REVISED LANDFILL CLOSURE PLAN

TOWN OF MOREAU, NEW YORK

Prepared for

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CHAPTER 4

POST-CLOSURE MONITORING AND MAINTENANCE OPERATIONS

4.1 INTRODUCTION

The portion of the Town of Moreau landfill site which has been used for landfilling will have reduced utility in the future. Inactive landfills are generally unsuitable for agricultural usage or construction. Because a shallow root zone is necessary to maintain the integrity of the impermeable layer, the site cannot be reforested. Vegetation should, therefore, be limited to grasses and small non-woody plants. At this time, it is intended that the area will be maintained as an open space. It is anticipated that post-closure uses of the site will include only continued operation of the Town transfer station, the County recycling facility, and ongoing monitoring and maintenance of the closed landfill facility. There should be no public access to the landfill site. Other uses may be evaluated in the future, at which time they will be submitted to the NYSDEC for review and approval. In order to reduce potential liability and illegal dumping of waste, access control will be maintained, and the entire landfill site will be posted.

Following closure, a provision will be included in the property deed indicating the period of time during which the property has been used as a landfill, describing the wastes contained within, and noting that records of the facility have been filed with the department. The deed will also reference a map which shall be filed with the County clerk and which will clearly indicate the limits of the landfilled areas within the property boundary. The deed will also indicate that the use of the site is restricted to uses that shall not disturb the integrity of the final cover, any other components of the containment system, the function of the monitoring or environmental control systems, or increase the potential threat to human health or the environment.

4.2 MONITORING REQUIREMENTS

6 NYCRR Part 360 specifies a 30-year minimum post-closure monitoring period. During the first five years, annual baseline and quarterly routine monitoring must be performed, at which time the town may request to modify the monitoring program. Considering that the original hydrologic

investigation was completed in 1991, that quarterly monitoring has been performed since that time (seven years by final closure), and that data from the monitoring program has been relatively consistent, the town may approach the NYSDEC prior to five years after closure, provided results remain consistent, to revise the monitoring program. The protocol used to collect, preserve, and transport water samples is included in Appendix H, Field Sampling Procedures.

A. **Groundwater Monitoring.** The current groundwater monitoring program includes six groundwater monitoring points, three surface water points, and one sample of the public water supply which is collected from a production well at the town's water supply. The location and identification of the groundwater (EHC-1S, EHC-2S, MW-3, MW-4, MW-5, and MW-6) are shown on Sheet 1. In order to rotate the baseline parameter sampling event one quarter each year, four routine analyses are performed for each baseline event. This program will continue through the final closure of the landfill and until a revised program is approved by the NYSDEC. Parameters for each sampling event are identified in Table 4-1.

The monitoring requirements have two special provisions which may be waived by NYSDEC in the future. First, PCB analysis will take place at all groundwater and surface water locations for every sampling event. Second, hexavalent chromium will be sampled each quarter at surface water location S-1.

B. **Surface Water Monitoring.** There are three locations at which surface water samples shall be collected each quarter: (1) the flowing stream along the southern edge of the landfill, at the outfall at the southwestern edge of the property (S-1); (2) standing water in the wet area near Well MW-5; and (3) a wet area near Well MW-6S. The analytical program for surface water will coincide with the schedule established for groundwater.

As a special condition of the monitoring program, hexavalent chromium will be monitored every quarter at location S-1.

C. **Leachate Monitoring.** Leachate will be inspected visually on each groundwater-surface water monitoring visit. Although evidence of leachate outbreaks has been observed in the past, samples have not been collected. With partial closure and ongoing operations, leachate outbreaks are not anticipated. In the event that leachate is found, it will be tested for the parameters in Table 4-1.

Records of the leachate monitoring will be kept and submitted to the NYSDEC with the annual monitoring summary.

D. **Explosive Gas Monitoring.** Monitoring to date has identified the presence of explosive gas in monitoring points located near the toe of the landfill, as described in Section 1.4 of this report. Since the installation of the gas vents (March 1997), it appears that concentrations have dropped. The 11 gas monitoring points and on-site buildings will continue to be monitored and reported on a quarterly basis in accordance with 6 NYCRR Part 360. Monitoring with a portable detector should be performed when the ground surface has been wet or frozen for several days. Monitoring should be done below the wet or frozen zone. 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 the other monitoring results.

4.3 MAINTENANCE REQUIREMENTS

After construction of the landfill cap, the town will be responsible for maintenance of the cap and associated structures. The town anticipates that the majority of maintenance work required can be performed by the town staff, with town equipment. In addition, many of the personnel have been involved in the ongoing work related to the closure and are familiar with the site. Highly specialized work, such as geomembrane repair, will be contracted out to a qualified contractor. Maintenance of the site is projected to continue for 30 years, but may be reduced with NYSDEC approval.

Routine maintenance and inspection checks will be conducted at least monthly. The post-closure field inspection report will be completed each time a site inspection is performed. A record of each inspection should be maintained by the town. A summary of maintenance results will be reported to the NYSDEC as part of the annual summary.

A. **Landfill Cap.** Areas of differential settlement can be anticipated over the maintenance period. Minor areas which do not exhibit ponding or significant movement of the cover soils will be left alone and monitored periodically. Areas of minor ponding will be corrected by adding additional soil materials to promote drainage. Areas of settlement where significant movement of cover soils or release of landfill gases are evident may require excavation to examine the condition of the geomembrane. Repairs to the cap will be made where necessary.

B. **Drainage Ditch.** The drainage ditch will be checked for failure or obstructions once in the spring and once in the fall, as well as after the occurrence of severe storms (greater than 1 inch per hour). The drainage ditch will be maintained free of obstructions, damaged or failed sections will be repaired, and sediment build-up removed. Areas on site which are consistently eroded by drainage will be repaired, and riprap or erosion blankets will be placed on them.

C. **Cover and Vegetation.** Post-closure cover maintenance will include, but will not be limited to:

1. Mowing the vegetation as required to maintain a healthy cover crop. In general, it is anticipated that mowing will be performed once during early spring (June) and again in early fall (September) in order to discourage the growth of woody plants.

2. Re-vegetating areas as needed; clearing of trees and brush at the boundary to limit infringement.

3. Repairing eroded or settled areas by adding soil and topsoil and then reseeding. Heavy equipment and vehicular traffic should be limited to the access road to prevent damage to the cap.

D. **Access Control.** Access control is to be maintained such that unauthorized entrance to the facility is prevented. This control will include repair or replacement of fences, gates and locks as needed. Access roads will be maintained and eroded areas will be repaired. No public access to the site will be necessary.

E. **Gas Venting System.** The gas venting system will be inspected for plugging and damage of the vent risers and return bends. If damage has occurred, the vent risers will be replaced from the connecting union (push-on joint). The basis of having the push-on joint in the barrier protection layer is such that if the gas vent riser needs to be replaced, it would not be necessary to damage the geomembrane. The replacement of the barrier protection layer will be by hand and hand tamped for compaction such that the replaced portion meets the performance of the original final cap.

TABLE 4-1

WATER QUALITY ANALYSIS TABLE

DESCRIPTION	GROUND AND SURFACE WATER		
	BASELINE PARAMETERS	ROUTINE PARAMETERS	EXPANDED PARAMETERS
FIELD PARAMETERS			
Static Water Level (in Wells and Sumps)	✓	✓	✓
Specific Conductance	✓	✓	✓
Temperature	✓	✓	✓
Floaters or Sinkers[1]	✓		
pH	✓	✓	✓
Eh	✓	✓	✓
Dissolved Oxygen[2]	✓	✓	✓
Field Observations[3]	✓	✓	✓
LEACHATE INDICATORS			
Total Kjeldahl Nitrogen (TKN)	✓		✓
Ammonia	✓	✓	✓
Nitrate	✓	✓	✓
Chemical Oxygen Demand (COD)	✓	✓	✓
Biochemical Oxygen Demand (BOD_5)	✓		✓
Total Organic Carbon (TOC)	✓	✓	✓
Total Dissolved Solids (TDS)	✓	✓	✓
Sulfate	✓	✓	✓
Alkalinity	✓	✓	✓
Phenols	✓	✓	✓
Chloride	✓	✓	✓
Total Hardness as $CaCO_3$	✓	✓	✓
Turbidity	✓	✓	✓
Color	✓		✓
Boron	✓		✓
METALS			
Potassium	✓	✓	✓
Sodium	✓	✓	✓
Iron	✓	✓	✓
Manganese	✓	✓	✓
Magnesium	✓	✓	✓
Lead	✓	✓	✓
Cadmium	✓	✓	✓
Aluminum	✓		✓
Calcium	✓	✓	✓

TABLE 4-1 (continued):

DESCRIPTION	GROUND AND SURFACE WATER		
	BASELINE PARAMETERS	ROUTINE PARAMETERS	EXPANDED PARAMETERS
METALS (CONT.)			
Toxic Metals[4] and Cyanide	√		√
Volatile Organics[5]	√		√
All Constituents Listed in 6 NYCRR Subpart 373-2, Appendix 33[6]			√
PCBs[7]			

The Department may modify this list as needed.

All samples must be whole and unfiltered, except as otherwise specified by the Department.

(1) Any floaters or sinkers found must be analyzed separately for baseline parameters.

(2) Surface water only.

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

(4) Hexavalent chromium will be analyzed every quarter at surface water location S-1. Toxic metals include antimony, arsenic, beryllium, barium, cadmium, chromium (total and hexavalent), copper, lead, mercury, nickel, selenium, silver, thallium, and zinc. (The 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.)

(5) Volatile organics are to be analyzed using USEPA Methods 601 and 602 as described in 40 CFR Part 136 (see Section 360-1.3 of this Part).

(6) Upon request of the applicant, the Department may waive the requirement to analyze for dioxins and furans (suggested Method 8280), where appropriate.

(7) PCBs will be sampled during each April (second quarter) event at all groundwater and surface water locations.

In addition, post-closure maintenance will 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. 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 prevent 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, additional measures should be taken to prevent off-site migration. These measures may include additional venting, additional interception trenches, or active landfill gas recovery. The percentage of explosive gas emanating from gas vents should be measured to indicate the effectiveness of the gas vents.

F. **Groundwater Monitoring Wells.** During routine inspections, the groundwater monitoring wells should be checked to assure that the locks, risers, and caps are in good condition. Any evidence of damage or tampering should be reported and repaired during the next sampling event.

G. **Explosive Gas Monitoring Points.** During routine inspections, the explosive gas monitoring points should be checked to verify that they are accessible and not damaged. Damaged points should be reported and replaced during the next sampling event.

H. **Erosion and Sediment Control.** To minimize sediment excursions off the landfill footprint, perimeter silt fencing will remain in place until a uniform stand of vegetation is established. Sediment buildup will be removed, as required, and damaged portions of the fence will be repaired or replaced.

4.4 POST-CLOSURE MONITORING AND MAINTENANCE COSTS

Annual costs related to ongoing post-closure O&M are summarized in Table 4-2 based upon the full 6 NYCRR Part 360 program. Adjustments will be required if subsequent reductions are requested and approved.

TABLE 4-2

ANNUAL MONITORING AND MAINTENANCE OPERATION COSTS

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
Environmental Monitoring				
Years 1-5[1]	1	Each	$54,000	$54,000
Years 6-15[2]	1	Each	35,400	35,400
Years 16-30[3]	1	Each	32,000	32,000
Maintenance				
Monthly site inspection	12	Days	325	3,900
Mowing	2	Each	3,000	6,000
ESTIMATED ANNUAL OPERATING AND MAINTENANCE COSTS Years 1-5 Years 6-15 Years 16-30				 **$63,900** **$45,300** **$41,900**

(1) Quarterly monitoring.
(2) Semi-annual monitoring
(3) Annual monitoring.

4.5 FINANCIAL ASSURANCE

Using the Local Government Financial Test (LGFT), the town submitted financial assurance documentation on March 31, 1998. This demonstration was accepted in a May 26, 1998 memorandum from the Department. The town is responsible to annually update the required information within 180 days of the close of the fiscal year to continue compliance.