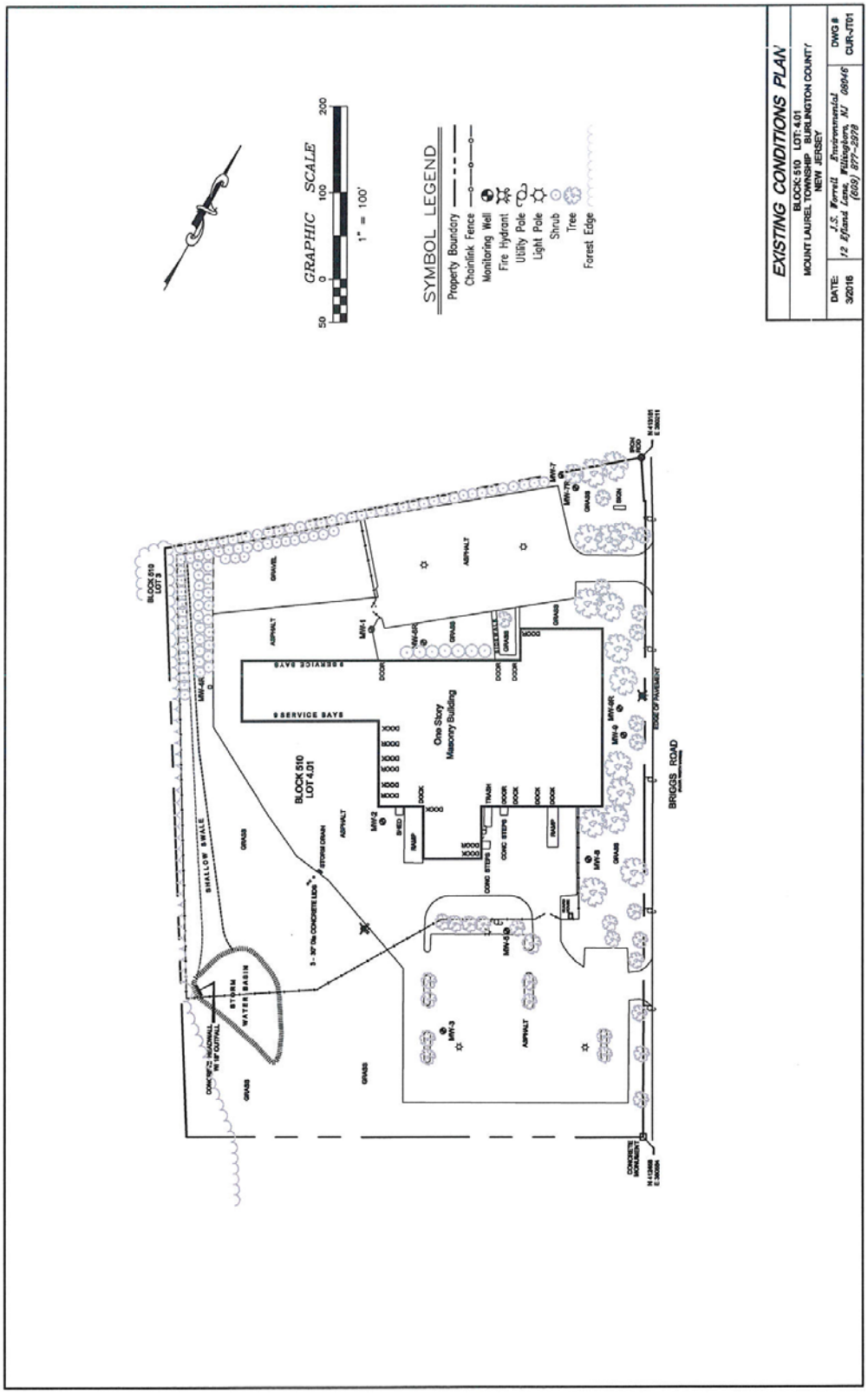
EXISTING CONDITIONS PLAN
BLOCK: 510 LOT: 4.01
MOUNT LAUREL TOWNSHIP BURLINGTON COUNTY
NEW JERSEY
DATE: 3/2016
DWG # CUR-IT01
GRAPHIC SCALE
1" = 100'
SYMBOL LEGEND
Property Boundary
Chainlink Fence
Monitoring Well
Fire Hydrant
Utility Pole
Light Pole
Shrub
Tree
Forest Edge
BLOCK 510 LOT 4.01
One Story Masonry Building
9 SERVICE BAYS
BRIGGS ROAD
SHALLOW SWALE
STORM WATER BASIN
GRAVEL
ASPHALT
GRASS

Table 1

TAL Metals (total) mg/L

	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
MW01																							
2/23/2015	ND (200)	3.3	84.7	16.1	ND (5)	1.3	13,400	ND (10)	38.3	2.3	33,000	ND (10)	10,000	220	ND (0.2)	6	1,720	ND (35)	ND (10)	80,100	ND (25)	ND (50)	ND (60)
3/10/2016	ND (200)	ND (60)	368	18.1	0.23	ND (5)	12,600	ND (10)	5.5	ND (25)	57,400	ND (10)	10,500	505	ND (0.2)	4.3	1,780	ND (35)	ND (10)	80,800	ND (25)	0.86	6.1
6/26/2017	ND (200)	ND (60)	119	17.5	ND (5)	ND (5)	11,900	ND (10)	0.87	ND (25)	28,500	ND (10)	9,090	188	ND (0.2)	ND (40)	2,180	ND (35)	ND (10)	68,800	ND (25)	ND (50)	3.1
7/31/2018	ND (200)	1.7	168	19.5	ND (5)	ND (5)	11,700	ND (10)	ND (50)	ND (25)	30,900	ND (10)	8,400	178	ND (0.2)	4.6	2,440	ND (35)	ND (10)	64,600	ND (25)	ND (50)	7
MW02																							
2/23/2015	832	ND (60)	ND (10)	58.3	1.1	2.2	14,500	0.59	23.7	8.1	718	ND (10)	7,170	344	0.077	20.7	2,780	ND (35)	ND (10)	30,100	3.1	ND (50)	92.3
3/10/2016	669	ND (60)	ND (10)	51.2	1.1	2	14,400	ND (10)	19.6	ND (25)	ND (100)	ND (10)	6,990	299	ND (0.2)	16	2,770	ND (35)	ND (10)	26,600	ND (25)	ND (50)	79.8
6/26/2017	673	ND (60)	ND (10)	59.7	0.96	1.7	11,700	ND (10)	20.4	ND (25)	ND (100)	ND (10)	5,860	310	ND (0.2)	17	2,970	ND (35)	ND (10)	27,400	ND (25)	ND (50)	83.7
7/31/2018	771	ND (60)	ND (10)	82.4	1.5	2.2	14,500	1.1	24.1	ND (25)	20.1	ND (3)	5,430	183	ND (0.2)	21	2,480	ND (35)	ND (10)	20,500	ND (25)	ND (50)	62.0
MW03																							
2/23/2015	516	ND (60)	ND (10)	23.9	ND (5)	0.64	14,900	1	4.7	11.6	311	2.6	6,480	115	ND (0.2)	4.8	2,410	ND (35)	ND (10)	21,100	2	ND (50)	42.7
3/10/2016	456	ND (60)	ND (10)	23.2	0.22	0.44	14,500	ND (10)	4.1	ND (25)	116	2.4	6,330	105	ND (0.2)	4.3	2,250	ND (35)	ND (10)	26,800	ND (25)	0.67	49.2
6/26/2017	202	ND (60)	ND (10)	16.9	ND (5)	ND (5)	13,600	ND (10)	3.4	ND (25)	3,130	ND (10)	6,750	102	ND (0.2)	40	2,720	ND (35)	ND (10)	16,100	ND (25)	ND (50)	144
7/31/2018	165	ND (60)	ND (10)	22.5	ND (5)	ND (5)	16,300	0.97	4.4	ND (25)	592	2.5	6,790	92.1	ND (0.2)	4.8	2,960	ND (35)	ND (10)	30,500	ND (25)	0.73	24.9
MW04R																							
3/10/2016	154	ND (60)	ND (10)	83.1	0.61	ND (5)	13,200	ND (10)	22.5	5	78.7	ND (10)	4,880	201	ND (0.2)	18.5	1,990	ND (35)	ND (10)	34,700	ND (25)	1	70.5
6/26/2017	723	ND (60)	ND (10)	74.5	1.6	ND (5)	13,100	4.9	18.8	ND (25)	ND (100)	ND (10)	5,660	64.6	ND (0.2)	18.3	2,030	ND (35)	ND (10)	15,900	ND (25)	ND (50)	58.3
7/31/2018	545	ND (60)	ND (10)	82.4	1.9	0.38	13,700	5.8	19.5	ND (25)	127	ND (3)	5,430	183	ND (0.2)	20.5	2,480	ND (35)	ND (10)	20,500	ND (25)	ND (50)	62.3
MW05																							
2/23/2015	2,930	ND (60)	ND (10)	31.2	1.2	ND (5)	18,300	1	3.5	4.1	557	ND (10)	6,490	15	ND (0.2)	4.8	1,200	ND (35)	ND (10)	17,900	ND (25)	ND (50)	38.1
3/10/2016	1,860	ND (60)	ND (10)	40.6	1.3	ND (5)	18,400	ND (10)	5.3	ND (25)	538	2.5	7,600	104	ND (0.2)	50.3	5,000	ND (35)	ND (10)	44,200	ND (25)	1.8	217
6/26/2017	1,590	ND (60)	ND (10)	60.4	0.93	1.3	20,200	ND (10)	16.8	3.9	650	ND (10)	7,920	193	ND (0.2)	16.4	3,850	ND (35)	ND (10)	52,300	ND (25)	ND (50)	132
7/31/2018	1,170	ND (60)	2.2	51.3	1.1	0.44	17,500	0.41	11.3	ND (25)	3,450	ND (10)	6,930	132	ND (0.2)	10.5	3,740	ND (35)	ND (10)	47,500	ND (25)	ND (50)	114
MW6R																							
2/23/2015	176	ND (60)	6.6	37.6	ND (5)	0.91	49,000	1.3	2.7	8.1	718	ND (10)	22,000	42.7	ND (0.2)	12.5	4,100	ND (35)	ND (10)	41,900	3.3	6.3	7.4
3/10/2016	148	ND (60)	3.2	36.9	0.38	0.87	61,800	0.7	7.3	3.4	119	ND (10)	28,800	36.8	ND (0.2)	20.6	4,200	ND (35)	ND (10)	24,300	ND (25)	3.4	14.2
6/26/2017	ND (200)	ND (60)	ND (10)	41.7	ND (5)	ND (5)	45,600	ND (10)	3.9	4.8	53.9	ND (10)	19,600	30.9	ND (0.2)	12.5	4,890	ND (35)	ND (10)	60,300	ND (25)	ND (50)	10
7/31/2018	ND (200)	ND (60)	2.6	55.8	ND (5)	0.29	37,600	ND (10)	2.1	ND (25)	378	ND (10)	15,500	39.3	ND (0.2)	20.5	2,480	ND (35)	ND (10)	20,500	ND (25)	ND (50)	62.3
MW7R																							
3/10/2016	721	ND (60)	ND (10)	184	0.89	0.62	28,500	1.2	9.7	3.1	30.2	ND (100)	9,280	211	ND (0.2)	11.8	4,140	ND (35)	ND (10)	74,800	ND (25)	ND (50)	42.5
6/26/2017	1,060	ND (60)	ND (10)	186	0.71	0.76	37,100	ND (10)	15.3	4.4	ND (100)	ND (100)	12,100	375	ND (0.2)	17.7	4,740	ND (35)	ND (10)	141,000	ND (25)	ND (50)	56.5
7/31/2018	819	1.4	3.1	161	0.99	0.81	30,600	0.52	13.8	ND (25)	532	ND (10)	10,700	321	ND (0.2)	17.8	4,460	ND (35)	ND (10)	106,000	ND (25)	0.52	47.4
MW8R																							
3/10/2016	2,270	ND (60)	ND (10)	63.2	1.9	4	13,400	ND (10)	35.7	ND (25)	1,150	ND (10)	7,360	102	ND (0.2)	48.3	4,920	ND (35)	ND (10)	43,000	ND (25)	ND (50)	48.6
6/26/2017	2,010	ND (60)	ND (10)	56	1.5	3.5	12,600	ND (10)	36.6	ND (25)	3,130	ND (10)	6,750	102	ND (0.2)	50.5	4,770	ND (35)	ND (10)	43,500	ND (25)	10.9	231
7/31/2018	2,280	ND (60)	ND (10)	72.7	1.9	4.2	14,200	ND (10)	39.5	ND (25)	3,140	2.2	7,650	100	ND (0.2)	54.6	5,130	ND (35)	ND (10)	46,400	ND (25)	8.7	251
MW9R																							
3/10/2016	1,070	ND (60)	ND (10)	90.1	0.84	6.7	14,800	1.2	20.7	16.7	110	ND (10)	5,610	85.6	ND (0.2)	30.3	2,830	ND (35)	ND (10)	11,400	3.9	0.61	144
6/26/2017	1,800	ND (60)	ND (10)	77.7	0.83	10	13,800	ND (10)	29.3	4.1	798	6.8	5,730	65.2	ND (0.2)	40	2,720	ND (35)	ND (10)	16,100	ND (25)	ND (50)	144
7/31/2018	1,540	ND (60)	ND (10)	78.2	1.1	4.1	14,100	4.4	16.4	4.1	798	8.7	5,510	51.4	ND (0.2)	24.6	2,970	ND (35)	ND (10)	21,300	ND (25)	ND (50)	85.0
NJDEP GWQS	200	6	3	6,000	1	4	NGWS	70	100	1,300	300	100	NGWS	50	2	100	NGWS	40	40	50,000	2	60	2000

Notes:

25.0 result MDL above NJDEP GWQS

5,000 detected result

700 result above NJDEP GWQS

J: Sample result is greater than the MDL but below the CRDL

U: indicates analyzed for but not detected

NA: not analyzed

NJDEP Class IIA GWQS: NJDEP Ground water Quality Standards N.J.A.C. 7:9C (last adopted without change 3/4/2014)

NGWS/NMCL: No applicable ground water cleanup standard

Well numbering: Wells labeled with leading zeros and those with the zero omitted have the same numerical value, i.e., MW01 = MW1

Table 2

TAL Metals (dissolved) mg/L

	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
MW01																							
2/23/2015	ND (200)	ND (60)	50.9	15	ND (5)	0.76	12,100	ND (10)	ND (50)	ND (25)	29,200	ND (10)	10,300	222	ND (0.2)	5.6	1,690	ND (35)	ND (10)	84,100	3	ND (50)	ND (60)
3/10/2016	ND (200)	ND (60)	120	12	0.19	ND (5)	12,900	ND (10)	5.6	ND (25)	45,800	ND (10)	10,800	519	ND (0.2)	3.8	1,790	ND (35)	ND (10)	83,300	ND (25)	1	3.4
6/26/2017	ND (200)	ND (60)	110	15.8	ND (5)	ND (5)	11,600	ND (10)	0.74	ND (25)	29,300	ND (10)	8,910	194	ND (0.2)	ND (2)	2,070	ND (35)	ND (10)	66,500	ND (25)	ND (50)	3
7/31/2018	ND (200)	2.0	136	19.8	ND (5)	ND (5)	11,900	ND (10)	ND (50)	ND (25)	28,200	ND (10)	8,680	180	ND (0.2)	4.4	2,540	ND (35)	ND (10)	65,700	2.9	ND (50)	5.9
MW02																							
2/23/2015	799	ND (60)	ND (10)	59.6	1.1	2.3	14,200	0.69	23.2	5	ND (100)	ND (10)	6,950	335	0.077	19.5	2,700	ND (35)	ND (10)	29,500	ND (25)	ND (50)	91.5
3/10/2016	669	ND (60)	ND (10)	51.2	1.1	2	14,400	ND (10)	19.6	ND (25)	ND (100)	ND (10)	6,990	299	ND (0.2)	16	2,770	ND (35)	ND (10)	26,600	ND (25)	ND (50)	79.8
6/26/2017	676	ND (60)	ND (10)	59.5	0.95	1.6	11,600	ND (10)	20.2	ND (25)	ND (100)	ND (10)	5,850	311	ND (0.2)	17.2	2,030	ND (35)	ND (10)	27,100	ND (25)	ND (50)	84.1
7/31/2018	845	ND (60)	ND (10)	81.1	1.5	2.5	15,100	0.91	25.8	ND (25)	166	ND (10)	7,660	342	ND (0.2)	39.9	4,750	ND (35)	ND (10)	29,700	ND (25)	ND (50)	102
MW03																							
2/23/2015	368	ND (60)	ND (10)	22.9	ND (5)	0.51	14,800	ND (10)	4.2	10.5	ND (100)	ND (10)	6,370	114	ND (0.2)	4.9	2,340	ND (35)	ND (10)	20,900	3	ND (50)	36.8
3/10/2016	391	ND (60)	ND (10)	19.6	0.3	0.61	14,000	ND (10)	3.7	1.8	18.3	2.4	6,090	103	ND (0.2)	4.7	2,190	ND (35)	ND (10)	21,800	ND (25)	ND (50)	33.8
6/26/2017	126	ND (60)	ND (10)	17.6	ND (5)	ND (5)	13,600	ND (10)	3.1	23.3	ND (100)	ND (10)	5,600	90.3	ND (0.2)	3.3	2,360	ND (35)	ND (10)	21,200	ND (25)	ND (50)	25.6
7/31/2018	73.2	ND (60)	ND (10)	18.9	0.11	ND (5)	15,800	ND (10)	4.0	ND (25)	18.7	ND (10)	6,590	87.9	ND (0.2)	4.5	2,870	ND (35)	ND (10)	29,800	ND (25)	ND (50)	23.0
MW04R																							
3/10/2016	154	ND (60)	ND (10)	83.1	0.61	ND (5)	13,200	ND (10)	22.5	5	78.7	ND (10)	4,750	366	ND (0.2)	17.9	2,060	ND (35)	ND (10)	40,900	ND (25)	1	70.5
6/26/2017	683	ND (60)	ND (10)	75	1.6	ND (5)	13,200	2.9	18.7	4.6	ND (100)	ND (10)	4,930	204	ND (0.2)	18.3	2,030	ND (35)	ND (10)	15,900	ND (25)	ND (50)	57.8
7/31/2018	549	1.8	ND (10)	81.8	1.9	0.33	13,700	6.4	20	ND (25)	166	ND (10)	5,430	181	ND (0.2)	20.7	2,430	ND (35)	ND (10)	20,400	ND (25)	0.62	45.8
MW05																							
2/23/2015	1,800	ND (60)	ND (10)	31.4	1.1	ND (5)	17,800	ND (10)	3.3	2.5	48.2	ND (10)	6,360	16.6	ND (0.2)	4.7	1,250	ND (35)	ND (10)	18,400	ND (25)	ND (50)	36.8
3/10/2016	1,790	ND (60)	ND (10)	38.3	1.2	ND (5)	17,800	ND (10)	5.2	ND (25)	525	ND (10)	6,860	47.6	ND (0.2)	5.3	1,880	ND (35)	ND (10)	26,800	ND (25)	ND (50)	48.6
6/26/2017	1,560	ND (60)	ND (10)	61.2	0.93	1.3	20,300	ND (10)	16.8	32.9	724	ND (10)	7,930	192	ND (0.2)	16.3	3,810	ND (35)	ND (10)	35,000	ND (25)	ND (50)	57.8
7/31/2018	1,080	ND (60)	ND (10)	48.2	0.95	0.4	16,600	0.65	10.9	ND (25)	3,570	ND (10)	6,570	126	ND (0.2)	18.1	4,460	ND (35)	ND (10)	108,000	ND (25)	ND (50)	107
MW6R																							
2/23/2015	ND (200)	ND (60)	4.2	37.1	ND (5)	0.7	49,000	ND (10)	1.9	4.4	36.2	ND (10)	21,400	41	ND (0.2)	10.9	3,960	ND (35)	ND (10)	42,200	4.1	1.4	4.9
3/10/2016	60.4	ND (60)	ND (10)	34.6	0.26	0.76	62,100	ND (10)	7	2.8	18.5	ND (10)	28,700	37.1	ND (0.2)	21.2	4,280	ND (35)	ND (10)	25,800	ND (25)	2.5	13.4
6/26/2017	ND (200)	ND (60)	ND (10)	40.5	ND (5)	ND (5)	43,200	ND (10)	3.7	ND (25)	40.6	ND (10)	18,500	28.9	ND (0.2)	12.2	4,740	ND (35)	ND (10)	57,800	ND (25)	ND (50)	9.2
7/31/2018	ND (200)	1.8	ND (10)	81.8	1.9	0.32	35,400	ND (10)	20	ND (25)	20.2	ND (10)	14,500	37.0	ND (0.2)	39.9	4,750	ND (35)	ND (10)	85,900	ND (25)	2.3	5.6
MW7R																							
3/10/2016	721	ND (60)	ND (10)	184	0.89	0.62	28,500	1.2	9.7	3.1	30.2	ND (100)	9,280	211	ND (0.2)	11.8	4,140	ND (35)	ND (10)	74,800	ND (25)	ND (50)	42.5
6/26/2017	1,050	ND (60)	ND (10)	61.2	0.93	1.3	36,800	ND (10)	15.5	4.9	ND (100)	ND (100)	11,900	374	ND (0.2)	17.3	4,710	ND (35)	ND (10)	140,000	ND (25)	ND (50)	56.8
7/31/2018	832	ND (60)	3.5	158	1	0.8	30,700	0.51	13.9	ND (25)	530	ND (100)	10,700	321	ND (0.2)	18.1	4,460	ND (35)	ND (10)	108,000	ND (25)	ND (50)	45.8
MW8R																							
3/10/2016	2,270	ND (60)	ND (10)	63.2	1.9	4	13,400	ND (10)	35.7	ND (25)	1,150	ND (10)	7,360	102	ND (0.2)	48.3	4,920	ND (35)	ND (10)	43,000	ND (25)	ND (50)	48.6
6/26/2017	2,010	ND (60)	ND (10)	58.5	1.4	3.5	12,500	ND (10)	36.9	ND (25)	2,350	ND (10)	6,650	101	ND (0.2)	50.6	4,710	ND (35)	ND (10)	43,300	ND (25)	ND (50)	232
7/31/2018	2,280	ND (60)	ND (10)	64.5	1.8	4.1	14,200	ND (10)	40.3	ND (25)	2,210	ND (10)	7,680	97.3	ND (0.2)	54.3	5,130	ND (35)	ND (10)	46,300	ND (25)	2.5	250
MW9R																							
3/10/2016	1,070	ND (60)	ND (10)	90.1	0.84	6.7	14,800	1.2	20.7	16.7	110	ND (10)	5,610	85.6	ND (0.2)	30.3	2,830	ND (35)	ND (10)	11,400	3.9	0.61	144
6/26/2017	1,700	ND (60)	ND (10)	74.8	0.81	9.8	13,600	ND (10)	28.7	ND (25)	477	6.5	5,660	64.6	ND (0.2)	40.1	2,680	ND (35)	ND (10)	15,900	ND (25)	ND (50)	141
7/31/2017	1,430	ND (60)	ND (10)	73.7	0.97	8.8	13,500	5.0	15.4	ND (25)	419	6.8	5,280	49.0	ND (0.2)	24.4	2,850	ND (35)	ND (10)	20,500	ND (25)	ND (50)	79.9
NJDEP GWQS	200	6	3	6,000	1	4	NGWS	70	100	1,300	300	100	NGWS	50	2	100	NGWS	40	40	50,000	2	60	2,000

Notes:

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