Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS

New York State Department of Environmental Conservation
Operation & Maintenance Manual for the Prattsburg Landfill
Cap Site # 8-51-013
Region 8 Steuben County

☒ Approved ☐ Approved As Noted ☐ Resubmit With Revisions ☐ Disapproved

COMMISSIONER OF ENVIRONMENTAL CONSERVATION

Date 4/8/96

Designated Representative 4/8/96

Report

Prattsburg Landfill Cap Post-Closure Monitoring and Maintenance Operations Manual Steuben County, New York

March 1996

Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS

April 2, 1996

Mr. Vincent Spagnoletti
Commissioner
Steuben County Department of Public Works
3 East Pulteney Square
Bath, New York 14810

Re: Prattsburg Landfill, Steuben County
Post-Closure Monitoring and Maintenance Operations Manual
Site No. 8-51-013
S&W File No. 2985.0

Dear Mr. Spagnoletti:

In accordance with Task 18 (B) of our Amendment No. 3, dated October 1, 1992, we are pleased to submit the Post-Closure Monitoring and Maintenance Operations Manual, revised per the NYSDEC comment letter dated February 26, 1996.

The manual should be reviewed by the County so that they are aware of future responsibilities at the closed Prattsburg Landfill site.

Very truly yours,

Jeffrey H. Heath, P.E.
Director, Solid Waste Services

JHH/bat
Enclosures

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PRATTSBURG LANDFILL CAP

POST-CLOSURE MONITORING AND MAINTENANCE

OPERATIONS MANUAL

STEUBEN COUNTY, NEW YORK

Prepared for

STEUBEN COUNTY, NEW YORK

Howard B. LaFever

Prepared by

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March 1996

Project No. 42985ZA

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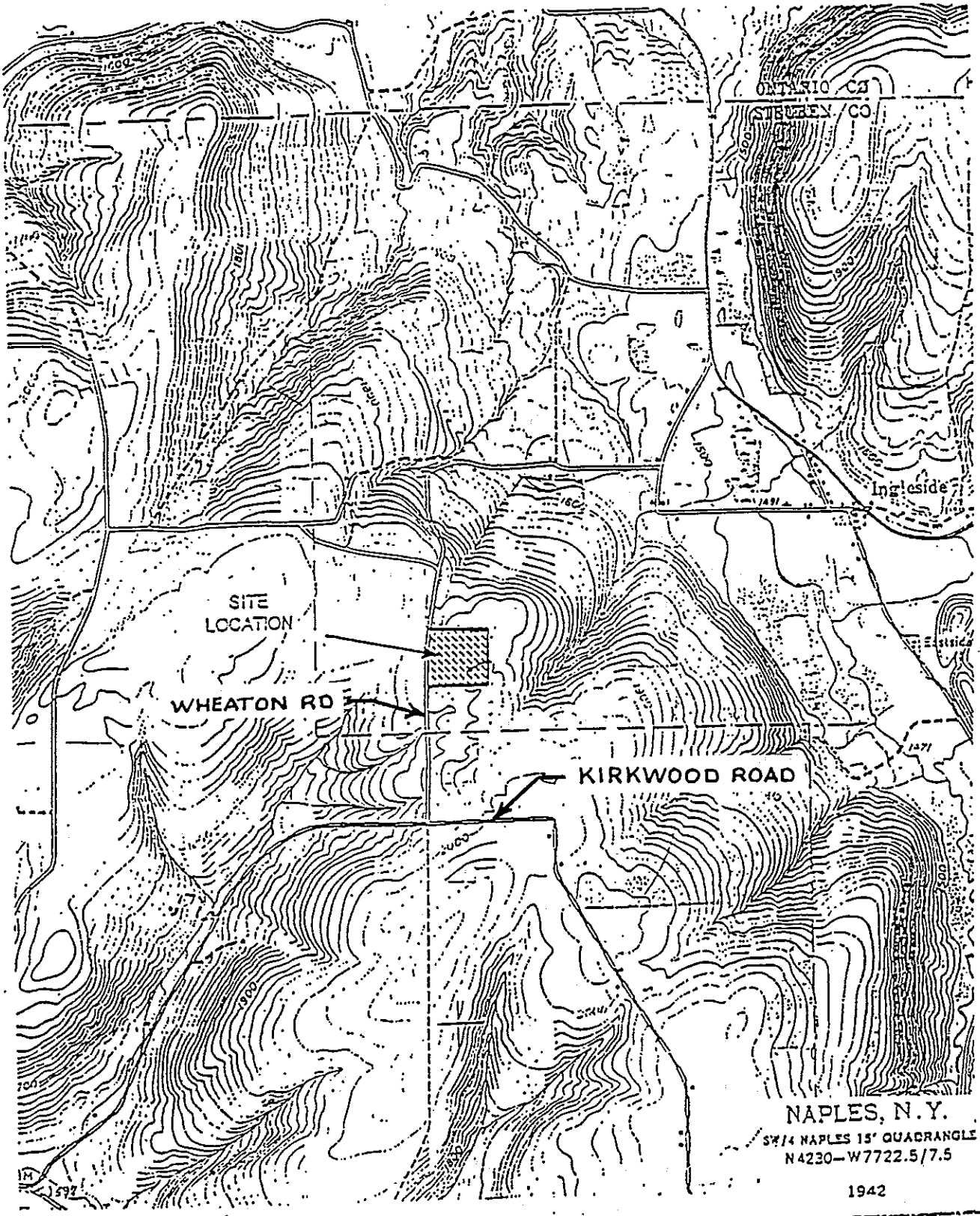
SECTION 1 - INTRODUCTION

The Prattsburg landfill is located on Wheaton Road in the Town of Cohocton, NY, as shown on Figure 1. The landfill occupies approximately 12 acres. Wheaton Road passes along the west side of the site, and the rest of the site is bordered by woods. The facility was originally operated by the Towns of Cohocton and Prattsburg. In 1976, the site was leased by Steuben County, which operated the site until 1986, when it was closed to refuse disposal. The Prattsburg Landfill has been classified by the NYSDEC as a Class 2 Inactive Hazardous Waste Site and is assigned No. 8-51-013. The 1986 Consent Order signed by Steuben County requires that a post-closure monitoring and maintenance operations manual be submitted which provides instructions for assuring efficient and safe management of the closed facility.

The Remedial Investigation/Feasibility Study (RI/FS) completed for the Prattsburg Landfill identified the extent of environmental impact and the most appropriate means of managing site-related contamination.

A number of volatile aromatic and halogenated organic compounds were identified at the Prattsburg Landfill, as well as several metals in groundwater that exceed state water quality standards. From the baseline risk assessment completed as part of the RI, there is presently no significant risk of exposure to landfill-related contamination under existing land use conditions. The only potential future risk of exposure is due to future installation of water supply wells in proximity to the landfill. The FS, therefore, focused on an effective management strategy for groundwater.

A number of remedial alternatives were evaluated in the FS. Based on that evaluation, it was concluded in the Record of Decision (ROD, March 1995) that the most appropriate remedial response would consist of a cap complying with the 1986 Consent Order, improved to include a low permeability layer, a barrier protection layer, and additional gas venting. A perimeter fence would also be installed to secure the site, and long-term monitoring would be implemented. Institutional controls, including the establishment of a buffer zone, were recommended, but at a minimum,



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DATE: 12/95 · JOB No.: 2985

PRATTSBURG LANDFILL
STEUBEN COUNTY, NEW YORK

FIGURE 1
SITE LOCATION

periodic water user surveys would be performed. An example residential water well survey form is included as Exhibit 8. When carried out, this remedial response and long-term monitoring program would effectively mitigate future risks associated with the landfill.

This manual addresses procedures and instructions on how to operate and maintain the Prattsburg Landfill's closure cap for a period after closure set by New York State Department of Environmental Conservation (NYSDEC) to be at least 30 years from November 14, 1995.

The closed landfill is to be inspected according to a schedule established by Steuben County. Initially, this will be at quarterly intervals. If Steuben County desires to change the inspection interval, the NYSDEC will be petitioned for their approval.

Inspections are to be by persons designated by the Steuben County Department of Public Works Assistant Landfill Commissioner. The inspections will be made by personnel who have been instructed by the Assistant Landfill Commissioner on how to fill out the inspection form and are experienced in landfill operations in Steuben County. Steuben County will ensure that personnel performing monitoring and maintenance activities at the site have the appropriate training and certifications in conformance with OSHA requirements. In order for the inspections to be complete and consistent, a checklist has been prepared and is included as Exhibit 1. It should be filled out in the field as the inspection occurs, and copied if necessary at a later time (should it be raining or snowing during this inspection).

Inspection reports are to be submitted to the Commissioner of Public Works as soon as possible after the inspection is completed. Inspection reports, as well as annual monitoring reports, will be sent to Mr. Gerald Rider, Jr., P.E., Chief, Operations, Maintenance and Support Section, Division of Hazardous Waste Remediation, NYSDEC, 50 Wolf Road, Albany, NY 12233-7010; and Ms. Mary Jane Peachey, Regional Hazardous Waste Remediation Engineer, NYSDEC, 6274 East Avon-Lima Road, Avon, NY 14414. The reports will indicate any matters which might need attention by the County. Should the inspection sheet be changed during the post-closure period, a revised copy will be sent to the NYSDEC.

SECTION 2 - POST-CLOSURE MAINTENANCE

The area of the site used for landfilling will have reduced utility in the future. Inactive landfills are generally not suitable for agricultural usage nor for construction. Due to the limitations of a shallow root zone to maintain the integrity of the impermeable layer, the site cannot be reforested. Vegetation should be limited to grasses and small non-woody plants. The area could be an open field, providing habitat for small animals.

Post-closure maintenance will include, but is not limited to, mowing the vegetation two times per year (to discourage woody plants). Additional mowings will be required if woody type plants are discovered during site inspections. The first mowing will be performed after the grass has gone to seed in the late spring and the second in the fall. If the mower operator notices signs of stressed vegetation, the NYSDEC will be notified. Post-closure maintenance will also include revegetating areas as needed, clearing of trees and brush at the boundary to limit infringement, repair or addition of topsoil in eroded or settled areas, and maintenance of gas ventilation systems. A 6-foot high fence and gate has been installed around the perimeter to limit access to the site. No further measures to control access are proposed except posting the site, periodic patrolling and inspections after closure.

Significant maintenance activities (not including mowing or drainage maintenance) performed should be detailed in the Site Maintenance Repair Form in Exhibit 3.

2.1 DRAINAGE SYSTEM

The sheet flow drainage system will be periodically checked for erosion. Inspections of the surface will occur as part of the quarterly inspections and after the occurrence of severe storms (precipitation greater than 1-inch per hour). Run-on and runoff controls at the site are designed to function during peak discharge from at least a 24-hour, 25-year storm. No run-on onto the capped area is anticipated, due to its elevation above the surrounding ground surface. Runoff is controlled primarily by a sheet flow into the surrounding wooded area from the grassed landfill cap. Due to the shallow slopes of the landfill, no drainage ditches were installed to direct water to collection points. Any concentrated flow of runoff will be controlled by installing riprap if evidence of continuing erosion persists. This alternative will be implemented when revegetation is not possible for the eroded area.

2.2 GAS VENT SYSTEM

The gas venting system will be inspected for plugging and damage of the vent risers and return bends during the quarterly site inspection. If damage has occurred, the vent risers will be replaced above the connecting union. Screens have been installed over the vent openings to deter tampering. During site inspections, any yellowed or stressed vegetation around the vents or across the site will be noted. In these cases, gas monitoring may be performed to determine gas concentrations.

2.3 COVER SYSTEM

Quarterly surveyance of the landfill surface will be made to note areas of erosion, dead vegetation, subsidence, or ponding water. These areas are to be noted on the field inspection report sheet (see Exhibit 1). If ponded areas or breaches greater than 2 inches in width or 4 inches in depth are found, their location should be recorded on the site plan included in the field inspection report sheet (see Exhibit 1). After consultation with NYSDEC, appropriate repair measures shall be promptly undertaken in accordance with cap repair protocol presented in Exhibit 2.

SECTION 3 - POST-CLOSURE GROUNDWATER MONITORING

The RI/FS identified groundwater as the only potential medium for transport of or exposure to site contaminants. To ensure continued protection of public health and the environment following landfill closure, a sampling and analytical program for groundwater will be implemented. A list of parameters consistent with the findings of the RI/FS and the ROD will be targeted for analysis.

The following sampling and analysis plan was developed to fulfull applicable requirements of 6 NYCRR Part 360 and Part 375 and will provide for an effective, long-term monitoring strategy for the closed facility. The effectiveness of the monitoring program, as it relates to the selected remedy, will be evaluated on a yearly basis and revised as appropriate, based on the ongoing collection and evaluation of site data.

3.1 GROUNDWATER MONITORING FACILITIES

The groundwater monitoring network for the site consists of a series of overburden and bedrock monitoring wells designed to allow sampling from the overburden and upper bedrock groundwater zones. A total of five overburden monitoring wells and six bedrock monitoring wells will be monitored on a semi-annual basis to determine the effectiveness of the selected remedy on local groundwater quality. The construction summary for these monitoring wells are included on Table 1. The locations of the wells is shown on site plan in Exhibit 1. Complete well construction details are provided on the well logs included as Exhibit 7 for the wells constructed during the RI/FS.

3.2 ANALYTICAL PROGRAM

A list of target analytes to be monitored is included in the Field Sampling and Analytical Plan (Exhibit 5) as presented in Exhibit 5-4. The list includes both organic and inorganic constituents, based on the parameters identified from previous site investigations. As indicated, analytical methods 8010 and 8020 will be used for the analysis for organics. NYSDEC 1991 ASP protocol will be observed for the post-closure analytical program.

3.3 MONITORING FREQUENCY

Semi-annual monitoring will be completed for the first five years of the post-closure period, and annual monitoring will take place thereafter, based on NYSDEC approval. During the entire post-closure monitoring period, including the first five years of monitoring, the monitoring program will be evaluated annually to assess its effectiveness and will be revised as appropriate, subject to NYSDEC approval.

3.4 GROUNDWATER MONITORING PROCEDURES

The monitoring program will be carried out according to the requirements of the Field Sampling and Analytical Plan, included as Exhibit 5. The plan addresses the monitoring program objectives and sampling procedures, including sample handling, shipping, and recordkeeping.

SECTION 4 - CONTINGENCY PLANS

The following contingency plans have been developed to address the potential problems associated with fires, vectors, dust, odor, adverse weather, accidents, illegal dumping, groundwater contamination, and leachate control during post closure. It is anticipated that the potential for these problems will be minimal due to proper closure procedures and limited use of the site. The intent is to allow Steuben County to be prepared for the worst-case scenario and to provide the appropriate course of action, depending on events which occur.

4.1 FIRE CONTINGENCY PLAN

In case of a fire at the landfill, the Prattsburg or Cohocton Volunteer Fire Department will be dispatched to the scene. Exhibit 4 lists the appropriate telephone numbers. The fire department will be prepared with appropriate equipment and personnel to properly handle anticipated emergencies at the landfill. Steuben County will contact the fire departments to make them aware of their responsibilities and ensure their response to an emergency call at the landfill.

Fire equipment would enter the landfill by the main access/entrance road. Access to any area of the site can be accomplished by traveling along the perimeter or, if needed, across the top of the cap. Due to the shallow cap grades, fire equipment should be able to travel across the cap, although care will be taken to observe if the fire equipment is settling into the upper cap layer.

All persons not authorized by the County will be kept from the area of a fire. Details of the fire will be maintained with Steuben County. The report will include the source of the fire and any accident report forms. Photographs may be obtained, if practical.

If waste is exposed during a fire or during fire-fighting operations, appropriate air monitoring and personal protective equipment levels will be implemented until any damage to the landfill cap is repaired. Appropriate equipment will include full turnout with Self Contained Breathing Apparatus (SCBA).

The fire department may encounter grass or tree fires at the site. It is possible that gases emitting from the vents could be concentrated enough to ignite. If a landfill gas or trash fire is experienced,

fire fighters should take precautions to avoid inhalation of fumes by using a SCBA. Due to the unknown content of debris in the landfill, the skin should be protected during a trash fire.

4.2 VECTOR CONTINGENCY PLAN

Vectors are expected to be minimal or non-existent after proper closure of the landfill. The landfill cap will provide adequate cover which should preclude vectors burrowing into waste for food.

As part of each inspection, evidence of vectors will be recorded in Item Nos. 20, 28, or 29 of the Post-closure Field Inspection Report and described in the comment section of that report.

In the event a problem does arise with vectors, particularly with rodents, an extermination program can be initiated. This task should be performed by licensed professionals.

4.3 DUST CONTROL CONTINGENCY PLAN

The closure of the landfill will include vegetation of the final cover. After vegetation is completed, problems of blowing dust should be eliminated. During the initial growth of the vegetative cover or during excessive dry periods, there may be potential for dust problems to develop during high winds. If this should precipitate complaints or present potential for erosion of the cover material, the area of concern will be periodically watered down to minimize the dust problem and any eroded cover material will be replaced and seeded.

4.4 ODOR CONTROL

After the closure of the landfill, odors are often detected from the venting of landfill gases. The odors decrease with the age of the landfill and are sometimes detectable off-site due to dispersion. If odor does become an off-site problem, the source can be located with a hydrogen sulfide meter. Measures that are often utilized to control odors from the vents include filters, flaring, collection, scrubbing of gases, and other treatment mechanisms.

It is not anticipated that odor complaints will be a problem due to the landfill's secluded location and its period of dormancy.

4.5 SEVERE WEATHER CONDITIONS

The closure of the landfill has been designed for adequate drainage and control of normal rain conditions. During severe weather conditions (heavy rainstorm), the integrity of the constructed cap and surrounding terrain may deteriorate in localized areas due to erosion. After the occurrence of a severe storm, an inspection of the landfill area will be conducted to check for erosion of the cover, or adjacent areas that could eventually affect the cover. In the event that areas of excessive erosion are found, actions will be taken to repair and return the damaged area to its proper state. If riprap is needed in areas of intense concentration, then it will be installed with a geotextile placed beneath it.

4.6 ACCIDENT PROCEDURES

The closure of the landfill should control access by unauthorized individuals. If an accident does occur, the following procedure will be followed:

1. **Injury When Victim is Not Incapacitated.** Authorized personnel who receive injuries that do not incapacitate them, such as minor burns, punctures, and sprains, will be given first aid at the site only when necessary. The victim will then be taken to the hospital emergency room for examination and treatment. The phone number of the hospital is included in Exhibit 4.

Unauthorized persons who receive injuries that are not incapacitating *should not* be given first aid at the site unless absolutely necessary for the well being of the victim. If possible, obtain all personal information about the victim for purposes of completing accident report forms. Instruct individual to go to his doctor for examination and required treatment. Inform police.

2. **Serious Injury.** First aid will be rendered only by individuals who have had first aid training. Give only that first aid which is necessary to prevent further harm to the accident victim. Seriously injured victims should not be moved unless they are in danger because of their location.

Be certain to obtain personal information about the accident victims in order to complete accident forms. If person is not authorized to be on the site, inform the police. An ambulance should be called to transport the victim to the hospital. Contact numbers are listed in Exhibit 4 for ambulance services.

3. **Procedures After An Accident.** County representatives will make a complete investigation of the accident, including occurrences which may have led up to the accident. The investigation will be started as soon as possible. All witnesses to the accident and persons involved in the accident will be interviewed.

After the facts about the accident have been compiled, a determination of probable cause(s) of the accident will be made and a report filed with Steuben County and, if appropriate, with their insurance carrier.

After a thorough investigation and determination of the causes, corrective steps will be taken if applicable so that the same type of accident will not reoccur. Corrective steps may include, but are not limited to, instruction to authorized personnel, safety precautions, and the elimination or repair of unsafe conditions.

4.7 ILLEGAL DUMPING

No wastes are allowed to be disposed of at the landfill. In the case that illegal dumping is observed to be taking place or has already taken place, the following procedures will be followed:

1. Whoever observes such dumping shall report the incident to the Steuben County Assistant Commissioner. The observer should take all possible care to:

   a. Avoid exposure to the material dumped.

   b. Observe where the material was dumped; by whom (make note of vehicle and individuals identifying characteristics); how much was dumped; whether containers were dumped and if they appear sound or leaking; what the material looks like and if any

smells were noticed. Such observation should only be made with extreme caution and with the utmost regard for safety.

c. If possible, ask the hauler where the material was picked up.

d. The observer will not try to detain the vehicle alone, but will immediately inform the Region 8 NYSDEC and, if possible, ask the driver of the vehicle to remain at the dumping point to ensure adequate vehicle identification. If the driver attempts to leave the dumping point, the observer will make note of any identifying information.

2. The Assistant Commissioner will:

a. Record all pertinent facts regarding the vehicle including, but not limited to: name of hauler, license plate number, County landfill permit number, where the load was picked up if known, any visible evidence of the identity of waste substance, quantity and state of substance (solid or liquid), and if contained or loose.

b. Maintain careful records of personnel service and other costs incurred as a result of the dumping incident including, but not limited to, security costs in isolating the area, costs of removal (by contract or otherwise) of the suspect material, costs of intermediate or ultimate treatment and/or disposal, and any other pertinent costs.

c. Notify NYSDEC Regional Solid Waste Engineer.

d. Where radioactive or hazardous waste is suspected, notify the New York State Department of Health.

e. Steuben County will be responsible for determining whether or not material is hazardous based on criteria of 6 NYCRR Part 371. If it is not hazardous, the material will be removed to a permitted waste disposal facility. If material is positively identified as hazardous, arrange for disposition according to NYSDEC procedures and in strict conformance with the requirements of 6 NYCRR Part 371. If known, the responsible party for dumping the waste will be notified and made responsible for cleanup.

4.8 SURFACE AND GROUNDWATER CONTAMINATION CONTINGENCY PLAN

The final closure will minimize the amount of precipitation and overland flows which infiltrate the landfill. This will reduce leachate contamination of the surface and groundwater in the immediate area. Continued monitoring of wells and leachate will facilitate determining whether any contaminants are migrating off site.

Semi-annual monitoring will be continued on groundwater and leachate for a minimum of five years following closure. Annual summary reports will be submitted to Mr. Gerald Rider, Jr., P.E., Chief, Operations, Maintenance and Support Section, Division of Hazardous Waste Remediation, NYSDEC, 50 Wolf Road, Albany, NY 12233-7010; and Ms. Mary Jane Peachey, Regional Hazardous Waste Remediation Engineer, NYSDEC, 6274 East Avon-Lima Road, Avon, NY 14414. Requirements for further analysis and reports to NYSDEC will be determined by the Department at the end of each year. Requirements may be reduced or expanded based on this review. If this sampling program determines that significant off-site migration of surface or groundwater contamination is occurring, then the potential threat to human health or the environment will be assessed. Factors contributing to this assessment include, but are not limited to:

1. Proximity of downgradient groundwater users.

2. Distance to environmentally sensitive surface waters or wetlands.

3. Evidence of environmental damage, including stressed vegetation, abnormal surface water algal growth, and animal deaths due to water consumption.

4. Deterioration of surface or groundwater quality.

If a potential threat is identified, then the following contingency plans can be implemented.

If nearby groundwater users are suspected to have been impacted, samples will be taken from the users' wells and analyzed for the same baseline parameters as the monitoring wells. The recommended sampling and analytical methods will be followed. A written report will be submitted to the NYSDEC and NYS Department of Health (NYSDOH) outlining the date, time, area sampled,

type of sample, methods of sampling and analysis, the person who originated the concern for contamination, and any actions to be taken. If drinking water standards are not exceeded, the analysis will be repeated on a periodic basis. If contaminant levels exceed the drinking water standards, the following procedures will be followed:

1. Verify the results in question by additional sampling and analysis within eight weeks of the receipt of the original data and prepare a Field Investigation Program (FIP). Submit all information to NYSDEC and NYSDOH.

2. If the above items indicate the need for further investigation (i.e., Part 703 groundwater standards are exceeded, or elevations of parameters significantly above ambient groundwater quality, whichever is higher), then the remedial action contingency plan will commence.

The remedial action contingency plan consists of the following three steps:

1. Complete an approved FIP (approval by NYSDEC within six months).

2. Prepare a report describing conclusions and recommendations within two months of the conclusion of the field investigation.

3. If remedial construction is required, begin remediation within one month of NYSDEC approval of plans and specifications.

Remedial actions may include, but are not limited to:

1. Further diverting flows away from the landfill to minimize leachate production and migration, pending approval from the NYSDOH and NYSDEC.

2. Providing a potable water source to residents whose existing water service is affected by the contaminants. Suitable containers should be provided and water supplied on an as-needed basis.

3. Recovering the contaminated water and/or collect the leachate and remove to a wastewater treatment plant, following approval by the NYSDOH and NYSDEC.

4. Reducing the quantity of leachate by leachate recirculation, which could be used as a secondary contingency, on a temporary basis. This contingency measure is not viewed as a permanent or long-term solution.

5. Treating leachate on site as a potential contingency measure, although it will not be recommended unless all other alternatives are found not to be viable.

6. Containing the plume by utilizing cut-off wall.

If a private well is constructed on any parcel adjacent to the landfill property within a 1/4-mile radius, the County will pay for the sampling and analyses of the well prior to usage. The analyses of these drinking water samples will be done for volatile organic compounds and metals. If chemical contaminants are detected in private wells above drinking water standards, additional sampling will be conducted immediately to verify contamination. If contaminants are confirmed, then treatment units for the affected wells will be negotiated.

4.9 EXPLOSIVE GAS CONTINGENCY PLAN

The landfill closure design includes the installation of gas vent risers to provide passive gas venting over the entire landfill. Periodically, a visual survey of the area should be conducted to locate signs of differential settlement, expansion of the geomembrane layer, vegetative stress, odors, septic soil, and hissing or bubbling gases which can define potential areas that are not being properly vented or are potential gas migration routes.

If necessary, an additional explosive gas survey could be conducted with a portable combustible gas meter and soil probe or auger. The soil probe would consist of a short section of PVC pipe which could be partially embedded in soil. Readings should be taken by digging a small pit, backfilling the pit around the pipe, covering the exposed end of the pipe with a paraffin film, allowing gases in the pipe to come to equilibrium, sticking the explosimeter through the paraffin, and recording the maximum reading obtained. If readings are taken in the area of the final cover, care should be taken

not to exceed a depth of 1 foot in order to protect the geomembrane from damage. Any final cover soils which need to be removed will be properly replaced. At no time will tests subject the LLDPE barrier layer to damage. Readings should be recorded in percent of the lower explosive limit (LEL) for methane. One hundred percent (100 percent) LEL corresponds to a methane concentration of 5 percent by volume.

The areal extent of the survey will include the landfill and approximately a 100- to 200-foot boundary outside the perimeter of the landfill. Readings obtained from the landfill area should not exceed the lower explosive limit (5 percent by volume) for gases detected at the property boundary or beyond it. A predetermined grid system should be implemented throughout the testing area. The increments of each block will be 100 feet and each junction can be used as a sampling point. In addition, sampling should be conducted at 100-foot intervals around the perimeter of the landfill to determine whether explosive gases are migrating off site. Other monitoring points should include areas next to access roads, adjacent to utility poles, and in the near proximity of any underground utilities, such as pipelines and cables, which can facilitate gas migration through porous backfill material. Investigations should also be conducted for explosive gases in structures located off site within a one-quarter mile radius. These readings should not exceed 25 percent of the lower explosive limit.

The extent of further soil gas surveys will be determined based on results of periodic investigations. Measurements of explosive gas levels should be plotted and contoured in order to evaluate areas of high concentrations and possible migration paths. This assessment should consider the distance to adjacent structures, observed off-site and on-site vegetation damage, and subsoil potential for promoting extensive lateral migration. Based on this information, the need for an active gas control system can be evaluated. If necessary, gas venting structures should then be designed and incorporated into the closure design for the entire area of the landfill to control post-closure migration of explosive gases off site.

Depending on the extent of the off-site gas migration, the potential gas control systems which can be used may include the following or a combination of the following:

1. Additional gas vent risers;

2. Perimeter passive gas collection system, which may include trenches keyed into an impermeable layer or seasonably low water table, or gas collection wells screened into the unsaturated zone; or

3. Conversion of the existing passive system to a flare system.

Installation of any of the above systems will be completed with the minimal amount of damage to the final cover system. Any damaged areas will be repaired and/or replaced with material which will provide equal performance. This will include resealing or patching the LLDPE layer as necessary. In all cases, the gas collection system should limit the explosive gas concentrations to 5 percent by volume at or beyond the property boundary or 1.25 percent at facilities on or off site within one-quarter mile. If excessive gas migration is occurring (greater than 5 percent by volume), then an additional gas monitoring survey may be necessary in addition to the gas venting system. The frequency of monitoring will be established in conjunction with the Region 8 NYSDEC office.

SECTION 5 - SITE HEALTH AND SAFETY PLAN

A. SITE DESCRIPTION

Date:	October 8, 1992 Revised: March 14, 1996
Location:	Wheaton Road, Cohocton, NY
Hazards:	Volatile organics in groundwater, landfill gas
Surrounding Population:	Rural residential
Topography:	Rolling hills
Weather Conditions:	Usually overcast, wind generally out of northwest

B.

Public Information Officer:	Rich Dunn, Steuben County
Site Safety Officer:	Rich Dunn, Steuben County
NYSDEC Representatives:	Jeff Konsella
	James Drumm

C. ON-SITE CONTROL. The Site Safety Officer has been designated to coordinate access control and security on site. A safe perimeter has been established at the site boundaries by means of a 6-foot high fence. No unauthorized personnel should be within this area.

The support zone will be all areas beyond the fenceline. The exclusion zone is areas within the fenceline.

D. HAZARD EVALUATION. The following substances are known or suspected to be on site. The primary hazards of each are identified.

SUBSTANCE	CONCENTRATIONS (IF KNOWN)	PRIMARY HAZARDS
Toluene	20	Headaches, nausea, dizziness
Benzene	9	Headache, giddiness, irritation
Ethylbenzene	420	Irritation, dizziness, headache
MEK	16	Headache, irritation, nausea, numbness of extremities
Tetrachloroethane	11	Irritation, headache, dizziness

Hazardous substance information form(s) for the involved substance(s) have been completed and are attached.

E. PERSONAL PROTECTIVE EQUIPMENT. Based on evaluation of potential hazards, the following levels of personal protection have been designated for the applicable work areas or tasks:

LOCATION	JOB FUNCTION	LEVEL OF PROTECTION
Fenced site	Water sampling	A B C (D) Other

Specific protective equipment for each level of protection is as follows:

Level A	Fully-encapsulating suit SCBA (disposable coveralls)
Level B	Splash gear (saranax-coated Tyvek suit) SCBA or airline respirators
Level C	Splash gear (Tyvek suit) Full-face canister respirator Boots Gloves Hard hat
Level D	Overalls Safety glasses Boots Gloves Hard hat

1. **Action Levels.** The following criteria shall be used to determine appropriate action:

Volatile Organics in Breathing Zone	Level of Respiratory Protection
0-5 ppm	Level D
5-200 ppm	Level C
200-1000 ppm	Level B - air line
1000+ ppm	Level B - SCBA

% Lower Explosive Limit (LEL)	Action
10-20	Use non-sparking tools and explosionproof electrical components
Above 25	Discontinue work and take remedial action

Should to to Level C upon detec tion if breathing zone >5 ppm on PID.

PCB Exposure	Respiratory Protection
<1 mg/m^3	Level C
>1 mg/m^3	Level B - air line
<500 mg/m^3	Level A - SCBA

The following protective clothing materials are required for the involved substances:

Substance (Chemical Name)	Material (Material Name, e.g., Viton)

If air purifying respirators are authorized, GMC-H is the appropriate canister for use with the involved substances and concentrations. A competent individual has determined that all criteria for using this type of respiratory protection have been met.

NO CHANGE TO THE SPECIFIED LEVELS OF PROTECTION SHALL BE MADE WITHOUT THE APPROVAL OF THE SITE SAFETY OFFICER.

2. **Protective Equipment.** This section describes hazardous level classifications. Table 2 shows minimum equipment requirements necessary for the specified protection levels.

TABLE 2

HAZARD LEVEL VS. EQUIPMENT

	LEVEL OF PROTECTION			
	A	B	C	D
Hard hat	√	√	√	√
Face shield/safety glasses			√	√
Boots	√	√	√	√
Inner gloves	√	√	√	
Outer gloves	√	√	√	
Work coveralls				√
Chemical-resistant coveralls			√	
Chemical-resistant suit		√		
Fully encapsulating suit	√			
Air purifying respirator			√	
SCBA/air-line respirator	√	√		
Two-way radio	√			

Regardless of level of protection, every field team should be equipped with a first aid kit including, but not limited to, bandages, compresses, tape, scissors, disinfectant and eyewash.

Level A

Level A protection should be worn when the highest available level of both respiratory, skin and eye contact protection is needed. While Level A provides the maximum available protection, it does not protect against all possible airborne or splash hazards. For example, suit materials may be rapidly permeable to certain chemicals in high air concentrations or heavy splashes.

Level B

Level B protection should be selected when the highest level of respiratory protection is needed, but cutaneous or percutaneous exposure to the small unprotected areas of the body (i.e., neck and back of head) is unlikely or where concentrations are known within acceptable exposure standards.

Level C

Level C protection should be selected when the type(s) and concentration(s) of respirable material is known or reasonably assumed to be not greater than the protection factors associated with air-purifying respirators; and if exposure to the few unprotected areas of the body (i.e., neck and back of head) is unlikely to cause harm. Continuous monitoring of site and/or individuals should be established to ensure this minimum protection level is still acceptable throughout the exposure.

Level D

Level D is the basic work uniform and should be worn for all site operations. Level D protection should only be selected when sites are positively identified as having no toxic hazards. All protective clothing should meet applicable OSHA standards.

All personal protective equipment used during the course of this field investigation must meet the following applicable OSHA standards:

TYPE OF PROTECTION	REGULATION	SOURCE
Eye and face	29 CFR 1910.133	ANSI Z87.1-1968
Respiratory	29 CFR 1910.134	ANSI Z88.1-1980
Head	29 CFR 1910.135	ANSI Z89.1-1969
Foot	29 CFR 1910.136	ANSI Z41.1-1967

ANSI = American National Standards Institute

Level C respiratory protection consists of wearing a full-face air purifying respirator with compound specific cartridges. Both the respirator and chemical cartridges must be approved by NIOSH and MSHA.

Air purifying respirators cannot be used under the following conditions:

- Oxygen deficiency.

- IDLH concentration.
- High relative humidity.
- Contaminant levels exceed designated maximum use concentrations.
- Poor warning properties.

Individuals who use air purifying respirators must wear a respirator which has been successfully fitted to their faces. An improperly-fitted respirator provides little respiratory protection. In the event that organic vapor levels exceed the upper limit for Level C protection (20 ppm), all field personnel are to stop work.

3. **Heat Stress.** The use of protective equipment may create heat stress. Monitoring of personnel wearing impermeable clothing should commence when the ambient temperature is 70°F or above. Table 3 presents the suggested frequency for such monitoring. Monitoring frequency should increase as the ambient temperature increases or as slow recovery rates are observed. Heat stress monitoring should be performed by a person with a current first aid certification who is trained to recognize heat stress symptoms. For monitoring the body's recuperative abilities to excess heat, one or more of the following techniques will be used. Other methods for determining heat stress monitoring, such as the wet bulb globe temperature (WBGT) index from American Conference of Governmental Industrial Hygienist (ACGIH) TLV Booklet can be used.

To monitor the worker, measure:

a. **Heart Rate.** Count the radial pulse during a 30-second period as early as possible in the rest period.

- If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one third and keep the rest period the same.

- If the heart rate exceeds 110 beats per minute at the next rest period, shorten the following work cycle by one third.

b. **Oral Temperature.** Use a clinical thermometer (three minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking).

- If oral temperature exceeds 99.6°F (37.6°C), shorten the next work cycle by one third without changing the rest period.

- If oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following cycle by one third.

- Do <u>not</u> permit a worker to wear a semi-permeable or impermeable garment when oral temperature exceeds 100.6°F (38.1°C).

4. **Prevention of Heat Stress.** Proper training and preventive measures will aid in averting loss of worker productivity and serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat-related illness. To avoid heat stress, the following steps should be taken:

TABLE 3

SUGGESTED FREQUENCY OF PHYSIOLOGICAL MONITORING
AND WORK/REST SCHEDULE
FOR FIT AND ACCLIMATIZED WORKERS[1]

ADJUSTED TEMPERATURE[2]	NORMAL WORK ENSEMBLE[3]	IMPERMEABLE ENSEMBLE[4]
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5°-90°F (30.8°- 32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5°-87.5°F (28.1°-30.8°C)		After each 60 minutes of work
77.5°-82.5°C (25.3°-28.1°C)		After each 90 minutes of work
72.5°-77.5°C (22.5°C-25.3°C)		After each 120 minutes of work

(1) For work levels of 250 kilocalories/hour (light to moderate type of work).

(2) Calculate the adjusted air temperature (ta adj) by using this equation: ta adj °F = ta °F + (13 x % sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows).

(3) A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

a. Adjust work schedules.

- Modify work/rest schedules according to monitoring requirements.
- Mandate work slowdowns as needed.
- Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.

b. Provide shelter (air conditioned, if possible) or shaded areas to protect personnel during rest periods.

c. Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat, i.e., eight fluid ounces (0.23 liters) of water must be ingested for approximately every eight ounces (0.23 kg) of weight lost. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:

- Maintain water temperature at 50° to 60°F (10° to 16.6°C).
- Provide small disposable cups that hold about 4 ounces (0.1 liter).
- Have workers drink 16 ounces (0.5 liters) of fluid (preferably water or dilute drinks) before beginning work.
- Urge workers to drink a cup or two every 15 to 20 minutes or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight. Urge workers to salt their food appropriately.

d. Train workers to recognize the symptoms of heat-related illnesses.

e. Avoid alcohol consumption.

5. **Cold-Related Illness.** If work on this project begins in the winter months, thermal injury due to cold exposure can become a problem for field personnel. Systemic cold exposure is referred to as hypothermia. Local cold exposure is generally labeled frostbite.

a. **Hypothermia.** Hypothermia is defined as a decrease in the patient core temperature below 96°F. The body temperature is normally maintained by a combination of central (brain and spinal cord) and peripheral (skin and muscle) activity. Interferences with any of these mechanisms can result in hypothermia, even in the absence of what normally is considered a "cold" ambient temperature. Symptoms of hypothermia include shivering, apathy, listlessness, sleepiness and unconsciousness.

b. **Frostbite.** Frostbite is both a general and medical term given to areas of local cold injury. Unlike systemic hypothermia, frostbite rarely occurs unless the ambient temperatures are less than freezing and usually less than 20°F. Symptoms of frostbite are a sudden blanching or whitening of the skin; the skin has a waxy or white appearance and is firm to the touch; tissues are cold, pale and solid.

6. **Prevention of Cold-Related Illnesses**

a. Educate worker to recognize the symptoms of frostbite and hypothermia.

b. Identify and limit known risk factors:

- Prohibit phenothiazine use.
- Identify/warn/limit beta blocker use.

c. Assure the availability of enclosed, heated environment on or adjacent to the site.

d. Assure the availability of dry changes of clothes.

e. Develop capability for temperature recording at the site.

f. Assure the availability of warm drinks.

7. **Monitoring**. Start (oral) temperature recording at job site:

a. At the Field Team Leader's discretion when suspicion is based on changes in worker's performance or mental status.

b. At worker's request.

c. As a screening measure, two times per shift, under unusually hazardous conditions (e.g., wind-chill less than 20°F or wind-chill less than 30°F with precipitation).

d. As a screening measure whenever any one worker on the site develops hypothermia.

Any person developing moderate hypothermia (a core temperature of 91°F) cannot return to work for 48 hours.

8. **Air Monitoring Requirements.** Initial site monitoring will be required utilizing Level D protection. Prior to performing site activities, ambient air monitoring will be performed and site work zones will be established. Periodic monitoring will be performed when:

a. A different type of operation is initiated (e.g., groundwater sampling as opposed to well installation).

b. The weather conditions change.

c. Work begins on a different portion of the site.

d. At 5-foot intervals during well installation.

A photoionization detector and explosimeter will be the monitoring instruments used on site.

F. **COMMUNICATION PROCEDURES.** Continuous car horn blast is the emergency signal to indicate that all personnel should leave the Exclusion Zone.

The following standard hand signals will be used in case of failure of radio communications:

Hand gripping throat	Out of air; can't breathe
Grip partner's wrist or both hands around waist	Leave area immediately
Hands on top of head	Need assistance
Thumbs up	OK; I am all right; I understand
Thumbs down	No; negative

G. **DECONTAMINATION PROCEDURES.** Personnel and equipment leaving the fenced site shall be thoroughly decontaminated if levels of contamination were detected to require the use of protection. The standard Level D decontamination protocol shall be used.

Emergency decontamination will include the following stations: N/A.

The following decontamination equipment is required: N/A.

Normally, detergent and water will be used as the decontamination solution.

H. **SITE SAFETY AND HEALTH PLAN.**

1. **Emergency Medical Care.** Ira Davenport Hospital, Hammondsport Road, Bath, NY **(telephone 607-776-2141).** See Figure HSP-1 for route to hospital.

   Local ambulance service is from Cohocton Ambulance at **716-384-5152.** Whenever possible, arrangements should be made for on-site standby.

   List of emergency phone numbers:

Agency/Facility	Phone Number
Police (New York State)	(607) 776-2182
Fire (Cohocton)	(716) 384-5141
Hospital	(607) 776-2141
Ambulance (Cohocton)	(716) 384-5152

2. **Emergency Procedures.** The following standard procedures will be used by on-site personnel. The Site Safety Officer shall be notified of any on-site emergencies and be responsible for ensuring that the appropriate procedures are followed:

   a. **Personnel Injury in the Exclusion Zone.** Upon notification of an injury in the Exclusion Zone, the designated emergency signal, a continuous horn blast, shall be sounded. All site personnel shall assemble at the decontamination line. The rescue team

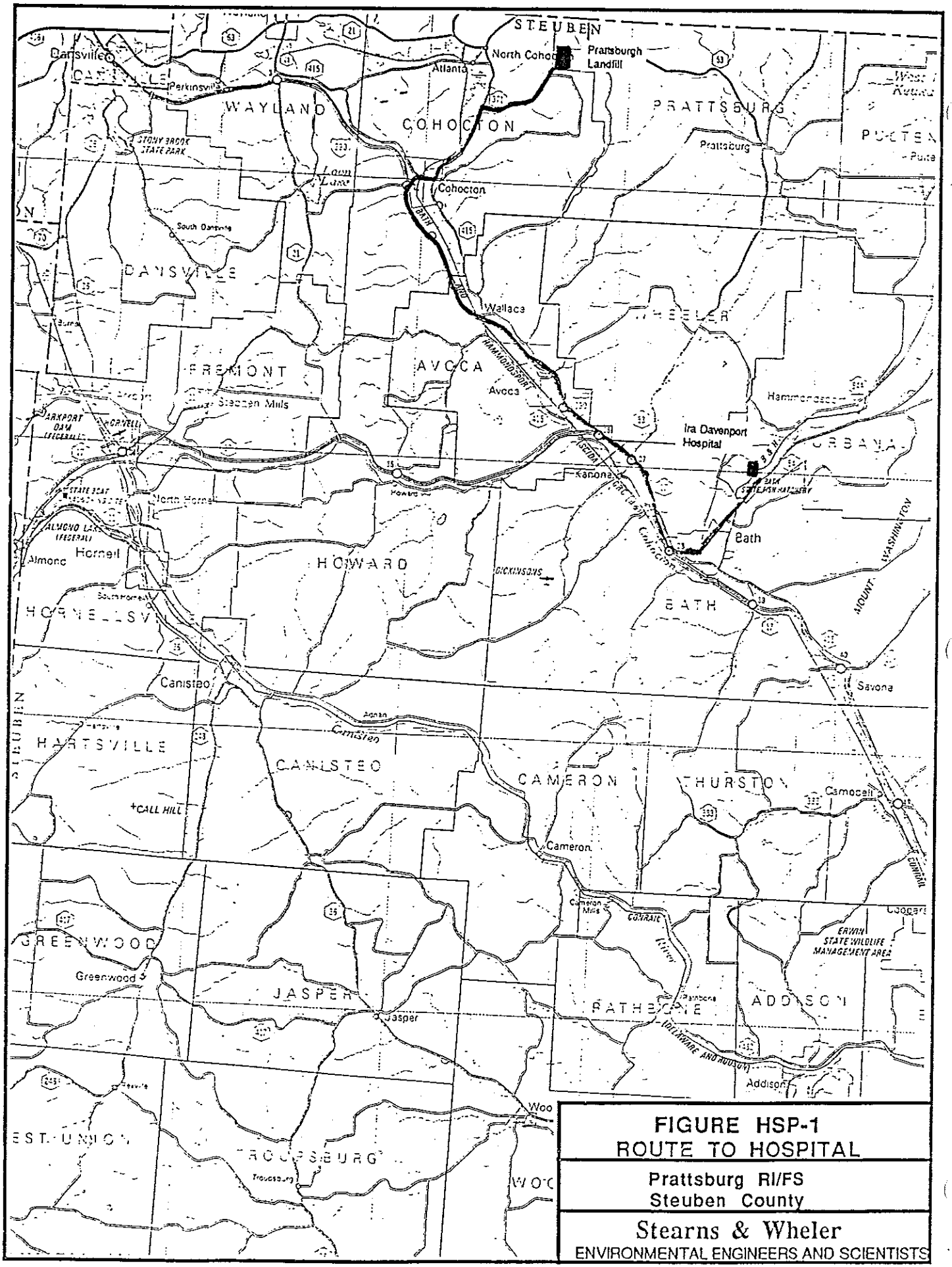


FIGURE HSP-1
ROUTE TO HOSPITAL

Prattsburg RI/FS
Steuben County

Stearns & Wheler
ENVIRONMENTAL ENGINEERS AND SCIENTISTS

will enter the Exclusion Zone (if required) to remove the injured person to the hotline. The Site Safety Officer should evaluate the nature of the injury and the affected person should be decontaminated to the extent possible prior to movement to the Support Zone. Appropriate first aid shall be initiated and contact should be made for an ambulance and with the designated medical facility (if required). No persons shall re-enter the Exclusion Zone until the cause of the injury or symptoms is determined.

b. **Personnel Injury in the Support Zone.** Upon notification of an injury in the Support Zone, the Site Safety Officer will assess the nature of the injury. If the cause of the injury or loss of the injured person does not affect the performance of site personnel, operations may continue. If the injury increases the risk to others, the designated emergency signal, a continuous horn blast, shall be sounded and all site personnel shall move to the decontamination line for further instructions. Activities on site will stop until the added risk is removed or minimized.

c. **Fire/Explosion.** Upon notification of a fire or explosion on site, the designated emergency signal, a continuous horn blast, shall be sounded and all site personnel assembled at the decontamination line. The fire department shall be alerted and all personnel moved to a safe distance from the involved area.

d. **Personal Protective Equipment Failure.** If any site worker experiences a failure or alteration of protective equipment that affects the protection factor, that person and his/her buddy shall immediately leave the Exclusion Zone. Re-entry shall not be permitted until the equipment has been repaired or replaced.

e. **Other Equipment Failure.** If any other equipment on site fails to operate properly, the Site Safety Officer shall be notified and then determine the effect of this failure on continuing operations on site. If the failure affects the safety of personnel or prevents completion of the Work Plan tasks, all personnel shall leave the Exclusion Zone until the situation is evaluated and appropriate actions taken.

In all situations, when an on-site emergency results in evacuation of the Exclusion Zone, personnel shall not re-enter until:

a. The conditions resulting in the emergency have been corrected.
b. The hazards have been reassessed.
c. The Site Health and Safety Plan has been reviewed.
d. Site personnel have been briefed on any changes in the Site Health and Safety Plan.

3. **Personal Monitoring.** The following personal monitoring will be in effect on site:

Personal exposure sampling: MicroTip PID screening, sampling pumps/tubes , or organic vapor monitors.

Medical monitoring: The expected air temperature will be less than 70°F. If it is determined that heat stress monitoring is required (mandatory if over 70°F), the following procedures shall be followed: Monitoring body temperature, body weight, pulse weight.

Chemical Fact Sheet*

Version 2

TETRACHLOROETHYLENE

* information in this sheet applies to workplace exposure resulting from processing, manufacturing, storing or handling and is not designed for the population at large. Any generalization beyond occupational exposures should not be made. The best industrial hygiene practice is to maintain concentrations of all chemicals at levels as low as is practical.

Chemical Names: Perchloroethylene, Ethylene tetrachloride, carbon dichloride; CAS 127-18-4.

Trade Names: Antisal, Dee Solv, Dav-Per, Ent 1860, PerSec, Tetranec and others.

Uses: Tetrachloroethylene is used as an industrial solvent, a dry cleaning agent, a cleaning and degreasing agent for metals, a fumigant and a chemical intermediate.

PHYSICAL INFORMATION

Appearance: Clear, colorless liquid.

Odor: Sweetish, similar to ether or chloroform. Minimum Detectable by Odor: 5 ppm.

Behavior in Water: Does not mix with water; it will sink.

Evaporation: Liquid evaporates slowly.

HEALTH HAZARD INFORMATION

OSHA Standard: Average 8 hour exposure -- ~~100~~ 25 ppm.

NIOSH Recommended Limit: Reduce exposure to the lowest feasible limit.

ACGIH Recommended Limit: Average 8 hour exposure -- 50 ppm.

rt Term Exposure:

Inhalation: Exposures of 200 ppm for 1 hour can cause irritation of the nose, mouth and throat, dizziness, headaches and lightheadedness; exposures of 1,000 ppm for 30 minutes can cause difficult breathing, weakness, loss of muscle control, irritability, tremors, convulsions, paralysis, coma, heart irregularities and death.

Skin: Can cause dry, scaly skin, a mild to moderate burning sensation, redness and inflammation.

Eyes: Can cause burning and irritation.

Ingestion: Can cause nausea, vomiting, diarrhea, bloody stool, a reddening of face and neck, weakness and loss of muscle control.

Long Term Exposure:

Exposures over 200 ppm during weeks or months can cause irritation of the respiratory tract, nausea, headache, sleeplessness, abdominal pains, constipation, dizziness, increased perspiration, fatigue, skin infection, kidney and liver damage, fluid in the lungs and coma. Most of these effects will disappear after exposure is stopped.

Tetrachloroethylene at high levels has caused cancer and birth defects in mice. Whether it causes cancer in humans is unknown.

*Prepared by the Bureau of Toxic Substance Assessment, New York State Department of Health. For an explanation of the terms and abbreviations used, see "Toxic Substances: How Toxic is Toxic" available from the New York State Department of Health.

EMERGENCY AND FIRST AID INSTRUCTIONS

Inhalation: Get person to fresh air. Give artificial respiration. Seek medical attention.

Skin: Wash contaminated area with soap and water for at least 5 minutes. Seek medical attention, if necessary.

Eyes: Wash eyes with large amounts of water, occasionally lifting the upper and lower lids. Continue washing for at least 15 minutes. Seek medical attention immediately.

Ingestion: Seek medical attention. Do not induce vomiting.

Note to Physician: Expired air analysis may be helpful in evaluating exposure. Give special attention to liver, kidney and CNS function. Alcoholism may be predisposing factor.

FIRE AND EXPLOSION INFORMATION

General: Considered non-flammable and non-explosive.

REACTIVITY

Materials to Avoid: Avoid contact with strong oxidizers such as permanganate, chlorine and dichromate. Decomposes slowly on contact with water to form highly irritating products.

PROTECTIVE MEASURES

Storage and Handling: Store in cool, dry, well-ventilated location.

Engineering Controls: Use only where there is an adequate ventilation system.

Protective Clothing (Should not be substituted for proper handling and engineering controls): If direct contact is likely, wear protective clothing, gloves resistant to tetrachloroethylene and eye protection or full face mask.

Protective Equipment: For any detectable levels use a self-contained breathing apparatus with a full facepiece operated in a positive pressure mode or a combination Type C supplied-air respirator and an auxiliary self-contained breathing apparatus both with a full facepiece and operated in a positive pressure mode. For escape from a contaminated area use a gas mask with an organic vapor canister or a self-contained breathing apparatus.

PROCEDURES FOR SPILLS AND LEAKS

Get all workers out of spill area. Wearing proper protective gear, spread absorbent material on small spills and evaporate liquid off in a hood or other well-ventilated area. For large spills, place in suitable container and,for final disposal.contact your regional office of the New York State Department Environmental Conservation.

For more information:
Contact the Industrial Hygienist or Safety Officer at your worksite or the New York State Department of Health, Bureau of Toxic Substance Assessment, 2 University Place, Albany, New York 12203.

emical Fact Sheet*

Revised June 1988

BENZENE

The information in this sheet applies to workplace exposure resulting from processing, manufacturing, storage or handling and is not designed for the general population. Any generalization beyond occupation... re should not be made. The best industrial hygiene practice is to minimize exposure to all ...als.

Chemical Names: Benzol, phenyl hydride, cyclohexatriene; CAS 71-43-2.

Other Names: Benzelene, Benzole, Carbon Oil, Carbon Naphtha, Coal Naphtha, Mineral Naphtha, Motor Benzol, Nitration Benzene, Phene, Pyrobenzol and others. Products known as benzin, petroleum benzin and benzine do not contain benzene.

Uses: In the manufacture of styrene, phenol, detergents, pesticides, plastics, resins, synthetic rubber, aviation fuel, pharmaceuticals, dyes, explosives, gasoline, perfumes, paints and coatings and other chemicals. Used in the industrial processing of nylon and photographic chemicals and as a solvent in the artificial leather, rubber goods and printing industries. Present as a contaminant in many solvents, fuels, oils and benzene derivatives.

PHYSICAL INFORMATION

Appearance: Colorless liquid.

Behavior in Water: Slightly soluble, floats.

Odor: Strong, pleasant.

Minimum Detectable by Odor: 1.5 ppm.

Evaporation: Rapid. Concentrated vapors are heavier than air and sink to the floor before mixing with air.

HEALTH HAZARD INFORMATION

OSHA Standard: Average 8 hour exposure limit (TWA) is 1 ppm; maximum exposure limit for a 15 minute peric... (STEL) is 5 ppm. Exposure above 0.5 ppm (half of the OSHA TWA) may require industrial hygiene and medical surveillance activities. Federal regulations exempt certain occupations from the exposure standards for benzene.

NIOSH Recommended Limit: Average 8 hour exposure limit (TWA) is 0.1 ppm; exposure limit for a 15 minute period (STEL) is 1 ppm.

ACGIH Recommended Limit: Average 8 hour exposure limit is 10 ppm, but workers are cautioned to keep ...posure to a minimum.

Short Term Exposure:

Inhalation: Exposure to concentrations above 1.5 ppm may cause excitation, giddiness, irritability, irritation of eyes, nose and respiratory tract, lung congestion, dizziness, nausea, slurred speech, tremors, and convulsions. Exposure to 50-150 ppm for 5 hours has been reported to produce headache an... weariness. Exposure to 7500 ppm for 30-60 minutes may cause slowed breathing, loss of consciousness and death. Exposure to levels of 19,000 to 20,000 ppm for 5-10 minutes may be fatal.

Skin: Benzene may irritate skin if not promptly removed. Benzene is easily absorbed through skin, especially if skin is damaged. Other solvents may increase the absorption of benzene.

Eyes: Liquid may cause severe irritation. Vapor at very high concentrations may cause a smarting or burning feeling.

Ingestion: May cause irritation of mouth, throat and stomach. Symptoms are similar to those listed under inhalation. One tablespoon may cause bronchitis, pneumonia, collapse and death.

Long Term Exposure:

Benzene is a known human carcinogen. Repeated or prolonged exposure at low concentrations has been linked to blood disorders including anemia (low blood count) and leukemia (cancer of the blood cells).

In addition to the symptoms listed under short term exposure, long term exposure to benzene may cause weight loss, nervousness, low blood pressure, shortness of breath, and bleeding of gums, nose and othe... mucous membranes. Skin may bruise easily. Effects of exposure may be delayed for months or years. Mild anemia has been reported after exposures of 25 ppm for several years or 100 ppm for 3 months. Exposures to levels of 100 to 200 ppm for 6 months or more have caused irreversible blood changes and damage to the liver and heart. Temporary partial paralysis has been reported. There is evidence that benzene may interfere with an individual's ability to fight infection. Repeated or prolonged skin contact may cause drying and scaling of the skin, contributing to skin infections.

...ny blood disorders associated with benzene exposure may occur without symptoms. Periodic blood test... occupationally exposed individuals should be conducted.

*P...epared by the Bureau of Toxic Substance Assessment, New York State Department of Health. For an explanation of the terms and abbreviations used, see "Toxic Substances: How Toxic is Toxic?", available from the New York State Department of Health.

EMERGENCY AND FIRST AID INSTRUCTIONS

Inhalation: Remove to fresh air. Give artificial respiration or oxygen if necessary. Seek medical attention.

Skin: Remove soiled clothing immediately. Wash skin thoroughly with soap and water for at least 5 minutes. Seek medical attention, if necessary. Thoroughly wash contaminated clothing before wearing.

Eyes: Wash eyes with water for at least 15 minutes. If irritation persists or vision appears to be affected, seek medical attention as soon as possible.

Ingestion: Do not try to induce vomiting. Seek medical attention immediately.

Note to Physician: Severe exposure may require supportive measures for pulmonary edema. Aspiration results in immediate lung edema and hemorrhage.

FIRE AND EXPLOSION INFORMATION

General: Flammable, vapor may spread considerable distance to a source of ignition and flash back. Vapor will burn in air at any temperature above 12°F (the flash point).

Explosive Limit: Upper 7.5%, Lower 1.3%.

Extinguisher: Carbon dioxide, dry chemical or foam.

REACTIVITY

Materials to Avoid: Contact with strong oxidizers (such as perchlorates, oxides or permanganates), or with iron in the presence of chlorine or bromine.

Conditions to Avoid: Exposure to sources of ignition.

PROTECTIVE MEASURES

Storage and Handling: Protect containers against physical damage. Storage preferred in an outdoor or detached building. If storage is indoors, use a standard flammable liquid storage room.

Engineering Controls: Use only with good ventilation.

Protective Clothing (Should not be substituted for proper handling and engineering controls): If direct contact is likely, wear protective rubber clothing, gloves and eye goggles.

Protective Equipment: For any detectable levels use a self-contained breathing apparatus with a full facepiece and operated in a positive pressure mode, or a combination Type C supplied-air respirator with an auxiliary self-contained breathing apparatus, both with full facepiece and operated in a positive pressure mode. For escape from a contaminated area use a gas mask with organic vapor canister or an escape self-contained breathing apparatus.

PROCEDURES FOR SPILLS AND LEAKS

Get all workers out of spill area. Put on protective clothing and equipment when entering spill area for clean-up. Spread absorbent material on spill, sweep up and keep contained in suitable container, tightly sealed. For final disposal, contact your regional office of the New York State Department of Environmental Conservation.

For more information:
Contact the Industrial Hygienist or Safety Officer at your worksite or the New York State Department of Health, Bureau of Toxic Substance Assessment, 2 University Place, Albany, New York 12203.

Chemical Fact Sheet*

2-BUTANONE (MEK)

Version 1

The information in this sheet applies to workplace exposure resulting from processing, manufacturing, storing or handling and is not designed for the population at large. Any generalization beyond occupational exposure should not be made. The best industrial hygiene practice is to maintain concentrations of all chemicals at levels as low as is practical.

Chemical Names: Ethyl methyl ketone, methyl-acetone; CAS 78-93-3.

Trade Names: Meetco, MEK and others.

Uses: As a solvent, paint stripper, cement, adhesive; in the surface coating industry; in the manufacture of smokeless powder and colorless synthetic resin.

PHYSICAL INFORMATION

Appearance: Clear colorless liquid.

Odor: Acetone-like. Minimum Detectable by Odor: 5 ppm.

Behavior in Water: Slightly soluble, floats.

Evaporation: Rapid.

HEALTH HAZARD INFORMATION

OSHA Standard: Average 8 hour exposure -- 200 ppm.

NIOSH Recommended Limit: Average 10 hour day/40 hour week -- 200 ppm.

ACGIH Recommended Limit: Average 8 hour exposure -- 200 ppm.

Short Term Exposure:

Inhalation: Human exposures to levels of 350 ppm caused irritation of the nose and throat. Numbness in fingers, arms and legs accompanied by headache, nausea, vomiting and fainting have occurred after exposure to levels of 300-600 ppm.

Skin: Contact with liquid or vapor at levels of 300-600 ppm caused severe irritation. Liquid is absorbed readily and may cause numbing of fingers and arms.

Eyes: Exposure to levels of 200 ppm produced irritation.

Ingestion: Can cause irritation of the mouth, throat and stomach, the severity of which will be dependent upon amount swallowed. Symptoms of poisoning include nausea, vomiting, stomach pain and diarrhea. Death can occur from ingestion of as little as 1 ounce.

Long Term Exposure:

Has been implicated in certain nervous disorders characterized by weakness, fatigue, heaviness in chest and numbness of hands and feet. These symptoms may develop after 1 year of exposure to vapor concentrations of 50-200 ppm. Improvement is gradual and may take years after exposure is discontinued.

*Prepared by the Bureau of Toxic Substance Assessment, New York State Department of Health. For an explanation of the terms and abbreviations used, see "Toxic Substances: How Toxic is Toxic" available from the New York State Department of Health.

EMERGENCY AND FIRST AID INSTRUCTIONS

Inhalation: Move to fresh air. Give artificial respiration or oxygen, as necessary. Seek medical attention if necessary.

Skin: Wash with soap and water for at least 5 minutes. Seek medical attention, if necessary.

Eyes: Wash with water for at least 15 minutes. Seek medical attention.

Ingestion: Seek medical attention.

Note to Physician: Induce emesis if greater than 1 ml/kg ingested. Magnesium or sodium sulfate cathartics should be used after all ingestions.

FIRE AND EXPLOSION INFORMATION

General: Flammable. Ignites at -8°C (17°F).

Explosive Limits: Upper -- 11.5%, lower -- 2%.

Extinguisher: Foam, powder or carbon dioxide.

REACTIVITY

Conditions to Avoid: Any source of ignition.

Materials to Avoid: Strong oxidizers such as chlorine, permanganate and dichromate.

PROTECTIVE MEASURES

Storage and Handling: Store in cool, well-ventilated place away from exposure to direct sun, strong oxidizers and source of ignition.

Engineering Controls: Adequate ventilation. Sinks, showers and eyewash stations should be readily available.

Protective Clothing (Should not be substituted for proper handling and engineering controls): Wear rubber gloves, apron, and eye goggles if contact with fumes or liquid is likely.

Protective Equipment: For levels up to 1,000 ppm use a chemical cartridge respirator with organic vapor cartridges and a full facepiece or a powered air-purifying respirator with an organic vapor cartridge. For levels up to 3,000 ppm use a gas mask with an organic vapor canister, a supplied-air respirator with a full facepiece, a self-contained breathing apparatus with a full facepiece or a supplied-air respirator operated in continuous-flow mode. For levels above 3,000 ppm or use in areas of unknown concentrations use a self-contained breathing apparatus with a full facepiece operated in a positive pressure mode or a combination Type C supplied-air respirator with an auxiliary self-contained breathing apparatus, both with a full facepiece and operated in a positive pressure mode. For escape from a contaminated area use a gas mask with an organic vapor canister or an escape self-contained breathing apparatus

PROCEDURES FOR SPILLS AND LEAKS

Get all workers out of spill area. Put on proper protective clothing and equipment. Spread vermiculite or any other absorbent over spill. Scoop up and store in suitable container. For final disposal contact your regional office of the New York State Department of Environmental Conservation.

For more information:
Contact the Industrial Hygienist or Safety Officer at your worksite or the New York State Department of Health, Bureau of Toxic Substance Assessment, 2 University Place, Albany, New York 12203.

Chemical Fact Sheet*

Version 2

ETHYL BENZENE

The information in this sheet applies to workplace exposure resulting from processing, manufacturing, storing or handling and is not designed for the population at large. Any generalization beyond occupational exposures should not be made. The best industrial hygiene practice is to maintain concentrations of all chemicals at levels as low as is practical.

Chemical Names: Ethyl benzol, phenyl ethane, CAS 100-41-4.

Trade Names: EB.

Uses: In the production of styrene and acetophenone; as a solvent; a heat transfer medium; a dielectric; in the manufacture of dyes, rubber adhesives, paints and varnishes and others.

PHYSICAL INFORMATION

Appearance: Clear, colorless liquid.

Odor: Aromatic, gasoline-like. Minimum Detectable by Odor: 140 ppm.

Behavior in Water: Insoluble, floats.

Evaporation: Does not evaporate readily; vapor is heavier than air.

HEALTH HAZARD INFORMATION

OSHA Standard: Average 8 hour exposure -- 100 ppm.

NIOSH Recommended Limit: None established.

ACGIH Recommended Limit: Average 8 hour exposure -- 100 ppm.

Short Term Exposure:

Inhalation: 200 ppm for 30 minutes can cause irritation of the nose and throat, dizziness, difficult breathing and depression. Very high levels can cause unconsciousness.

Skin: Can cause irritation, inflammation, blisters and burns.

Eyes: 200 ppm can cause irritation. Higher levels can cause burning, tearing and injury.

Ingestion: Can cause headache, sleepiness and coma.

Long Term Exposure:

May cause skin rash and irritation of eyes, nose and throat.

Prepared by the Bureau of Toxic Substance Assessment, New York State Department of Health. For an explanation of the terms and abbreviations used, see "Toxic Substances: How Toxic is Toxic" available from the New York State Department of Health.

EMERGENCY AND FIRST AID INSTRUCTIONS

Inhalation: Move person to fresh air. Give artificial respiration or oxygen as required. Seek medical attention, if necessary.

Skin: Remove contaminated clothing. Wash affected area with soap and water for at least five minutes. Seek medical atttention, if necessary.

Eyes: Wash eyes with water for 15 minutes. Seek medical attention.

Ingestion: If person is conscious, give water or milk to drink. Do NOT induce vomiting. Seek immediate medical attention.

Note to Physician: Aspiration of small amounts may cause extensive edema and lung hemorrage.

FIRE AND EXPLOSION INFORMATION

General: Flammable; vapors may spread a considerable distance and flash back. Ignites at 59°F (15°C).

Explosive Limits: Upper -- 6.7%, lower -- 1.0%.

Extinguisher: Foam, water, carbon dioxide, dry chemical.

REACTIVITY

Materials to Avoid: Contact with oxidizers such as permanganates and perchlorates can cause fire or explosion.

Conditions to Avoid: Contact with heat or flame can cause an explosion or release of toxic gases, such as carbon monoxide.

PROTECTIVE MEASURES

Storage and Handling: Store in a well-ventilated cool place, away from sunlight and sources of ignition.

Engineering Controls: Local exhaust or dilution ventilation, sinks, showers and eyewash stations should be provided.

Protective Clothing (Should not be substituted for proper handling and engineering controls): Eye-goggles, Viton, nitrile, or neoprene rubber gloves and rubber clothing should be used when contact is likely.

Protective Equipment: For levels up to 1,000 ppm use a chemical cartridge respirator with organic vapor cartridges, a powered-air purifying respirator with organic vapor cartridges, a supplied-air respirator or a self-contained breathing apparatus. For up to 2,000 ppm use a gas mask with an organic vapor canister, a supplied-air respirator with a full facepiece or a self-contained breathing apparatus with a full facepiece. For levels above 2,000 ppm or use in areas of unknown concentrations use a self-contained breathing apparatus with a full facepiece operated in a positive pressure mode or a combination Type C supplied-air respirator with an auxiliary self-contained breathing apparatus, both with a full facepiece and operated in a positive pressure mode. For escape from a contaminated area use a gas mask with an organic vapor canister or an escape self-contained breathing apparatus.

PROCEDURES FOR SPILLS AND LEAKS

Warn all workers of spill. Put on appropriate protective clothing and equipment. Remove all sources of ignition. Ventilate area. Spread vermiculite, sand or other absorbent material. Scoop up and place in a suitable container. For final disposal contact your regional office of the New York State Department of Environmental Conservation.

For more information:

Contact the Industrial Hygienist or Safety Officer at your worksite or the New York State Department of Health, Bureau of Toxic Substance Assessment, 2 University Place, Albany, New York 12203.

Chemical Fact Sheet*

Version 2

TOLUENE

[illegible] information in this sheet applies to workplace exposure resulting from processing, [illegible]facturing, storing or handling and is not designed for the population at large. Any [illegible]generalization beyond occupational exposures should not be made. The best industrial hy[illegible]iene practice is to maintain concentrations of all chemicals at levels as low as is prac[illegible]:ical.

Chemical Names: Methylbenzene, methylbenzol, phenylmethane, toluol; CAS 108-88-3.

[illegible]rade Names: Methacide, Antisal I and others.

Uses: Used in the manufacture of benzoic acid, benzaldehyde, explosives, dyes and adhesives.

PHYSICAL INFORMATION

[illegible]ppearance: Clear, colorless liquid.

Odor: Strong, pleasant. Minimum Detectable by Odor: 40 ppm.

[illegible]ehavior in Water: Only a very small amount will mix, the rest will float.

[illegible]vaporation: Liquid evaporates very slowly.

HEALTH HAZARD INFORMATION

OSHA Standard: Average 8 hour exposure limit -- ~~200~~ 100 ppm.

NIOSH Recommended Limit: Average 8 hour exposure -- 100 ppm.

ACGIH Recommended Limit: Average 8 hour exposure -- ~~100~~ 50 ppm.

Short Term Exposure:

Inhalation: 100 ppm exposure can cause dizziness, drowsiness and hallucinations. 100-200 ppm can cause depression. 200-500 ppm can cause headaches, nausea, loss of appetite, loss of energy, loss of coordination and coma. In addition to the above, death has resulted from exposure to 10,000 ppm for an unknown time.

Skin: Can cause dryness and irritation. Absorption may cause or increase the severity of symptoms listed above.

Eyes: Can cause irritation at 300 ppm.

Ingestion: Can cause a burning sensation in the mouth and stomach, upper abdominal pain, cough, hoarseness, headache, nausea, loss of appetite, loss of energy, loss of coordination and coma.

Long Term Exposure:

Levels below 200 ppm may produce headache, tiredness and nausea. From 200 to 750 ppm symptoms may include insomnia, irritability, dizziness, some loss of memory, loss of appetite, a feeling of drunkeness and disturbed menstruation. Levels up to 1,500 ppm may cause heart palpitations and loss of coordination. Blood effects and anemia have been reported but are probably due to contamination by benzene. Most of these effects are believed to go away when exposure stops.

Prepared by the Bureau of Toxic Substance Assessment, New York State Department of Health. [illegible]or an explanation of the terms and abbreviations used, see "Toxic Substances: How Toxic is [illegible]oxic" available from the New York State Department of Health.

EMERGENCY AND FIRST AID INSTRUCTIONS

Inhalation: Get person to fresh air Keep warm and quiet. Give artificial respiration, if necessary. Seek medical attention, if necessary.

Skin: Take off clothing soaked with liquid. Wash contaminated area with soap and water for at least 5 minutes. Seek medical attention, if necessary.

Eyes: Wash with large amounts of water for at least 15 minutes. Seek immediate medical attention.

Ingestion: Do not induce vomiting. Give one or two ounces of mineral oil. Seek immediate medical attention. Note: Never force an unconscious person to drink.

Note to Physician: Exposure to toluene at levels greater then 200 ppm may result in hippuric acid levels above 5 gm/liter urine. After elevated exposure, toluene may also be detected in blood.

EXPLOSION INFORMATION

General: Flammable liquid. Fumes may spread a considerable distance and flash back. Will ignite at 4.4°C, 40°F.

Explosive Limits: Upper Limit -- 7.0%, Lower Limit -- 1.27%.

Extinguisher: Water spray, carbon dioxide, dry chemical or foam.

REACTIVITY

Materials to Avoid: Reacts violently with chlorine, permanganate and dichromate.

Conditions to Avoid: Sources of ignition.

PROTECTIVE MEASURES

Storage and Handling: Store outdoors or in a detached building, if possible. If indoors, store in a standard flammable liquid storage room or cabinet. Protect containers from physical damage.

Engineering Controls: Use in well-ventilated area. Eyewash stations, sinks and showers should be readily available.

Protective Clothing (Should not be substituted for proper handling and engineering controls): If direct contact is likely, wear viton, PVA, NBR or polyethylene clothing.

Protective Equipment: For levels up to 1000 ppm use a chemical cartridge respirator with organic vapor cartridges, a supplied-air respirator, a self-contained breathing apparatus or a powered air-purifying respirator with organic vapor cartridges. For levels up to 2,000 ppm use a gas mask with an organic vapor canister, a supplied-air respirator with a full facepiece, a self-contained breathing apparatus with a full facepiece or a supplied-air respirator operated in continuous flow mode. For levels above 2000 ppm or at unknown concentrations use a self-contained breathing apparatus with a full facepiece operated in a positive pressure mode or a Type C supplied-air respirator with an auxiliary self-contained breathing apparatus, both with a full facepiece and operated in a positive pressure mode. For escape from a contaminated area use a gas mask with an organic vapor canister or an escape self-contained breathing apparatus.

PROCEDURES FOR SPILLS OR LEAKS

Get all workers out of the spill area. Put on a respirator and other protective clothing. Spread sand or other absorbent material over liquid to absorb it. Shovel into buckets, take to a safe place in the open air. Wash area of spill with soap and water. For final disposal contact your regional office of the N.Y.S. Department of Environmental Conservation.

For more information:
Contact the Industrial Hygienist or Safety Officer at your worksite or the New York State Department of Health, Bureau of Toxic Substance Assessment, 2 University Place, Albany, New York 12203.

EXHIBIT 1

POST-CLOSURE FIELD INSPECTION REPORT

EXHIBIT 1

POST-CLOSURE FIELD INSPECTION REPORT
Prattsburg Landfill, Wheaton Road, Steuben County, NY

Inspector Name: _____
Date: _____

1.	Entrance driveway condition		Good		Fair		Poor		
2.	Roadside ditches and culverts under driveway		Unobstructed		Obstructed				
3.	Fence condition		Good		Fair		Damaged*		
4.	Vegetative cover		Good		Poor*		Dead		Dormant
5.	Other plants present		Burdock		Thistle		Crownvetch		
6.	Wood plants		Not on cap		Present		Average diameter ___ inches		
7.	Gas vents		Unobstructed		Obstructed*		Missing*		Damaged*
8.	Surface erosion		None		Minor		Needs repair*		
9.	Differential settlement		None		Minor		Needs repair*		
10.	Perimeter of landfill		Clear		Sediments		Plugged*		
11.	Most recent mowing	Date:							
12.	Distance from cap to woods	Average:				Minimum*:			
13.	Posted signs		All present on arrival			No. replaced:			
14.	Groundwater monitoring wells		Secure with locks				Damaged		
15.	Litter present		No		Yes	Estimated removal date:			
16.	Evidence of ponded water		None		Observed*		Suspected*		
17.	Fallen trees		None		Present on cap*	Date removed:			

EXHIBIT 1 (continued):

18. Evidence of tresspass		Yes*		No			
19. Evidence of motor vehicle use		No		Auto/truck*		Motorcycle*	ATV*
20. Woodchuck/rabbit holes in cap		No		Yes	Date backfilled:		
21. Evidence of lightning strikes		No		Yes*			
22. Unauthorized materials present		No		Yes*			
23. Unathorized signs present		No		Yes*	Type:		
24. Dead animals present		No		Yes*			
25. Oil slicks observed in water puddles		No		Yes*			
26. Leachate seeps		No		Yes*	Stain color:		
27. Leachate fluid		Puddle		Stream*	Length: _____ feet		
28. Gulls/scavenger birds present		No		Yes			
29. Other animal foraging evidence		No		Yes			
30. Date of most recent cap delineation by Engineer:							

*Comments (indicate location on attached sheet):

_____

_____

_____

Corrective action taken:

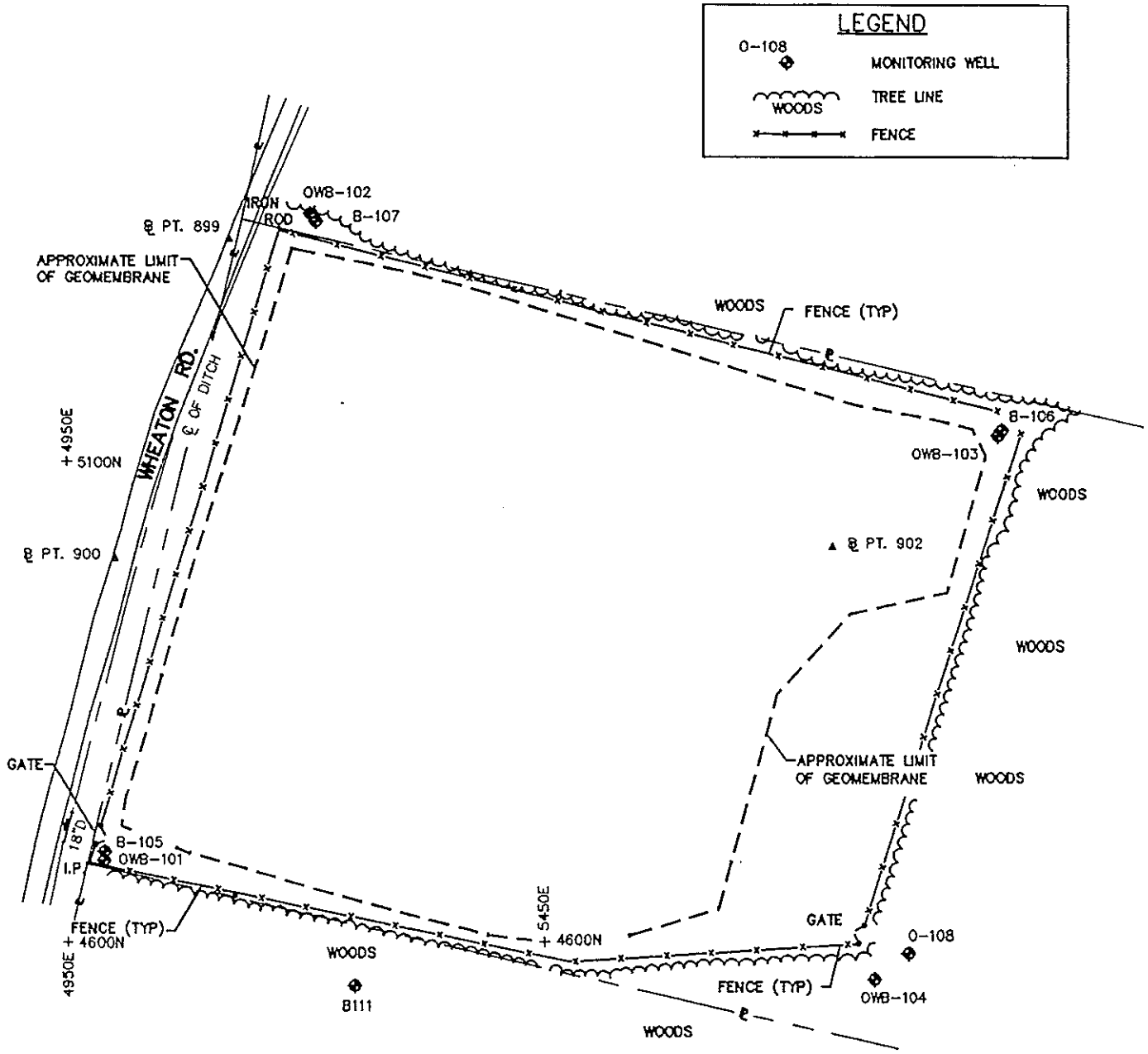
_____

_____

_____

Signature: _____

42985ZA.2



COMMENTS: _____

GRAPHIC SCALE

100 0 50 100 200

(IN FEET)

N

Stearns&Wheler
ENVIRONMENTAL ENGINEERS & SCIENTISTS

DATE: 12/95 JOB No.: 2985

STEUBEN COUNTY, NEW YORK

PRATTSBURG LANDFILL CLOSURE

SITE PLAN
INSPECTION FORM

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EXHIBIT 2

COVER REPAIR PROTOCOL

EXHIBIT 2

COVER REPAIR PROTOCOL

Appropriate repair measures that may be necessary for the cover system are listed below, according to type of problem.

A. **Ponded Area Caused by Differential Settlement.** Repair of this type of ponded area consists of excavating the ponded area, placing additional subgrade fill in the ponded area, and replacing the geomembrane and excavated cap materials to required grade. Repair procedure is as follows:

1. Field verify the location of the ponded area.

2. Establish perimeter of the ponded area.

3. Establish excavation limits 2 feet outside the perimeter of the ponded area.

4. Remove topsoil and barrier protection layer, stockpiling in separate piles.

5. Remove geomembrane in affected area.

6. Backfill and compact additional subgrade fill into the ponded area in 1-foot lifts, supplementing as required. Lifts should be benched into existing soil.

7. Repair geomembrane.

8. Backfill barrier protection layer, supplementing as required.

9. Place topsoil, supplementing as required.

10. Seed and mulch.

B. **Cap Breach.** Repair of a cap breach consists of excavating the breached area, recompacting the subgrade soil and replacing the geomembrane and excavated cap materials to required grade. Repair procedure is as follows:

1. Field verify the location of the breached area.

2. Establish perimeter of the breached area.

3. Establish excavation limits 2 feet outside the perimeter of the breached area.

4. Remove topsoil and barrier protection layer, stockpiling in separate piles.

5. Remove geomembrane in affected area.

6. Remove subgrade soil to a depth of 2.5 feet below the bottom of the breached area, providing 1-foot horizontal benches.

EXHIBIT 2 (continued):

7. Recompact remaining subgrade soil in place.

8. Backfill and compact additional subgrade soil into the excavated area in 1-foot lifts, supplementing as required.

9. Repair geomembrane.

10. Backfill barrier protection layer, supplementing as required.

11. Place topsoil, supplementing as required.

12. Seed and mulch.

Materials required for repairs include conventional excavation and earth handling equipment, subgrade soil (2-inch minus), barrier protection material, topsoil, seed, and mulch. Specifications for material characteristics, installation, and testing are attached. These specifications include:

SECTION	TITLE
02230	Subgrade Preparation
02260	Landfill Cover Construction
02266	Landfill Barrier Protection Material
02268	Landfill Topsoil and Seeding
02269	Quality Assurance/Quality Control Landfill Cover Soil Materials
02404	Linear Low Density Polyethylene Geomembrane
02409	Quality Assurance Testing Density Polyethylene Geomembrane

SECTION 02230

SUBGRADE PREPARATION

PART 1 GENERAL

1.01 WORK INCLUDED

A. Grading and filling of landfill surface to receive final cap.

B. Establishment and maintenance of grid elevations.

C. Undercut and over-excavate unsuitable material.

D. Place fill material, as required, and compact to specified subgrades.

E. Provide record drawings of grid elevations.

1.02 RELATED SECTIONS

A. Section 01001 - BASIC REQUIREMENTS
B. Section 01003 - TEMPORARY FACILITIES AND CONTROLS
C. Section 02210 - SITE CLEARING
D. Section 02141 - REMOVAL OF WATER
E. Section 02222 - EXCAVATING
F. Section 02223 - BACKFILLING
G. Section 02260 - LANDFILL COVER CONSTRUCTION
H. Section 02269 - QA/QC LANDFILL COVER SOIL MATERIALS

1.03 REFERENCES

A. ASTM D75 - Practice for Sampling Aggregates.

B. ASTM D422 - Standard Method for Particle-Size Analysis of Soils.

C. ANSI/ASTM D1557 - Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.

1.04 SUBMITTALS

A. Submittals shall be provided to Engineer a minimum of 10 days prior to the use of the proposed material or compaction device.

B. Submittals concerning the off-site fill for shaping subgrade.

1. Submit a 50-pound sample of the proposed material obtained in accordance with ASTM D75. Sample shall have

an attached label indicating the type and source of the material.

2. Submit a certified test results for the proposed material in accordance with Table 1 of this Section.

3. Submit an estimate of the quantity of material available at the source which meets the off-site fill specification and is represented by the certified test results and the 50-pound sample.

C. Submit written confirmation from the installer of the geomembrane that he has examined the proposed off-site fill that will be in contact with his product and has found them compatible. Any additional protective measures considered necessary by the geomembrane installer to provide a suitable surface for installation of the geomembrane, shall be provided by the Contractor, and the cost of providing such measures shall be included in the Contractor's original bid.

E. Submittals - Record drawings showing grid elevations of each layer of the capping system. Submit elevations after completion of subgrade before placement of subsequent layers.

1.05 DELIVERY, STORAGE AND HANDLING

A. If off-site fill for the subgrade is to be stockpiled, it shall be stored and handled to prevent trash, debris, organic matter, shale, snow, ice and other frozen or mechanically deleterious materials from being mixed into it.

PART 2 MATERIALS AND PRODUCTS

2.01 MATERIALS

A. Off-site Fill For Shaping Subgrade

1. Shall be free of organic matter, trash, shale, debris, snow, ice and other frozen or mechanically deleterious materials.

2. Shall meet the requirements outlined in Table 1 at the end of this Section.

3. Material shall have non-angular particles which are less than or equal to 2 inches in size.

2.02 PRODUCTS

None from this Section.

PART 3 EXECUTION

3.01 PERFORMANCE

A. Grading

1. Grades shown on the Contract Drawings are approximate subgrade elevations. Actual elevations shall be confirmed in the field.

2. Prior to the construction of the final capping system, as shown in the Sections on the Contract Drawings, grades shall be within 4 percent (min.) to 10 percent (max.).

B. Elevation Grid

1. Contractor shall establish a 100 ft. by 100 ft. control grid over the area to receive cover material.

2. Contractor shall record elevations at the 100 foot grid intersections and at all breaks in grade.

3. Engineer will supply a reproducible mylar or CADD drawing of the landfill cover area for the Contractor to record his grid elevations.

4. The Contractor shall make copies of the mylar or CADD drawing and record his grid elevations for each layer of the capping system indicated below.

5. The grid elevations shall be recorded and submitted for the Engineer's review at the following times:

a. Before placement of geomembrane.

b. After placement of the soil barrier protection layer.

3.02 PREPARATION

A. See Section 02110.

B. Temporary erosion and sediment controls shall be installed prior to construction of subgrade. See Section 01500.

C. Maintain a stable, dry area to place the off-site fill.

D. Remove all water, snow, ice, and debris from area to accept off-site fill. No calcium chloride or other chemicals shall be used to prevent freezing.

E. Do not place off-site fill on porous, wet, frozen, or spongy surfaces.

3.03 INSTALLATION

A. Place and compact off-site fill in continuous layers to meet the performance criteria of Table 1 at the end of this Section.

B. All areas of the subgrade beneath the geomembrane will have a minimum 6-inch thick layer of off-site fill.

C. Employ placement and compaction methods which are acceptable to Engineer.

D. Match compaction equipment and methods to the material and location being compacted in order to obtain specified field compaction.

3.04 FIELD QUALITY CONTROL

A. Perform Quality Assurance/Quality Control sampling and testing of off-site fill material in accordance with Section 02269.

B. Owner may perform sampling and testing as described in Section 01001.

C. Record elevations or depth of sample taken as required in Section 01001.

3.05 PROTECTION

A. Maintain proper grading and compaction of off-site fill to maintain positive drainage and to prevent ponding.

TABLE 1

MATERIAL GUIDELINES, REQUIREMENTS, AND PERFORMANCE CRITERIA
OFF-SITE FILL FOR SHAPING SUBGRADE

Material Requirements	Value	ASTM Test
Gradation (% passing)		
Upper Limit, 2-inch	100	ASTM D-422
Lower Limit, No. 200	0-50	
Non-angular		

Performance Criteria	Value	ASTM Test
Maximum lift thickness (inches)	12	---
Minimum compaction (%)	92	ASTM D-1557

END OF SECTION

SECTION 02260

LANDFILL COVER CONSTRUCTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. System description and performance requirement.

B. Contractor qualifications.

C. Warranty on completed cover installation.

D. Sequencing of cover components.

1.02 RELATED SECTIONS

A. Section 01001 - BASIC REQUIREMENTS: Alternates.
B. Section 01025 - UNIT PRICES
C. Section 02230 - SUBGRADE PREPARATION
D. Section 02262 - LANDFILL GAS VENTING MATERIAL
E. Section 02266 - LANDFILL BARRIER PROTECTION MATERIAL
F. Section 02268 - LANDFILL TOPSOIL AND SEEDING
G. Section 02269 - QA/QC FOR LANDFILL COVER SOIL MATERIALS
H. Section 02404 - LLDPE GEOMEMBRANE COVER
I. Section 02409 - QA TESTING - LLDPE GEOMEMBRANE COVER
J. Section 02421 - GEOTEXTILES

1.03 REFERENCES

A. None in this Section.

1.04 SYSTEM DESCRIPTION

A. The completed landfill cover shall form a controlled layer over the landfill to minimize the passage of precipitation and water down through the covered refuse and to control the accumulation of landfill gas and minimize off site gas migration. The cover shall be sloped as shown on the Contract Drawings to prevent ponding and to remove excess surface water while preventing erosion of the cover. The cover system shall be built of the cover components in accordance with the individual cover component specification sections as shown on the Contract Drawings.

B. The completed landfill cover shall meet minimum and maximum grades and consist of gas vents, geomembrane cover system, barrier protection layer, and seeded topsoil layer as required by the Owner's record of decision and Title 6 of the New York State Codes; Rules and Regulations; Part 360, Solid Waste Management Facilities, Subpart 360-2, Landfills; Section 360-2.13, Landfill Construction Requirements.

1.05 SUBMITTALS

A. Qualifications Statements with references, in accordance with Article 1.06.

1.06 QUALITY ASSURANCE

A. Qualifications - Contractor shall have successfully completed projects of comparable size including two completed projects involving landfill liner or cover construction totaling at least 10 acres.

B. Quality Assurance and Quality Control Testing requirements are in, or are referenced in, the individual cover-component specification sections.

C. Contractor will provide a topographic survey of the subgrade prior to geomembrane placement and prior to topsoil placement on a 100-foot by 100-foot grid.

1.07 DELIVERY, STORAGE AND HANDLING

A. Delivery, storage and handling shall be as required in individual cover component sections.

1.08 WARRANTY

A. Warranties on installed geomembrane materials shall be as stated in the individual geomembrane sections.

1.09 SEQUENCING AND SCHEDULING

A. Contractor shall be responsible for sequencing the installation of all components of the cover system.

B. Individual cover components shall not be covered with the subsequent component until all testing has been completed and accepted.

C. Contractor shall be responsible for the layout and protection of a grid system to be used for identifying all testing locations, seam locations, and panel locations], as required in individual specification sections.

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials and their specifications are contained in individual specification sections.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that the cover subgrade and each cover component has been properly installed, graded, tested, and had the test results accepted as required prior to installation of subsequent cover components.

3.02 PREPARATION

A. Prepare for installation of cover components in accordance with individual cover-component specification sections.

3.03 INSTALLATION

A. Install the liner components in accordance with the individual cover-component specification sections.

3.04 PROTECTION

A. Protect installed cover components from damage due to work on other cover components.

B. Protect installed cover components from damage due to weather.

C. Protect installed cover components from damage due to environmental conditions, such as wildlife.

END OF SECTION

SECTION 02266

LANDFILL BARRIER PROTECTION MATERIAL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Material and installation requirements for barrier protection material in the landfill cover.

1.02 RELATED SECTIONS

A. Section 01025 - UNIT PRICES
B. Section 01001 - BASIC REQUIREMENTS: Quality control
C. Section 02260 - LANDFILL COVER CONSTRUCTION
D. Section 02269 - QA/QC FOR LANDFILL COVER SOIL MATERIALS

1.03 REFERENCES

A. ASTM D75 - Method for Sampling Aggregates.

B. ANSI/ASTM D1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.

C. ASTM D422 - Standard Method for Particle-Size Analysis of Soils.

D. ASTM D2434 - Standard Test Methods for Permeability of Granular Soils (Constant Head).

E. ASTM D3080 - Standard Method for Direct Shear Test of Soils Under Consolidated Drained Conditions.

F. ASTM D4253 - Standard Test Method for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

G. ASTM D4254 - Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.

1.04 SUBMITTALS

A. Submittals shall be provided to Engineer a minimum of 10 days prior to the use of the proposed material or compaction device.

B. Submittals concerning the barrier protection material.

1. Submit a 50-pound sample of the proposed material obtained in accordance with ASTM D75. Sample shall have an attached label indicating the type and source of the material.

2. Submit certified test results for the proposed material in accordance with Table 1 of this Section.

3. Submit an estimate of the quantity of material available at the source which meets the barrier protection material specification and is represented by the certified test results and the 50-pound sample.

C. Submittals concerning the compaction equipment.

1. Submit a listing of the on-site equipment which will be used for compaction of the barrier protection material.

The listing shall include, at a minimum, the following:

a. Equipment manufacturer.
b. Model name and/or number
c. Gross weight.
d. Load per linear inch of compacting surface or contact stress.
e. Type of compaction (vibrating or static).

D. Submit written confirmation from the installer of the geomembrane that he has examined the proposed barrier protection material that will be in contact with his product and has found them compatible. Any additional protective measures considered necessary by the geomembrane installer to provide a suitable surface for installation of the geomembrane shall be provided by the Contractor, and the cost of providing such measures shall be included in the Contractor's original bid.

1.05 DELIVERY, STORAGE AND HANDLING

A. If barrier protection material is to be stockpiled, it shall be stored and handled to prevent trash, debris, organic matter, shale, snow, ice and other frozen or mechanically deleterious materials from being mixed into it.

PART 2 MATERIALS AND PRODUCTS

2.01 MATERIALS

A. Barrier Protection Material

1. Shall generally be a mixture of sand and gravel and shall meet the requirements of Table 1 at the end of this Section.

2. Shall be free of organic matter, trash, shale, debris, snow, ice and other frozen or mechanically deleterious materials.

2.02 PRODUCTS

None from this Section.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination requirements of Section 02260.

B. Verify that barrier protection material is not frozen when it is placed or compacted.

3.02 PREPARATION

A. Maintain a stable dry area to place the barrier protection material.

B. Remove all water, snow, ice, and debris from area to receive barrier protection material. No calcium chloride or other chemicals shall be used to prevent freezing.

C. Do not place barrier protection material on porous, wet, frozen or spongy surfaces.

3.03 INSTALLATION

A. Place and compact barrier protection material in continuous layers to meet the performance criteria of Table 1 at the end of this Section.

B. Employ placement and compaction methods which will not damage previous installed cover layers and are acceptable to Engineer.

C. Match compaction equipment and methods to the material and location being compacted in order to obtain specified field compaction.

D. Placement methods shall preclude deploying material parallel to the slope of the landfill.

3.04 FIELD QUALITY CONTROL

A. Perform Quality Assurance/Quality Control sampling and testing of barrier protection material in accordance with Section 02269.

B. Owner may perform sampling and testing as described in Section 01001.

C. Record elevations or depth of sample taken as required in Section 01001.

D. A topographic survey of the barrier protection layer will be provided by the Contractor using a 100-foot by 100-foot grid.

3.05 PROTECTION

A. Maintain proper grading of barrier protection material surfaces to maintain smooth surface for subsequent cover layer.

TABLE 1

MATERIAL GUIDELINES, REQUIREMENTS AND PERFORMANCE CRITERIA
LANDFILL BARRIER PROTECTION MATERIAL

Material Guidelines	Value
Gradation (% passing)	
No. 4	70-100
No. 40	30-60

Material Requirements	Value	ASTM Test
Gradation (% passing)		
1-inch	100	ASTM D422
No. 200	0-5	
Non-angular		
Effective angle of internal friction (degrees)	>32	ASTM D3080

Performance Criteria	Value	ASTM Test
Maximum lift thickness (inches)	12	---
Minimum compaction (%)	90	D1557
Hydraulic conductivity (cm/sec)	$>1x10^{-3}$	D2434

END OF SECTION

SECTION 02268

LANDFILL TOPSOIL AND SEEDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Material and installation requirements for topsoil, grass seed, and mulch used on the landfill cover area.

1.02 RELATED SECTIONS

A. Section 01025 - UNIT PRICES
B. Section 01564 - EROSION CONTROL
C. Section 02260 - LANDFILL COVER CONSTRUCTION

1.03 DEFINITIONS

A. Planting season shall be during the period of April 1 to May 15 or from August 15 to October 1.

1.04 SUBMITTALS

A. A topsoil and seeding plan shall be submitted showing the following information:

1. Location of source of topsoil.

2. If soil amendment is proposed, include amendment types, amendment quantities, and amendment test(s) results.

3. Seed mixture and application rate.

4. Fertilizer mixture and application rate.

5. Methods of application.

6. Erosion control method after seeding.

1.05 STORAGE

A. Seed shall be properly stored by the Contractor at the project site and any seed damaged during storage shall be replaced by the Contractor.

B. When topsoil is stockpiled before use, it shall be piled and protected from contamination by refuse, branches, rocks, and other deleterious material.

C. Mulch shall be protected on site to avoid damage to these materials.

1.06 WARRANTY

A. Any portion of landfill cover area failing to produce a full uniform stand of grass from any cause, including soil erosion, for a period of one year from date of final acceptance, shall be filled with soil as needed, reseeded at full seed rate, refertilized at one-half fertilization rate, and mulched. If erosion control material is utilized, it shall be removed and replaced with new erosion control material.

PART 2 PRODUCTS

2.01 MATERIALS

A. On-site Topsoil Material

1. Topsoil is only to be stripped from area within cap limits and without mixing with foreign materials.

2. All topsoil, loam, or other natural organic materials covering the areas shall be removed; and when suitable for reuse as topsoil, shall be stockpiled. Stockpiles shall be established only at approved locations and shall be maintained to prevent erosion and sedimentation until reuse. To prevent intermixing, topsoil shall not be stockpiled immediately adjacent to other stockpiled materials. All excavated materials shall be stockpiled at locations which will not create public endangerment or inconvenience.

3. Stockpile in area designated on site. Protect from erosion.

B. Off-site Topsoil Material

1. Topsoil shall be a natural fertile, agricultural soil capable of sustaining vigorous plant growth.

2. Topsoil shall have at least 2 percent by weight of fine textured stable organic material, and no greater than 6 percent, unless accepted as an alternative material by the Engineer. Muck soil shall not be considered topsoil.

3. Topsoil shall have not less than 20 percent fine textured material (passing the No. 200 sieve) and not more than 15 percent clay. (Finer than a 2 μm equivalent diameter).

4. Topsoil treated with soil sterilants or herbicides shall be so identified to the purchaser.

5. Topsoil shall be free of stones over 2 inches in diameter, trash, noxious weeds such as nutsedge and quackgrass, and will have less than 10 percent gravel by volume.

6. Topsoil containing soluble salts greater than 500 ppm shall not be used.

7. The topsoil shall have a pH range of 5.0 to 7.0.

C. Fertilizers

1. Fertilizers and chemicals for soil shall be as recommended by the local Soil Conservation District at the Department of Agriculture for the type of soil and grasses.

2. Lime shall be of the type and fineness required as determined by a reliable soil test and recommendations of a local turf grass specialist.

3. Fertilizer shall be complete, partially organic, commercial 10-6-4 fertilizer, containing at least 10% nitrogen, 6% available phosphorus and 4% potash.

4. Other commercial fertilizers, such as 20-10-10 or 12-6-6 may be used at application rates adjusted to provide the same quantity of nitrogen per 1000 square feet.

D. Seed

1. Grass seed used on this project shall be fresh, recleaned and of the latest crop year.

2. It shall conform to Federal and State Standards.

3. Each type of grass in the mixture shall meet or exceed the minimum percentage of purity and germination listed in the following Table for that type of grass with a maximum weed content of 0.1%. Type A seed is for area seeding over landfill and as shown on the drawing.

Variety	Spreading Rate in lbs/acre (lb/1000 sf)
	Type A
Common White Clover	8(.20)
Perennial Ryegrass	5(.10)
Tall Fescue	20(.45)
	33(.75)

4. A turf grass specialist may submit variations from the above subject to the Engineer's review and approval in the submittal.

5. All seed shall be delivered in standard size, unopened bags of the vendor, showing the weight, mixture, vendor's name and guaranteed analysis.

E. Topsoil Amendments or Substitutes

1. Natural topsoil materials may be amended or substituted completely with processed materials subject to the Engineer's review and approval.

2. The materials may be processed sewage sludge or yard wastes, manures, mulches, or other like materials.

3. If the Contractor decides to use the materials, he shall be responsible for testing these materials and obtaining the necessary permits, as required under Title 6 NYCRR Part 360 for processing or application of these materials.

4. The Contractor shall notify the Engineer of his intention to utilize this option and submit test results and other requirements specified in Part 1 of this section at least one month in advance of intended date of use.

5. Topsoil amendments or substitutes shall meet the following requirements as evidenced by laboratory analysis in conformance with Title 6 of the New York State Code of Rules and Regulations Part 360 Section 4.4 Requirements of another state:

Parameter	Maximum Concentration mg/kg, dry weight
Mercury	10
Cadmium	25
Nickel	200
Lead	1000
Chromium (total)	1000
Copper	1000
Zinc	2500
PCBs (total)	10

6. The completed topsoil mixture or substitute layer shall be free from nuisance odors, unattractive to vectors, adequately mixed to ensure uniformity of nutrients and properties, and capable of sustaining vigorous growth of plant material.

7. The material shall have no recognizable solid waste materials and maximum material size of 1 inch.

8. Guarantee - If it is the Contractor's decision to use topsoil amendments or substitutes and the material cannot support vigorous vegetation, it shall be removed and replaced with an equivalent volume of natural topsoil at the Contractor's expense.

F. Mulch

1. Mulch shall be oat, wheat, or rye straw free from noxious weeds and other materials which may interfere with the establishment of a healthy stand of grass.

2. Hydroseeding considerations refer to 3.02(c)3.

G. Source Quality Control

1. Engineer may inspect delivery tickets and manufacturer's quality control to verify that the seed delivered meets these specifications.

2. Testing of Topsoil and Topsoil Amendments

a. The topsoil and topsoil amendments, if used, shall be tested to determine suitability with respect to all applicable requirements of this Section.

b. Tests shall be made in accordance with the methods approved by the Soil Conservation District of the Department of Agriculture with any costs being borne by the Contractor.

c. Test frequency will be periodic during the placement of the topsoil and will be at the discretion of the Engineer. No more than one sample per acre of area covered will be allowed. All testing costs will be the responsibility of the Contractor. Any required amendments as a result of testing will be implemented by the Contractor.

d. Tests shall be conducted by a lab specifically equipped for soil analysis or analysis of the proposed amendment.

2.02 PRODUCTS

None for this section.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination requirements of Section 02260.

3.02 INSTALLATION

A. Topsoil

1. Topsoil shall be provided to a compacted depth and to the grades as shown on the Contract Drawings.

2. Topsoil shall not be delivered or placed in a frozen or muddy condition.

3. Compact with a light roller or equipment tracks. If tracking is used, machine direction will be parallel to the slope direction.

4. When finished, the surface shall conform to the finished grades shown or required and shall have a slightly loosened, pulverized surface at the time of seeding.

5. Any irregularities shall be corrected (filled, levelled, or smoothed, etc.) before the fertilizer and seed are placed.

6. Any subsequent settlement or displacement of the topsoil shall be restored to an acceptable condition at the Contractor's expense.

B. Fertilizer

1. The fertilizer shall be uniformly spread by a mechanical spreader at the rate recommended by the local soil conservation district.

2. The fertilizer shall be incorporated into the upper 2 inches of topsoil immediately after spreading.

C. Seed

1. Seed shall be applied during the defined planting season at the rate specified in Part 2 using a mechanical spreader.

2. Upon completion of the seeding, the area shall be raked lightly and rolled with a light hand roller.

3. The process of spraying grass seed, water, fertilizer, and mulch, known as hydro-seeding or hydro-mulching, may be utilized provided that water hazards are minimized.

a. Presoaking, the spraying of the materials and watering after spraying, shall be in strict accordance with the manufacturer's instructions.

b. The mulch used with hydro-seeding may be a wood fiber material compatible with the spray equipment.

D. Mulch

1. Immediately after seeding and rolling, the Contractor shall apply oat, wheat, or rye straw, free from noxious weeds, as a mulch, to a loose depth of about one inch.

2. Hydroseed will also require the application of oat, wheat, or rye straw, free from noxious weeds, as a mulch to a loose depth of about 1 inch.

3.03 PROTECTION AND MAINTENANCE

A. The Contractor shall protect and maintain seeded areas to assure a full even stand of grass as required in Part 1.

B. The Contractor shall perform all watering, mowing, and reseeding as necessary for a minimum of 30 days, and until final completion of the Contract, to ensure the establishment of a uniform stand of specified grasses.

C. Prior to completion of the contract, the Contractor shall mow all seeded areas uniformly to a height of approximately 3 inches, and remove all excess mulch.

END OF SECTION

SECTION 02269

QUALITY ASSURANCE/QUALITY CONTROL
LANDFILL COVER SOIL MATERIALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The quality assurance/quality control requirements, including sampling frequency and test type.

B. The requirements for documentation for the sampling and testing.

C. The requirements for failed quality control tests.

1.02 RELATED SECTIONS

A. Section 01025 - UNIT PRICE ITEMS: Requirements applicable to unit prices for work of this Section.

B. Section 02230 - SUBGRADE PREPARATION

C. Section 02260 - LANDFILL COVER CONSTRUCTION

D. Section 02262 - LANDFILL GAS VENTING MATERIAL

E. Section 02266 - LANDFILL BARRIER PROTECTION MATERIAL

F. Section 02268 - LANDFILL TOPSOIL AND SEEDING

1.03 SUBMITTALS

A. A Quality Assurance/Quality Control Plan that includes as a minimum:

1. A letter stating that the testing firm is an independent firm and has no financial interest in the Contractor.

2. Documentation of certification as an engineering technician for each individual performing testing or sampling procedures on the site.

3. Proof of certification for each individual using nuclear testing equipment.

4. An outline of nuclear equipment transportation and storage procedures.

5. An outline of soil sampling handling and transportation procedures. Submit one typical shipping device to be used in the transportation of thin-walled tube sample, if applicable.

6. Sample locations, test reports and quality control certificates, and quality assurance testing summary.

1.04 REFERENCES

A. ASTM D-75, "Standard Practice for Sampling Aggregates".

B. ASTM D-422, "Standard Method for Particle-Size Analysis of Soils".

C. ASTM D1556 - "Test Method for Density and Unit Weight of Soil in Place by the Sand Cone Method."

D. ASTM D-1557, "Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort."

E. ASTM D-1587, "Standard Practice for Thin-Walled Tube Sampling of Soils".

F. ASTM D-2216, "Standard Method for Laboratory Determination of Moisture Content of Soil, Rock, and Soil-Aggregate Mixtures."

G. ASTM D-2434, "Standard Test Method for Permeability of Granular Soils (Constant Head)".

H. ASTM D2922, "Test Methods for Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth)."

I. ASTM D-2974, "Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils."

J. ATM D3017, "Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)."

K. ASTM D-3080, "Standard Method for Direct Shear Test of Soils Under Consolidated Drained Conditions".

L. ASTM D-3740, "Standard Practice for Evaluation of Agencies Engaged in the Testing and/or Inspection of Soil and Rock as used in Engineering Design and Construction".

M. ASTM D-4220, "Standard Practices for Preserving and Transporting Soil Samples".

N. ASTM D-4253, "Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibrating Table".

O. ASTM D-4254, "Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density".

P. ASTM D-4318, "Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils".

1.05 QUALITY ASSURANCE

A. Technicians using nuclear testing equipment shall be certified for such work.

B. All technicians performing testing or sampling shall be certified as engineering technicians.

C. Observe Nuclear Regulatory Commission Industrial Code Rule 38.

D. Label all samples to indicate, at a minimum, type of material, sample number, location of the sample, lift location, if applicable, the quantity represented by the sample, and the location of the overall quantity represented by the sample.

PART 2 MATERIALS AND PRODUCTS

2.01 PRODUCTS

A. Reports of data in triplicate from field and laboratory testing, including location of field samples. Reports shall include at a minimum: sample number, location of sample, quantity of material represented by sample, location of the overall quantity represented by the sample.

B. Quality control/quality assurance certificates and field and laboratory test data generated from the required sampling and testing procedures.

1. Each certificate shall be signed by an authorized representative of the testing firm, such as the laboratory manager, who will certify that sampling and test methods were performed in accordance with those described for this work.

2. Each certificate shall reference the test sample number.

PART 3 EXECUTION

3.01 INSPECTION

A. Maintain on the site for inspection, the information outlined in ASTM Designation D-3740.

B. Prior to beginning work, verify that the Engineer has reviewed the testing facilities.

3.02 PREPARATION

A. Verify that the areas to be tested are ready to be tested.

B. Review testing parameters, requirements, and anticipated schedules to assure that adequate personnel and proper equipment will be available.

C. Perform audits as needed, to evaluate the construction, testing, and reporting process and to discuss any changes which may simplify and expedite the work.

D. Coordinate sampling and testing operations so as to have the necessary data available on a timely basis.

1. Quality control samples shall be taken such that test results are available at the time the sampled material is being placed and compacted.

2. Quality assurance tests should be made immediately available so evaluations and determinations concerning installed material can be made.

3.03 PROTECTION

A. Minimize disturbance of previously-completed work during the performance of the work in this Section.

3.04 QUALITY CONTROL SAMPLING AND TESTING

A. Perform quality control sampling and testing of source materials prior to the use of a specified quantity of materials to determine if mechanical characteristics and laboratory performance criteria are consistent with those required for the work, and to provide information for use in handling, preparation and compaction activities.

B. Inform the testing firm of anticipated quantities and locations of excavated soil on a daily basis to enable the testing firm to prepare for quality control sampling and testing.

C. Based on quantity estimates, notify the testing firm when and where quality control sampling is required.

D. Quality control sampling shall be performed as follows:

1. For material which is taken directly from its natural state to the landfill, the testing firm shall obtain a representative sample from the next proposed section of the material source, as identified by the Contractor.

2. For material which is excavated, spread and/or worked to prepare the material and then used for construction, the testing firm shall obtain a representative sample from the next proposed section of the material source, as identified by the Contractor.

3. For material which is excavated and stockpiled for later use or excavated, spread and then stockpiled, the testing firm shall obtain a representative sample from the stockpile in accordance with ASTM Designation D-75.

4. In all cases, the testing firm should visually inspect the proposed borrow material for noticeable variations in material and sample different materials separately.

5. Mass samples shall be of sufficient quantity for the required testing. Subsamples for individual test procedures shall be extracted as required by specific test methods.

6. All samples shall be labeled as required in Part 1 of this Section.

7. Subsample labels shall denote the sample from which they were derived.

E. Quality control testing shall be performed as follows:

1. The minimum frequency of testing and test methods used shall be in accordance with Table 1.

2. Samples which must be tested off-site shall be handled in accordance with ASTM Designation D-4220.

3. Permeability testing of gas venting material shall be performed at >92 percent of its maximum dry unit weight as determined by the most recent Proctor or relative density analysis.

3.05 QUALITY ASSURANCE SAMPLING AND TESTING

A. Quality assurance sampling and testing of compacted soil materials is to be performed after a specified quantity of material has been prepared, placed, and compacted to verify that compaction requirements have been met and that the resulting field performance criteria are consistent with those obtained from quality control testing and those required for the work.

B. Inform the testing firm of anticipated quantities of placed and compacted material on a daily basis to enable the testing firm to prepare for quality assurance sampling and testing.

C. Notify the testing firm when and where quality assurance testing and/or sampling is required.

D. Quality assurance testing and sampling shall be performed as follows:

1. The minimum frequency of testing and the test methods to be used are listed in Table 2.

2. Depending on the nature of the barrier protection material, field compaction verification testing may be waived and visual observation of compaction may be substituted. Written request with supporting documentation shall be submitted to and written approval received from the Engineer prior to a change in the Quality Assurance Program.

3. All penetrations shall be repaired as follows:

a. Penetrations in the barrier protection material shall be filled with the same material and compacted.

3.06 QUALITY ASSURANCE TESTING SUMMARY

A. The Contractor shall prepare and maintain a Quality Assurance Testing Summary which shall consist of the following information:

1. For every lift of the cover component, a separate data sheet for the cover shall be utilized, with each indicating the component and lift identification on the data sheet.

2. The approximate area represented by each Proctor analysis, based on filling pattern and quantities, shall be outlined and labelled on each data sheet.

3. The location of each nuclear moisture content and density test for that lift shall be recorded and labelled on each data sheet.

4. The location of each sand cone test for that lift shall be recorded and labelled on each data sheet.

5. The location of each permeability sample for that lift shall be recorded and labelled on each data sheet.

3.07 SPECIAL CONDITIONS

A. Failed Tests

1. Acceptable soil shall be defined as soil which lies between consecutive sample locations which produced test results meeting all applicable specifications.

2. In the event that a quality control test result does not meet specifications, the material from which the sample was taken and which the sample represents shall be considered unacceptable and shall not be used for construction.

   a. The Contractor may take and test additional samples about the failed sample to limit the area represented by the failed sample at no additional compensation.

   b. The Contractor may amend the soil as he deems necessary and retest the soil. The amendment shall be documented by a certified soil testing laboratory.

3. In the event that a quality assurance test does not meet specifications, the area represented by the failed sample shall be considered unacceptable and shall be removed and replaced with an equivalent amount of acceptable material at no additional compensation.

   a. The Contractor may take and test additional samples about the failed sample to limit the area represented by the failed sample, at no additional compensation.

TABLE 1

QUALITY CONTROL, FREQUENCY OF TESTING

		Frequency of Testing		
Test	Method	Off-site Fill for Shaping Subgrade	Gas Venting Material	Barrier Protection Material
Particle size analysis	ASTM D-422	1/1,000 CY	1/500 CY	1/500 CY
Modified Proctor Analysis	ASTM D-1557	1/2,500 CY*	1/2,500 CY*	1/2,500 CY*
Permeability	ASTM D-2434		1/2,500 CY	1/2,500 CY
Organic content	ASTM D-2974			1/5,000 CY
Shear strength**	ASTM D-3080	1/1,000 CY		1/1,000 CY
Moisture content	ASTM D-2216	1/500 CY	1/500 CY	1/500 CY

*If applicable, based on material characteristics, otherwise perform maximum/minimum density testing, in accordance with ASTM D-4253 and D-4254.
**Shear strength testing shall only be required for materials placed on slopes >10%, which are in contact with a geomembrane.

TABLE 1 (continued)

Notes:
(1) CY = cubic yards or portion thereof.
(2) Each soil material shall have one series of tests completed, submitted, and approved prior to beginning use of that material.
(3) Samples shall also be taken and tested at noticeable changes in material.

TABLE 2

QUALITY ASSURANCE, FREQUENCY OF TESTING

Test	Method	Frequency of Testing	
		Off-site Fill for Shaping Subgrade	Barrier Protection Material
Moisture content	ASTM D-3017	50-foot grid (each lift)	50-foot grid (each lift)
Dry unit weight	ASTM D-2922	50-foot grid (each lift)	50-foot grid (each lift)
Moisture content and dry unit weight	ASTM D-1556	200-foot grid (each lift)	200-foot grid (each lift)

END OF SECTION

SECTION 02404

LINEAR LOW DENSITY POLYETHYLENE GEOMEMBRANE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for manufacture, supply, storage, and installation of linear low density polyethylene (LLDPE) geomembrane cover.

B. Requirements for the geomembrane manufacturer.

C. Requirements for the Installation Contractor.

D. Geomembrane warranty.

E. Requirements for prefabricated boots at all penetrations through the geomembrane cover.

1.02 RELATED SECTIONS

A. Section 01025 - UNIT PRICE ITEMS
B. Section 01001 - BASIC REQUIREMENTS: Quality Control
C. Section 01005 - CLOSEOUT
D. Section 02409 - QUALITY ASSURANCE TESTING, LLDPE GEOMEMBRANE

1.03 REFERENCES

A. Documents

1. National Sanitation Foundation (NSF), "Standards for Flexible Membrane Liners".

2. NYSDEC, Division of Solid Waste, Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (NYCRR), Part 360; Solid Waste Management Facilities (Effective 12/31/88), Subpart 2: Landfills, Section 13: Landfill Construction Requirements.

3. USEPA Technical Guidance Document - Inspection Techniques for the Fabrication of Geomembrane Field Seams, EPA/530/SW-91/051, May 1991.

4. USEPA Technical Guidance Document - The Fabrication of Polyethylene FML Field Seams, EPA/530/SW-89/069, September 1989.

B. Testing Standards

1. ASTM D-638, "Standard Test Method for Tensile Properties of Plastics."

2. ASTM D-751, "Standard Test Methods for Coated Fabrics."

3. ASTM D-1238, "Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer."

4. ASTM-1505, "Standard Test Method for Density of Plastics by the Density - Gradient Technique."

5. ASTM D-1603, "Standard Test Method for Carbon Black in Olefin Plastics."

6. FTMS 101C-2065, "Federal Test Method Standard for Puncture Resistance and Elongation Test (1/8-inch Radius Probe Method)."

1.04 DEFINITIONS

A. Film Tearing Bond (FTB) - A failure in the ductile mode of one of the bonded sheets by tearing prior to complete separation to the bonded area.

B. Machine Direction (MD) - The direction parallel to the direction of movement.

C. Cross-Machine Direction (TD) - The direction perpendicular to the long, machine or manufactured direction.

D. General Contractor

1. May be the Installer.

2. Responsible for required submittals to the Engineer.

3. Responsible to take the acceptable materials which have been delivered to the site and install them in accordance with the plans and specifications.

4. Shall organize a pre-installation conference and organize daily progress meeting if required by the Engineer.

E. Polymer Supplier

1. Retained by the manufacturer.

2. Shall supply raw polymer which meets the specifications to the manufacturer.

3. Shall provide submittals and certifications as specified.

F. Manufacturer

1. Retained by the General Contractor or Installer.

2. Shall use approved polymer as supplied by the polymer supplier to manufacture geomembrane materials which meet the specifications.

3. Shall provide submittals and certifications as required.

4. Shall provide written warranties as required.

5. Shall provide a tour of the manufacturing facility, including observation of the manufacture of the materials provided specifically for the project, if requested by the Owner and/or Engineer.

G. Fabricator

1. When used, shall be retained by the manufacturer, Installer or General Contractor.

2. May also be the manufacturer.

3. Shall fabricate approved materials produced by the manufacturer into products which meet the specifications.

4. Shall fabricate materials in an off-site location.

5. Shall provide submittals and certifications as required.

H. Transporter

1. Retained by manufacturer, fabricator, Installer, or General Contractor.

2. May be the manufacturer, fabricator, or Installer.

3. Responsible to transport synthetic rolls from the manufacturer to the Installer at the project site without damage.

I. Installer

1. Retained by the manufacturer, fabricator, or General Contractor.

2. Can be the manufacturer or fabricator.

3. Responsible to take the acceptable materials which have been delivered to the site and install them in accordance with the plans and specifications.

4. Should inspect each roll of material as it is delivered to the site for damage during transport.

5. Shall provide a Field Crew Foreman and Seaming Foreman.

J. Field Crew Foreman

1. Retained by the Installer.

2. Responsible for all activities associated with the installation of the geomembrane.

3. Shall be on-site during all aspects of geomembrane installation.

4. Shall be responsible for subgrade acceptance, handling, placement, seaming, testing, repairing and all other activities performed by the Installer.

5. Shall supervise the unloading of geomembrane materials and their storage and protection until used.

K. Seaming Foreman

1. Retained by the Installer.

2. May be the Field Crew Foreman.

3. Responsible for all seaming activities associated with construction of the geomembrane materials.

4. Shall be Installer's Representative at daily meetings.

L. Seaming Crew

1. Retained by the Installer.

2. Responsible for the seaming of individual geomembrane sheets or panels.

1.05 SUBMITTALS

The General Contractor shall be responsible for the following submittals:

A. Submittals With Bid Documents

1. Manufacturer

a. A list documenting no less than 10 completed facilities totaling a minimum of 20,000,000 square feet for which the manufacturer has manufactured geomembrane. For each facility the following information shall be provided:

1) Name and purpose of the facility.

2) The location and date of installation.

3) The name of the Owner, the project manager, designer, fabricator (if any), and the Installer.

4) The name and telephone number of the contract at the facility who can discuss the project.

5) In addition, the geomembrane type, thickness, and total square footage of the installation surface should be included.

b. Manufacturers listed in Section 02404 Part 2, Section 2.01.A as acceptable manufacturers are not required to submit manufacturing documentation.

2. Installer

a. A list documenting at least 10 completed facilities for which the Installer has completed the installation of a geomembrane totaling a minimum of 10,000,000 square feet. For each facility, the following information shall be provided:

1) The name and purpose of the facility, its location, and the date of installation.

2) The name of the project manager, designer, manufacturer, and fabricator (if any).

3) The name and qualifications of the supervisor(s) of the Installer's crew(s).

4) The type(s) of seaming, patching, and tacking equipment.

5) Any available information on the performance of the lining system at the facility.

b. A list documenting at least five completed facilities for which the Installer has completed the installation of a 40 mil very or linear low density

polyethylene geomembrane totaling a minimum of 2,000,000 square feet. For each facility, the following information shall be provided:

1) Name and purpose of each facility.

2) The location and date of installation.

3) The name and qualification of the supervisor(s) of the Installer's crew(s).

4) The type(s) of seaming, patching, and tacking equipment used.

5) Any available information on the performance of the lining system at the facility.

c. Certification indicating an approval or license from the manufacturer to install the manufacturer's materials.

3. Polymer Supplier - Documentation indicating that the polymer supplier has previously produced a minimum of 1,000,000 lbs. of polymer of the same composition as that proposed for use in the manufacture of the 40 mil LLDPE geomembrane cover.

B. Submittals After Award, Prior to Shipping

1. Manufacturer

a. Copies of quality control certificates for each roll or panel of geomembrane. Each quality control certification shall include: (a) roll or panel number(s) and identification; and (b) certification that each roll was continuously inspected for uniformity, damage, imperfections, holes, cracks, thin spots and foreign materials. Additionally, the geomembrane liner must be inspected for tears, punctures and blisters.

b. Certification that the geomembrane supplied for this work was manufactured as consecutive rolls from a single lot or from consecutive lots.

c. Certification that the geomembrane and extrudate, if applicable, produced for this work have the same properties and are of the same resin.

d. Reports of tests conducted to verify conformance with Table 1.

e. If requested by the Engineer, the Quality Control procedures utilized in the geomembrane manufacturing process.

f. Origin and identification of the resin, including the resin supplier's name and production plant and resin brand name and type.

g. Copies of quality control certificates issued by the resin supplier to verify conformance with Table 1.

h. Certification that the geomembrane produced for this work has an equivalent hydraulic conductivity less than $1x10^{-12}$ centimeter per second.

2. Installer

a. Certification that the field crew foreman has a minimum of 4,000,000 square feet of actual geomembrane installation experience and a minimum of 2,000,000 square feet of supervisory experience for geomembrane installation projects.

b. Certification that the seaming foreman has a minimum of 2,000,000 square feet of actual geomembrane seaming experience and a minimum of 1,000,000 square feet of supervisory experience during the seaming of geomembrane materials.

c. Certification that each individual on the seaming crew has a minimum of 500,000 square feet of geomembrane seaming experience and a minimum of 200,000 square feet of seaming experience with 40 mil polyethylene geomembranes.

3. Transporter - Certification that the transporter has transported a minimum of 1,000,000 square feet of geomembrane material.

C. Submittals After Award, Prior to Installation

1. Manufacturer

a. Fabrication capabilities, including equipment, personnel, number of shifts per day, and capacity per shift.

b. Daily fabrication quantity estimates proposed for this work.

2. Installer

a. A letter stating that the granular and geocomposite materials and Owner's proposed installation methods

for soil and geosynthetics layers immediately above and below the geomembrane are acceptable for geomembrane installation.

b. Documentation outlining installation quality control requirements and procedures.

c. Proposed Installation Panel Layout Drawing

1) Drawing shall show the location and reference number of all panels and expected seams.

2) Drawing shall include all necessary details, including the order of panel installation.

3) Panels shall be designed to meet the requirements of Articles 3.03 and 3.04.

D. Submittals During Installation

1. Copies of seaming quality assurance records which shall include apparatus temperature, extrudate temperature, if applicable, and ambient air temperature, for each apparatus in use.

2. Copies of quality assurance certificates which shall include:

a. Panel numbers and identification.

b. Quality assurance test locations, procedures and results.

c. Documentation of repairs, including location and retest results.

E. Submittals Upon Installation Completion

1. Record drawing(s) for each panel layout diagram (2 prints, 1 reproducible).

2. Summary and log of all quality assurance testing performed.

3. Summary and log of the ambient temperature at which seaming was performed, in addition to geomembrane surface temperature and seam wedge temperature, recorded every two hours during placement and seaming.

4. A listing of any precipitation events occurring at the site, including time of such occurrences, the intensity and the amount of the event.

1.06 QUALITY ASSURANCE

A. Qualifications

1. Polymer Supplier - Shall have previously produced a minimum of 1,000,000 lbs. of polymer of same composition (documented).

2. Manufacturer

a. Shall have previously manufactured a minimum of 20,000,000 square feet of geomembrane over a minimum of 10 projects.

b. Shall be listed by the National Sanitation Foundation (NSF) as having met Standard 54 requirements for flexible membrane liners.

c. Shall agree to allow the Owner, his authorized representative, or an independent testing laboratory to visit the manufacturing facility and perform sampling and testing.

3. Transporter - Shall have previously transported a minimum of 1,000,000 square feet of geomembrane materials.

4. Installer

a. Shall have previously installed a minimum of 10,000,000 square feet of geomembrane materials over a minimum of 10 projects.

b. Shall have previously installed a minimum of 2,000,000 square feet of geomembrane materials of the same composition and thickness over a minimum of five projects.

c. Shall be certified by the manufacturer as being an approved and/or licensed installer of the manufacturer's materials.

5. Field Crew Foreman

a. Shall have a minimum of 4,000,000 square feet of actual geomembrane installation experience.

b. Shall have a minimum of 2,000,000 square feet of supervisory experience for geomembrane installation projects.

c. Shall remain on site throughout geomembrane installation and shall be responsible for subgrade acceptance, handling, placement, seaming, testing,

repairs and all other activities performed by the Installation Contractor.

6. Seaming Foreman

   a. Shall have a minimum of 2,000,000 square feet of actual geomembrane seaming experience.

   b. Shall have a minimum of 1,000,000 square feet of supervisory experience during the seaming of geomembrane materials.

   c. Shall oversee and direct all seaming operations for this work.

7. Seaming Crew - Each individual on the seaming crew shall have a minimum of 500,000 square feet of geomembrane seaming experience and a minimum of 200,000 square feet of seaming experience with 40 mil polyethylene geomembranes.

B. Pre-Installation Conference - The General Contractor shall convene a pre-installation conference with the Engineer and geomembrane installer.

1.07 REGULATORY REQUIREMENTS

A. 6 NYCRR Part 360, Subpart 2 - Landfills, Section 13, Subdivision K.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Delivery

1. Transportation of the geomembrane rolls to the job site is the responsibility of the manufacturer or transporter.

2. The geomembranes shall not be folded for shipment. They shall be rolled and covered with an appropriate material.

3. The geomembrane rolls shall be labeled with the following information:

   a. Name of manufacturer.
   b. Product type.
   c. Product thickener.
   d. Manufacturer's batch code.
   e. Date of manufacture.
   f. Physical dimensions.
   g. Panel number.
   h. Direction of unrolling.

4. Any damaged rolls shall remain on the transport vehicle for return to the point of origin.

5. The Installation Contractor shall be responsible for the off-loading of all geomembrane materials.

B. Storage

1. All geomembranes shall be stored so as to be protected from puncture, dirt, grease, water, moisture, mud, mechanical abrasions, sunlight, excessive heat, or other damage.

2. Rolls and panels shall be stored on a prepared surface (not wooden pallets) and shall not be stacked.

C. Handling

1. Provide adequate handling equipment for moving geomembrane rolls which do not pose any risk of damage to the rolls.

2. The Installation Contractor shall be responsible for the on-site handling of all geomembrane materials.

3. No geomembrane material shall be transported without the field crew foreman present.

4. Repair any damage to the protective wrapping on geomembrane rolls or panels and protect from ultraviolet light and weather.

5. Direct contact with geomembranes shall be minimized. Geomembrane in heavy traffic areas shall be protected by a geosynthetic overlay.

6. Equipment and tools shall not damage the geomembrane as a result of handling, trafficking, excessive heat or other means.

7. Personnel working on the geomembrane shall not smoke, wear damaging shoes, excessively traffic or engage in other activities which may damage the geomembrane.

8. No vehicular equipment shall be driven directly on a geomembrane.

1.09 ENVIRONMENTAL REQUIREMENTS

A. Adequate loading (e.g., sand bags, tires or similar items that will not damage the geomembrane) shall be placed to prevent uplift by wind. In case of high winds, continuous loading is recommended along edges of panels to minimize wind flow under the panels.

B. Geomembranes shall not be placed or seamed:

1. During precipitation, during periods of fog, or in the presence of excess moisture (e.g., dew, ponded water).

2. During periods of winds in excess of 20 mph or when gusting wind conditions interfere with handling operations.

3. When sheet temperatures are lower than 32 degrees F or higher than 158 degrees F and when air temperature is above 120 degrees F.

a. Installer shall submit procedures for seaming when sheet temperatures are between 40 degrees F and 50 degrees F and between 32 degrees F and 40 degrees F.

1.10 WARRANTY

A. The manufacturer shall warranty his materials for a minimum of 20 years after the date of Substantial Completion.

B. The Installer shall warranty his workmanship for a minimum of one year.

PART 2 MATERIALS

2.01 MANUFACTURER

A. The following is a list of manufacturers with the capacity to provide the geomembrane specified in this Section:

1. Poly-America, Inc.
2. SLT North America, Inc.

B. The above may not be the only manufacturers who can provide acceptable materials. Approval will be made by submittal review.

2.02 MATERIALS

A. Geomembrane - The LLDPE geomembrane shall be manufactured of new, first-quality resin and shall be compounded and continuously manufactured specifically for this work. The resin manufacturer shall certify each batch for the acceptance criteria listed in Table 1.

2.03 SOURCE QUALITY CONTROL

A. The manufacturer and polymer supplier shall perform the material testing as specified in Table 1.

B. The geomembrane shall meet or exceed the applicable acceptance criteria in Table 1.

2.04 PRODUCTS

A. None from this Section.

PART 3 EXECUTION

3.01 EXAMINATION

A. The Installation Contractor's field crew foreman shall examine all subgrades to receive geomembrane materials on a daily basis for projections or voids which may cause damage to the liner during installation. Report any changes in subgrade conditions which require repair to the Engineer.

B. Examine all geomembrane rolls or panels upon delivery.

1. Verify that rolls or panels are labeled as specified in Article 1.08.

2. Examine the surface of all rolls and/or panels for defects and damage. Rolls and/or panels with severe flaws shall be rejected.

3.02 PREPARATION

A. Prepare the subgrade to receive geomembrane material.

B. Protect geomembrane as outlined in Article 1.08.

3.03 INSTALLATION

A. Place geomembrane rolls or panels as indicated on the panel drawing (to be provided by Installation Contractor).

1. Geomembrane shall be placed over sufficient area so that all refuse is beneath the constructed cap.

2. Geomembrane shall only be placed on subgrades which have been inspected and accepted in writing by the Installation Contractor's field crew foreman.

3. Any additional protective measures considered necessary by the geomembrane installer to provide a suitable surface for installation of the geomembrane shall be provided by the Contractor, and the cost of providing such measures shall be included in the Contractor's original bid.

4. Only those rolls or panels which can be placed and seamed or permanently anchored on at least two sides on the same day they are placed shall be removed from protective packaging on a daily basis.

5. Geomembrane rolls or panels should be placed in an orderly fashion which shall minimize or prevent surface water from flowing below an in-place geomembrane.

6. Field seams shall be oriented parallel to the line of slope.

7. No horizontal seams shall be allowed on slopes greater than 5 percent.

8. No horizontal seams shall be allowed within 5 feet of the toe of any side slope.

9. In corners and odd-shaped geometric locations, the number of field seams shall be minimized.

B. Unroll geomembrane from the tube and position for seaming.

1. The method used to unroll the geomembrane shall not cause scratches or crimps in the geomembrane and shall not damage the underlying natural or geosynthetic material.

2. The method used to place the geomembrane shall minimize wrinkles.

3.04 SEAMS

A. All surfaces to be seamed shall be clean and free of moisture, dust, dirt, grease, and other foreign substances.

1. If moisture is present in the area to be seamed, air blowers shall be used to remove the moisture.

B. Seams shall be aligned with the least possible number of wrinkles and "fishmouths".

1. Wrinkles or fishmouths at seam overlaps shall be cut along the ridge of the imperfection, flattened and repaired.

2. After seaming, imperfections shall be repaired and tested as described in Article 3.09 of this Section.

3. Place a permanent mark next to each imperfection to aid in location of necessary repairs.

C. Seams shall have a finished overlap of a minimum of 5 inches for dual wedge fusion welding, but in any event, sufficient

overlap shall be provided to allow peel tests to be performed on the seam.

D. If applicable, the procedure used to temporarily bond adjacent panels together shall not damage the geomembrane; in particular, the temperature of hot air at the nozzle of any spot welding apparatus shall be controlled such that the geomembrane is not damaged.

E. Seaming shall be accomplished using dual hot wedge fusion welding and extrusion (fusion) welding seams.

1. Dual hot wedge welding shall be used for all long, straight seams, where applicable.

2. Dual hot wedge welding equipment shall be automated vehicular-mounted devices with rubber niprollers and shall be equipped with instrumentation to indicate temperature and pressure.

3. Dual hot wedge welding equipment shall be cleaned twice daily, once in the morning and once in the afternoon.

F. A movable protective layer shall be used below each overlap of geomembrane during field seaming to prevent the buildup of moisture between the sheets.

G. All field seaming operations shall be supervised by the seaming foreman and no field seams shall be made without the seaming foreman present.

3.05 TRIAL SEAMS

A. Trial seams shall be performed on fragment pieces of geomembrane to verify that seaming conditions are satisfactory and to supply test specimens for the quality assurance program.

B. Trial seams shall be conducted at the beginning of each seaming period and at least once each four hours for each seaming apparatus used that day. Trial seams shall be made under the identical conditions as the actual seams.

C. Each seamer shall make at least one trial seam each day for each seam method.

D. Trial seams shall be a minimum of 42 inches in length and 1 foot in width, with the seam centered in the 1-foot width.

E. Two test specimens shall be cut from each trial seam at one-third the distance from each end. Specimen size shall satisfy testing requirements listed in Table 1 of Section 02409.

F. Both test specimens shall immediately be tested for peel and shear strength as outlined in Table 1 of Section 02409.

G. If either specimen does not meet the acceptance criteria, the seamer and seaming apparatus and/or methods shall not be accepted and shall not be used for seaming until the deficiencies are corrected and two consecutive trial seams are successful.

H. The remaining end sections shall be retained, one by the Owner and one by the Installer, with the central portion sent to the off-site independent geosynthetic testing firm for quality assurance testing.

I. If any seamer's trial-seam sample does not meet acceptance criteria when tested by the off-site quality assurance laboratory, a test seam sample shall be taken from each seam completed by the seamer during the shift associated with the unacceptable trial seam and forwarded to the quality assurance testing laboratory.

J. If subsequent specimens do not meet the acceptance criteria, the length of seam represented by the test specimen shall be rejected.

3.06 FACTORY SEAMING

A. The geomembrane may be factory seamed to form pipe boots.

B. Factory seaming operations shall be performed in accordance with Articles 3.04 and 3.05 of this Section.

C. All factory seams shall be tested in accordance with Article 3.07 of this Section.

D. Any length of seam which is considered rejected as a result of a failed destructive test shall not be shipped for use on this project.

3.07 QUALITY ASSURANCE TESTING

A. Seams shall be quality assurance tested as described in Section 02409 by a qualified, independent testing laboratory who shall be retained by the Installer.

B. For locations where seams cannot be non-destructively tested as determined by the Engineer, seaming operations shall be continuously observed by the seaming foreman for uniformity and completeness.

3.08 FAILED TESTS

A. If any test specimen does not meet the acceptance criteria listed in Table 1 of this Section or Table 1 of

Section 02409, the test series shall be considered unacceptable and all material or length of seam represented by the test series shall be rejected. The Contractor may, at no additional compensation, take additional samples for quality control testing in an attempt to minimize the amount of material represented by the failed test.

B. An acceptable length of seam shall be defined as a length of seam which lies between acceptable destructive test locations and has passed non-destructive seam testing.

C. Quality Assurance Testing - Destructive Seam Tests

1. The Contractor has two options:

a. The seam may be reconstructed between any two acceptable test locations.

b. The acceptable length of seam may be retraced from the location of the previous acceptable test location to an intermediate point no less than 10 feet from the failed test location, where an additional field test sample shall be taken. If the field sample passes on-site peel and shear strength testing, a full test sample shall be taken for off-site laboratory testing. If the field test sample fails, the process may be repeated. All unacceptable lengths of seam shall be repaired as described in Article 3.09 of this section.

D. Quality Assurance Testing - Non-destructive Seam Tests - All unacceptable lengths of seam shall be repaired in accordance with Article 3.09 of this Section.

3.09 DEFECTS AND REPAIRS

A. Place a permanent mark next to each defect to aid in location of necessary repairs. All seams and non-seam areas of the geomembrane shall be inspected by the field crew foreman for defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter. Because light reflected by the geomembrane helps to detect defects, the surface of the geomembrane shall be clean at the time of inspection. The geomembrane surface shall be brushed, blown or washed by the installation contractor if the amount of dust or mud inhibits inspection. The Contractor shall decide if cleaning of the geomembrane is needed to facilitate inspection.

B. Each suspect location in seam and non-seam areas shall be non-destructively tested, as appropriate, in the presence of the field crew foreman. Each location that fails the non-destructive testing shall be marked by the field crew foreman and repaired accordingly.

C. No material will be placed over a repaired section of geomembrane by the Owner prior to completion of all destructive and non-destructive testing and acceptance of the repair.

D. Punctures, pin holes, small tears and localized imperfections shall be repaired using a patch.

E. Large tears and lengths of seam shall be repaired using a cap strip. No reseaming over existing seams shall be permitted.

F. Large wrinkles which exist at the end of seaming operations and which may become creased during backfilling shall be cut and reseamed.

G. Patches and cap strips shall have rounded edges (minimum radius of 3 inches), shall be made of the same geomembrane, and shall extend a minimum of 6 inches beyond the edge of defects. All patches shall be of the same compound and thickness as the geomembrane provided for this work. Patches shall be seamed using extrusion (fusion) welding.

1. Liester fusion welds shall not be allowed.

H. Tears which lie on slopes greater than 5% or which lie in areas of stress and have sharp ends shall have all sharp ends rounded prior to repair.

I. The geomembrane below large patches and cap strips shall be cut as necessary to prevent moisture or gas collection between sheets.

J. All repair seams shall be made in accordance with the requirements of Article 3.04 of this Section.

K. Each repair shall pass non-destructive tests. Large cap strips may require destructive testing, as directed by the Engineer.

3.10 OWNER'S INDEPENDENT QUALITY ASSURANCE

A. The Owner may retain a geosynthetic testing firm to perform additional independent testing of the material and seam performance and observe and document activities relative to the quality assurance of the geomembrane installation.

B. All test results shall be interpreted in the same manner as those received from the Contractor's independent testing firm.

C. In the event that any test does not meet the acceptance criteria for that specific test method, the test series

shall be considered unacceptable and the material or length of seam represented by the test series shall be rejected.

1. The Contractor may elect to have additional samples taken and similar testing performed by the Owner's testing firm in an attempt to minimize the material represented by the failed test.

2. Any additional sampling and testing requested by the Contractor for this purpose shall be at the Contractor's cost.

D. In the event of discrepancies between the Owner's test results and the Contractor's test results, the Contractor will be responsible for arranging a third testing firm independent from all parties to verify test results. The cost of this third party testing will be paid for as stated in Section 01001.

3.11 RECORDING QUALITY ASSURANCE TEST DATA

A. During the geomembrane installation process, the Installation Contractor shall record the following information on record drawings in accordance with Section 01005.

1. The location and identification number of each imperfection, the date found, the date repaired and the result of non-destructive testing on the seam (acceptable/unacceptable).

2. The location, date, sample number and test result (acceptable/unacceptable) of each destructive test series.

3. The location, identification number and date of each non-destructive air pressure seam test, the length of the tested seam, and the result of the test (acceptable/unacceptable), if applicable.

4. The location, date and lengths of non-destructive vacuum box seam testing performed on a daily basis.

3.12 PIPE BOOT LEAK TESTING

A. All pipe boot seam connections shall be tested under a 3-foot head of water for a minimum of 24 hours. Acceptable pipe boots shall show no leakage.

B. Alternative testing methods may be allowed, as determined by the Engineer.

3.13 GEOMEMBRANE ACCEPTANCE

A. The Contractor shall retain all ownership and responsibility for the geomembrane until final acceptance of all work under this contract by the Owner.

B. The geomembrane liner shall be accepted by the Owner when all of the following conditions are met:

1. Installation is finished.

2. Verification of the adequacy of all field seams and repairs, including associated testing, is complete.

3. Certification, including record drawing(s), is provided by the installation contractor to the Owner's representative.

4. Required warranties are received.

TABLE 1

QUALITY CONTROL TESTING REQUIREMENTS

Test Description	Test Method	Minimum Test Frequency	Acceptance Criteria
Raw Material Testing			
Melt flow index	ASTM D-1238 Condition 190/2.16	1 per 20,000 lbs.	<0.3 grams/ 10 min.
Carbon black	ASTM D-1603	1 per 20,000 lbs.	2.0-3.0%
Manufacture Testing			
Density	ASTM D-1505 Method A	1 test series per 100,000 sq. ft.	≥0.92 gr/cc(1)
Thickness 40 mil	ASTM D-751 as modified by NSF 54, App. A	1 test series per 100,000 sq. ft.	Avg. >40 mils All tests >36 mils
Tensile strength - smooth 40 mil:			
Break strength	ASTM D-638	1 test series each MD and TD per 100,000 sq.ft.	>68 lb/in (1)
Break elongation			≥800% (1)

TABLE 1 (continued)

Test Description	Test Method	Minimum Test Frequency	Acceptance Criteria
Puncture resistance - smooth 40 mil	FTMS-101C Method 2065	1 test series per 100,000 sq.ft.	>50 lb (1)

(1)Minimum average roll values (MARV).

END OF SECTION

SECTION 02409

QUALITY ASSURANCE TESTING
LINEAR LOW DENSITY POLYETHYLENE GEOMEMBRANE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for all materials, equipment and labor necessary to perform quality assurance sampling and testing of linear low density polyethylene (LLDPE) geomembrane cover.

B. Requirements for reports and documentation of laboratory and field sampling and data.

1.02 RELATED SECTIONS

A. Section 01025 - UNIT PRICE ITEMS
B. Section 02404 - LLDPE GEOMEMBRANE

1.03 REFERENCES

A. ASTM D-4437, "Standard Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes"

B. National Sanitation Foundation (NSF), "Standards for Flexible Membrane Liners"

1.04 SUBMITTALS

A. Prior to commencing any work, the Installer shall obtain and provide to the Engineer for review and approval:

1. A listing of qualifications for the proposed geomembrane testing firms(s) and its key personnel, who shall be retained by the Contractor to perform the work described in this Section.

2. A listing of testing apparatus and testing standards typically performed by the geomembrane testing firm.

3. A schedule for quality assurance sampling and testing showing anticipated dates.

4. A letter stating that the geosynthetic testing firm is an independent firm and has no financial interest in the geomembrane installer or manufacturer.

PART 2 MATERIALS AND PRODUCTS

2.01 MATERIALS

None in this Section.

2.02 PRODUCTS

A. Reports showing test sample locations on panel layout drawing.

B. Quality control certificates and field and laboratory test data generated from the required sampling and testing procedures.

1. Each certificate shall be signed by an authorized representative of the testing firm, such as the laboratory manager, who shall certify that test methods and results were performed in accordance with those described for this work.

2. Each certificate shall reference the test sample number.

PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

A. Examine installation to determine if installation is ready for sampling and testing.

B. Review testing parameters, requirements and anticipated schedules to assure that adequate personnel and proper equipment will be available.

C. Conduct performance audits between the Engineer, Installer and testing firms on a monthly basis, or more frequently as needed, to evaluate the construction, testing and reporting process and to discuss any changes which may simplify and expedite the work.

D. Coordinate sampling and testing operations to have the necessary data available on a timely basis. Quality control information and test results shall be provided to the Engineer as soon as they are available.

3.02 QUALITY ASSURANCE SAMPLING AND TESTING

A. Quality assurance sampling and testing of geosynthetic materials shall be performed after installation of a roll or panel of material to verify that the mechanical characteristics of the seams will not compromise the geomembrane integrity.

B. Destructive Seam Testing

1. Destructive seam samples shall be taken and tested in accordance with Table 1.

2. The location of each sample shall be at the discretion of the Owner's representative and designated on a copy of the panel layout drawing, along with the date and time of sampling and the sample number.

3. Destructive test samples shall be a minimum of 42 inches in length. Two subsamples shall be cut from the test sample at one-third the distance from each end for on-site destructive seam testing. The central portion of the test sample shall be used for off-site destructive seam testing. The remaining end portions of the test sample shall be labeled and delivered, one to the Owner and one to the Installer.

4. The two subsamples shall be taken and tested on-site for peel and shear strength.

5. If both on-site subsamples meet the acceptance criteria of Table 1, the central portion of the test sample shall be shipped for off-site destructive seam testing.

6. If either on-site or off-site test results do not meet the acceptance criteria listed in Table 1, the length of seam represented by the test sample shall be rejected.

C. Non-destructive Seam Testing

1. All seams shall be non-destructively tested over the entire length of seam by at least one of the following methods as specified in Table 1.

2. Vacuum Box Testing - See ASTM D4437 for test method.

3. Air Pressure Testing

   a. Air pressure testing shall be used only for dual hot wedge seams.

   b. Testing equipment used shall include, but not be limited to, the following:

      1) An air pump equipped with pressure gauge capable of generating and sustaining a pressure between 25 and 30 psi and mounted on a cushion to protect the geomembrane.

      2) A manometer equipped with a sharp hollow needle, or other approved pressure feed device.

3) Associated hose with fittings and connections.

c. Testing procedures shall be the following:

1) Seal both ends of the seam to be tested.

2) Insert needle or other approved pressure feed device into the tunnel created by the fusion weld.

3) Insert pressure gauge in the other end of the seam being tested to assure the entire seam is tested.

4) Energize the air pump to a pressure between 25 and 30 psi, close valve, and sustain pressure for approximately 5 minutes.

5) If loss of pressure exceeds 2 psi, or if pressure does not stabilize, locate and mark faulty area, inform the installation contractor of the defect, and retest after it is repaired.

6) Remove the pressure feed device and the pressure gauge and seal the geomembrane.

7) If any test does not meet the acceptance criteria, the length of seam represented by the test shall be considered unacceptable.

(continued)

TABLE 1

QUALITY ASSURANCE TESTING REQUIREMENTS FOR SEAMING

Test Description	Test Method	Minimum Test Frequency	Acceptance Criteria
Installation Testing			
DESTRUCTIVE TESTS(1,2)			
Peel strength	ASTM D-4437 as modified by NSF 54, App. A	1 test per 500 linear feet(3,6)	Avg. ≥50 lb/in All tests ≥31 lb/in
Shear strength	ASTM D-4437 as modified by NSF 54, App. A	1 test per 500 linear feet(3)	Avg. ≥60 lb/in All tests ≥40 lb/in
NON-DESTRUCTIVE TESTS(4)			
Vacuum box	ASTM D-4437	All seams shall be tested by at least one of these methods	No imperfections
Air pressure(5)	25 to 30 psi for 5 min.		<2 psi drop

(1) All destructive test results based on Film-Tear Bond (FTB) criteria. All samples which produce seam failures shall be considered unacceptable.
(2) A minimum of one series of destructive tests shall be performed each day that seaming is performed.
(3) When ambient air temperatures during seaming operations are less than 50 degrees F, testing frequency shall be increased to one test per 300 linear feet.
(4) Contractor has option of one of the two tests.
(5) All hypodermic needle punctures shall be repaired as required by the geomembrane manufacturer.
(6) Peel strength testing shall be completed on both Weld A and Weld B, as defined by NSF 54 for dual hot wedge seams.

END OF SECTION

EXHIBIT 3

SITE MAINTENANCE REPAIR FORM

EXHIBIT 3

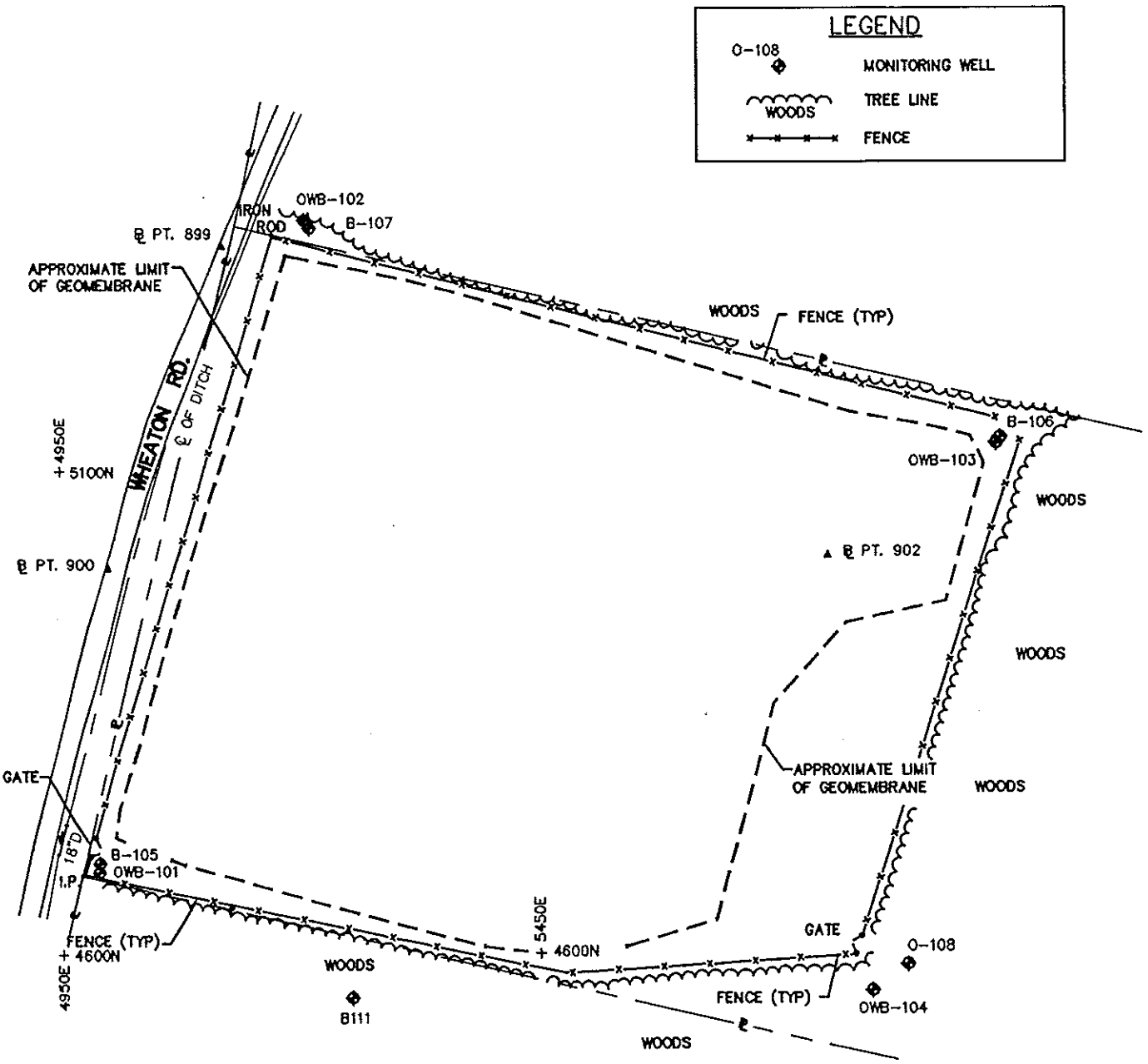
SITE MAINTENANCE REPAIR FORM

DATE	
LOCATION OF MAINTENANCE REPAIR	
REASON FOR MAINTENANCE REPAIR	
MAINTENANCE WORK PERFORMED BY	
SUMMARY OF WORK PERFORMED	
PROTECTIVE/SAFETY MEASURES TAKEN	
RESULT OF MAINTENANCE REPAIR WORK	
STEUBEN COUNTY REPRESENTATIVE	
SIGNATURE	
DATE	

* A copy of the form must be reviewed and filed with the Steuben County Assistant Commissioner of Department of Public Works.

EXHIBIT 4

EMERGENCY SERVICES



COMMENTS:

GRAPHIC SCALE

100 0 50 100 200

(IN FEET)

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Stearns & Wheler
ENVIRONMENTAL ENGINEERS & SCIENTISTS

DATE: 12/95 JOB No.: 2985

STEUBEN COUNTY, NEW YORK

PRATTSBURG LANDFILL CLOSURE

SITE PLAN
INSPECTION FORM

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EXHIBIT 4

EMERGENCY SERVICES

The following is a list of telephone numbers and addresses the agencies and organizations to be contacted for emergency services:

ORGANIZATION	ADDRESS/CONTACT PERSON
Owner/Operator	Mr. Rich Dunn, Assistant Commissioner Steuben County DPW 3 East Pulteney Square Bath, NY 14810 (607) 776-9631, Extension 2476
Regulatory Agencies	~~Ms. Mary Jane Peachey~~ Todd Caffoe Hazardous Waste Engineer New York State Department of Environmental Conservation Region 8 6274 East Avon-Lima Road Avon, NY 14414 (716) 226-2466
	~~Mr. Gerald Rider~~ Thomas Reamon NYSDEC Division of Hazardous Waste Remediation Bureau of Hazardous Site Control 50 Wolf Road Albany, NY 12233 (518) 457-0927
	~~Mr. Richard Tuers~~ New York State Department of Health Western Section Bureau of Environmental Response Investigation 11 University Place Albany, NY 12203 (518) 457-6309
Hospital	Ira Davenport Hospital 7571 State Route 54 Bath, NY 14810 (607) 776-2141
Ambulances and Fire Departments	Prattsburg Volunteer Fire Department (607) 522-3500
	Cohocton Volunteer Fire Department (716) 384-5151

EXHIBIT 5

FIELD SAMPLING AND ANALYTICAL PLAN

EXHIBIT 5-1

OVERVIEW OF ANALYTICAL PROGRAM

EXHIBIT 5-1

OVERVIEW OF ANALYTICAL PROGRAM

Analytical procedures will be performed by a New York State Department of Health Environmental Laboratory Approval Program (NYSDOH-ELAP) certified laboratory and in accordance with NYSDEC Analytical Services Protocol (ASP - NYSDEC 1991). Field blanks and duplicate samples will be collected for QA purposes according to NYSDEC requirements. Number and frequency of blanks and duplicates is itemized by matrix group in Exhibit 5-2, Field Sampling Procedures.

The data quality objective of the Field Sampling and Analytical Plan is to take representative groundwater samples from the site and subsequently ensure that the analyzing laboratory provides technically reasonable data. The purpose of the analytical program is to provide Steuben County and the NYSDEC and NYSDOH with chemical data from the Prattsburg Landfill to ensure the protection of public health and the environment.

EXHIBIT 5-2

FIELD SAMPLING PROCEDURES

EXHIBIT 5-2

FIELD SAMPLING PROCEDURES

The sampling program for the site consists of representative sampling of groundwater. The sampling program has been developed in order to provide ongoing monitoring for landfill impacts to the environment, if any. Samples will be handled in accordance with these Field Sampling Procedures and the Quality Assurance Plan.

Completed laboratory information and chain-of-custody sheets will be provided by the laboratory. The minimum information to be included on the chain-of-custody form is as presented on the attached standard form. The laboratory staff will add preservation chemicals to the sample bottles prior to sample collection and provide documentation regarding holding times and sample preservation techniques.

A. **Bottle Preparation.** It is important to use the proper sample containers in order to maintain representative groundwater chemistry between the field and the laboratory. Sample containers will be prepared by the laboratory. Proper preservation will be added, the jars tagged, and the chain-of-custody initiated prior to shipping.

B. **Sample Designation.** Each sampling location will be given a unique sample designation. The sample designation consists of matrix type, location, site name, date and time of sampling. Samples will be identified by a short alphanumeric prefix to the sample location number based on the wells from which they are collected.

Sample bottles will be labeled individually. Each label will identify the site name, depth, matrix, sample location (e.g., OWB-101) and date and time of sample collection. Chain-of-custody forms and field log book entries should refer to each sample in the same manner. No two samples will carry the same sample designation.

C. **Monitoring Well Sampling Techniques.**

1. **Explosive and Volatile Organic Vapors.** Ambient air in the well will be measured for explosive gas and volatile organic vapors before the well is evacuated. Data will be recorded on Field Sampling Record.

2. **Documented Contamination.** For wells with documented contamination, standing water in the well will be checked for immiscible layers or other contaminants that are lighter or heavier than water (floaters or sinkers). Floaters or sinkers will be sampled and analyzed by a separate method described in Section D.5.c.11 of the field sampling procedures.

3. The NYSDEC requires that groundwater samples collected for metals analysis not be filtered. Filtration is to be allowed only if samples of unacceptable high turbidity are unavoidable, in which case, both filtered and unfiltered samples must be submitted for analysis.

D. **Sampling Equipment and Procedures.**

1. **Recordkeeping.** Field records are the responsibility of the field sampling personnel. The field personnel are responsible for keeping the field log book and preparing the chain-of-

custody forms. All field records must be dated; kept in an organized, legible, and up-to-date form in the log book; and recorded with an indelible ballpoint pen. In addition to the field log book, the Field Sampling Record (Exhibit 5-5) or equivalent will be completed.

2. **Decontamination.** The following materials and procedures should be used to decontaminate equipment that will come in contact with sample media. Wherever possible, dedicated or disposable sampling equipment is used to eliminate the need for decontamination and further reduce the possibility of cross contamination between samples.

MATERIALS
Five-gallon jug with pour spout, potable water source
Five-gallon bucket - wash tub
Tall, kitchen-style garbage can lined with clean garbage bag - clean equipment holder/ dryer
Small Rubbermaid storage box - small parts wash tub
Alconox
Bottle brushes - 24" or more
Bristle scrub brush
Pesticide-grade methanol
Deionized water
PVC gloves
Nitrile gloves
Tyvek suit
Pipe wrench
Paper towels
Aluminum foil
Goggles

To avoid being splashed during decontamination, the sampler shall wear a Tyvek suit, goggles and a pair of nitrile gloves over PVC gloves. Outer gloves must undergo decontamination procedures simultaneously with equipment.

3. **Procedure.**

a. Wash in alconox and water; use bottle brush on inside of bailers; use bottle brush or scrub brush as necessary; wipe with paper towel.

b. Rinse with tap water; be sure to rinse hands (collect rinse solution in wash bucket).

c. Rinse with methanol and allow to air dry; rinse hands.

d. Rinse with deionized water; air dry.

e. Dispose of rinse water properly.

4. **Groundwater Sampling by Bailer.** Below are listed step-by-step procedures for sampling monitoring wells using bailers. The protocol is designed to provide representative samples while reducing the chances for cross contamination between sampling points. Toward this end, disposable or dedicated bailers should be used. In addition, sampling shall proceed from the least likely to the most likely contaminated locations.

5. **Bailer Sampling Procedure.**

a. **Preparation.**

1) Review sampling plan and project QAPP.

2) Order sample bottles from laboratory.

3) Notify interested parties (regulators, client) of sampling event.

4) Receive bottles. Check for proper bottles and chain-of-custody information.

5) Attend presampling meeting.

6) Assemble and check necessary equipment (personal protection equipment, rope, bailers, field instruments, notebook).

b. **Calibration Data.** The following data must be included whenever the pH, Eh, and conductivity meters are calibrated:

1) The temperature, nominal value, and expiration date of the calibration fluids.

2) The temperature-corrected value of the calibration fluids.

3) The final (after calibration) reading of the instruments as they measure the calibration fluids and the time those readings are taken.

4) If necessary, reasons why calibration could not be achieved.

c. **Sampling.**

1) Identify the well and record the location in the field book.

2) Put on a new pair of disposable PVC gloves.

3) Put on a pair of nitrile gloves.

4) Cut a slit in the center of the plastic sheet and slip it over the well, creating a clean surface onto which the sampling equipment can be positioned.

5) Do not kick, transfer, drop or in any way let soils or other materials fall onto this plastic sheet unless it comes from inside the well.

6) Clean meters, tools, equipment, etc. before use.

7) Clean the well cap with a clean towel, remove the well cap, and plug, placing both on the plastic sheet. Do not use petroleum products or aerosol lubricants to free.

8) Using an electric water level indicator, measure the depth to the water table to the nearest 0.01 foot. If free-phase product is present, use an oil-water interface probe or a clear bottom-valve bailer to determine the thickness of the free product. Record this information in the field book and Field Sampling Record.

9) Clean the well depth probe and rinse it with deionized water after use.

10) Compute the volume of water in the well and record this volume in the field book.

11) Attach enough polypropylene rope to a bailer to reach the bottom of the well and lower the bailer slowly into the well, making certain to submerge it only far enough to fill it one-half full. The purpose of this is to recover any oil film if one is present on the water table. If floaters or sinkers are present in the well, then thoroughly describe the color, appearance, thickness, and odor in the field book and Field Sampling Record. The need for and type of additional chemical analysis will be determined on an as needed basis depending on the nature of the non-aqueous phase liquid.

12) Pull the bailer out of the well, keeping the polypropylene rope on the plastic sheet. Empty the groundwater from the bailer into a clean glass quart container and observe its appearance. Note: This sample will not undergo laboratory analysis and is collected to observe the physical appearance of the groundwater only.

13) Record the physical appearance of the groundwater in the field book and Field Sampling Record. Measure the water's turbidity and record on Field Sampling Record.

14) Initiate bailing the well from the top of the water column, making certain to keep the polypropylene rope on the plastic sheet. Groundwater should be dumped from the bailer into a graduated pail to measure the quantity of water removed from the well. The purged water should be screened with the photoionization detector (PID) before disposing. PID readings above the site action level require that the purged water be drummed for proper disposal.

15) If available, a minimum of three well volumes must be bailed prior to sampling or until the well is bailed dry. If the well is bailed dry, allow sufficient time for the well to recover before proceeding with Step 18, not to exceed 24 hours. For wells with adequate recharge, sampling should be done immediately. Record this

information on the groundwater field sampling record. Obtain a second turbidity measurement prior to sampling.

16) Remove the sampling bottles from their transport containers and prepare the bottles for receiving samples. Inspect labels to verify proper sample identification. Be sure labeling is complete before filling containers. Sample bottles should be kept cool with their caps on until they are ready to receive samples. Arrange the sampling containers to allow for convenient filling. Always fill the containers for volatile organic compounds first. Filter and add preservatives to appropriate samples.

17) Record time sampling begins, and note the interval between bailing (purging) and sampling. To provide comparable samples, maintain same interval between well evacuation and sampling.

18) To minimize agitation of the water and obtain a sample fresh from the surrounding formation, initiate sampling by lowering the bailer slowly into the well, making certain to submerge it only far enough to fill it completely. Fill sample bottles and return each to its proper transport container. Keep samples on ice. If required, seal each container with chain-of-custody seals.

19) If the sample bottles cannot be filled quickly, keep them cool with the caps on until they are filled. The vials labeled for volatile organic compounds (VOCs) analysis should be filled from one bailer, then securely capped.

20) After the last sample has been collected, record the date and time and empty one bailer of water from the surface of the water in the well into a beaker and measure the record the pH, Eh, conductivity and temperature of the groundwater following the procedures outlined in the equipment operation manuals. Also, obtain a final turbidity measurement. Record this information in the field book and Field Sampling Record. The beaker must then be rinsed with distilled water prior to reuse.

21) Begin the chain-of-custody record. A separate entry is required for each well with the required analysis listed individually.

22) Replace the well cap and lock the well protection assembly before leaving the well location.

23) Place the polypropylene rope and disposable bailer, gloves, rags and plastic sheeting into a plastic bag for disposal.

D. **Corrective Action.** The field sampling procedure will be followed as described in this document. In the event of a problem, any corrective measures taken will be documented in the sampling report submitted to the NYSDEC. The documentation will include a description of the deficiency, the corrective action taken, and the persons responsible for implementing the corrective action. Any future alterations to the field sampling procedures shall be included as an amendment to the Field Sampling and Analytical Plan.

E. **Field QA/QC.** In addition to water samples collected from the monitoring wells, two types of "blanks" will be collected and submitted to the chemical laboratory for analyses. The blanks will consist of 40 ml VOA vials as follows:

1. **Trip Blank.** A trip blank will be prepared by the laboratory and will accompany the sample bottle shipment. The trip blank will consist of distilled, deionized water that accompanies the other sample bottles into the field and back to the laboratory. A trip blank will be included with each shipment of samples where sampling and analysis for volatiles is planned. The trip blank will be analyzed for volatile organic compounds to determine whether VOCs have been introduced into the samples as a consequence of field or laboratory contamination.

2. **Field (Wash) Blanks.** Field wash blanks are analyzed to check the effectiveness of decontamination. Each sample consists of distilled deionized water (prepared by the laboratory) poured through a decontaminated bailer or other sampling apparatus. It is usually collected as a last step in the decontamination procedure prior to sampling of a monitoring well. The wash blank can be analyzed for all or some of the compounds which the subsequent monitoring well sample is scheduled for. In the event dedicated sampling equipment (i.e., disposable bailers) is used such that decontamination procedures are not warranted, field blanks will not be included for analysis.

3. **Duplicate Samples.** One duplicate sample will be collected during each sampling event. The duplicate sample will be collected from one of the monitoring wells sampled in that event. The sample containers for the duplicate sample and the chain-of-custody will not reveal the identity of the well from which the sample is collected. The results of the duplicate analyses will be used to check for analytical integrity.

4. **Matrix Spike and Matrix Spike Duplicate (MS/MSD).** MS/MSD samples will be collected at one of the sample locations for each semi-annual event. MS/MSD samples are collected as triplicate samples and are used by the laboratory to determine analytical accuracy. The location from which the MS/MSD samples are collected should be recorded in the Field Sampling Record and the chain-of-custody form.

F. **Sample Handling And Analysis.** The following sections describe what to do with samples once they have been collected. Examples of paperwork are attached for reference.

1. **Packaging.** Samples processed for analyses must be packaged for shipment in accordance with current U.S. Department of Transportation (DOT) regulations. Required government and commercial carrier shipping papers must be filled out. Information can be obtained from the carrier (i.e., Federal Express) before field sampling begins.

The following checklist should be followed regardless of transport method:

a. Samples will be transported in metal ice chests or sturdy plastic coolers (cardboard or styrofoam containers are unacceptable).

b. Remove previously-used labels, tape and postage from cooler.

c. Ship filled sample bottles in same cooler in which empty bottles were received. Coolers should have a permanent identification number affixed to the outside walls or lid.

d. Affix return address label to cooler.

e. Check to see that sample bottles are tightly capped.

f. Be sure bottle labels are completed.

g. While packing cooler, fill out chain-of-custody form.

h. Wrap sample bottles in bubble pack and place in cooler.

i. Pack bottles with extra bubble pack, vermiculite, or styrofoam "peanuts". Be sure to pack trip blank if applicable.

j. Keep samples refrigerated in cooler with bagged ice or frozen cold packs. Do not use ice for packing material; melting will cause bottle contact and possible breakage.

k. Separate sampler's copy of chain-of-custody and keep with field notes.

l. Tape paperwork (COC, manifest, return address) in ziplock bag to inside cooler lid.

m. Close cooler and apply signed and dated custody seal in such a way that the seal must be broken to open cooler.

n. Securely close cooler lid with packing or duct tape. Be sure to tape latches and drain plugs in closed position.

2. **Shipping.** Because holding times are very important for accurate laboratory analyses, it is imperative that samples arrive at the lab as soon as possible following sampling. Samples must be hand delivered on the same day as sampling or sent via overnight mail.

When using a commercial carrier, follow the steps below.

a. Securely package samples and complete paperwork.

b. Weigh coolers for air transport.

c. Complete air bill for commercial carrier (air bills can be partially completed in office prior to sampling to avoid omissions in field). If necessary, insure packages.

d. Keep customer copy of air bill with field notes and chain-of-custody form.

EXHIBIT 5-2 (continued):

e. When coolers have been released to transporter, call receiving laboratory and give information regarding samplers' names, method of shipment, cooler identification numbers, and expected time of arrival.

f. Call lab on day following shipment to be sure samples arrived intact. If bottles are broken, locations can be determined from chain-of-custody and resampled.

EXHIBIT 5-3

LABORATORY QUALITY ASSURANCE PLAN

EXHIBIT 5-3

LABORATORY QUALITY ASSURANCE PLAN

The quality assurance plan of the analytical laboratory will be included as Exhibit 5-3 of the Prattsburg Landfill Field Sampling and Analytical Plan and subject to approval by Steuben County and NYSDEC. The analytical laboratory will carry NYSDOH-ELAP certification, and will provide NYSDEC ASP (NYSDEC 1991) deliverables.

Ambient water quality standards and guidance values have been determined by the NYSDEC (October 1993) in order to protect the State's waters. The minimum detection limit for water parameters will be specified as the practical quantitation limits (PQLs). The PQLs are described by the NYSDEC [Part 360-2.11(d)(6)] as the lowest concentration of analytes in groundwater that can be reliably determined under normal laboratory practices. For any water quality parameter, if the PQL is less than the water quality standard, the minimum detection limit for the parameter will be the PQL. But if the PQL is greater than the water quality standard, the minimum detection limit will be the water quality standard.

The analytical quality assurance (AQA) and analytical quality control (AQC) interpretations for the sampling program will be provided by the laboratory analyzing the samples. The laboratory will provide a discussion the AQA/AQC programs, including AQA/AQC goals and procedures for environmental monitoring. This discussion will include such items as: 1) quality objectives of project; 2) laboratory employee qualifications; 3) AQC procedures; and 4) standard operating procedures for all aspects of environmental monitoring, including sample bottle preparation, sample preservation, holding times, and analytical methods.

Should circumstances require, specific laboratory standard operating procedures will be submitted to the NYSDEC regarding the following:

1. Receipt, storage, and handling of samples.
2. Sample scheduling to ensure holding times are met.
3. Reagent and standard preparation.
4. General laboratory techniques.
5. Description of analytical performance.
6. Equipment calibration.
7. Documentation for corrective actions taken.

EXHIBIT 5-4

WATER QUALITY ANALYSIS TABLES

EXHIBIT 5-4
Site Analytical Program
O&M Manual
Prattsburg Landfill
Steuben County, New York

TAL Metals			
7429-90-5	Aluminum	7439-95-4	Magnesium
7440-36-0	Antimony	7439-96-5	Manganese
7440-38-2	Arsenic	7439-97-6	Mercury
7440-39-3	Barium	7440-02-0	Nickel
7440-41-7	Beryllium	7782-49-2	Selenium
7440-43-9	Cadmium	7440-22-4	Silver
7440-47-3	Chromium	7440-28-0	Thallium
7440-48-4	Cobalt	7440-62-2	Vanadium
7440-50-8	Copper	7440-66-6	Zinc
7439-89-6	Iron	5955-70-0	Cyanide
7439-92-1	Lead		

NYSDEC (1991) ASP

TCL Volatile Organic Compounds (Suggested method: 8010/8020)			
CAS No.	Compound	CAS No.	Compound
74-87-3	Chloromethane	10061-01-5	cis-1,3-Dichloropropene
74-83-9	Bromomethane	79-01-6	Trichloroethene
75-01-4	Vinyl chloride	124-48-1	Dibromochloromethane
75-00-3	Chloroethane	79-00-5	1,1,2-Trichloroethane
75-09-2	Methylene chloride	71-43-2	Benzene
67-64-1	Acetone	10061-02-6	trans-1,3-Dichloropropene
75-15-0	Carbon disulfide	75-25-2	Bromoform
75-35-4	1,1-Dichloroethene	108-10-1	4-Methyl-2-Pentanone
75-34-3	1,1-Dichloroethane	591-78-6	2-Hexanone
540-59-0	1,2-Dichloroethene (tot)	127-18-4	Tetrachloroethene
67-66-3	Chloroform	79-34-5	1,1,2,2-Tetrachloroethane
107-06-2	1,2-Dichloroethane	108-88-3	Toluene
78-93-3	2-Butanone	108-90-7	Chlorobenzene
71-55-6	1,1,1-Trichloroethane	100-41-4	Ethylbenzene
56-23-5	Carbon tetrachloride	100-42-5	Styrene
75-27-4	Bromodichloromethane	1330-20-7	Xylenes (tot)
78-87-5	1,2-Dichloropropane		

EXHIBIT 5-5

FORMS

FIELD SAMPLING RECORD

Stearns&Wheler

Project: _____
Project #: _____
Date: _____
Samplers: _____
_____
Weather: _____

SAMPLE LOCATION SKETCH

SAMPLE INFORMATION

Sample ID:_____
Sample Source: Well, Surface Water, Leachate
Well Type/Size:_____
Total Well Depth:_____ (from top of casing)
Depth to Water:_____ (from top of casing)
Height of Water Column:_____
Time Sample Taken:_____
Description of sample location: _____
_____
Sample Comments:_____
_____

WELL VOLUME CALCULATION

2in. casing:_____ ft. of water x 0.16 = _____gallons
3in. casing:_____ ft. of water x 0.36 = _____gallons
4in. casing:_____ ft. of water x 0.65 = _____gallons

PURGE METHOD

Disp Bailer _____ Stain. Steel Bailer _____
Bladder Pump _____ Other _____
Peristaltic Pump _____

Volume of water removed _____ gal.
> 3 volumes removed: yes no
Dry: yes no

FIELD PARAMETERS

Time	Temp (C)	Conduct. (umhos)	pH	Eh (mV)	Turbidity (NTU)	Sample Numbers	Observations

CHAIN OF CUSTODY RECORD

Stearns&Wheler

Project Name/Project No.	
Samplers Signature	

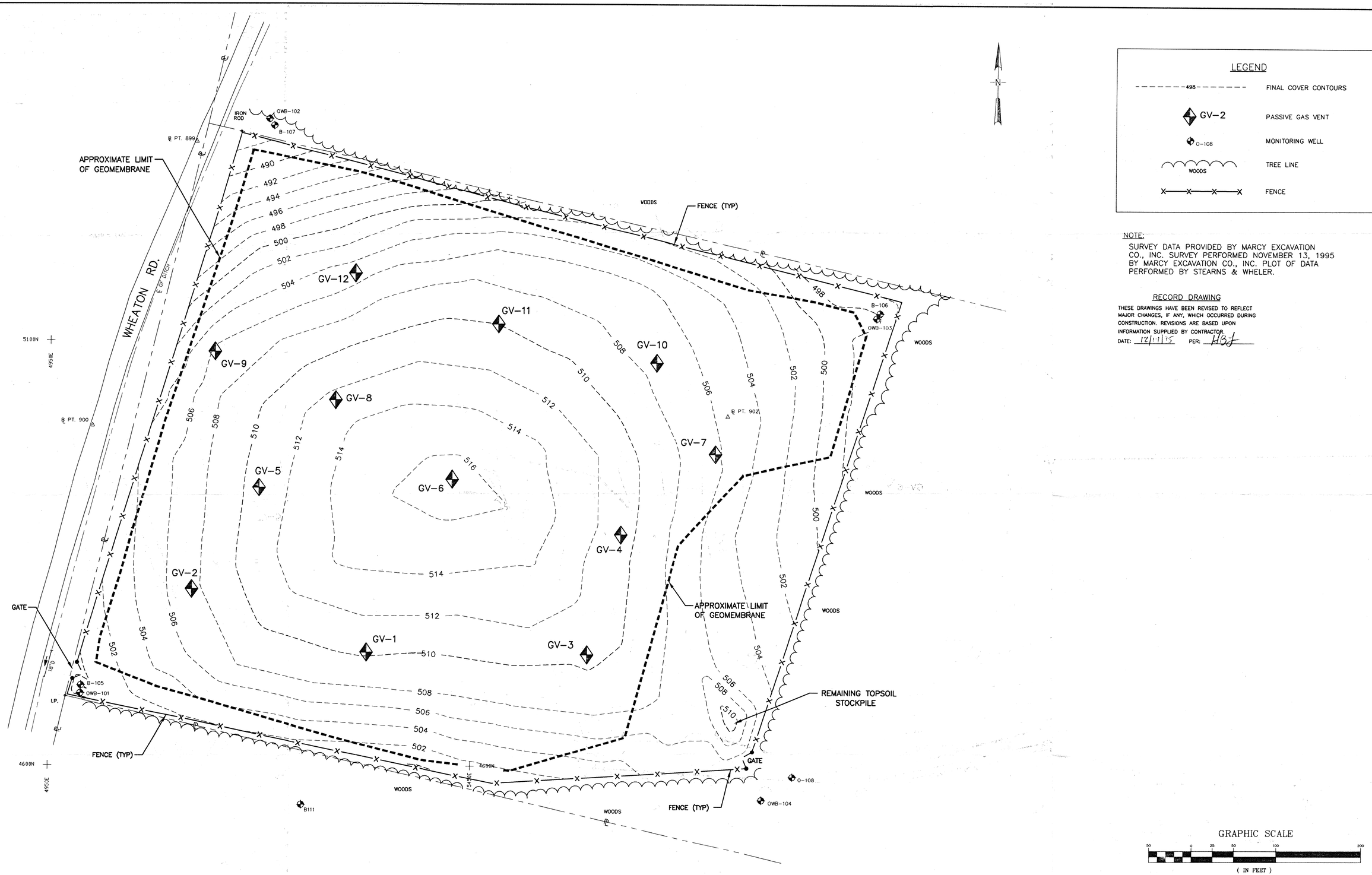
FIELD LAB NO.	LAB ID NO.	COLLECTION DATE	COLLECTION TIME	COLLECTION LOCATION	SAMPLE TYPE/DESCRIPTION	ANALYSIS REQUIRED

Was Shipped Container Intact When Received By Lab? Yes_____ No_____ Initials_____ Total No. of Containers_____

RELINQUISHED BY (signature)	DATE/TIME	RECEIVED BY (signature)	WERE ALL INDIVIDUAL SAMPLE SEALS INTACT? YES___ NO____ IF NO, INDICATE SAMPLE NUMBERS ON WHICH SEALS WERE BROKEN AT TIME OF RECEIPT.
			ANALYST_____ DATE_____ signature

EXHIBIT 6

FINAL COVER RECORD DRAWING



NOTES:

Underground facilities, structures, and utilities have been plotted from available surveys and records, and therefore their locations must be considered approximate only. There may be others, the existence of which is presently not known.

It is a violation of New York State Education Law for any person, unless acting under the direction of a licensed professional engineer, to alter an item on this drawing in any way. If an item is altered, the altering engineer shall affix to the item his/her seal and the notation "altered by" followed by his/her signature and the date of such alteration, and a specific description of the alteration.

ISSUE NO.						
3	FOR CONSTRUCTION				HBL	6/29/95
	MRY	6/95	BLS	MRY		
2	REVISED PER N.Y.S.D.E.C. COMMENTS				HBL	5/19/95
	MRY	5/95	JHH	MRY		
1	FOR N.Y.S.D.E.C. APPROVAL				HBL	4/5/95
	MRY	03/95	MJJ	MRY		
ISSUE NO.	DRAWN	DATE	CHECKED	DESIGNER	APPROVED	DATE
4	FINAL COVER CONTOURS PER SURVEY 11-13-95					
	MRY	11/95	MJJ	MRY	HBJ	12/19/95
ISSUE NO.	DRAWN	DATE	CHECKED	DESIGNER	APPROVED	DATE

PROJECT SUPERVISOR Harold B. Johnson DEPARTMENT SUPERVISOR Harold B. Johnson

STATE OF NEW YORK HOWARD BENSON JOHNSON LICENSED PROFESSIONAL ENGINEER No. PE 51872

Stearns & Wheler
ENVIRONMENTAL ENGINEERS & SCIENTISTS

STEUBEN COUNTY, NEW YORK
PRATTSBURG LANDFILL CLOSURE
FIGURE 6-1
FINAL COVER RECORD DRAWING

JOB NO.	2985	CONTRACT	1	SHEET	1 of 1

Project Name: Prattsburg Landfill

Job No. 2379.9

Start
Date 5/20/93 Time 1150
Finish
Date 5/25/93 Time 1730

Stearns and Wheler

Environmental
Engineers and Scientists

Boring ID: B105

Drilling Company: American Auger

Driller:

S&W Inspector: DO

Drill Rig Type: Mobile ATV

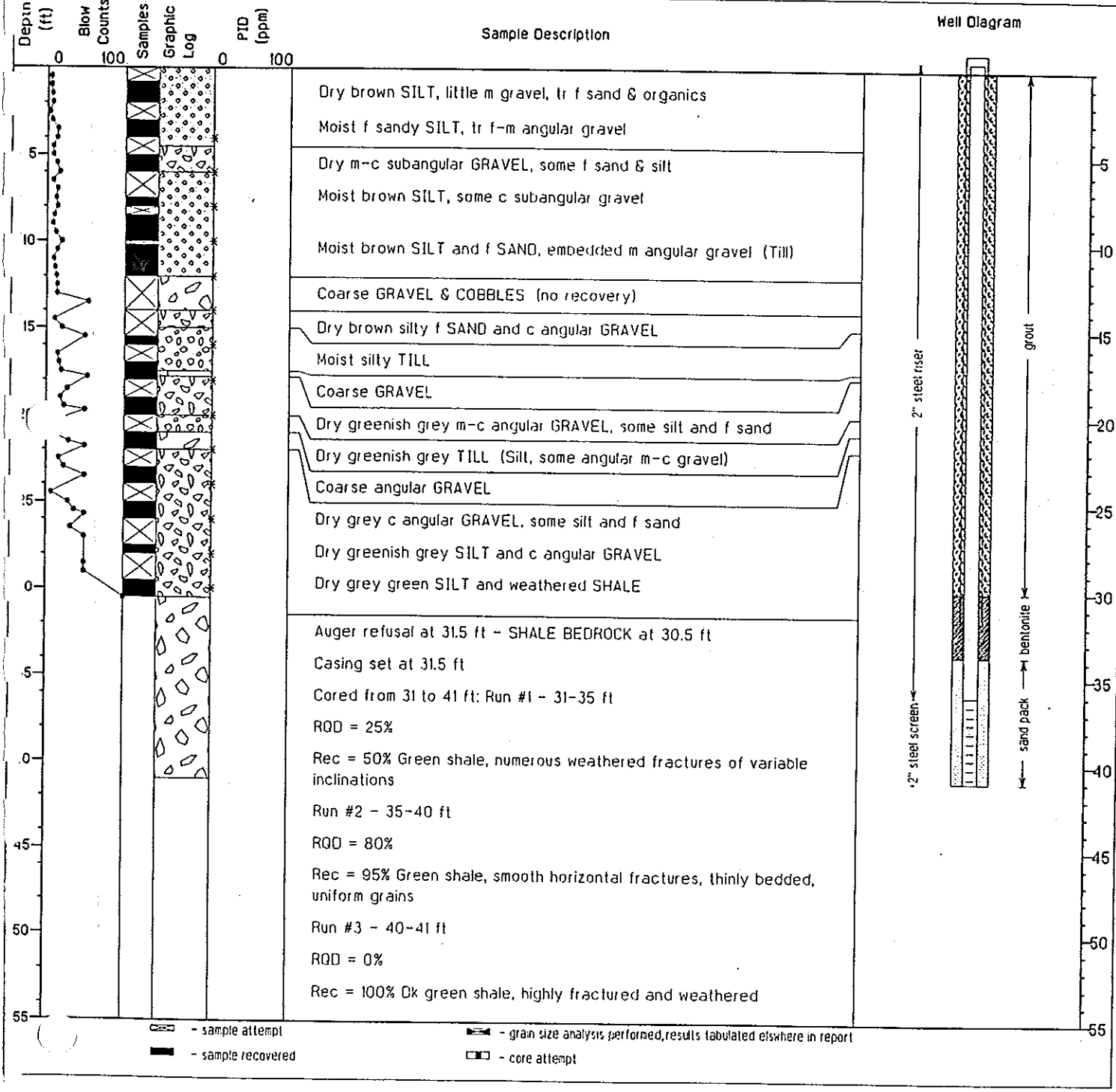
Drilling Method: HSA

Weather: P cloudy

Elevation
502.13 (Top of Casing)

X coord: feet
Y coord: feet

Groundwater Observations
Time : n/a
Date : n/a
Casing Depth: n/a
Boring Depth: n/a
Water Depth : n/a



Descriptions in log have been generalized for clarity of presentation. Significant changes in lithology have been noted. Original well logs are available from Stearns and Wheler files.

Project Name: Prattsburg Landfill

Job No. 2379.9

Start
Date 5/24/93 Time 1200
Finish
Date 5/26/93 Time 1050

Stearns and Wheler

Environmental
Engineers and Scientists

Boring ID: B106

Drilling Company: American Auger

Driller:

S&W Inspector: DO

Drill Rig Type: Mobile ATV

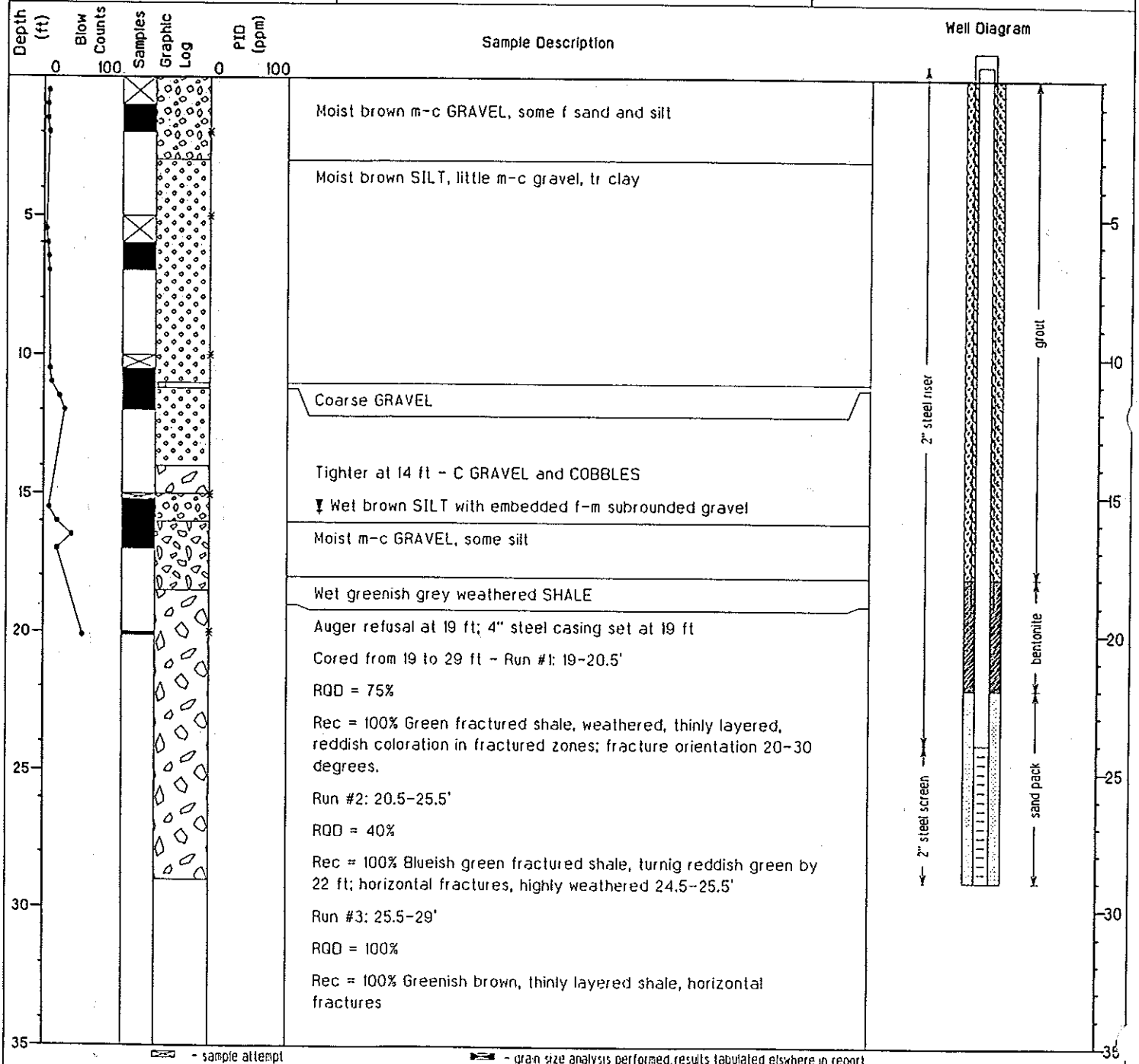
Drilling Method: HSA

Weather: Cloudy, showers

Elevation
498.24 (Top of Casing)

X coord: feet
Y coord: feet

Groundwater Observations
Time : n/a
Date : n/a
Casing Depth: n/a
Boring Depth: n/a
Water Depth : n/a



Descriptions in log have been generalized for clarity of presentation. Significant changes in lithology have been noted. Original well logs are available from Stearns and Wheler files.

Project Name: Prattsburg Landfill

Job No. 2379.9

Start
Date 5/21/93 Time 1045
Finish
Date 5/26/93 Time 1530

Stearns and Wheler

Environmental
Engineers and Scientists

Boring ID: B107

Drilling Company: American Auger

Driller:

S&W Inspector: DO

Drill Rig Type: Mobile ATV

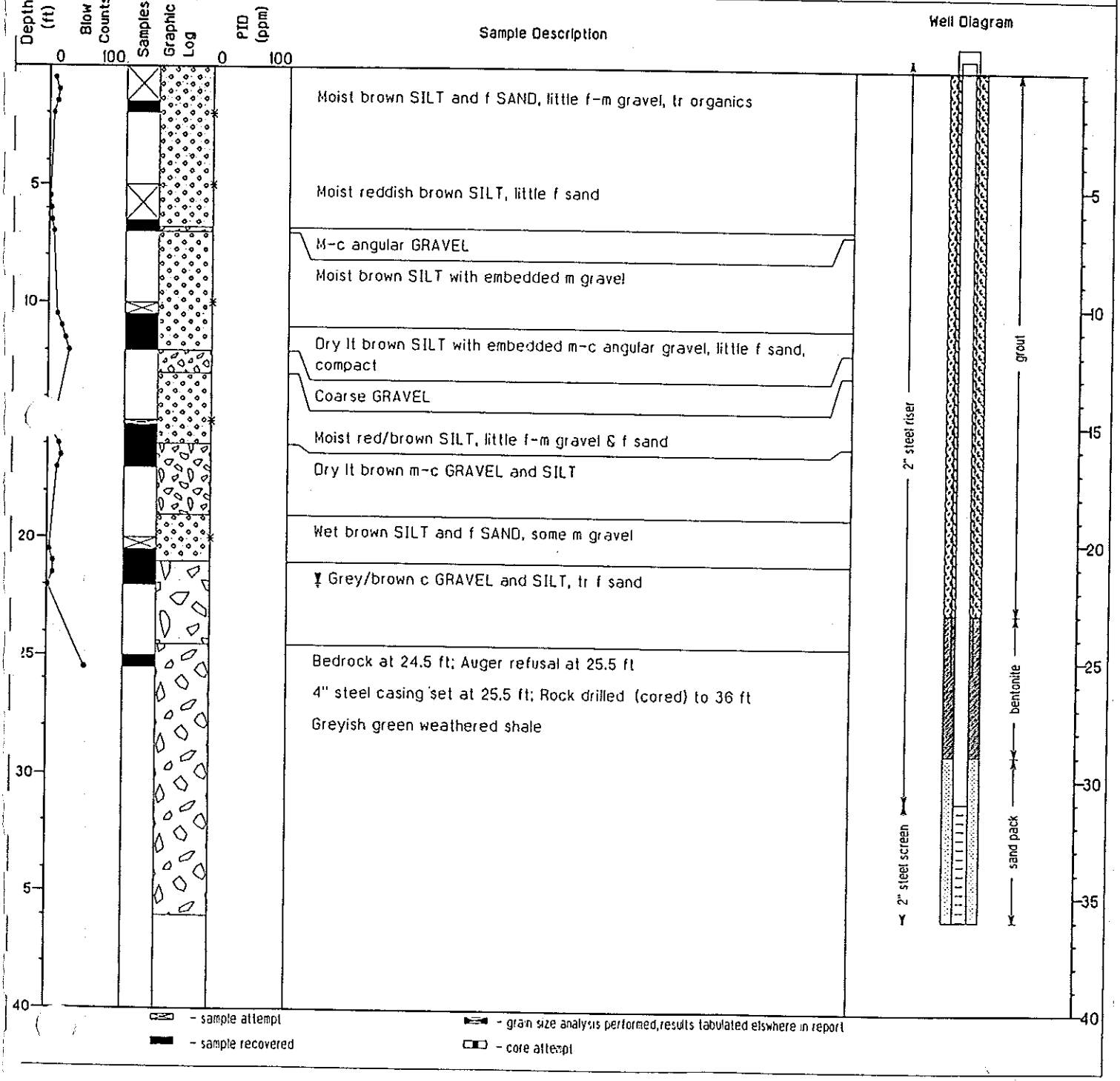
Drilling Method: HSA

Weather: Sunny, 45F

Elevation
488.88 (Top of Casing)

X coord: feet
Y coord: feet

Groundwater Observations
Time : 1300
Date : 5/21/93
Casing Depth: 22'
Boring Depth: 22'
Water Depth : 21'



- sample attempt
- sample recovered
- grain size analysis performed, results tabulated elswhere in report
- core attempt

Descriptions in log have been generalized for clarity of presentation. Significant changes in lithology have been noted. Original well logs are available from Stearns and Wheler files.

Project Name: Prattsburg Landfill

Job No. 2379.9

Start
Date 5/27/93 Time 1100
Finish
Date 5/27/93 Time 1200

Stearns and Wheler

Environmental
Engineers and Scientists

Boring ID: O 108a

Drilling Company: American Auger

Driller:

S&W Inspector: DO

Drill Rig Type: Mobile ATV

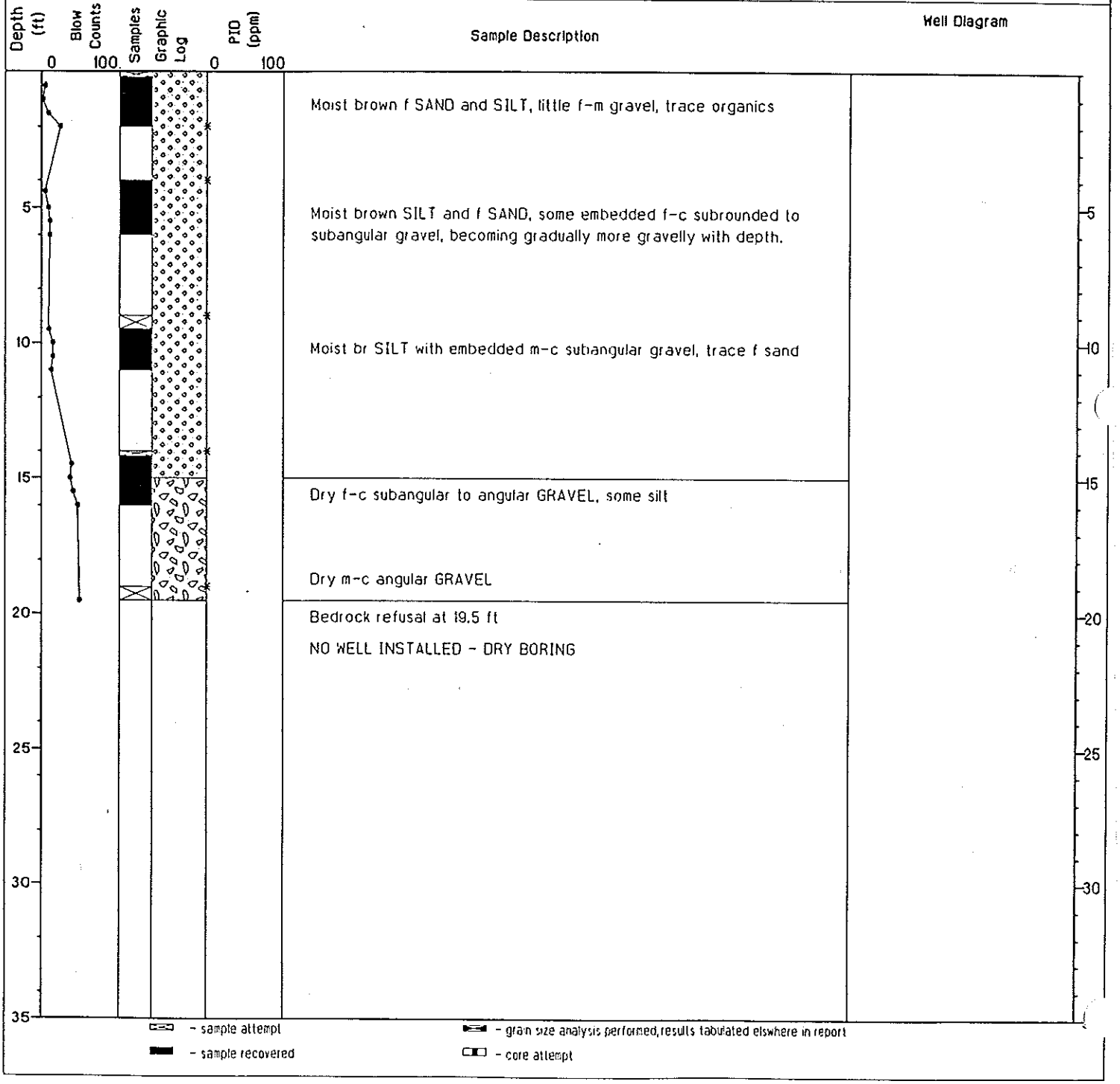
Drilling Method: HSA

Weather: Sunny, 70F

Elevation
n/a

X coord: feet
Y coord: feet

Groundwater Observations
Time : n/a
Date : n/a
Casing Depth: n/a
Boring Depth: n/a
Water Depth : none observed



Descriptions in log have been generalized for clarity of presentation. Significant changes in lithology have been noted. Original well logs are available from Stearns and Wheler files.

Project Name: Prattsburg Landfill

Job No. 2379.9

Start
Date 5/27/93 Time 1305
Finish
Date 5/27/93 Time 1445

Stearns and Wheler

Environmental
Engineers and Scientists

Boring ID: O 108b

Drilling Company: American Auger

Driller:

S&W Inspector: DO

Drill Rig Type: Mobile ATV

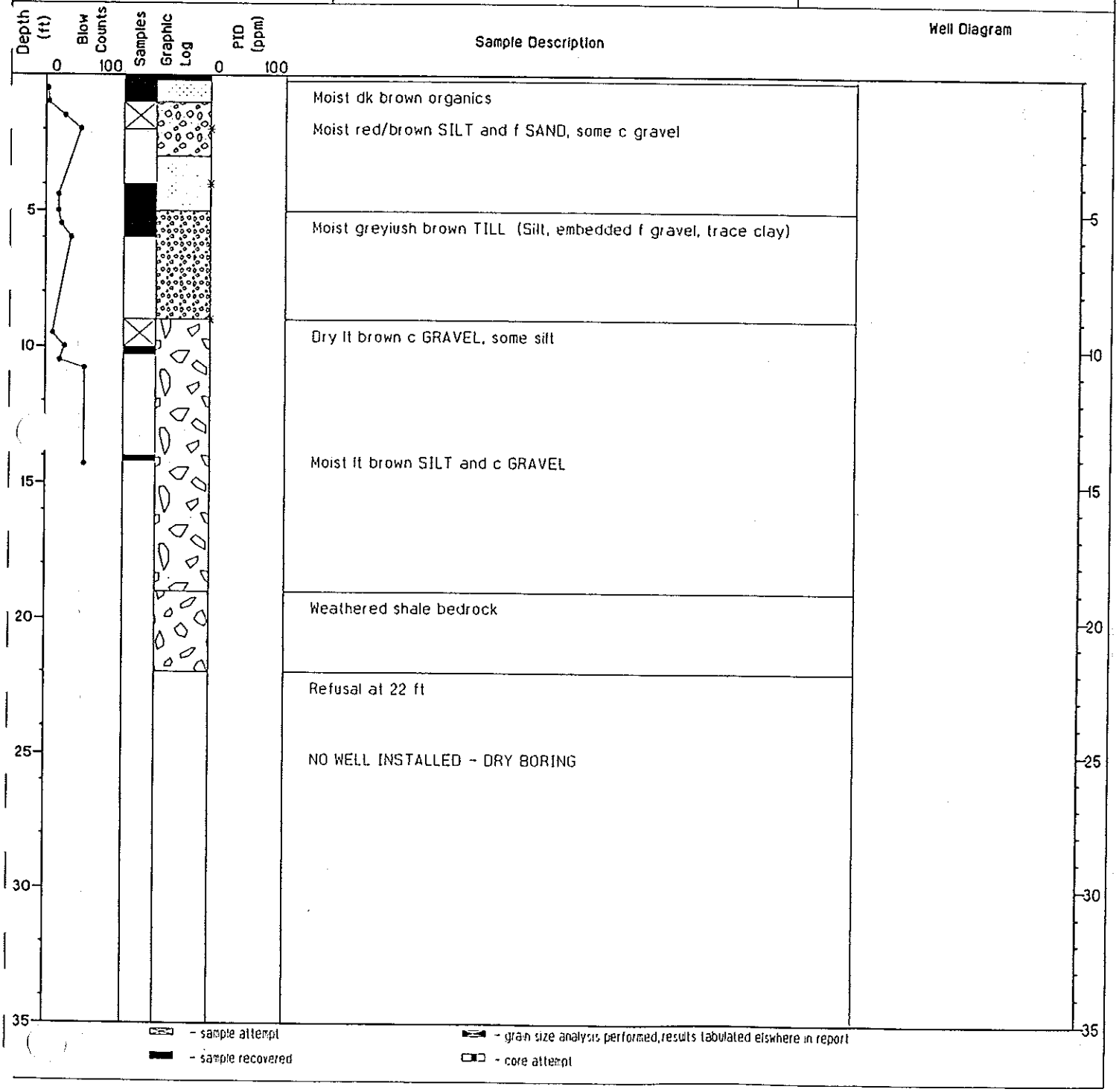
Drilling Method: HSA

Weather: Sunny, 70F

Elevation
n/a

X coord: feet
Y coord: feet

Groundwater Observations
Time : n/a
Date : n/a
Casing Depth: n/a
Boring Depth: n/a
Water Depth : none observed



Descriptions in log have been generalized for clarity of presentation. Significant changes in lithology have been noted. Original well logs are available from Stearns and Wheler files.

Project Name: Prattsburg Landfill

Job No. 2379.9

Start
Date 5/27/93 Time 1500
Finish
Date 5/27/93 Time 1735

Stearns and Wheler

Environmental
Engineers and Scientists

Boring ID: 0 108c

Drilling Company: American Auger

Driller:

S&W Inspector: DO

Drill Rig Type: Mobile ATV

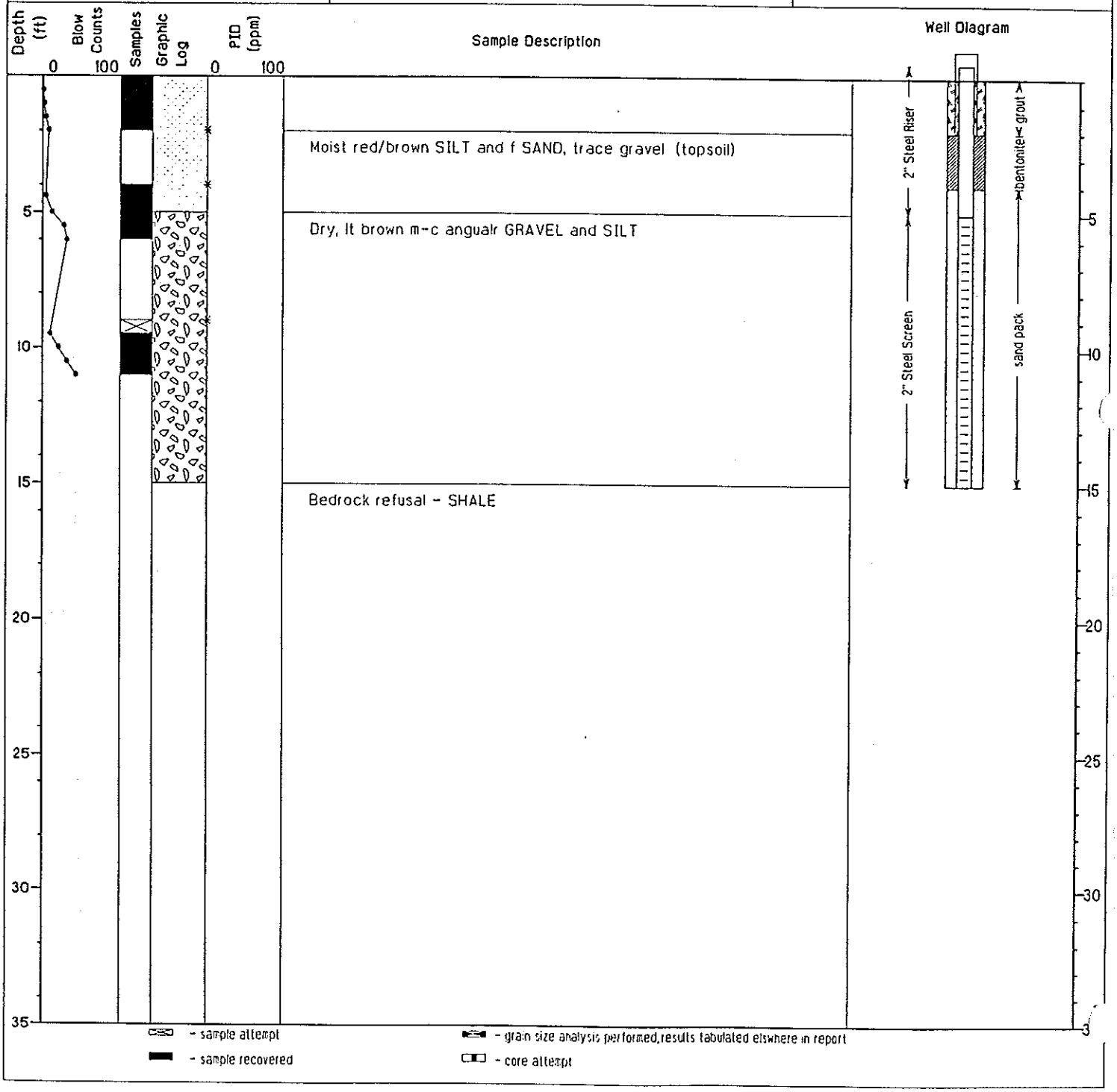
Drilling Method: HSA

Weather: Sunny, 70F

Elevation
505.22 (Top of Casing)

X coord: feet
Y coord: feet

Groundwater Observations
Time : n/a
Date : n/a
Casing Depth: n/a
Boring Depth: n/a
Water Depth : none observed



Descriptions in log have been generalized for clarity of presentation. Significant changes in lithology have been noted. Original well logs are available from Stearns and Wheler files.

Project Name: Prattsburg Landfill

Job No. 2379.9

Start
Date 5/25/93 Time 1045
Finish
Date 5/25/93 Time 1215

Stearns and Wheler

Environmental
Engineers and Scientists

Boring ID: P 1

Drilling Company: American Auger

Driller:

S&W Inspector: DO

Drill Rig Type: Mobile ATV

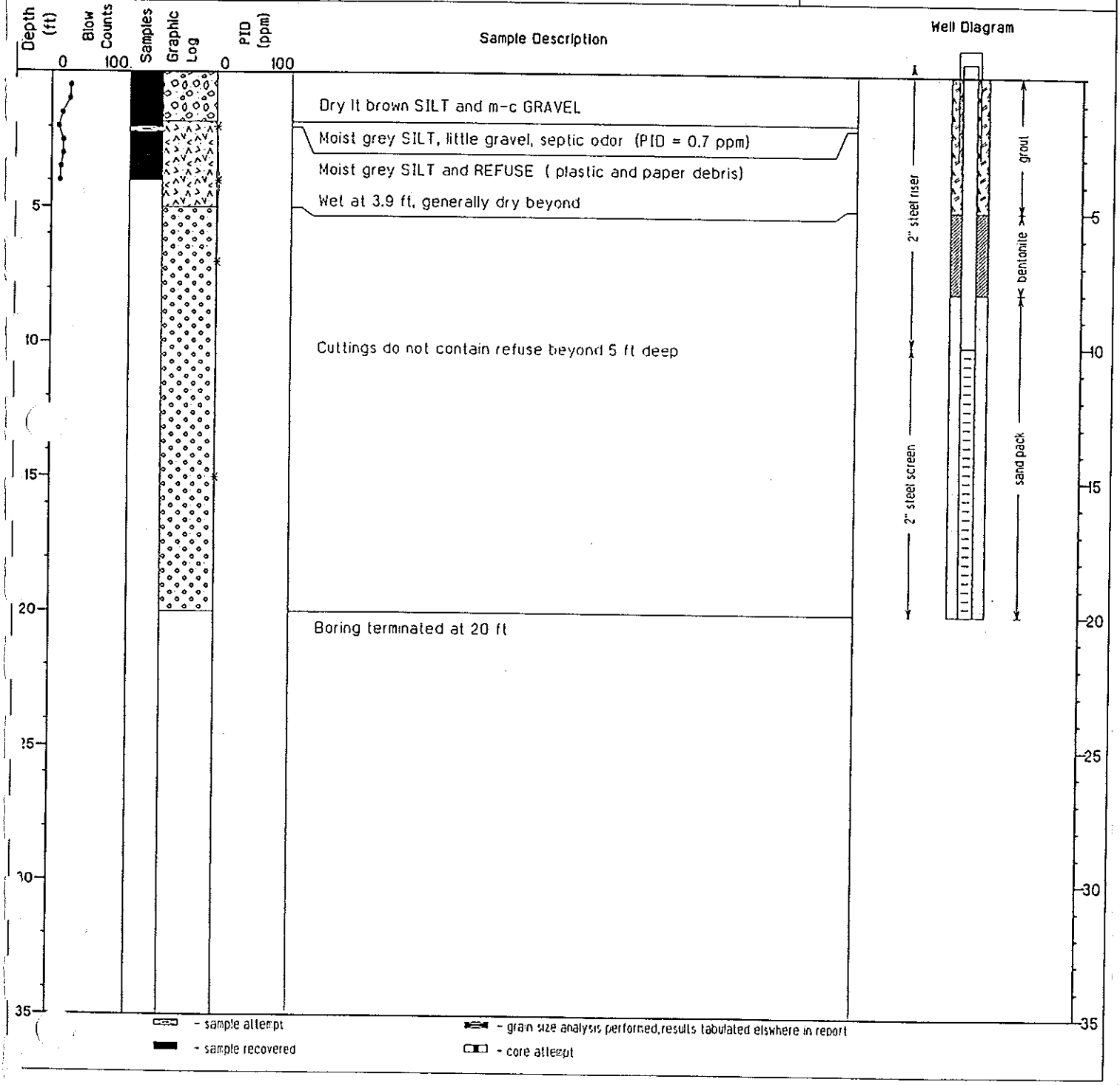
Drilling Method: HSA

Weather: P cloudy, breezy

Elevation
512.43 (Top of Casing)

X coord: feet
Y coord: feet

Groundwater Observations
Time : n/a
Date : n/a
Casing Depth: n/a
Boring Depth: n/a
Water Depth : n/a



Descriptions in log have been generalized for clarity of presentation. Significant changes in lithology have been noted. Original well logs are available from Stearns and Wheler files.

Project Name: Prattsburg Landfill

Job No. 2379.9

Start
Date 5/24/93 Time 1600
Finish
Date 5/27/93 Time 0945

Stearns and Wheler

Environmental
Engineers and Scientists

Boring ID: P 2

Drilling Company: American Auger

Driller:

S&W Inspector: DO

Drill Rig Type: Mobile ATV

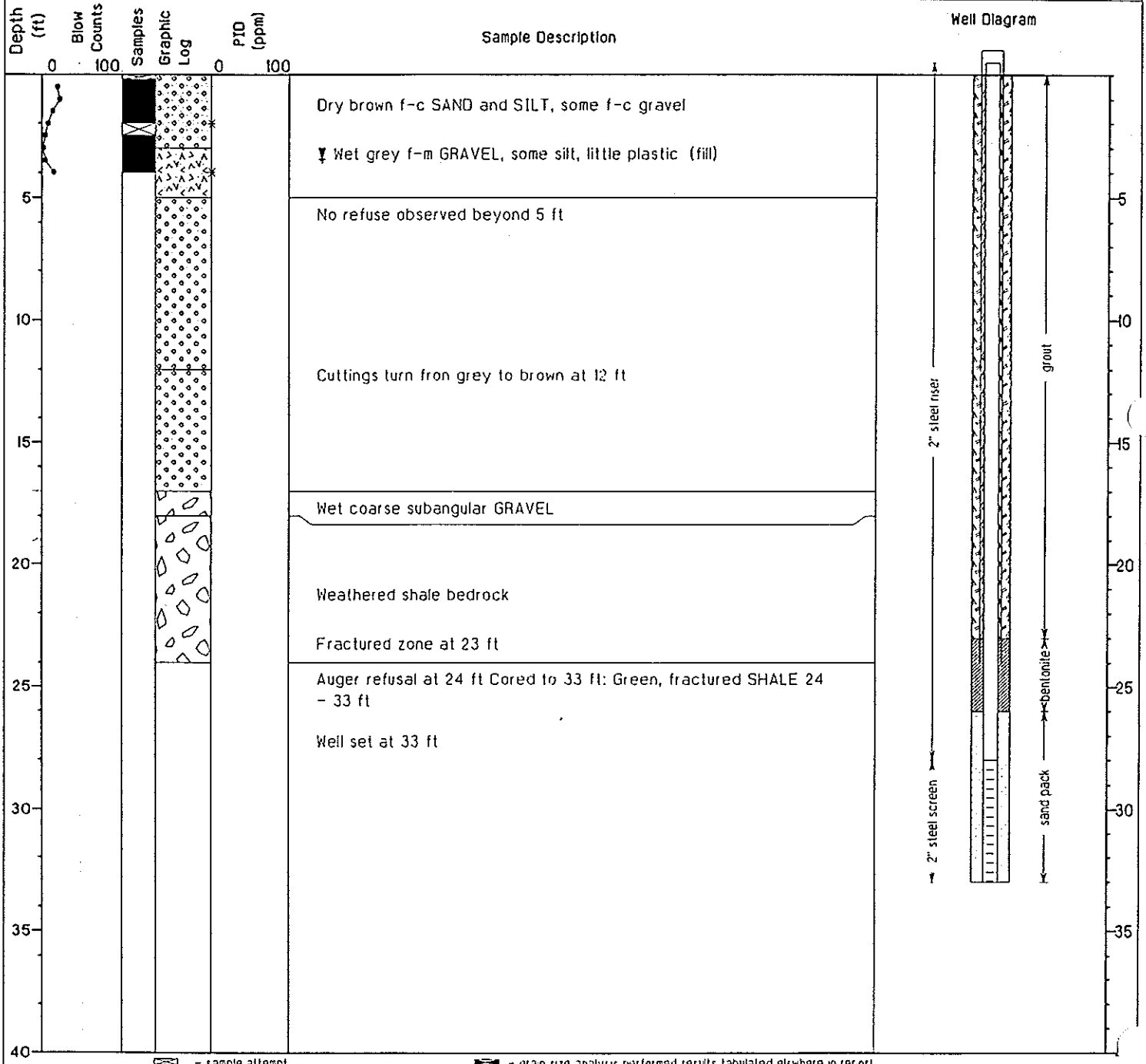
Drilling Method: HSA/Rock Core

Weather: Cloudy, breezy

Elevation
512.16 (Top of Casing)

X coord: feet
Y coord: feet

Groundwater Observations
Time : 1615
Date : 5/24/93
Casing Depth: 5'
Boring Depth: 5'
Water Depth : 3'



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Project Name: Prattsburg Landfill

Job No. 2379.9

Start
Date 8/24/94 Time 1511
Finish
Date 8/25/94 Time 1222

Stearns and Wheler

Environmental
Engineers and Scientists

Boring ID: B109

Drilling Company: American Auger

Driller:

S&W Inspector: SLG

Drill Rig Type: Mobile ATV

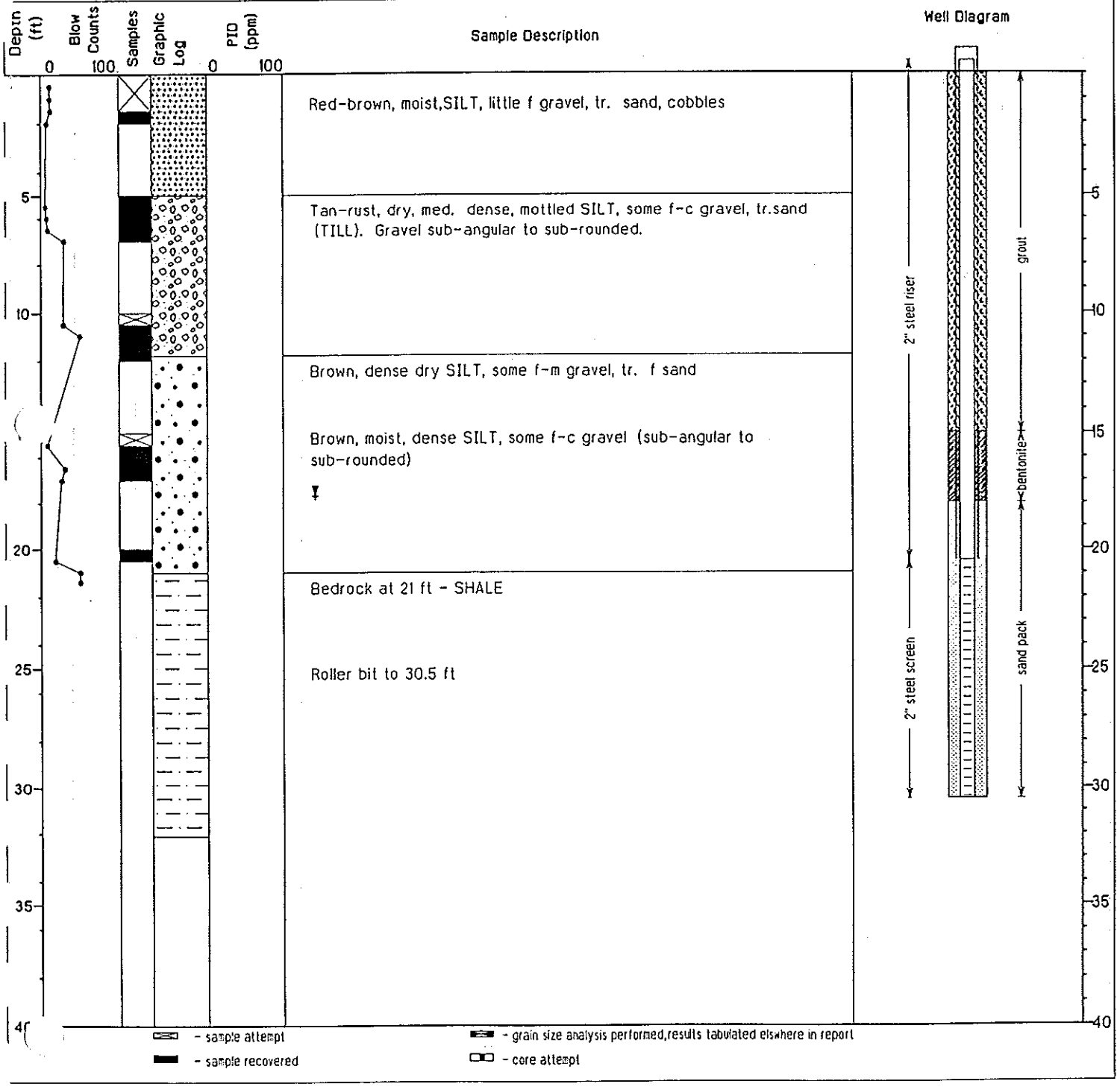
Drilling Method: HSA

Weather: Sunny

Elevation

X coord: feet
Y coord: feet

Groundwater Observations
Time :
Date : 8/24/94
Casing Depth: 20
Boring Depth: 20
Water Depth : 17



Descriptions in log have been generalized for clarity of presentation. Significant changes in lithology have been noted. Original well logs are available from Stearns and Wheler files.

Project Name: Prattsburg Landfill

Job No. 2379.9

Start
Date 8/25/94 Time 1456
Finish
Date 8/26/94 Time 0930

Stearns and Wheler

Environmental
Engineers and Scientists

Boring ID: B110

Drilling Company: American Auger

Driller:

S&W Inspector: SLG

Drill Rig Type: Mobile ATV

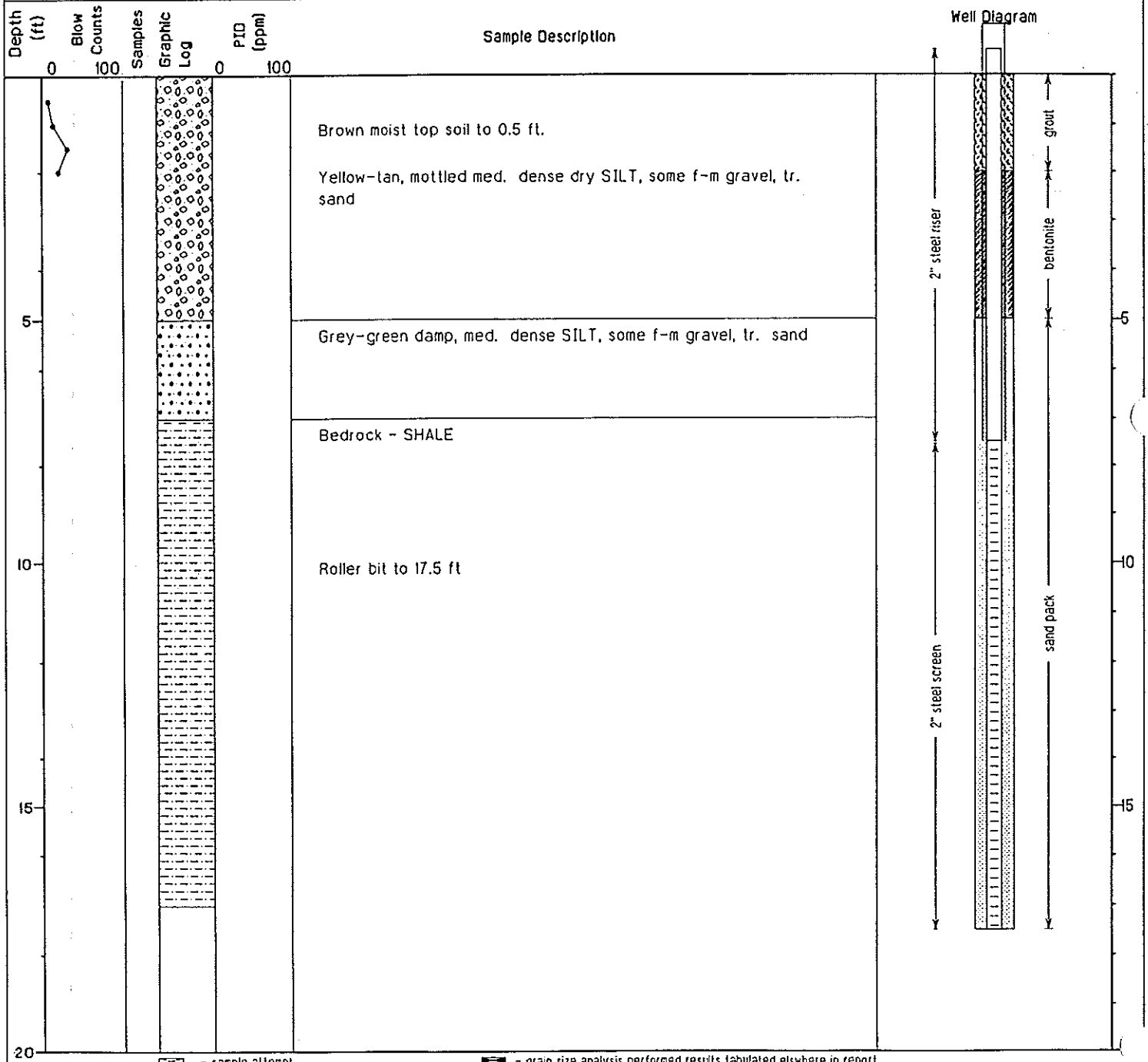
Drilling Method: HSA

Weather: p/sunny

Elevation

X coord: feet
Y coord: feet

Groundwater Observations
Time :
Date : 8/24/94
Casing Depth: 20
Boring Depth: 20
Water Depth : 17



Descriptions in log have been generalized for clarity of presentation. Significant changes in lithology have been noted. Original well logs are available from Stearns and Wheler files.

Project Name: Prattsburg Landfill

Job No. 2379.9

Start
Date 8/26/94 Time 1231
Finish
Date 8/30/94 Time 1000

Stearns and Wheler

Environmental
Engineers and Scientists

Boring ID: B111

Drilling Company: American Auger

Driller:

S&W Inspector: TLH

Drill Rig Type: Mobile ATV

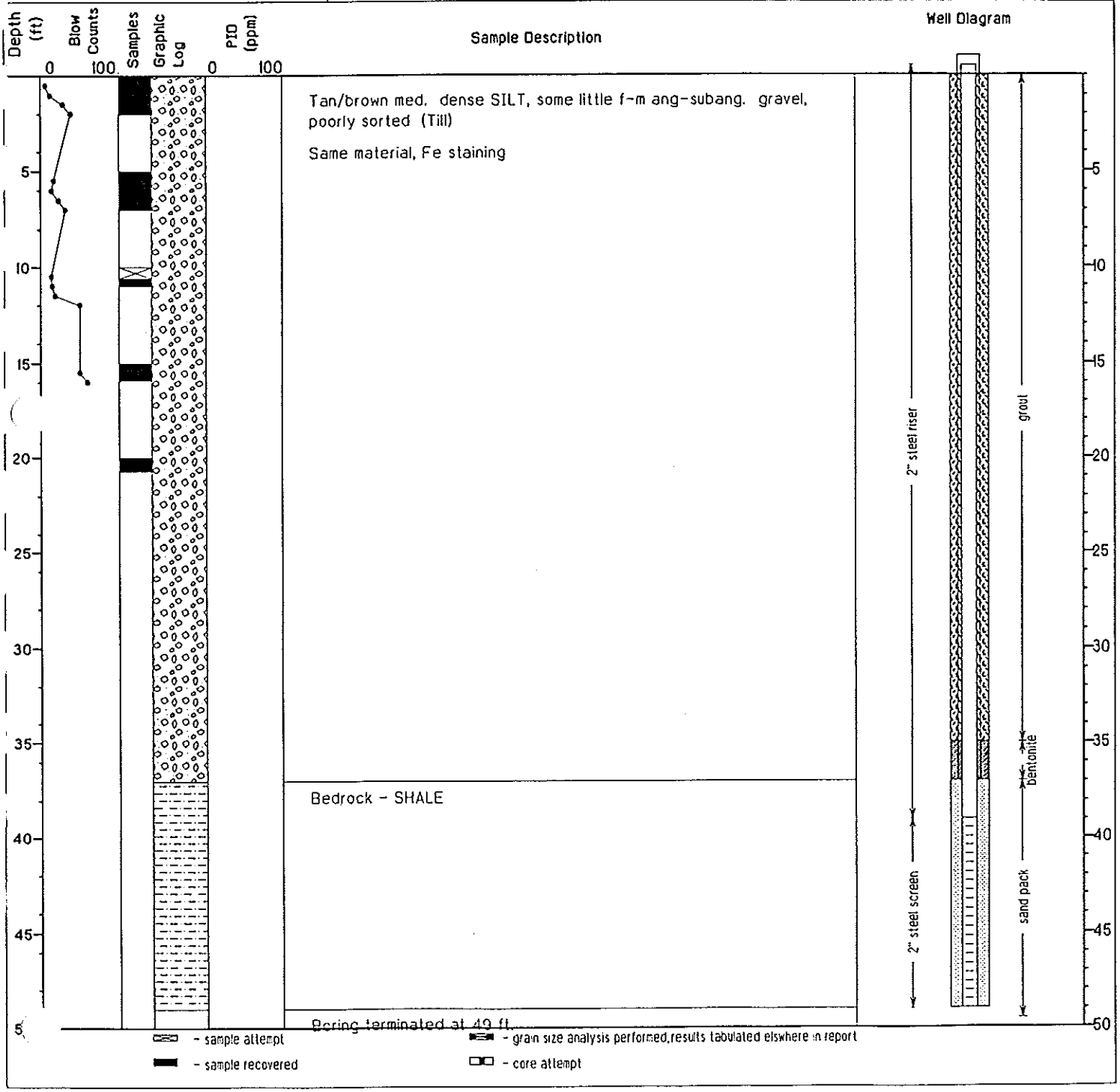
Drilling Method: HSA

Weather: p/sunny

Elevation

X coord: feet
Y coord: feet

Groundwater Observations
Time : N/A
Date : N/A
Casing Depth: N/A
Boring Depth: N/A
Water Depth : N/A



Descriptions in log have been generalized for clarity of presentation. Significant changes in lithology have been noted. Original well logs are available from Stearns and Wheler files.

EXHIBIT 8

RESIDENTIAL WATER WELL SURVEY

RESIDENTIAL WATER WELL SURVEY

Name: _____

Address: _____

_____

_____

Phone: _____

Steuben County
Department of Public Works

Please provide the following information regarding your water well.

Date installed: _____

Installation method: Drilled ☐ Dug ☐

Total depth:_____ feet

Do you presently use a water purification or filtration device? Please describe.

_____

_____

_____

Please provide a brief description of water quality.

Have you noticed any unusual taste characteristics? If yes, please describe.

_____

_____

_____

Water appearance: clear ☐ cloudy ☐ Other (please explain)

_____

_____

Water color (describe, or indicate if there are no unusual colors): _____

_____

Odors (describe, or indicate if there are none) _____

_____

_____

Has any analysis been recently performed on you water? If yes, please summarize the results._____

_____

_____

Please provide additional comments regarding water quality if you like.

_____

_____