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OPERATION
AND
MAINTENANCE MANUAL
FOR

TOWN OF RHINEBECK
LANDFILL CLOSURE

TOWN OF RHINEBECK
DUTCHESS COUNTY, NEW YORK

PREPARED BY:
D.F. WHEELER ENGINEERS
53 NORTH BROADWAY
RED HOOK, N.Y. 12571

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T/O Rhinebeck Landfill

PREFACE

This operation and maintenance manual is a guide to the landfill operator. This manual is written cognizant of the fact that a full or part-time operator will be responsible for the proper operation and maintenance of the landfill facility. The facility operator should be experienced in the operation of these types of facilities, and use his expertise in maintaining the landfill to high standards, and in the most efficient manner to achieve proper ground water quality and a long service life.

Section 1.0 GENERAL INFORMATION

The Town of Rhinebeck owns and operates the Town of Rhinebeck landfill. In response to the current New York State Department of Environmental Conservation Standards, this refuse disposal facility has ceased operation, and has been closed in accordance with 6 NYCRR Part 360 regulations for Solid Waste Management Facilities. The landfill closure was constructed in conformance with approved plans under the regulatory review of the New York State Department of Environmental Conservation (NYSDEC).

The landfill closure facility generally comprised of the following:

Intermediate Cover :

The existing refuse landfill area has received a twelve inch (12) intermediate layer of soils. This layer is located directly above the compacted refuse layer. This layer of material consists of loam/shale mixture that has been removed from on-site sources. This layer has been constructed to allow for gases to be transported away from the waste layer.

Gas Vents:

In order to remove any gases from the intermediate cover layer forty-two (42) gas vents have been provided. These gas vents are constructed of four (4) inch diameter perforated polyvinyl chloride (PVC) pipe. The vents extend vertically from the existing refuse through the landfill cover, and extend above grade. The lower end is capped and the higher end has a riser that extends through the final cover and topsoil, and rises three (3) feet above grade. The riser is fitted with a goose neck and is equipped with a fine bug screen. This bug screen will prevent foreign objects or debris from entering the vent system. Based on the detail shown on the plans accompanying this manual, the gas vents will extend into the refuse layer a minimum of five (5) feet, to ensure that any gas which may be generated can escape through the cap (barrier protection layer and barrier layer). In addition to the gas vents, gas monitoring tubes have been provided to provide a sampling location to check for any potential gas migration off-site; or laterally away from the landfill.

Final Cover:

The final cover material is a low permeability barrier layer.

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The purpose of this layer is to minimize precipitation migration into the landfill refuse area. By minimizing the amount of water entering the landfill refuse, this will correspondingly reduce the amount of leachate generated by the facility.

Leachate Collection System:

The leachate collection system will only be installed if a significant leachate seep is observed after landfill closure. Due to the fact that the Town of Rhinebeck placed an intermediate clay barrier on the existing landfill and based on the fact that there appears to be no surface leachate discharge during numerous site inspections by the town engineer, no need for a leachate collection system is anticipated. The following description applies only if a leachate collection system is, in fact, installed.

The leachate collection system is comprised of two (2) leachate lagoons, nine (9) precast concrete manholes, and approximately two thousand two hundred (2,200) linear feet of eight (8) inch diameter perforated poly-vinyl chloride (PVC) pipe.

Around the perimeter of each lagoon is a subsurface curtain drain that drains to daylight. This will aid in minimizing the amount of ground water entering the lagoons. The leachate level of these lagoons should be monitored frequently (at least monthly) and be removed from the site by a private scavenger and disposed of at a certified waste site or municipal sewage treatment plant, as needed.

Section 2.0 POST-CLOSURE OPERATION AND MAINTENANCE

The following information is provided as a guide for personnel which will aid in assuring effective monitoring, leachate management, sampling and analysis, and proper maintenance of all facility components to meet the requirements of 6 NYCRR Part 360 Solid Waste Management Facilities for a minimum period of thirty (30) years after the land fill closure.

The Town of Rhinebeck shall perform an inspection of the landfill, as described below, every three (3) months. The Town Supervisor shall appoint an individual or the town engineer to perform these inspections, and shall be responsible for the performance of the inspections. A written report will be completed during each inspection. A copy of all the inspections will be maintained in the Town's

files.

Soil Cover/Drainage Structures:

Due to the long slopes of the landfill sides, several diversion swales have been provided to intercept runoff for diversion to larger drainage ways leading off the landfill slopes. These swales must be periodically inspected to: insure proper drainage flow, remove any foreign debris, insure grass cover to minimize erosion. If secondary seeding is required due to erosion during heavy storms, staked hay bales shall be installed as a temporary measure to minimize erosion until grass vegetation has been re-established.

Soil cover integrity, slopes, and cover vegetation shall also be inspected periodically, any deficiencies shall be recorded, and repaired immediately, temporary erosion control measures shall be implemented.

Vegetative cover on landfill mass shall be mechanically mowed at least bi-annually.

Groundwater/Leachate Monitoring:

Environmental and facility monitoring points must be maintained and sampled during the post-closure period for a minimum of thirty (30) years. Annual summary reports must be submitted to the facility's engineer and the New York State Department of Environmental Conservation (NYSDEC), during the first quarter of the following year. The initial report is due within ninety (90) days of commencement of the testing. Annual baseline and quarterly routine monitoring, sampling, and analysis must be performed on groundwater, surface water and leachate samples (if a leachate collection system is actually installed) for a minimum period of five (5) years. The requirements for subsequent analysis will be determined at the end of each five (5) year period. A copy of the water quality analysis table is attached herewith in appendix A. A sketch plan of the monitoring well locations is attached herewith in Appendix B.

There has been some confusion regarding the monitoring well designations with the Subsurface Investigation Report (SIR) prepared by Clough, Harbour & Associates. Therefore, pursuant to a request by the NYSDEC, the monitoring well designations have been revised as follows:

MONITORING WELL LEGEND

OLD S.I.R. DESIGNATION	NEW DESIGNATION
MW-U01	Existing MW-1D
MW-3U	Existing MW-2S
-	Proposed MW-3D
MW-D03	Existing MW-5D
MW-D04	Existing MW-6D
MW-2U	Existing MW-7S
MW-2D	Existing MW-8D
MW-2M	Existing MW-9S
MW-1U	Existing MW-10S
MW-1D	Existing MW-11D
MW-1M	Existing MW-12S

In addition, if a leachate collection system is actually installed, the level of leachate within each lagoon shall be monitored and recorded. Total volumes removed from each lagoon shall be recorded by the operator and submitted to NYSDEC as part of the annual report.

Previously submitted subsurface investigation reports as prepared by Clough, Harbour, & Associates are on file with the Town of Rhinebeck.

Leachate Collection System:

The leachate collection system will only be installed if a significant leachate seep is observed after landfill closure. Due to the fact that the Town of Rhinebeck placed an intermediate clay barrier on the existing landfill and based on the fact that there appears to be no surface leachate discharge during numerous site inspections by the town engineer, no need for a leachate collection system is anticipated. The following description applies only if a leachate collection system is, in fact, installed.

The leachate collection system is comprised of perforated pipe, manholes, and cleanouts. The collection system manholes shall be inspected monthly. Lids shall be removed and inverts shall be checked for possible foreign debris, silt build up, and settlement of solids. All settled materials shall be removed and disposed of properly. If a large amounts of settlement or deposits are found, the operator shall contact the facility's engineer immediately. All collection lines shall be inspected for proper operation.

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Cleanouts and manholes shall be inspected annually to remove (snake) any foreign matter from the system. The operator shall keep a record of periodic inspections, and all required maintenance. Maintenance of the leachate collection system is required for landfill closure and must continue for as long as leachate is capable of adversely impacting the environment

Gas Collection System:

The gas venting system shall be visually inspected bi-monthly. All risers shall be inspected for foreign matter. Any evidence of discolorations of the gas generation, should be recorded and the Town Engineer shall be contacted. All damaged vent risers and screens shall be replaced immediately. On a quarterly basis, the operator shall take the presence of methane gas. The meter shall be a hand held combustible gas meter and it shall be calibrated and metered to indicate the percent of methane in the air. The readings, if any, shall be recorded and included on the annual report submitted to the Town Engineer. In addition, the gas monitoring tubes shall likewise be tested and readings recorded. Locations of the gas monitoring tubes are shown on the attached plan. These tubes will be utilized to determine if there is any lateral migration of methane gas from the landfill. Post-closure explosive gas monitoring and maintenance shall be preformed at least quarterly to ensure that: (a) explosive gas levels do not exceed twenty-five (25) percent of the lower explosive limit within any structures on or off the site (except gas control or recovery system components); and (b) the level of subsurface explosive gas does not exceed the lower explosive limit anywhere along the property boundary. If monitoring shows these levels are exceeded, the Town Engineer and the DEC should be notified and remedial action, such as the construction of gas cut-off trenches, should be immediately taken. In addition, this quarterly explosive gas monitoring and maintenance should assure that the gas vents are not blocked and that the landfill gas has not damaged the final cover.

Post-closure explosive gas monitoring should include: subsurface monitoring along a perimeter outside the waste mass but within the property boundary; monitoring within all on-site and nearby structures; and inspection of the final cover and surrounding area. Monitoring with a portable detector should be preformed when the ground surface has been wet or frozen for several days. Monitoring should be done below the wet or frozen zone.

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In addition, post-closure monitoring and maintenance should include regular inspection of the landfill final cover and surrounding area for cracks or stressed vegetation which might indicate the escape of landfill gas. Areas where there are cracks or where vegetation appears stressed should be tested with a portable explosive gas detector. Any areas of the final cover which may have been damaged should be repaired and steps should be taken, such as the installation of additional gas vents, to avoid future damage. Areas around the waste mass where gas is found to be escaping should be tested with a portable explosive gas detector to determine whether they indicate pathways by which explosive gas is migrating off-site. If so, the Town Engineer shall be contacted and additional measures should be taken to prevent off-site migration, such as construction of on-site gas barriers. The percentage of explosive gas emanating from gas vents should be measured to indicate the effectiveness of the gas vents.

All gas monitoring should be performed when the atmospheric pressure is low (below 29.92 inches of mercury). Atmospheric pressure should be recorded along with other monitoring results.

Section 3.0 REGULATORY AGENCIES

The landfill closure is under the constant regulatory review of the New York State Department of Environmental Conservation.

New York State Dept. of Environmental Conservation
(NYSDEC) Region 3
21 South Putt Corners Road
New Paltz, NY 12561
(914) 256-3137

Contact: Alan Fuchs Sanitary Engineer

NOTE: Spill Emergency Hotline # is 1-800-457-7362

The operator shall conduct all sampling, monitoring, and reporting requirements related to landfill closure monitoring in accordance with the approvals and permits issued by NYSDEC.

Section 4.0 CONTINGENCY PLAN

Under most circumstances, the visits to the landfill should consist of a combination walk through/drive through to observe all major components of the closed facility as previously referenced heretofore. It is anticipated that the site should be relatively free from catastrophic emergencies. However, this contingency plan should be employed by the operator to deal with unexpected, but reasonably possible emergency events. These might include, but are not limited to fire, vandalism, differential settlement, leachate line breaks or leachate spills. The site operator shall at all times of inspection, carry appropriate keys to gain access to the access road gate in case of emergency. In case of any emergency, the contingency plan will be for the landfill operator to immediately contact the Town Engineer, followed by the immediate contact of the appropriate emergency response agency. The NYSDEC regional office shall be notified within forty-eight (48) hours of any corrective action taken. All problems encountered and the corrective measures taken during the calendar year should be included in the annual report. The key plan for this action will be as follows:

EVENT	ACTION	AGENCY
Fire	Call	Fire Dept.
Vandalism	Call	Police
Erosion	Call	Highway Dept.
Leachate line break	Call	Town Engineer
Leachate spill	Call HOTLINE	NYSDEC
Differential settling	Call	Town Engineer
Odor of methane	Call	Town Engineer
High leachate level	Call	Leachate hauler

By immediately contacting these agencies, the situation will be assessed by professional trained personnel and other appropriate equipment and personnel can be dispatched to the site to effectuate the necessary repairs. In this fashion, it is hoped that the closed facility will remain in tact for its service life and any unexpected emergencies can be mitigated to reduce adverse environmental impacts. The emergency phone numbers for the referenced agencies are listed directly below.

Section 5.0 PHONE DIRECTORY AND SITE ACCESS

In order to assist the operator in emergency and routine operation and maintenance of the facility the following directory of phone numbers have been compiled:

- | | |
|-------------------------------------|-----------------|
| 1) Fire Department | 914 876-2100 |
| | or 914 471-1414 |
| 2) Ambulance | 914 876-2100 |
| 3) New York State Police | 914 876-4033 |
| 4) Dutchess County Sheriff | 914 452-0400 |
| 5) Town of Rhinebeck Police | 914 452-0400 |
| 6) Town of Rhinebeck Town Hall | 914 876-3409 |
| 7) Town of Rhinebeck Highway Garage | 914 876-6263 |
| 8) Dan Wheeler, P.E. | 914 758-3926 |
| 9) Mike Moskiewicz, P.E. | 914 758-3926 |

Keys for access to the landfill property and to the monitoring wells are available at the town engineer's office. Please contact Mike Moskiewicz at the above office for access to the landfill or monitoring wells.

Section 6.0 GROUNDWATER AND SURFACE WATER SAMPLING PLAN

The proposed groundwater sampling plan has been developed based on a review of the approved "Municipal Subsurface Investigation Report Town of Rhinebeck, Dutchess County, New York". This report was prepared by Clough, Harbour and Associates. The report was approved by the NYSDEC.

Based on the investigation, conclusions, sample results and the groundwater flow net at the Rhinebeck Landfill, it is proposed to test the following wells during the post closure period:

- | | |
|-------------------|--------------------|
| 1) Existing MW-2S | 6) Existing MW-9S |
| 2) Proposed MW-3D | 7) Existing MW-10S |
| 3) Existing MW-5D | 8) Existing MW-11D |
| 4) Existing MW-7S | 9) Existing MW-12S |
| 5) Existing MW-8D | |

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It is believed that by testing these wells, along with surface water testing, there will be adequate coverage to evaluate any impacts which may be attributable to the existence of the landfill. It is proposed that the Town Engineer will oversee the sampling and testing of the wells, but that the sample collection and analysis will be contracted to a New York State approved testing laboratory.

The samples will be collected utilizing protocols and procedures approved by the United States Environmental Protection Agency (USEPA) and the NYSDEC. These will include equipment, necessary well evacuation, holding times and sample trip blanks. Necessary chain of custody documentation will be provided.

It is proposed to test all nine (9) wells for baseline parameters one (1) time per year. This would be performed in the first quarter of each calendar year. For the remaining three (3) quarters of the year, the routine parameters would be tested. At this point in time, it is proposed to initiate well sampling and testing in 1995. The sampling schedule would be approximately as follows:

- | | |
|-----------------------------|-------------------|
| 1) Collect baseline samples | June 1, 1997 |
| 2) Collect routine samples | September 1, 1997 |
| 3) Collect routine samples | December 1, 1997 |
| 4) Collect routine samples | March 1, 1998 |

It would be proposed to follow the same sample schedule, in general, from year to year. Dates may fluctuate based on specific events, but overall sampling consistency would be our goal.

At the time of submission of an annual report, the dates for the upcoming year would be targeted.

The list of parameters which constitutes routine and baseline parameters is attached herewith as excerpted from the current Part 360 regulations.

Groundwater sampling shall continue as outlined above for a minimum of thirty (30) years from the date of final landfill closure.

SECTION 7.0 WATER SAMPLING PROTOCOL

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Prior to the collection of each groundwater sample the water table elevation in each monitoring well will be measured and recorded. Based on the amount of ground water contained in the well casing, three (3) times the calculated volume of stored water will be removed prior to obtaining a representative groundwater sample for analysis. In the event that the well is bailed dry prior to evacuating three (3) volumes of storage the well will be allowed to recharge and a representative sample will be collected.

A sanitized disposable polyethylene bailer with a dedicated piece of polycord shall be utilized to obtain a ground water sample from each of the monitoring wells. A new disposable bailer shall be utilized on each monitoring well to reduce the possibility of cross-contamination. In addition, the instrument utilized to determine the water elevation shall be rinsed with deionized water rinse, then washed with hexane, air dried, and once again rinsed with deionized water to reduce the possibility of cross-contamination.

Due to the possibility that the monitoring wells and water table may be deeper than would be considered practical to evacuate with a bailer, it may be necessary to employ a hand or mechanical pump to purge the well. If this procedure is utilized, a piece of polyethylene tubing and footvalve, will be dedicated to each of the monitoring wells to prevent the occurrence of cross-contamination. If a mechanical pump is utilized to purge the well, the pump shall be equipped with a ball valve to limit the well evacuation flow and thus aid in limiting the amount of turbidity caused by the well purging.

Surface water samples shall be taken from midway between the water surface and stream bottom. Care should be taken not to include bottom sediment in the surface water sample. Similar precautions should be taken to avoid cross contamination as in the well sampling procedure.

Field measurements shall be made on each representative groundwater and surface water sample and will include temperature, pH, Eh, and specific conductance.

Based on the ground water sampling data that has been received from the Subsurface Investigation Report, it appears that only slightly elevated levels of leachate indicators, are present. If these levels are found in the future to substantially increase, the town engineer shall recommend that all water evacuated from the wells be retained in a liquid tight container and disposed of at a local waste water

treatment plant.

The well sampling system will be properly sanitized before each use. All samples shall be stored on ice in a cooler and transported with a completed chain of custody form to a NYSDEC technically accepted laboratory. A field blank will also be submitted to the analytical laboratory for Quality Assurance/Quality Control purposes.

A summary of all environmental monitoring points may be found in Appendix C.

SECTION 8.0 POST CLOSURE MONITORING WELL INSTALLATION WORKING PLAN

Pursuant to the hydrogeologic comments received from the NYSDEC region 3 office, it is required that the Town of Rhinebeck install one (1) additional monitoring well to comply with the horizontal well separation requirements as set forth in NYSDEC Part 360. These new monitoring well shall become part of the monitoring well network and become part of the required sampling.

The new monitoring wells shall be installed within ninety (90) days following the completion of the final cover system. The new monitoring wells shall be located as indicated on the closure plans. The proposed monitoring well MW-3D shall be a deep well into bedrock.

The monitoring wells shall consist of a two (2") inch diameter schedule 40 PVC riser pipe and screen section. The screen section shall be ten (10') feet long and shall contain #10 slots. The riser pipe section length will be dictated by the subsurface conditions encountered in the borehole. All screen and riser pipe sections are to be connected with flush-mounted threaded couplings, and in no instance shall glue or joint compound be allowed. The monitoring well shall have sufficient length of riser pipe to extend two (2) to three (3) feet above the ground surface.

For the proposed monitoring well, a sand pack consisting of #1 whitehead sand or equal will be placed around the screen from the base of the boring to an elevation of one (1') foot above the top of the screen. A second layer of #00 white head sand shall then be placed around the riser pipe, for a depth of one (1) foot as illustrated in the attached figure. Alternately, the proposed well may be installed using an open

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borehole type construction. The open borehole type construction will consist of a steel casing 5-10 feet into competent rock and an open borehole length of less than 20 feet.

Over the sand pack or into the bedrock, a minimum two (2') foot layer of bentonite in powder or pellets shall be placed around the riser pipe. The remaining borehole will be backfilled using a cement/bentonite grout which will be tamped in place to a depth of about three (3') feet from the surface. A length of four (4") diameter, protective steel casing will be installed over the monitoring wells and grouted inside and out with a cement slurry. The protective casing shall be equipped with a locking cover and lock that can be opened with a key. The PVC cap placed on the PVC riser is to be vented with a 1/8 inch diameter drill hole placed concentrically on the cap end.

Four (4") inch steel casing or minimum 4 1/4 inch inside diameter hollow stem auger will be advanced concurrently with soil sampling for the new monitoring well. The shallow boring shall be terminated as directed by the Town Engineer. Split spoon samples shall be removed in accordance with the procedure outlined in ASTM-D1586, 1984. Split spoon samplers shall be steam cleaned prior to each use. Samples shall be collected at continuous intervals to characterize the stratigraphic sequence and to determine the depth of overburden. Description of soils using the Unified Classification System shall be completed by a geologist and shall be presented in a field log.

Once the confirmation of bedrock has been completed, a rock core shall be obtained from the bore, to assess the rock type and quality and to access the bedrock aquifer for monitoring. A total of ten (10') feet of core shall be removed from the bore. Sampling of bedrock shall be performed with using a NX double-tube diamond core barrel with a non-rotating inner barrel in accordance with ASTM D-2113. Descriptions of the rock core, including rock type, bedding, fracturing, hardness, and rock quality designation, shall be completed and a test core report shall be completed.

In moving from one boring location to another, all drilling equipment including drill pipe, and sampling spoon, etc., must be cleaned of all foreign matter, and sanitized with a high-velocity steam cleaner. The split spoon must be cleaned with a laboratory grade detergent and rinsed with deionized water before initial use and after each sample before

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reintroduction into the borehole. In addition, all monitoring well materials used for monitoring well development will be steam cleaned before being placed in the borehole.

During the drilling of the boreholes, monitoring of air quality at the top of the drill stem using a combustible gas (methane) monitor and HNU meter to test for organic vapors, will be utilized to identify hazardous conditions for the personnel.

No earlier than 24 hours after the completion of the monitoring well, the well shall be developed by pumping, and surging, either mechanically or with an air line. The monitoring well shall be developed until the turbidity of the recovered well water is less than 50 Nephelometric Turbidity Units (NTU's) as measured by a portalab turbidimeter.

Five (5) days prior notice must be provided to the NYSDEC prior to the installation of the monitoring well. The sampling of for the water quality analysis will be performed within two (2) weeks following the development of the monitoring well. The initial water quality analysis will consist of a complete NYSDEC baseline scan as outlined in the attached table, and in conformance with the groundwater sampling protocol in section 7.0.

APPENDIX A:
WATER QUALITY ANALYSIS TABLE

WATER QUALITY ANALYSIS TABLES

ROUTINE PARAMETERS¹

Common Name ²	CAS RN ³	Suggested Methods	PQL ⁴ ($\mu\text{g/l}$)
Field Parameters:			
Static water level..... (in wells and sumps)			
Specific Conductance.....		9050	
Temperature.....			
Floater or Sinkers ⁵			
pH.....		9040 9041	
Eh.....			
Dissolved Oxygen ⁶			
Field Observations ⁷			
Turbidity.....		180.1	
Leachate Indicators:			
Total Kjeldahl Nitrogen...		351.1 351.2 351.3	60
Ammonia.....	7664-41-7	351.4 350.1 350.2 350.3	200 60 100
Nitrate.....		9200	
Chemical Oxygen Demand....		410.1 410.2 410.3 410.4	50000 50000 50000 80000
Biochemical Oxygen Demand (BOD ₅).....		405.1	2000
Total Organic Carbon.....		9060	
Total Dissolved Solids....		160.1	40000
Sulfate.....		9035 9036 9038	
Alkalinity.....		310.1 310.2	20000 6000
Phenols.....	108-95-2	8040	
Chloride.....		9250 9251 9252	
Bromide.....		320.1	2000
Total hardness as CaCO ₃ ...		130.1 130.2	20000 30000

ROUTINE PARAMETERS¹

Common Name ²	CAS RN ³	Suggested Methods	PQL ⁴ (µg/l)
Inorganic Parameters:			
Cadmium.....	(Total)	6010 7130 7131	40 50 1
Calcium.....	(Total)	7140	40
Iron.....	(Total)	7380	100
Lead.....	(Total)	7381 6010 7420 7421	4 400 1000 10
Magnesium.....	(Total)	7450	4
Manganese.....	(Total)	7460	40
Potassium.....	(Total)	7461	0.8
Sodium.....	(Total)	7610 7770	40 8

The department may modify this list as necessary.

Notes

¹This list contains parameters for which possible analytical procedures are provided in EPA Report SW-846 Test Methods for Evaluating Solid Waste, third edition, November 1986, as revised December 1987, and Methods for Chemical Analysis of Water and Wastes, USEPA-600/4-79-020, March, 1979. The regulatory requirements pertain only to the list of parameters; the right hand columns (Methods and PQL) are given for informational purposes only. See also footnote 4.

²Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

³Chemical Abstracts Service Registry Number. Where "Total" is entered, all species in the groundwater that contain this element are included.

⁴Practical Quantitation Limits (PQLs) are the lowest concentrations of analytes in groundwaters that can be reliably determined within specified limits of precision and accuracy by the indicated methods under routine laboratory operating conditions. The PQLs listed are generally stated to one significant figure. PQLs are based on 5 ml samples for volatile organics and 1 L samples for semivolatile organics. CAUTION: The PQL values in many cases are based only on a general estimate for the method and not on a determination for individual compounds; PQLs are not a part of the regulation.

⁵Any floaters or sinkers found must be analyzed separately for baseline parameters.

⁶Surface water only.

⁷Any unusual conditions (colors, odors, surface sheens, etc.) noticed during well development, purging, or sampling must be reported.

BASELINE PARAMETERS¹

Common Name ²	CAS RN ³	Suggested Methods	PQL ⁴ (µg/l)
Field Parameters:			
Static water level..... (in wells and sumps)			
Specific Conductance.....		9050	
Temperature.....			
Floater or Sinkers ⁵			
pH.....		9040 9041	
Eh.....			
Dissolved Oxygen ⁶			
Field Observations ⁷			
Turbidity.....		180.1	
Leachate Indicators:			
Total Kjeldahl Nitrogen...		351.1 351.2 351.3 351.4	60
Ammonia.....	7664-41-7	350.1 350.2 350.3	200 60 100
Nitrate.....		9200	
Chemical Oxygen Demand....		410.1 410.2 410.3 410.4	50000 50000 50000 80000
Biochemical Oxygen Demand (BOD ₅).....		405.1	2000
Total Organic Carbon.....		9060	
Total Dissolved Solids....		160.1	40000
Sulfate.....		9035 9036 9038	
Alkalinity.....		310.1 310.2	20000 6000
Phenols.....	108-95-2	8040	
Chloride.....		9250 9251 9252	
Bromide.....	24959-67-9	320.1	2000
Total hardness as CaCO ₃ ...		130.1 130.2	20000 30000
Color.....		110.1 110.2 110.3	80

BASELINE PARAMETERS¹

Common Name ²	CAS RN ³	Suggested Methods	PQL ⁴ ($\mu\text{g/l}$)
Boron.....	7440-42-8		
Inorganic Parameters:			
Aluminum.....	(Total)	7020	10
Antimony.....	(Total)	6010	300
		7040	2000
Arsenic.....	(Total)	7041	30
		6010	500
Barium.....	(Total)	7060	10
		7061	20
Beryllium.....	(Total)	6010	20
		7080	1000
		6010	3
Cadmium.....	(Total)	7090	50
		7091	2
		6010	40
Calcium.....	(Total)	7130	50
Chromium.....	(Total)	7131	1
	(Total)	7140	40
		6010	70
Chromium (Hexavalent).....	18540-29-9	7190	500
		7191	10
		7195	
		7196	600
Cobalt.....	(Total)	7197	30
		7198	
		6010	70
Copper.....	(Total)	7200	500
		7201	10
		6010	60
Cyanide.....	(Total)	7210	200
Iron.....	(Total)	7211	10
		9010	200
Lead.....	(Total)	7380	100
		7381	4
		6010	400
Magnesium.....	(Total)	7420	1000
Manganese.....	(Total)	7421	10
		7450	4
Mercury.....	(Total)	7460	40
Nickel.....	(Total)	7461	0.8
		7470	2
Potassium.....	(Total)	6010	150
		7520	400
		7610	40

BASELINE PARAMETERS¹

Common Name ²	CAS RN ³	Suggested Methods	PQL ⁴ ($\mu\text{g/l}$)
Selenium.....	(Total)	6010 7740 7741	750 20 20
Silver.....	(Total)	6010 7760 7761	70 100 10
Sodium.....	(Total)	7770	8
Thallium.....	(Total)	6010 7840 7841	400 1000 10
Vanadium.....	(Total)	6010 7910 7911	80 2000 40
Zinc.....	(Total)	6010 7950 7951	20 50 0.5
Organic Parameters:			
Acetone.....	67-64-1	8260	100
Acrylonitrile.....	107-13-1	8030	5
Benzene.....	71-43-2	8260 8020 8021	200 2 0.1
Bromochloromethane.....	74-97-5	8260 8021	5 0.1
Bromodichloromethane.....	75-27-4	8260 8010 8021	5 1 0.2
Bromoform; Tribromomethane	75-25-2	8260 8010 8021	5 2 15
Carbon disulfide.....	75-15-0	8260	5
Carbon tetrachloride.....	56-23-5	8260 8010 8021	100 1 0.1
Chlorobenzene.....	108-90-7	8260 8010 8020 8021	10 2 2 0.1
Chloroethane; Ethyl chloride.....	75-00-3	8260 8010 8021	5 5 1

BASELINE PARAMETERS¹

Common Name ²	CAS RN ³	Suggested Methods	PQL ⁴ (µg/l)
Chloroform; Trichloromethane.....	67-66-3	8010 8021	0.5 0.2
Dibromochloromethane; Chlorodibromomethane....	124-48-1	8260 8010 8021	5 1 0.3
1,2-Dibromo-3-chloropropane; DBCP.....	96-12-8	8260 8011 8021	5 0.1 30
1,2-Dibromoethane; Ethylene dibromide; EDB.....	106-93-4	8260 8011 8021	25 0.1 10
o-Dichlorobenzene; 1,2-Dichlorobenzene.....	95-50-1	8260 8010 8020 8021 8120	5 2 5 0.5 10
p-Dichlorobenzene; 1,4-Dichlorobenzene.....	106-46-7	8260 8270 8010 8020 8021 8120 8260 8270	5 10 2 5 0.1 15 5 10
trans-1,4-Dichloro-2-butene.....	110-57-6	8260	100
1,1-Dichloroethane; Ethylidene chloride.....	75-34-3	8010 8021	1 0.5
1,2-Dichloroethane; Ethylene dichloride.....	107-06-2	8260 8010 8021	5 0.5 0.3
1,1-Dichloroethylene; 1,1-Dichloroethene; Vinylidene chloride.....	75-35-4	8260 8010 8021	5 1 0.5
cis-1,2-Dichloroethylene; cis-1,2-Dichloroethene..	156-59-2	8260 8021	5 0.2
trans-1,2-Dichloroethylene; trans-1,2-Dichloroethene.....	156-60-5	8260 8010 8021	5 1 0.5
1,2-Dichloropropane; Propylene dichloride.....	78-87-5	8260 8010 8021	5 0.5 0.05
cis-1,3-Dichloropropene...	10061-01-5	8260 8010	5 20
trans-1,3-Dichloropropene.	10061-02-6	8260 8010 8260	10 5 10

BASELINE PARAMETERS¹

Common Name ²	CAS RN ³	Suggested Methods	PQL ⁴ ($\mu\text{g/l}$)
Ethylbenzene.....	100-41-4	8020 8221 8260	2 0.05 5
2-Hexanone; Methyl butyl ketone.....	591-78-6	8260	50
Methyl bromide; Bromomethane.....	74-83-9	8010 8021	20 10
Methyl chloride; Chloromethane.....	74-87-3	8010 8021	1 0.3
Methylene bromide; Dibromomethane.....	74-95-3	8010 8021 8260	15 20 10
Methylene chloride; Dichloromethane.....	75-09-2	8010 8021 8260	5 0.2 10
Methyl ethyl ketone; MEK; 2-Butanone.....	78-93-3	8015 8260	10 100
Methyl iodide; Iodomethane	74-88-4	8010 8260	40 10
4-Methyl-2-pentanone; Methyl isobutyl ketone..	108-10-1	8015 8260	5 100
Styrene.....	100-42-5	8020 8021 8260	1 0.1 10
1,1,1,2-Tetrachloroethane.	630-20-6	8010 8021 8260	5 0.05 5
1,1,2,2-Tetrachloroethane.	79-34-5	8010 8021 8260	0.5 0.1 5
Tetrachloroethylene; Tetrachloroethene; Perchloroethylene.....	127-18-4	8010 8021 8260	0.5 0.5 5
Toluene.....	108-88-3	8020 8021 8260	2 0.1 5
1,1,1-Trichloroethane; Methylchloroform.....	71-55-6	8010 8021 8260	0.3 0.3 5
1,1,2-Trichloroethane.....	79-00-5	8010 8260	0.2 5
Trichloroethylene; Trichloroethene.....	79-01-6	8010 8021 8260	1 0.2 5
Trichlorofluoromethane; CFC-11.....	75-69-4	8010 8021 8260	10 0.3 5

BASELINE PARAMETERS ¹			
Common Name ²	CAS RN ³	Suggested Methods	PQL ⁴ (µg/l)
1,2,3-Trichloropropane....	96-18-4	8010 8021	10 5
Vinyl acetate.....	108-05-4	8260	15
Vinyl chloride; Chloro-ethene.....	75-01-4	8260 8010 8021	50 2 0.4
Xylenes.....	1330-20-7	8260 8020 8021 8260	10 5 0.2 5

The department may modify this list as necessary.

Notes

¹This list contains 47 volatile organics for which possible analytical procedures provided in EPA Report SW-846 Test Methods for Evaluating Solid Waste, third edition, November 1986, as revised December 1987, includes Method 8260; 25 metals for which SW-846 provides either Method 6010 or a method from the 7000 series of methods; and additional parameters for which possible procedures are provided in Methods for Chemical Analysis of Water and Wastes, USEPA-600/4-79-020, March, 1979. The regulatory requirements pertain only to the list of parameters; the right hand columns (Methods and PQL) are given for informational purposes only. See also footnote 4.

²Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

³Chemical Abstracts Service Registry Number. Where "Total" is entered, all species in the groundwater that contain this element are included.

⁴Practical Quantitation Limits (PQLs) are the lowest concentrations of analytes in groundwaters that can be reliably determined within specified limits of precision and accuracy by the indicated methods under routine laboratory operating conditions. The PQLs listed are generally stated to one significant figure. PQLs are based on 5 ml samples for volatile organics and 1 L samples for semivolatile organics. CAUTION: The PQL values in many cases are based only on a general estimate for the method and not on a determination for individual compounds; PQLs are not a part of the regulation.

⁵Any floaters or sinkers found must be analyzed separately for baseline parameters.

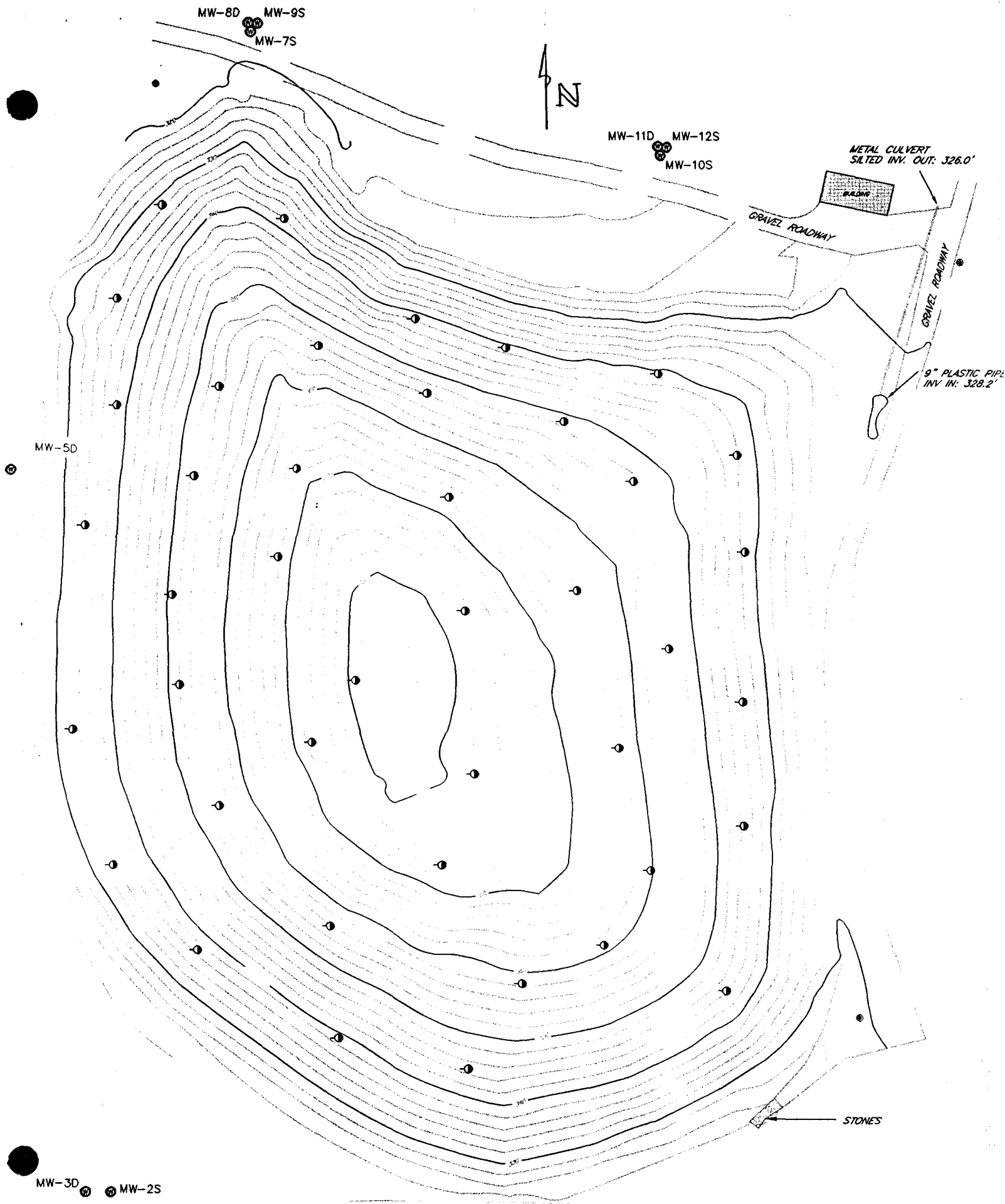
⁶Surface water only.

⁷Any unusual conditions (colors, odors, surface sheens, etc.) noticed during well development, purging, or sampling must be reported.

⁸The department may waive the requirement to analyze Hexavalent Chromium provided that Total and Hexavalent and Trivalent Chromium values do not exceed 0.05 mg/l.

APPENDIX B:

PLAN OF MONITORING WELL LOCATIONS



RHINEBECK LANDFILL MONITORING WELL LOCATIONS

APPENDIX C:
ENVIRONMENTAL MONITORING POINT SUMMARY

Environmental Monitoring Point: MW-2S

Location: South of Landfill

Date Installed: 3/21/90

Measuring Point Location: Top of PVC Riser

Measuring Point Elevation (ft msl): 327.0

Ground Surface Elevation (ft msl): 324.4

Hydro Stratigraphic Flow Regime Screened: Overburden Aquifer

Total Well Depth: 24.5 ft

Well Base Elevation (ft msl): 299.9

Well Screen Interval Depth: 6-21 ft

Well Screen Interval Elevation (ft msl): 318.4-303.4

Hydraulic Conductivity of Screened Interval: 0.03 ft/day

Anticipated Depth to Water: 3.25 ft

Anticipated Water Elevation (ft msl): 321.1

Recommended Purging and Sampling Methods: See Section 7.0 of the *Operations and Maintenance Manual* for a description of the recommended purging and sampling methods.

Environmental Monitoring Point: MW - 3D

Location: South of Landfill

Date Installed: September 12, 1997

Measuring Point Location: Top of PVC Riser

Measuring Point Elevation (ft msl): 326.4

Ground Surface Elevation (ft msl): 325.4

Hydro Stratigraphic Flow Regime Screened: Bedrock

Total Well Depth: 47.0 ft

Well Base Elevation (ft msl): 278.4

Well Screen Interval Depth: 31.6 - 46.6 ft

Well Screen Interval Elevation (ft msl): 278.8 - 263.8

Hydraulic Conductivity of Screened Interval: Not measured*

Anticipated Depth to Water: 17 ft

Anticipated Water Elevation (ft msl): 308.4

Recommended Purging and Sampling Methods: See Section 7.0 of the *Operations and Maintenance Manual* for a description of the recommended purging and sampling methods.

* Based on observations during well development, the hydraulic conductivity would be expected to be in the range of 0.01 to 0.15 ft/day.

Environmental Monitoring Point: MW - 5D

Location: West of landfill on east side of stream

Date Installed: Unknown

Measuring Point Location: Top of PVC Riser

Measuring Point Elevation (ft msl): 328.0

Ground Surface Elevation (ft msl): 326.0

Hydro Stratigraphic Flow Regime Screened: Bedrock Aquifer

Total Well Depth: 34.2 ft

Well Base Elevation (ft msl): 291.8

Well Screen Interval Depth: 29.2-34.2 ft

Well Screen Interval Elevation (ft msl): 296.8-291.8

Hydraulic Conductivity of Screened Interval: 1.3 ft/day

Anticipated Depth to Water: 9.3 ft

Anticipated Water Elevation (ft msl): 318.7

Recommended Purging and Sampling Methods: See Section 7.0 of the *Operations and Maintenance Manual* for a description of the recommended purging and sampling methods.

Environmental Monitoring Point: MW - 7S

Location: North of landfill, north side of road, near culvert

Date Installed: 4/26/90

Measuring Point Location: Top of PVC Riser

Measuring Point Elevation (ft msl): 323.3

Ground Surface Elevation (ft msl): 322.0

Hydro Stratigraphic Flow Regime Screened: Upper part of overburden aquifer

Total Well Depth: 14.2 ft

Well Base Elevation (ft msl): 307.8

Well Screen Interval Depth: 8.5-13.5 ft

Well Screen Interval Elevation (ft msl): 303.5-298.5

Hydraulic Conductivity of Screened Interval: 0.5 ft/day

Anticipated Depth to Water: 2.6 ft

Anticipated Water Elevation (ft msl): 320.7

Recommended Purging and Sampling Methods: See Section 7.0 of the *Operations and Maintenance Manual* for a description of the recommended purging and sampling methods.

Environmental Monitoring Point: MW - 8D

Location: North of landfill, north side of road, near culvert

Date Installed: 4/10/90

Measuring Point Location: Top of PVC Riser

Measuring Point Elevation (ft msl): 323.3

Ground Surface Elevation (ft msl): 322.0

Hydro Stratigraphic Flow Regime Screened: Bedrock aquifer

Total Well Depth: 51 ft

Well Base Elevation (ft msl): 271

Well Screen Interval Depth: 41.0-51.0 ft

Well Screen Interval Elevation (ft msl): 281.0-271.0

Hydraulic Conductivity of Screened Interval: 0.1 ft/day

Anticipated Depth to Water: 1.6 ft

Anticipated Water Elevation (ft msl): 321.7

Recommended Purging and Sampling Methods: See Section 7.0 of the *Operations and Maintenance Manual* for a description of the recommended purging and sampling methods.

Environmental Monitoring Point: MW - 9S

Location: North of landfill, north side of road, near culvert

Date Installed: 4/23/90

Measuring Point Location: Top of PVC Riser

Measuring Point Elevation (ft msl): 324.6

Ground Surface Elevation (ft msl): 322.2

Hydro Stratigraphic Flow Regime Screened: Middle of overburden aquifer

Total Well Depth: 25 ft

Well Base Elevation (ft msl): 297.2

Well Screen Interval Depth: 19.5-24.5 ft

Well Screen Interval Elevation (ft msl): 302.7-297.7

Hydraulic Conductivity of Screened Interval: 0.2 ft/day

Anticipated Depth to Water: 2.8 ft

Anticipated Water Elevation (ft msl): 321.8

Recommended Purging and Sampling Methods: See Section 7.0 of the *Operations and Maintenance Manual* for a description of the recommended purging and sampling methods.

Environmental Monitoring Point: MW - 10S

Location: North of landfill, north side of road, near maintenance building

Date Installed: 4/30/90

Measuring Point Location: Top of PVC Riser

Measuring Point Elevation (ft msl): 325.2

Ground Surface Elevation (ft msl): 324.2

Hydro Stratigraphic Flow Regime Screened: Upper part of overburden aquifer

Total Well Depth: 14 ft

Well Base Elevation (ft msl): 310.2

Well Screen Interval Depth: 8.5-13.5 ft

Well Screen Interval Elevation (ft msl): 315.7-310.7

Hydraulic Conductivity of Screened Interval: 0.1 ft/day

Anticipated Depth to Water: 3.6 ft

Anticipated Water Elevation (ft msl): 321.6

Recommended Purging and Sampling Methods: See Section 7.0 of the *Operations and Maintenance Manual* for a description of the recommended purging and sampling methods.

Environmental Monitoring Point: MW - 11D

Location: North of landfill, north side of road, near maintenance building

Date Installed: 3/22/90

Measuring Point Location: Top of PVC Riser

Measuring Point Elevation (ft msl): 325.5

Ground Surface Elevation (ft msl): 324.2

Hydro Stratigraphic Flow Regime Screened: Bedrock aquifer

Total Well Depth: 45 ft

Well Base Elevation (ft msl): 279.2

Well Screen Interval Depth: 33.0-45.0 ft

Well Screen Interval Elevation (ft msl): 291.2-279.2

Hydraulic Conductivity of Screened Interval: 9.3 ft/day

Anticipated Depth to Water: 3.4 ft

Anticipated Water Elevation (ft msl): 322.0

Recommended Purging and Sampling Methods: See Section 7.0 of the *Operations and Maintenance Manual* for a description of the recommended purging and sampling methods.

Environmental Monitoring Point: MW - 12S

Location: North of landfill, north side of road, near maintenance building

Date Installed: 4/27/90

Measuring Point Location: Top of PVC Riser

Measuring Point Elevation (ft msl): 325.9

Ground Surface Elevation (ft msl): 324.2

Hydro Stratigraphic Flow Regime Screened: Lower part of overburden aquifer

Total Well Depth: 27 ft

Well Base Elevation (ft msl): 297.2

Well Screen Interval Depth: 21.5-26.5 ft

Well Screen Interval Elevation (ft msl): 302.7-297.7

Hydraulic Conductivity of Screened Interval: 0.5 ft/day

Anticipated Depth to Water: 3.4 ft

Anticipated Water Elevation (ft msl): 321.6

Recommended Purging and Sampling Methods: See Section 7.0 of the *Operations and Maintenance Manual* for a description of the recommended purging and sampling methods.

Environmental Monitoring Point: S-2

Location: Downstream end of culvert on access road

Date Installed: N/A

Measuring Point Location: N/A

Measuring Point Elevation (ft msl): N/A

Ground Surface Elevation (ft msl): N/A

Hydro Stratigraphic Flow Regime Screened: Surface water

Total Well Depth: N/A

Well Base Elevation (ft msl): N/A

Well Screen Interval Depth: N/A

Well Screen Interval Elevation (ft msl): N/A

Hydraulic Conductivity of Screened Interval: N/A

Anticipated Depth to Water: N/A

Anticipated Water Elevation (ft msl): N/A

Recommended Purging and Sampling Methods: See Section 7.0 of the *Operations and Maintenance Manual* for a description of the recommended purging and sampling methods.