



Department of Environmental Conservation

Division of Hazardous Waste Remediation

Edgemere Landfill
Site Number 2-41-004
Queens County, New York

New York State Superfund
Record of Decision

March 1993



New York State Department of Environmental Conservation
MARIO M. CUOMO, *Governor* THOMAS C. JORLING, *Commissioner*

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Edgemere Landfill
49th Street and Beach Channel Drive
Arverne, Queens County
New York 10013
Site Code: 241004
Funding Source: Environmental Quality Bond Act (1986), Title 3

STATEMENT OF PURPOSE

This document describes the selected remedial alternative for the Edgemere Landfill Site, developed in accordance with New York State Environmental Conservation Law (ECL), and consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 USC Section 9601, et seq., as amended by Superfund Amendment and Reauthorization Act of 1986 (SARA). Exhibit A identifies the documents that comprise the Administrative Record for the site. The documents in the Administrative Record are the basis for the record of decision.

ASSESSMENT OF THE SITE

Actual and threatened releases of hazardous substances from this site did present a potential threat to public health, welfare, and the environment. Interim Remedial Measures (IRM's) undertaken by the New York City Department of Sanitation (NYCDOS) under an Order on Consent removed the source of contaminants in the drum burial area. At the Edgemere Landfill Site actual or threatened releases of the remaining hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision, present a current or potential threat to public health, welfare and the environment.

STATEMENT OF BASIS

This decision is based upon the administrative record for the Edgemere Landfill Site. A copy of the record is available for public review and/or copying at the following locations:

New York State Department of Environmental Conservation
Region 2 Office
47 - 40 21st Street
Long Island City, New York 11101

New York Public Library
Arverne Branch
31-12 Beach 54 Street
Arverne, New York 11691

Community Board # 14
19-31 Mott Avenue, Room 311
Far Rockaway, New York 11692

New York City Department of Sanitation
Landfill Engineering, 9th. Floor
44 Beaver Street
New York, New York 10004

The following documents are the primary components of the Administrative Record:

- A. "Edgemere Landfill - Remedial Investigation - Final Report", prepared by Gibbs & Hill for the New York City Department of Sanitation; May 1991.
- B. "Edgemere Landfill - Feasibility Study - Final Report", prepared by Gibbs & Hill for the New York City Department of Sanitation; March 1992.
- C. "Expedited Response Action - Project Report - Edgemere Landfill", prepared by IT Corporation for the New York City Department of Sanitation; August 1990.
- D. "Petition for Partial Delisting of the Edgemere Landfill from the Inactive Hazardous Waste Registry", prepared by the New York City Department of Sanitation; October 1990.

DESCRIPTION OF SELECTED REMEDY

The major elements of the selected remedial program can be summarized as follows:

1. Construction of an impermeable cap in compliance with 6 NYCRR Part 360 for landfill closure.
2. Construction of a landfill gas management system consisting of landfill gas collection for flaring and or active recovery.
3. Management controls for construction and maintenance of a surface water drainage system, and air, groundwater and surface water monitoring.
4. Construction of a groundwater extraction and treatment system in the neck area adjacent to the former drum burial area.

DECLARATION

The selected remedy is designed to be protective of human health and the environment, is designed to comply with applicable Federal and New York State environmental quality standards, and is cost effective. The remedy uses solutions acceptable to the local community and elected officials.

March 24, 1993
Date


Ann Hill DeBarbieri
Deputy Commissioner
Office of Environmental Remediation

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**RECORD OF DECISION
EDGEMERE LANDFILL**

I. SITE LOCATION AND DESCRIPTION

The Edgemere Landfill is located on the Rockaway Peninsula in the Borough of Queens, New York City, New York (Figure I). The Edgemere peninsula was constructed of more than 2.5 million cubic yards of dredged sand fill placed over the original bay marshlands. The Edgemere Landfill site covers an area of approximately 173 acres on the Rockaway Peninsula which is bounded in the east by Norton Basin and Little Bay, on the north by Jamaica Bay's Norton Basin, on the west by Sommerville Basin and Grass Haddock Channel, and on the south by Rockaway Peninsula. The Landfill extends northeast approximately 3,200 feet into Jamaica Bay and is approximately 2,000 feet wide. A security fence runs east-west through the Neck Area of the landfill, extending from Sommerville Basin to Little Bay, curtailing access to the site.

The landfill can be divided into three major regions as follows:

1. The Neck Area which comprises approximately 40 acres, has a low topographical relief of approximately 5 to 10 feet, and is devoid of municipal waste;
2. The Fill Area, which comprises 118 acres of land with current topographic relief of over eighty (80) feet. The fill consists mainly of municipal wastes; and
3. Rockaways Community Park and the roadways entrance, comprises the remaining 15 acres is located immediately south of the Neck Area.

II. SITE HISTORY

The Edgemere Landfill site began operation in 1938 and received approximately 1,200 tons per day of New York City's solid wastes until June of 1991 when it ceased operation in accordance with the closure date agreed to in the August 1987 Consent Order between the New York State Department of Environmental Conservation (NYSDEC) and the New York City Department of Sanitation (NYCDOS). Approximately 9,000,000 cubic yards of wastes consisting of residential waste, rubbish, street dirt, construction waste and demolition debris were received at the site.

In December 1981, NYCDOS was informed by the State of Pennsylvania criminal prosecution office that industrial (potentially hazardous) waste may have been illegally disposed of at several New York City sites including the Edgemere Landfill. The exact quantities and locations where the waste was dumped are unknown. It was reported that volumes ranged from 11,000 gallons in 1969 to 55,000 gallons per week in 1974 and upwards to 50,000 gallons a night in 1978. In

response to the initial allegations of illegal dumping of hazardous waste at the site, NYCDOS performed preliminary groundwater sampling in 1982. Laboratory analyses of the groundwater samples showed contravention of New York State Groundwater Standards. Approximately 3000 buried 55-gallon drums were discovered in the Neck Area of the landfill.

In 1989, NYCDOS prepared a Site Characterization Report and recommended that an Interim Remedial Action or IRM (Expedited Response Action or ERA termed by NYCDOS) be implemented to address the buried drum area. A Focussed Feasibility Study (FFS) selected excavation and/or off-site treatment and or disposal of wastes. During the IRM, approximately 7,000 drums/drum carcasses were excavated and crushed. Crushed drums were disposed of in a chemical secure landfill in Alabama while contaminated soil was incinerated at a TSDf in Texas and liquids were incinerated at a TSDf in South Carolina.

In October 1990, NYCDOS petitioned the NYSDEC for partial delisting of the buried drum area of the Edgemere Landfill from the Registry of Inactive Hazardous Waste Sites. NYSDEC and NYSDOH accepted the petition and the boundaries of the Edgemere Landfill were revised. The Registry site now includes 118 acres of the landfill area and 1.1 acres of the former drum burial area.

The RI/FS work continued through 1991. The Remedial Investigation Report was approved in May 1991 and a Feasibility Study Report was finalized in March 1992.

III. CURRENT SITE STATUS

A. Summary of Field Investigations

The following paragraphs summarize the components and conclusions of the field investigations performed at the site. For more detailed information regarding the individual investigations or for additional regional information, refer to the appropriate report(s) listed in the Administrative Record (Exhibit A).

1982 Investigation - NYCDOS performed a preliminary investigation which included the installation of four monitoring wells along the southern border, immediately adjacent to the Rockaways Community Park. Results of the groundwater samples showed concentrations of lead and phenols exceeding the NYS Groundwater Standards. In December of 1982, buried 55-gallon drums were discovered in the Neck Area by a heavy equipment operator digging up soils and looking for cover material to be used in other areas of the landfill.

1983 Investigations - NYCDOS initiated two investigations to locate the drums and to determine their contents. In January 1983 NYCDOS collected nine samples from selected 55-gallon drums. The sample

analysis identified materials in the drums as paint residues containing elevated levels of heavy metals. This investigation also identified numerous (approximately 3000+) 55-gallon drums in various stages of decay.

In March 1983, a magnetometer survey was conducted to facilitate the location of the buried drums. Eighteen additional drum samples and one soil sample were collected. Sample analysis exhibited the characteristics of EP Toxicity and by definition the waste was classified as characteristic hazardous waste. NYCDOS also performed an on-site air monitoring program.

NYCDOS initiated two additional hydrogeological investigations in 1983, which included the installation of sixteen monitoring wells and thirty seven (37) borings. The monitoring wells were installed to evaluate three distinct horizons as:

U - The unconfined leachate mound in the landfill area. The leachate mound consists of solid waste (5 to 35 feet thick) and dredged sand fill (10 to 20 feet thick) and is directly underlain by tidal marsh deposits.

The unconfined water-bearing zone (neck area) consists of dredged sand fill and is devoid of municipal waste. This zone is directly underlain by tidal marsh deposits.

S - Shallow Upper Glacial Sand, which extends vertically from the bottom of the tidal marsh deposits to a depth approximately 25 feet below the tidal marsh deposits.

D - Deep Upper Glacial Sand, which extends vertically from about 25 feet to 120 feet below the tidal marsh deposits.

In September 1983, NYSDEC consultant Woodward-Clyde Inc., completed a phase I-Preliminary Investigation at the landfill and recommended a Phase II investigation.

In March 1984, sampling of monitoring wells revealed volatile and semivolative compounds in the drum area.

In 1985, additional investigations were conducted in the Neck Area where the buried drums were discovered. These investigations determined that both the liquid and solid waste contents within the buried drums meet the definition of characteristic hazardous waste. As such, further remedial investigation was recommended to determine the proper remedial action to address the buried drums.

In 1986, both the state and federal government implemented more stringent environmental regulations; the federal government amended the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 through the Superfund Amendments and Reauthorization Act (SARA) and the state implemented the

Environmental Quality Bond Act (EQBA). As a result of these newly enhanced state and federal requirements, in August 1987, NYSDEC and NYCDOS entered into a Consent Order for a full remedial program and required that a Remedial Investigation/Feasibility Study (RI/FS) be conducted in accordance with the USEPA RI/FS Guidance Document.

Gibbs and Hill, Inc. was retained by NYCDOS to perform an RI/FS at the Edgemere Landfill, and after extensive negotiations with NYCDOS, the work plan was approved and the RI/FS field work commenced. Field work for remedial investigation included geophysical investigation by magnetometer survey, electrical resistivity sounding, and ground penetrating radar. An exploratory excavation program included excavation of trenches and pits to identify the boundaries of the drum burial area. Hydrogeological investigation included installation of 49 monitoring wells, 6 borings, 2 tidal gauges, off shore coring and a tidal hydraulic study. Three Public Information meetings were held at various stages of the remedial investigation program. Field activities also included groundwater sampling of 59 monitoring wells (49 RI Wells and 11 IRM Wells) for five rounds, surface water, leachate, sediments, and air sampling programs. A Qualitative Health Risk Assessment Report was prepared in December 1990.

In November 1988, as part of the RI/FS, a geophysical survey and exploratory excavation program were conducted by NYCDOS to determine the location of the buried drums and delineate their extent. The drum burial area was located in an isolated area within the Neck Area and measured approximately 1.1 acres (approximately 240 feet X 233 feet X 8 feet) in size.

NYCDOS prepared a Site Characterization Report which concluded that sufficient data exists to classify the drum burial area as an operable unit. Based upon this conclusion, it was recommended that an IRM be implemented to address the buried drums. A Focused Feasibility Study (FFS) was performed to identify the most cost effective and environmentally sound remedial alternative to address the buried drums. Excavation and off-site treatment (incineration) /disposal (secure landfill) was approved by NYSDEC as the remedial plan.

In 1989, NYCDOS awarded the IRM contract to IT Corporation. Field work for the IRM commenced in February 1990. Approximately 7,000 drums/drum carcasses were excavated and crushed. A total of 217 tons of crushed drum carcasses were landfilled at a chemical secure landfill in Alabama; 800 tons of contaminated soil were incinerated at a TSDF in Texas; and 5,600 gallons of liquid were incinerated at a TSDF facility in South Carolina. The post excavation confirmatory sampling program included extensive surface and trench bottom soil sampling and installation of eleven monitoring wells around the drum burial area.

In October 1990, NYCDOS prepared a petition report for partial delisting of the Edgemere Landfill from the Registry of Inactive Hazardous Waste Sites. This report included pre-excavation and post-excavation soil sampling results and two rounds of groundwater results. After review by various Divisions of NYSDEC and NYSDOH, the boundaries of the hazardous waste site were revised to exclude 40 acres of the Neck Area from the Registry. The Registry description now only includes 118 acres of the landfill and 1.1 acres of the former drum burial area.

B. Summary of Site Conditions

Groundwater Contamination - The estimated amount of leachate generated from the Edgemere Landfill varies from 100,000 gallons per day (gpd) to 350,000 gpd, with an average of 150,000 gpd during years of normal precipitation. The amount of leachate stored in the saturated portion of the landfill mound is estimated to be 92,000,000 gallons, of which 60,000,000 gallons are in dredged sand fill and 32,000,000 gallons are in the saturated portion of the solid waste mass. An additional 44,000,000 gallons of leachate is also estimated to be in storage in the tidal marsh deposits underlying the landfill mass in the landfill area, and 10 to 30 million gallons of contaminated water is estimated to be trapped in the 30 feet to 40 feet thick unsaturated solid waste overlying the leachate mound.

Total volatile organic compounds (VOC), Base Neutrals and Acid Extractables (BNAE), inorganics (lead, barium, cadmium) and Municipal Waste Parameters (BMW) have been found in the leachate mound (Figures 3a, 3b, 3c & 3d). This leachate mound includes concentrated leachate within the solid waste mass and leachate contaminated groundwater in the dredged sand fill zone above the tidal marsh deposits. The Shallow Upper Glacial Sands (SUGS), underlie the landfill area and extend vertically down from the tidal marsh to depths of 25 feet. This region is also contaminated with the same components as the leachate mound, but at lesser concentrations (Figures 4a, 4b, & 4c). Due to saltwater intrusion, groundwater at the site cannot be used as a potable source.

Although the groundwater in the Neck Area in the unconfined water bearing zone is contaminated with total VOCs, the concentrations have reduced from 68,000 ppb to 38,000 ppb after source removal from the drum burial area during two sampling events. However, VOC concentration has gone back up to over 200,000 ppb in the third sampling event. Total VOCs in SUGS are significantly lower (126 ppb). BNAEs and PCBs were not detected in any of the zones. Pesticides were detected at low concentrations in U (0.044 ppb) and S-Wells (.56 ppb). Inorganic (lead, cadmium and cyanide) contamination exists in U and S wells. Significant total VOC contamination of Deep Upper Glacial Sands (DUGS) was found in monitoring wells (Well 101D = 8,900 ppb and well 225D = 2,000 ppb). Both of these wells are located in the middle of the drum

burial area (Figures 4a & 5). It is possible that some of the soils in the drum storage area, which were not removed because they were below the IRM cleanup levels, still contain sufficient contaminants to produce the 38,000 ppb total VOCs found in groundwater in the shallow water bearing zone.

The general direction of the groundwater flow in the shallow water bearing zone of the Neck Area is from the southern boundary to the north towards well 202 in the center of the Neck Area. At well 202 the groundwater flow divides, with part of flow to the west and part to the east. The groundwater flow from the leachate mound in the landfill section of the site is radial from the center of the landfill laterally to adjacent tidal surface waters (146,000 gpd under average conditions). Tidal Marsh Deposits varies from 0 to 2 feet at certain areas of the landfill.

Soil/Sediment Contamination - The highest concentrations of contaminated soil within the Edgemere Landfill were found at the 1.1-acre former drum burial area site in the Neck Area. Post excavation sampling shows that the contamination levels are below the cleanup level of 100 ppm total VOCs. Above normal levels of contaminants were also found in the soils of the 118-acre landfill portion of the site. Volatile organics, inorganics and BNAEs are high in the leachate mound and tidal marsh deposits. Low concentration of contamination exists in the upper glacial sands. Soils in the Neck Area shows VOC contamination of tidal marsh deposits.

Jamaica Bay Surface Water - The tidal surface waters in Jamaica Bay (including the Edgemere peninsula) have been designated Class "I" in accordance with NYSDEC, Title 6, Chapter X, Parts 700-705. The Class I waters are suitable for secondary contact recreation and any other usage except primary contact recreation and shellfishing for market purposes. Laboratory chemical analysis of surface water samples indicate that 1) chlorides and total dissolved solids in tidal surface waters were in the brackish to saline water range and 2) that surface water chemistry adjacent to the landfill mass does not vary greatly from background values except for mercury at 1 of 29 sampling locations. Tidal inflow of seawater from the Atlantic Ocean is the primary source of high chlorides and TDS found in tidal surface waters of Jamaica Bay.

Jamaica Bay Sediments - Tidewater sediments were tested for 29 stations near Edgemere and six far-field stations in the Bay. A comparison of results show that the VOCs found in the sediment samples near the Edgemere Landfill and the six far-field locations are similar. BNAE contamination is limited and no PCBs were detected. Inorganics are lower than background conditions. Pesticide contamination (47 to 760 ppb) with aldrin and DDT is reported at several locations. At 7 of the 29 sample stations, DDT levels exceeded 100 ppb (Figure 6). The source of high DDT

concentrations found in tidewater sediments near Edgemere probably did not originate at the landfill. According to NOAA Technical Memo # 59, April 1991, the mean total DDT in Jamaica Bay is 88 ppb. The data from the NOAA testing clearly indicates that there is a DDT problem in the entire Jamaica Bay, and the results of the testing near Edgemere is consistent with the results from the far-field stations. High Ammonia and nitrate levels were found in tidewater sediments near Edgemere.

Risk Assessment - A qualitative Health Risk Assessment was conducted in December 1990. The Risk Assessment was not only a baseline assessment that addresses potential hazards to human health and the environment, but also addresses the potential human health and environmental impacts of future land usage assuming a final cap is placed over the landfill. The Risk Assessment concluded that 1) due to saltwater intrusion, groundwater at the site cannot be used as a potable source and 2) for soil, air, surface water and sediments, future workers and recreational users could be exposed to chemicals during various activities.

Based upon the Qualitative Health Risk Assessment of 1990, the Quantitative Risk Assessment only evaluated the risks associated with air and soil media. The findings of the health risk assessment was that the risk of exposure for all target populations exceed EPA's acceptable risk level via inhalation from the surface soil at the drum burial area. During the IRM all the surface soils were excavated and disposed off-site and trenches and pits were backfilled by clean soils. Since the major source of contamination has been removed during the IRM, the inhalation risk in the drum area no longer exists.

IV. ENFORCEMENT STATUS

The following Order on Consent was executed by the NYSDOS and the NYSDEC:

<u>Date</u>	<u>Index Number</u>	<u>Subject of Order</u>
August 1987	D2-7001-87-07	Remedial Program

V. GOALS FOR REMEDIAL ACTIONS

The remedial alternatives selected for the site by the Department were developed in accordance with the New York State Environmental Conservation Law (ECL) and are consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 USC Section 9601, et. seq., as amended by the Superfund Amendment and Reauthorization Act of 1986 (SARA). The Criteria used in evaluating the potential remedial alternatives is described in the National Contingency Plan 140 CFR 300.43 and can be summarized as follows:

1. Compliance with Applicable or Relevant and Appropriate New York State Standards, Criteria and Guidance (SCGs)-- are divided into the categories of chemical-specific (e.g. groundwater standards), action-specific (e.g. design of a landfill), and location-specific (e.g. protection of wetlands).
2. Protection of Human Health and the Environment-- This criteria is an overall and final evaluation of the health and environmental impacts to assess whether each alternative is protective. This is based upon a composite of factors assessed under other criteria, especially short/long-term effectiveness and compliance with SCGs.
3. Short-term Impacts and Effectiveness-- The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment is evaluated. The length of time needed to achieve the remedial objectives is estimated and compared with other alternatives.
4. Long-term Effectiveness and Permanence-- If wastes or residuals will remain at the site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude and nature of the risk presented by the remaining wastes; 2) the adequacy of the controls intended to limit the risk to protective levels; and 3) the reliability of these controls.
5. Reduction of Toxicity, Mobility and Volume-- Department policy is to give preference to alternatives that permanently and significantly reduce the toxicity, mobility, and volume of the wastes at the site. This includes assessing the fate of the residues generated from treating the wastes at the site.
6. Implementability-- The technical and administrative feasibility of implementing the alternative is evaluated. Technically this includes the difficulties associated with the construction and operation of the alternative, the reliability of the technology, and the ability to effectively monitor the effectiveness of the remedy. Administratively, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining special permits, right of way for construction, etc.
7. Cost-- Capital and operation and maintenance costs are estimated for the alternatives and compared on a present worth basis. Although cost is the last criterion evaluated, where two or more alternatives have met the

requirements of the remaining criteria, lower cost can be used as the basis for final selection.

The site specific goals for remediating the Edgemere Landfill can be summarized as follows:

- o close the site in conformance with applicable, relevant and appropriate requirements (ARAR).
- o treatment and/or containment of the site such that, to the extent technically feasible, the concentration of contaminants is reduced to below acceptable levels of risk or to within discharge limits.
- o treatment of groundwater such that the concentration of contaminants is reduced to within promulgated standards.
- o ensure that remedial activities do not increase the potential for the migration of contamination to the groundwater, surface water and ambient air.
- o protect people who perform recreational activities in Rockaway Park from the harmful effects of contaminants in the air, soil, and water.
- o prevent significant adverse environmental impacts on the surrounding flora, and fauna caused by contaminant release from the landfill.
- o control and treat landfill gas.

The following section addresses the alternatives that have been evaluated to achieve these goals.

VI. SUMMARY OF EVALUATION OF REMEDIAL ALTERNATIVES

A. Initial Screening of the Alternatives:

Although the NYSDEC has elected to treat the Edgemere Landfill Site as one "operable unit" (i.e., as one area for application of remedy), the site lends itself to the approach of examining alternatives for each of the various affected media separately, then assembling a recommended site-wide alternative from the most feasible alternative evaluated for each medium. The screening criteria focused on technologies capable of achieving control of contaminant release or migration from the site, taking into account waste characteristics and site characteristics.

The feasibility study has evaluated 26 different technologies for achieving the remedial goals. Table 1 summarizes the results of the screening of the technologies and identifies those which were excluded from a detailed analysis. A complete description of the technologies can be found in the RI/FS report.

B. Assembly of the Alternatives:

Various remedial technologies are assembled together (as discussed below) to provide alternatives that will satisfy environmental, institutional, and technical objectives for remediation and closure of the landfill.

Alternative I - No Action and Management Controls

Under the No Action alternative, the Edgemere Landfill would be closed in accordance with the NYSDEC closure regulations, except that a cap would not be placed over the landfill. Closure would consist of grading, revegetation, surface runoff and sediment controls, installation of a passive gas-vent system, and fencing of the site. In addition, a groundwater, surface water, and air monitoring program would be instituted as part of this alternative.

Over the long-term, improvements to air, soil, surface water and groundwater would occur as contaminants in the landfill continue to degrade. In the short-term, implementation of this alternative would result in the release of fugitive dusts to the atmosphere. In addition, contaminants may continue to volatilize and be released to the atmosphere, leaching of the on-site soils or landfill contents would continue to impact groundwater quality, and contaminated groundwater would continue to discharge to the water bodies surrounding the landfill.

This alternative would not meet the remedial ARAR's and would not satisfy 6NYCRR Part 360 requirements.

Alternative II - Final Cover, Landfill Gas Management Technologies, Monitoring, and Management Controls

Under this alternative, the Edgemere Landfill would be closed in accordance with the NYSDEC landfill closure requirements including construction of a landfill cap and landfill gas management system. A groundwater, surface water and air monitoring program would be implemented as part of the alternative.

Implementation of this alternative would result in a short-term release of fugitive dusts and volatile organics to the atmosphere during construction. Contaminated groundwater would continue to discharge to the surface water bodies surrounding the landfill for a period of some years. The reduction of infiltration through the landfill contents would improve the quality of groundwater and the surrounding surface water. Over the long-term, improvement of

on-site soils would occur as a result of natural processes.

This alternative would satisfy 6 NYCRR Part 360 closure requirements and it is anticipated to meet ARAR's because the groundwater quality is expected to return to background quality in several years after the cap.

Alternative III - Final Cover, Landfill Gas & Leachate Management Technologies, Long-Term Monitoring, and Management Controls

This alternative consists of closure of the landfill with a cap, construction of a leachate extraction system in the landfill area, construction of an on-site treatment facility, and discharge through an outfall to the bay.

Short-term impacts from the implementation of this alternative would result in the release of fugitive dusts to the atmosphere during grading and construction of the leachate containment and/or extraction system, increased traffic and noise during construction and operation of the plant, and increased energy use for pumping and operation of plant. Over the long-term, air, groundwater and surface water quality would improve. This alternative would be effective in preventing existing groundwater contamination from migrating off-site.

This alternative would meet all remedial ARAR's

Alternative IV - Final Cover, Landfill Gas & Leachate Management Technologies, Monitoring, Groundwater Treatment Technologies, and Management Controls

Alternative IV consists of pumping the contaminated groundwater plume in the landfill area and the Neck Area to the surface, treating it, and discharging the treated water into the bay. This treatment program would be conducted in conjunction with landfill closure and monitoring of surface water, air and groundwater.

Short-term impacts from the implementation of this alternative would result in the release of fugitive dusts to the atmosphere during construction of the leachate containment/extraction system, drainage structures, and treatment plant, increased traffic and noise during construction and operation of the plant, and increased energy use for pumping and operation of plant. Over the long-term, air, groundwater and surface water quality would improve. This alternative will be effective in preventing existing groundwater contamination from migrating off-site.

This alternative would meet all remedial ARAR's.

Alternative V - Final Cover, Landfill Gas Management Technologies, Long-Term Monitoring, Groundwater Treatment in the Neck Area, and Management Controls

Alternative V consists of pumping the contaminated groundwater plume in the Neck Area to the surface, treating it, and discharging the treated water into the bay. This treatment program would be conducted in conjunction with landfill closure and monitoring of surface water, air and groundwater.

Implementation of this alternative would result in the release of fugitive dusts to the atmosphere during construction, increased noise during operation of the plant, and increased energy use for pumping and operation of plant. Over the long-term, groundwater, air, and surface water quality would improve. This alternative would be effective in preventing existing groundwater contamination from migrating off-site.

C. Evaluation of the Alternatives:

Remediation of the Edgemere Site entails addressing the main landfill mass; landfill leachate; landfill gas; contaminated groundwater and long term monitoring. Different combinations of the feasible remedial technologies were assembled into four groups as described above in section IV-B.

Department policy (Technical and Administrative Guidance Memorandum #4030: "Selection of Remedial Actions at Inactive Hazardous Waste sites") provides a method of scoring the extent to which a proposed remedial alternative complies with the remedial goals stated above in section V.

In all cases, the evaluation of the No-Action alternative is carried through to the end of the analysis for comparison purposes. At this site, the No-Action alternative is not acceptable since releases of contaminants into the air and groundwater would continue at levels that present a significant threat to the environment.

D. Selection of the Preferred Alternative:

The general reason for selection of a remedy include the protection of human health and the environment; meeting the ARAR's set for the site; and finding a remedy which is technologically feasible and cost effective.

A summary of the non-cost evaluation criteria was evaluated which included a ranking of effectiveness, environmental, institutional, and implementability criteria. Present worth costs for each of the alternatives is presented in Table 3. Based on a review of existing data collected for the Edgemere Landfill, evaluation of the prior removal action and the results of the human health-based

risk assessment, NYCDOS selected Alternative 2 as the final remedy since it was determined to be the most desirable combination of beneficial effects and cost-effectiveness. However, this alternative is insufficient to achieve the necessary specific goals to remediate this site.

Final capping of the landfill is estimated to reduce leachate flow from 150,000 gpd to approximately 20,000 gpd. The final cap will inhibit precipitation from entering the landfill and further prevent generation of additional leachate. The contaminated leachate will continue to enter the surface water around the Edgemere Landfill or the groundwater beneath the site. However, it should be noted that tidal dilution effects of Edgemere Tidal Prisms on groundwater discharge vary from 1925:1 to 8700:1. This high dilution factor significantly reduces the contaminant concentrations. It should also be pointed out that a saltwater wedge exists beneath the landfill. Except for iron, mercury and ammonia, tidewater quality near Edgemere Landfill is similar but at slightly lower levels than the far field stations (background) for VOCs, metals and BMWs. The tidal surface waters in Jamaica Bay, including the Edgemere peninsula are not considered to be potential source of potable water.

The preferred alternative for this site is alternative V which is a modified alternative II and includes Final Cover, Landfill Gas Management Technologies, Long-Term Monitoring, Groundwater Treatment in the Neck Area, and Management Controls. The non-cost evaluation criteria scored highest for this alternative. Based upon available information, this alternative appears to provide the best balance of trade-offs among the alternatives with respect to the evaluation criteria described below.

This section evaluates the expected criteria and compares it to the other available options. The criteria used to compare the potential remedial alternatives are described in the section V - Goals for Remedial Alternatives.

Threshold Criteria - The first two criteria must be satisfied in order for the alternative to be eligible for selection.

1. **Protection of Human Health and the Environment.**

The proposed remedy will control risks to human health and the environment by reducing the release of the contaminants to the groundwater, surface water, and air pathways. The impermeable cover will reduce the amount of water infiltrating the site, reducing the quantity of leachate generation in the landfill mass and a subsequent diminished impact of contaminants on site groundwater will occur. Since the release of contaminated groundwater along the neck area is the mechanism for contamination of the surface water and sediments, reducing the release of untreated groundwater along this

area will directly reduce the contaminant loadings to the adjacent surface water bodies. The installation and operation of a gas collection and recovery system will reduce the possibility of off-site migration of the landfill gas, and that of direct uncontrolled emissions to the ambient air as well as the associated risks. No unacceptable short-term risks of cross-media impacts will be caused by implementation of the remedy.

Although Alternative IV would likely offer the highest overall protection of human health and the environment, there are factors that diminish the differences between the alternatives regarding this criterion. Specifically, the feasibility for collection and containment of groundwater for treatment along the entire perimeter of the landfill mass as well as any form of containment is in doubt due to the landfill's geological setting. There is a window at the northwestern perimeter of the landfill making it impossible for anchoring of the slurry walls, and the low topographic relief along the landfill perimeter would require a pumping system in the interceptor trenches.

2. Compliance with ARAR's - Compliance with ARAR's addresses whether or not above remedy will meet all the Federal, State and Local laws and regulations, and if not, provides grounds for invoking a waiver.

The implementation of the selected remedy should result in compliance with all ARAR's except for the attainment of on-site groundwater standards.

There are site geologic constraints which hinder the construction of an effective groundwater collection system. As can be seen from site geology, there is no presence of the low permeability tidal marsh deposit at the base of the landfill mass in the northwestern perimeter of the landfill extending to the center of the landfill, creating a window for hydraulic communication between the leachate mound and the underlying upper glacial aquifer. This window allows contaminated groundwater to seep vertically downward through the sands, thus making it impossible to construct a slurry wall for capture of groundwater. A groundwater treatment system would entail pumping an extensive quantity of site leachate and groundwater. Without the proper emplacement of an anchored slurry wall tying into an impermeable barrier at its base, there is no way to isolate site groundwater from the adjacent surface water. Groundwater drawdown near the perimeter of the landfill will result in the intrusion of large volumes of Jamaica Bay surface waters into the collection system. This will result in

an increased volume of water to be collected, treated and disposed of. In addition, the Jamaica Bay water will increase the total dissolved solid concentrations, making treatment more difficult.

Aside from a traditional pump and treat system another option for leachate collection is the installation of perimeter drains (interceptor trenches). However, shortcomings of this system include 1) the perimeter of the landfill does not provide sufficient topographic relief to rely totally on gravity flow, thus trench drains would have to be designed to flow into a series of wet wells with pumping systems. 2) at some locations, trenches have to be installed in refuse which could result in clogging of filter fabrics at the interface and 3) differential settlement of drains and piping could affect the integrity of the leachate collection and transfer system. Construction of the on-site treatment plant for the above groundwater collection and treatment technologies would disrupt the on-site soils and erosion of the disturbed soils could occur from high winds or storms. The estimated costs of the groundwater collection and treatment system is \$22,005,000 with operation and maintenance costs of \$973,000/year. It is estimated that capping of the landfill mass would reduce the leachate generation from 150,000 gpd to 20,000 gpd.

The requirements of site closure will be met by the installation of an engineered final cover system. Surface water quality standards will be maintained by reducing the release of contaminants along the neck area and the reduction of leachate generation. Ambient air standards will be met by constructing a gas collection and recovery system.

Primary Balancing Criteria - The remaining five "primary balancing criteria" are used to weigh major trade-offs among the different hazardous waste management strategies.

3. **Short-term Impacts and Effectiveness** While all of the alternatives are extensive, these containment alternatives do involve a limited amount of waste excavation. This is necessary to regrade segments of the site to achieve stable final slopes. Engineering controls will be applied to minimize the release of volatile compounds.
4. **Long-term Effectiveness and Permanence** Although only small amounts of the total waste mass would be treated, the preferred alternative would provide an adequate degree of long-term effectiveness and performance. The magnitude and nature of the risks presented by the

remaining wastes would be acceptable given the adequacy and reliability of the controls used to limit these risks. If the type or volume of contaminants released by the site were to significantly change, mitigative measures could be taken to address any new threats.

5. Reduction of Toxicity, Mobility or Volume The preferred alternative will reduce the toxicity of groundwater leaving the Neck Area and impacting the adjacent surface waters. The engineered cap will reduce infiltration of precipitation hence, decreasing the volume of leachate generated.
6. Implementability Even though all of the potential alternatives incorporate capping activities, the additional remedial components vary in the level of difficulty resulting from construction and operation. The preferred alternative incorporates well established capping activities as part of the containment strategy. The installation of the gas extraction wells and groundwater treatment system will not present any difficulties. The materials and personnel needed for these activities are readily available.
7. Cost The present worth cost of the preferred alternative (\$39,700,000) which includes \$3,500,000 for groundwater treatment of the Neck Area is neither the most or least expensive, while being protective of human health and environment.

VII. CITIZENS PARTICIPATION

To inform the local community and provide a mechanism for citizens to make the Department aware of their concerns, a citizens participation program has been implemented. In accordance with the Citizens Participation Plan developed for the project, the following goals have been accomplished:

- o information repositories have been established;
- o documents and reports associated with the project have been placed into the repositories;
- o a "contact list" of interested parties (e.g., media, public interest groups, government agencies, economic agencies, etc.) has been created;
- o fact sheets on the progress and status of the project were placed in the repositories and distributed to the contact list at various stages of the investigation;

- o public notice of the completion of the RI/FS and the proposed remedy was issued in the New York Newsday, Daily News and the local newspaper The Wave;
- o a fact sheet summarizing the results of RI/FS and the components of the proposed remedy were distributed to the contact list and local residents;
- o a public comment period was established and a public meeting was held on November 17, 1992 in Rockaways to describe the proposed remedy. The transcript of the meeting is part of the Administrative Record for the project and is in the document repositories;
- o The following is the list of various public meetings conducted on this project:
 - Dec. 14, 1988 Public Meeting on RI/FS Workplan
 - Mar. 1, 1990 Elected Officials Meeting on Drum Removal
 - Mar. 12, 1990 Public Information Meeting on Drum Removal
 - Jun. 28, 1990 Public Information Meeting on Drum Removal
 - Nov. 12, 1992 Elected Officials Meeting on PRAP
 - Nov. 17, 1992 Public Meeting on PRAP

A Responsiveness Summary of the comments received during the public meeting and the public comment period are included Appendix D along with the Department's responses to the comments. A public notice of the selected remedy will be issued along with a brief analysis of the program.

VIII. SUMMARY OF PROPOSED REMEDIAL ACTION PLAN

Based upon the results of the Remedial Investigation/Feasibility Study and remedy selection criteria, the NYSDEC has selected to implement Alternative V **Vented Cap, Passive Gas Collection for Active Recovery and/or flaring, Long Term Monitoring, Groundwater Treatment in the Neck Area, and Management Controls**. The estimated cost to implement this remedy is \$39,700,000. The elements of the selected remedy are as follows:

- 1) A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation, maintenance and monitoring of the remedial program.
- 2). Regrading of sections of the site to ensure proper final slopes.
- 3). Installation of the vented final cover to minimize surface infiltration of precipitation and collect gases generated by the wastes. Additionally an adequate number

of gas collection points will be installed around the perimeter and interior of the site to prevent the uncontrolled release of gases to the atmosphere. The major elements of the final cover will include vegetated top soil, a barrier protection layer, a drainage layer, a gas/water barrier and a gas collection layer. It is estimated that this vented cap will effectively reduce leachate generation from 150,000 gpd to 20,000 gpd.

- 4). Installation and operation of the gas collection and recovery system. Gases collected in the final cover system will be conveyed to a central point of collection at the surface of the landfill for flaring and/or recovery purposes.
- 5). Groundwater treatment in the Neck Area will be comprised of one or more of the processes of physical/chemical coagulation, sedimentation & filtration, air stripping and carbon adsorption to address the contaminated groundwater exiting the site. The treatment system includes extraction, treatment and reinjection.
- 6). Possible uses of this site may include Solid Waste Management Facilities to the extent such facilities are sited and permitted in accordance with 6NYCRR Part 360. To the extent that post remedial monitoring demonstrates the effectiveness of the remedy, an alternate site use may include public recreational purposes in the form of an open park. Post remediation use of the site must ensure that the integrity of the remedy is not damaged or compromised.
- 7). An environmental monitoring program to evaluate the performance of the remedial program. The performance standards to be obtained by implementing the remedy include meeting the SPDES numbers as shown in the Table 6. Groundwater monitoring will be conducted along the landfill perimeter and in the contaminated plume of the neck area for a period of fifteen years and will be evaluated on an annual basis.
- 8). Management Controls include implementation of the soil erosion and sediment control plan in accordance with the New York State Erosion and Sediment Control Requirements.

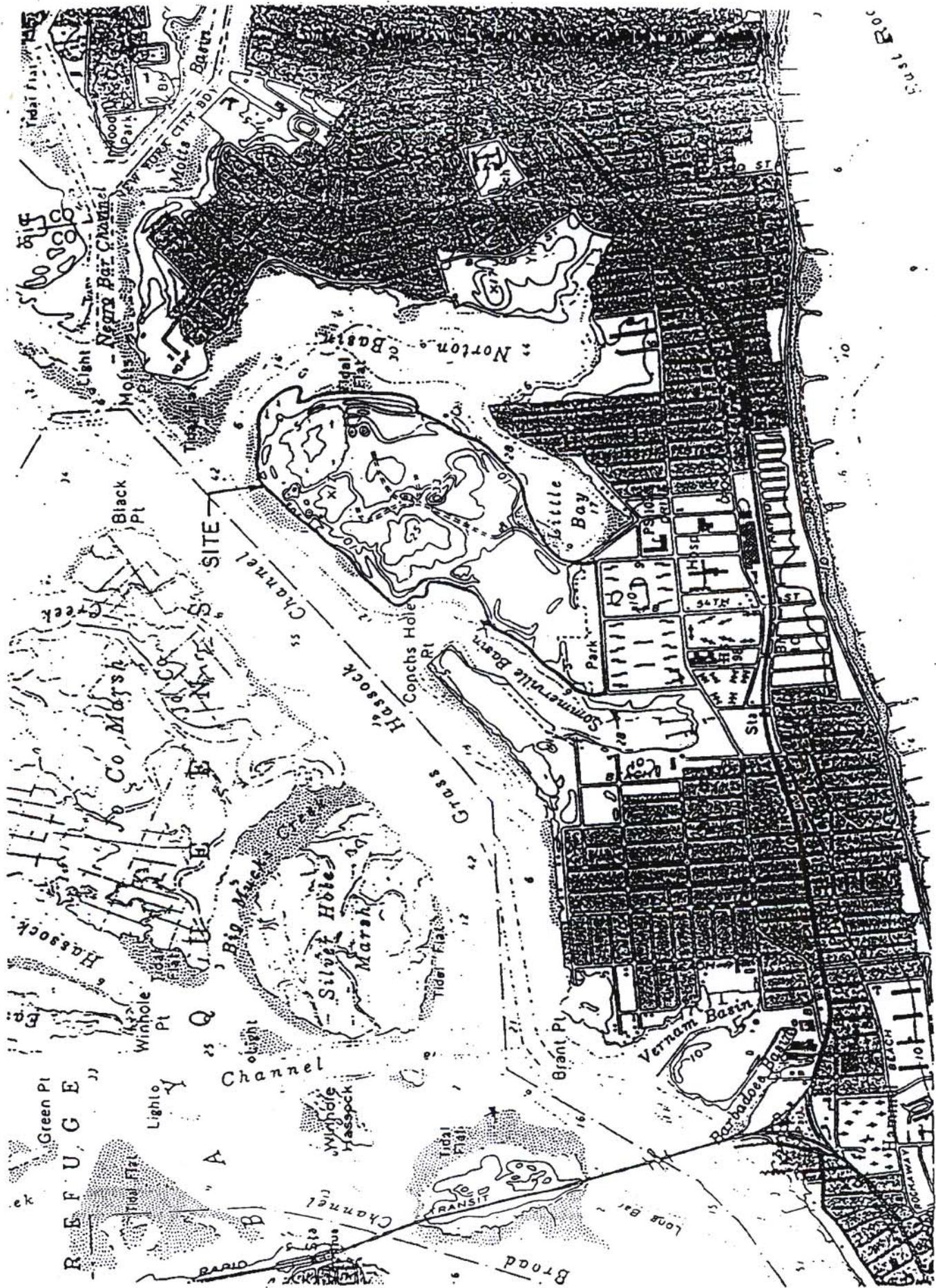
IX. REMEDIATION SCHEDULE

The following is the schedule for implementation of the selected remedial action at the Edgemere Landfill:

- | | |
|-------|--|
| 02/93 | Request for Proposals for 1) Remedial Design and 2) Construction Supervision Services. |
| 06/93 | Construction of the groundwater extraction and treatment system in the former drum burial area. |
| 09/94 | Completion of construction documents for final cover; a landfill gas management system; stormwater and erosion control system; and air, groundwater and surface water monitoring system. |
| 01/95 | Start Construction. |
| 12/96 | Complete Construction. |
| 01/97 | Start Post Remedial Maintenance and Monitoring. |

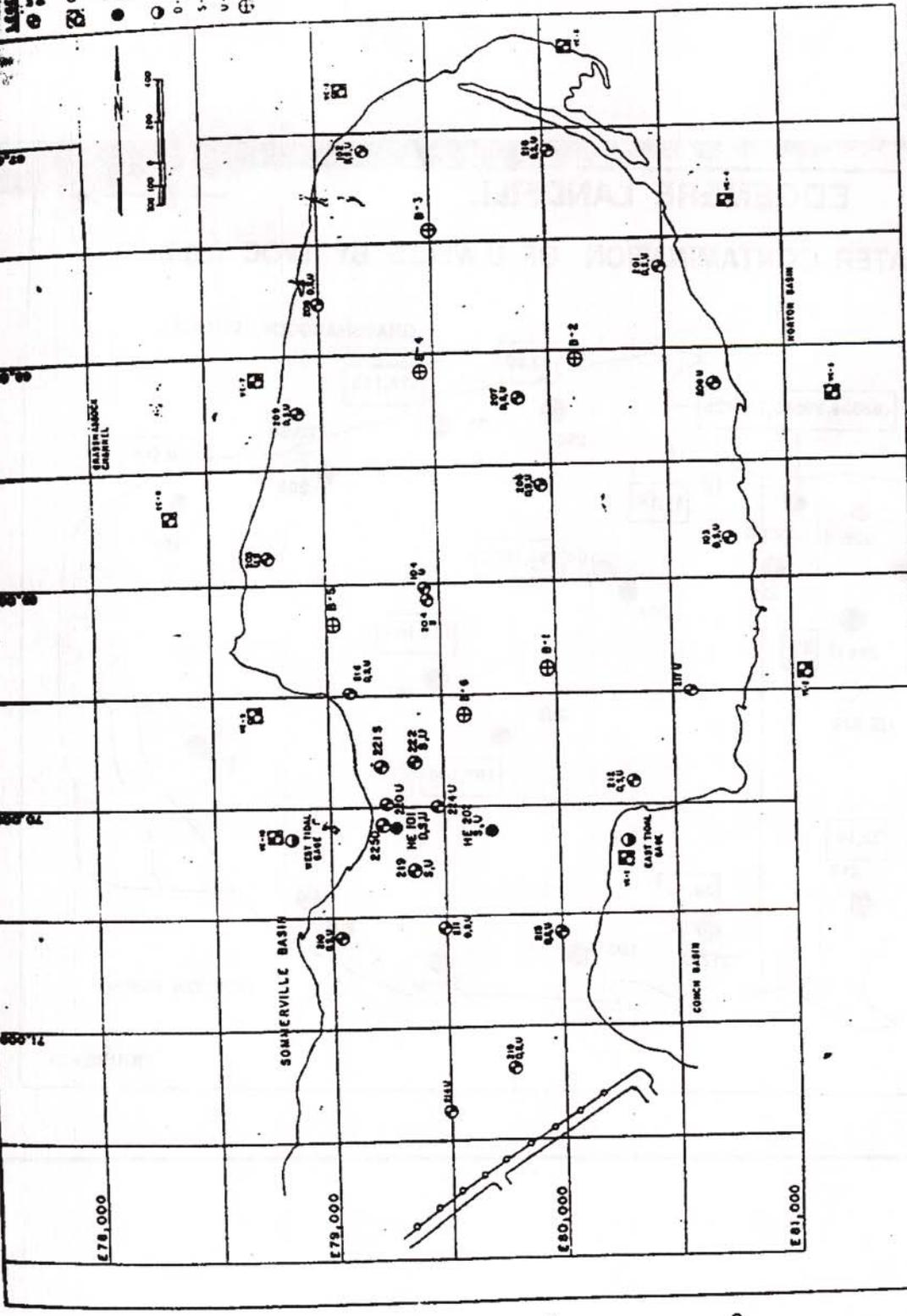
FIGURES

FIGURE - 1 SITE LOCATION MAP



IRCE: USGS FAR ROCKAWAY QUADRANGLE

- ① Seeps
 ② Seep Camp
 ○ Monitoring Site Includes
 Casing Pressure Hydropon
 Investigations
 ○ Field Gage
 ○ Deep Monitoring Well
 ○ Shallow Monitoring Well
 ○ Upper Monitoring Well
 ⊕ Boring Locations



TOXIC WASTE LANDFILL
 REMEDIAL INVESTIGATION/FEASIBILITY STUDY (R1/E5)
 MONITORING WELL, BORING AND
 OFFSHORE CORING LOCATION MAP

DATE: _____
 FIGURE #1

THE USE OF THIS MAP
 REPRESENTS THE
 RESOURCE RECOVERY AND WASTE DISPOSAL PLANNING

PROJECT SUPPORTED BY
 GIBBS & HULL INC.
 FEDERAL, STATE, AND LOCAL AGENCIES

SCALE
 AS SHOWN

NO. OF SHEETS	OF TOTAL SHEETS
DATE	DATE
BY	BY
CHECKED	CHECKED
APPROVED	APPROVED

FIGURE 2

EDGEMERE LANDFILL



GROUNDWATER CONTAMINATION OF U WELLS BY TVOC (ug/l)

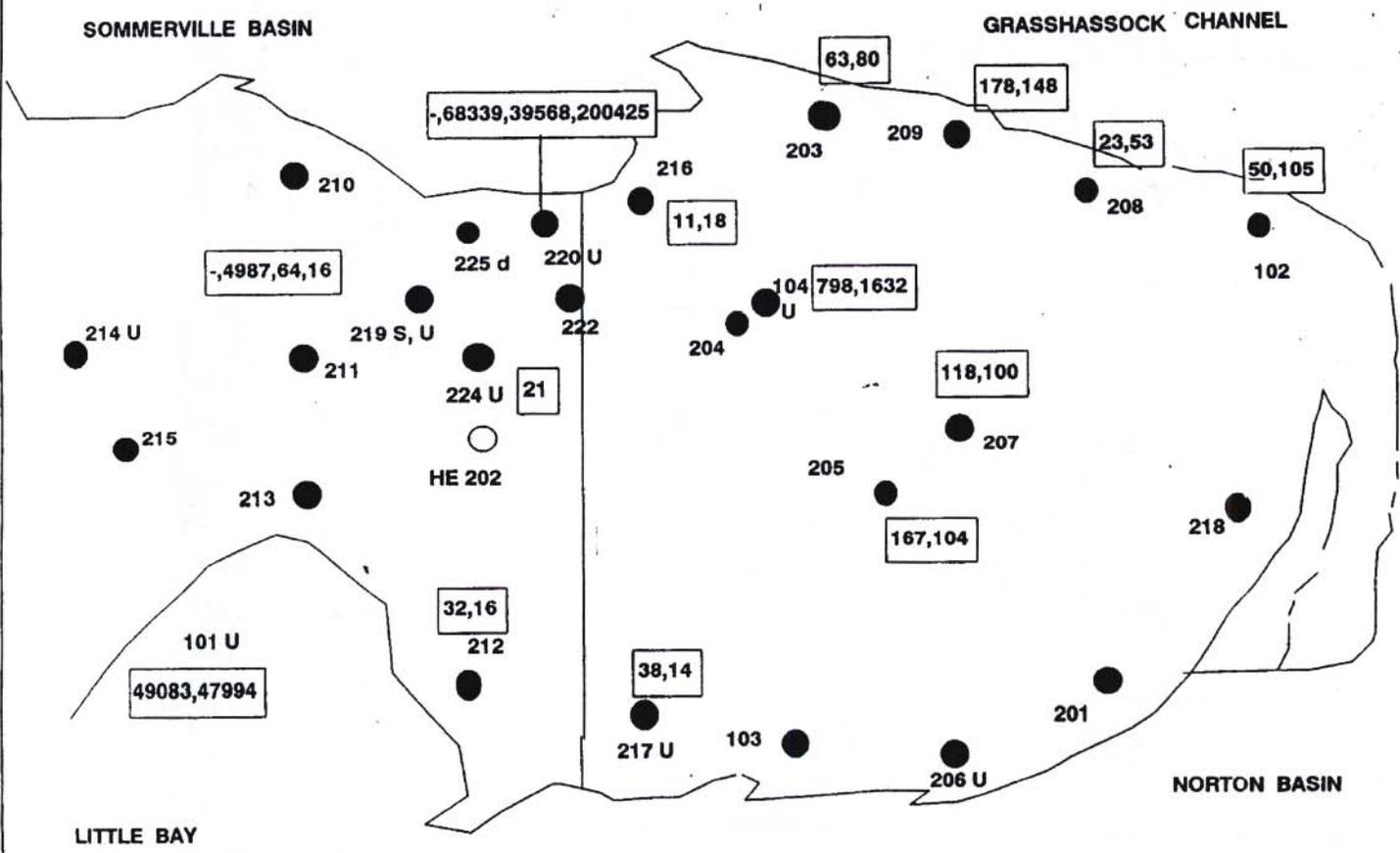


FIGURE - 3a

EDGEMERE LANDFILL

GROUNDWATER CONTAMINATION OF U WELLS BY CYANIDE (ug/l) (GROUNDWATER STANDARDS = 200 PPB)

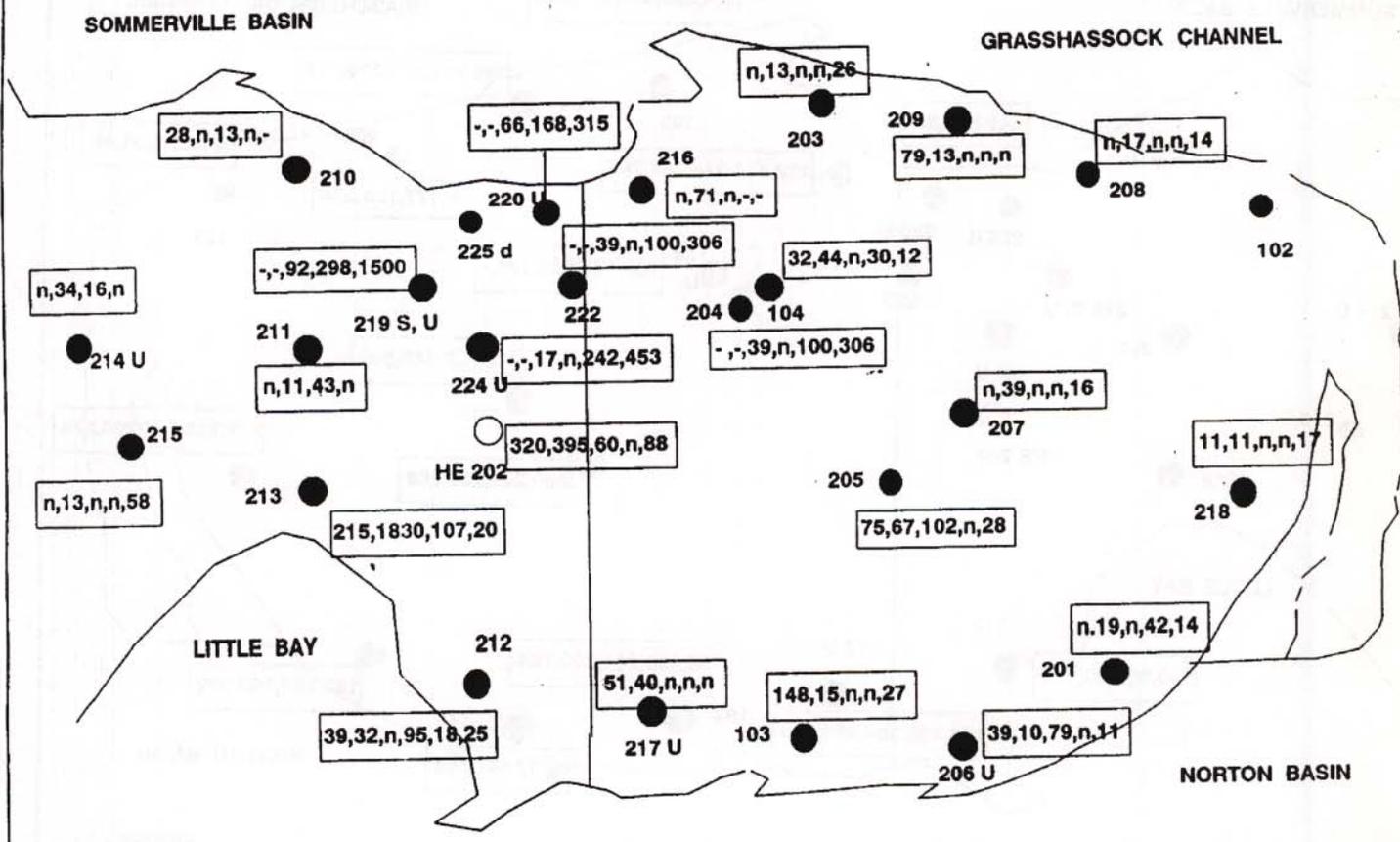


FIGURE - 3b

EDGEMERE LANDFILL

GROUNDWATER CONTAMINATION U WELLS BY AMMONIA (MG/L)

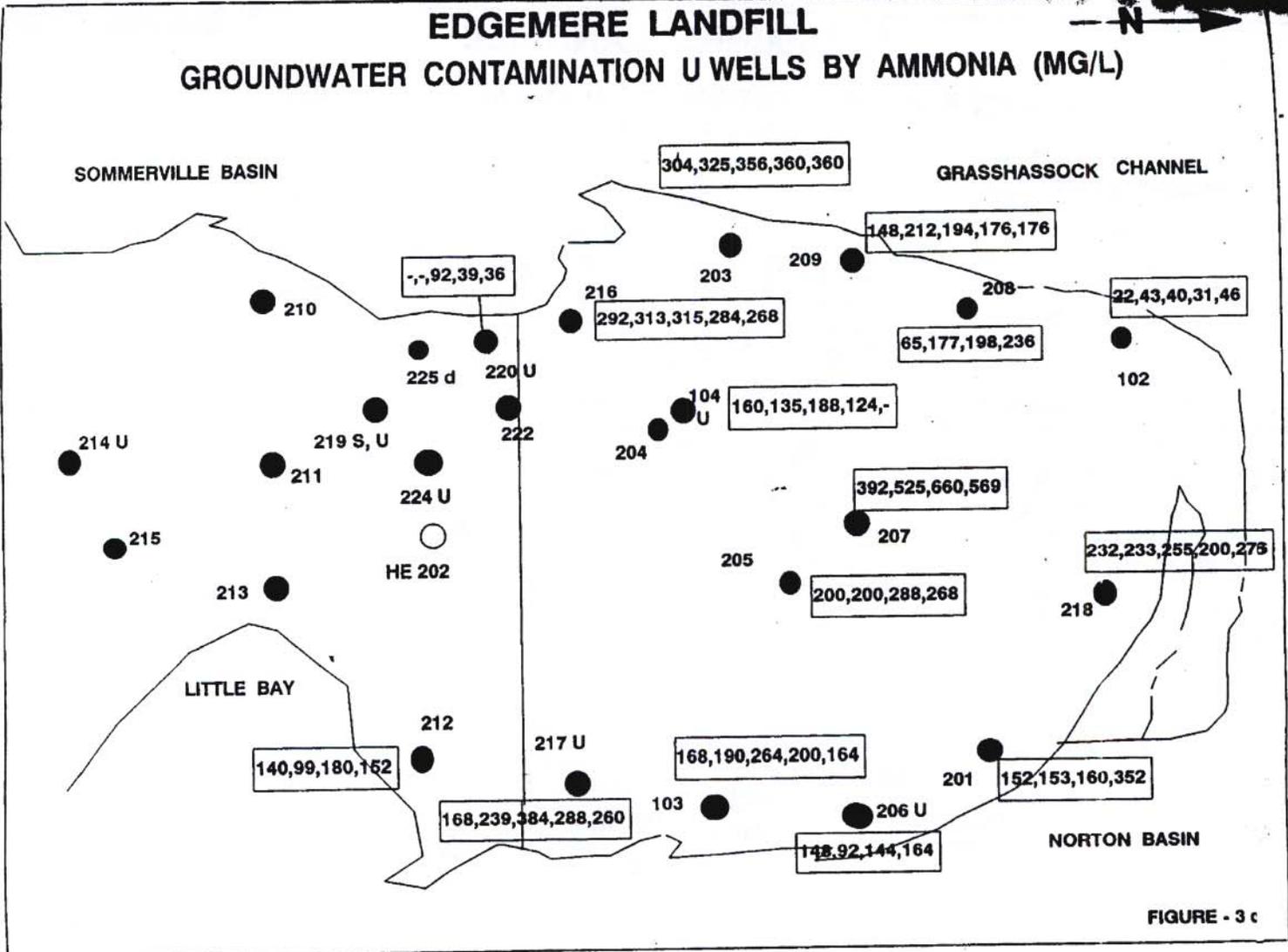


FIGURE - 3 c

EDGEMERE LANDFILL

GROUNDWATER CONTAMINATION OF U WELLS BY LEAD (UG/L)

(GROUNDWATER STANDARDS = 25 PPB, SPDES LIMITS = 56 PPB)

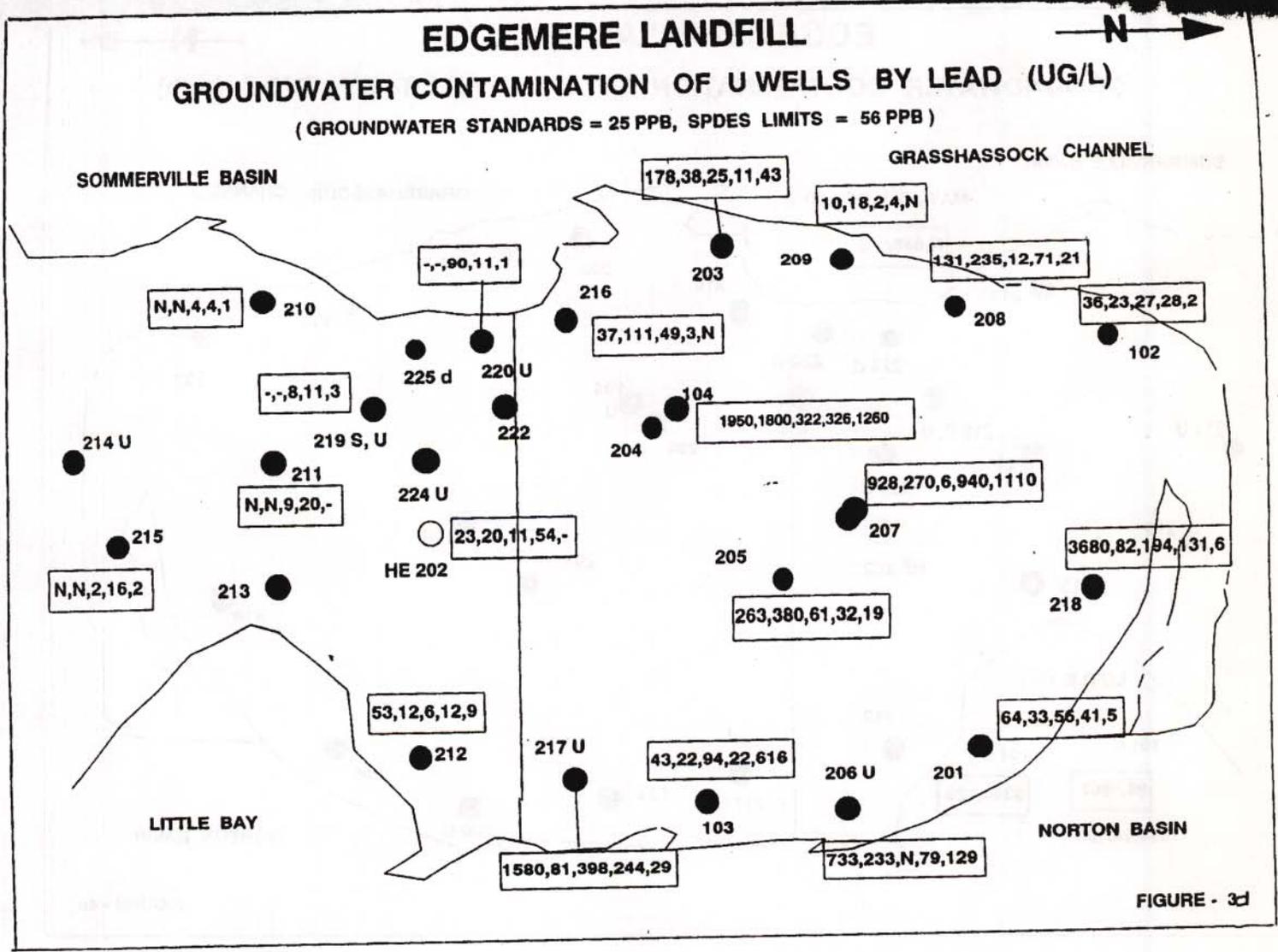
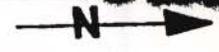
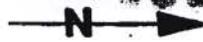


FIGURE - 3d

EDGEMERE LANDFILL



GROUNDWATER CONTAMINATION OF D & S WELLS BY TVOC (ppb)

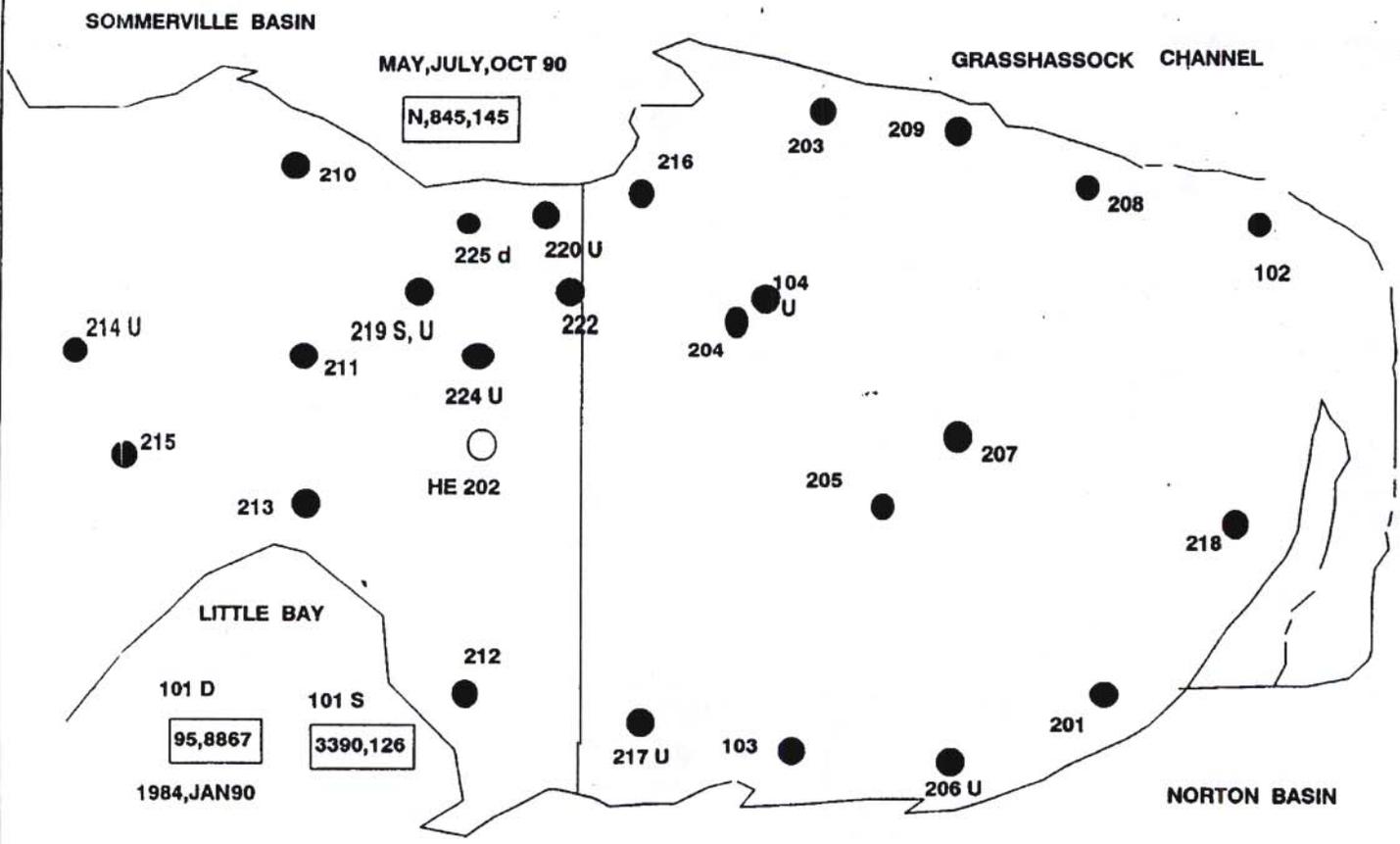


FIGURE - 4a

EDGEMERE LANDFILL

GROUNDWATER CONTAMINATION OF S WELLS BY CYANIDE (ug/l)

(GROUNDWATER STANDARDS = 200 PPB)

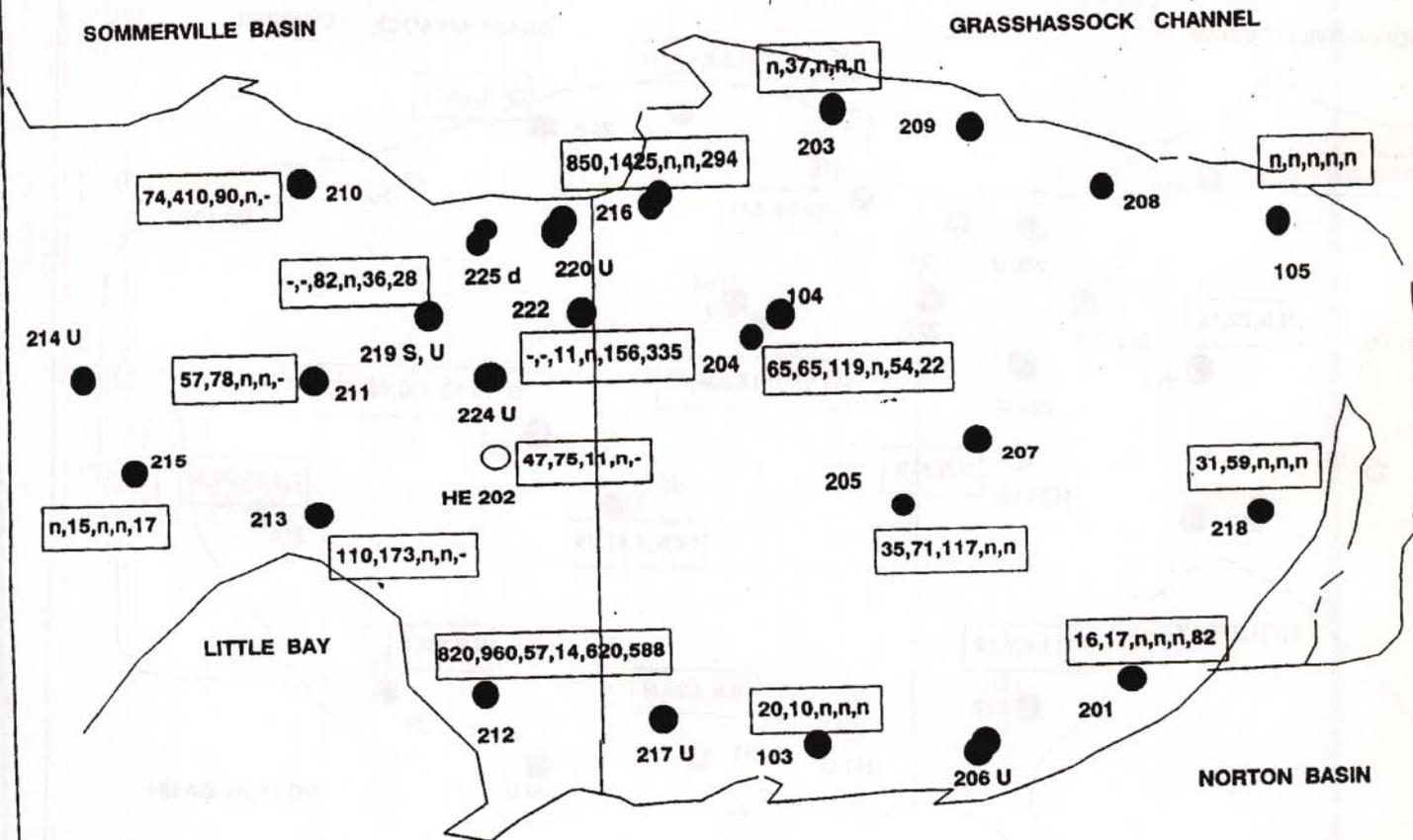


FIGURE - 4b

EDGEMERE LANDFILL

GROUNDWATER CONTAMINATION OF S WELLS BY LEAD (UG/L)

(GROUNDWATER STANDARDS = 25 PPB, SPDES NUMBERS = 56 PPB)

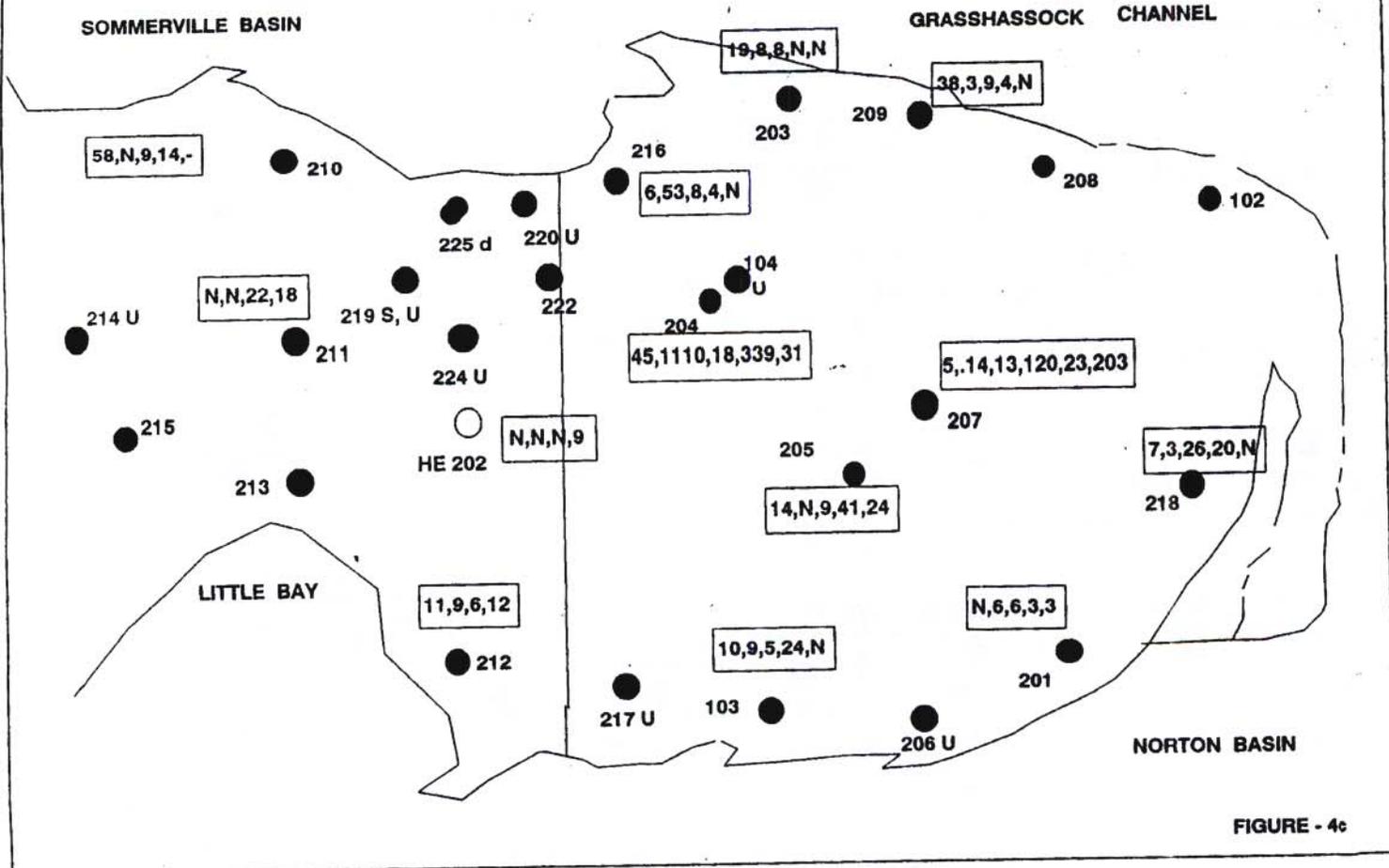


FIGURE - 4c

EDGEMERE LANDFILL

GROUNDWATER CONTAMINATION OF D WELLS BY CYANIDE (UG/L)

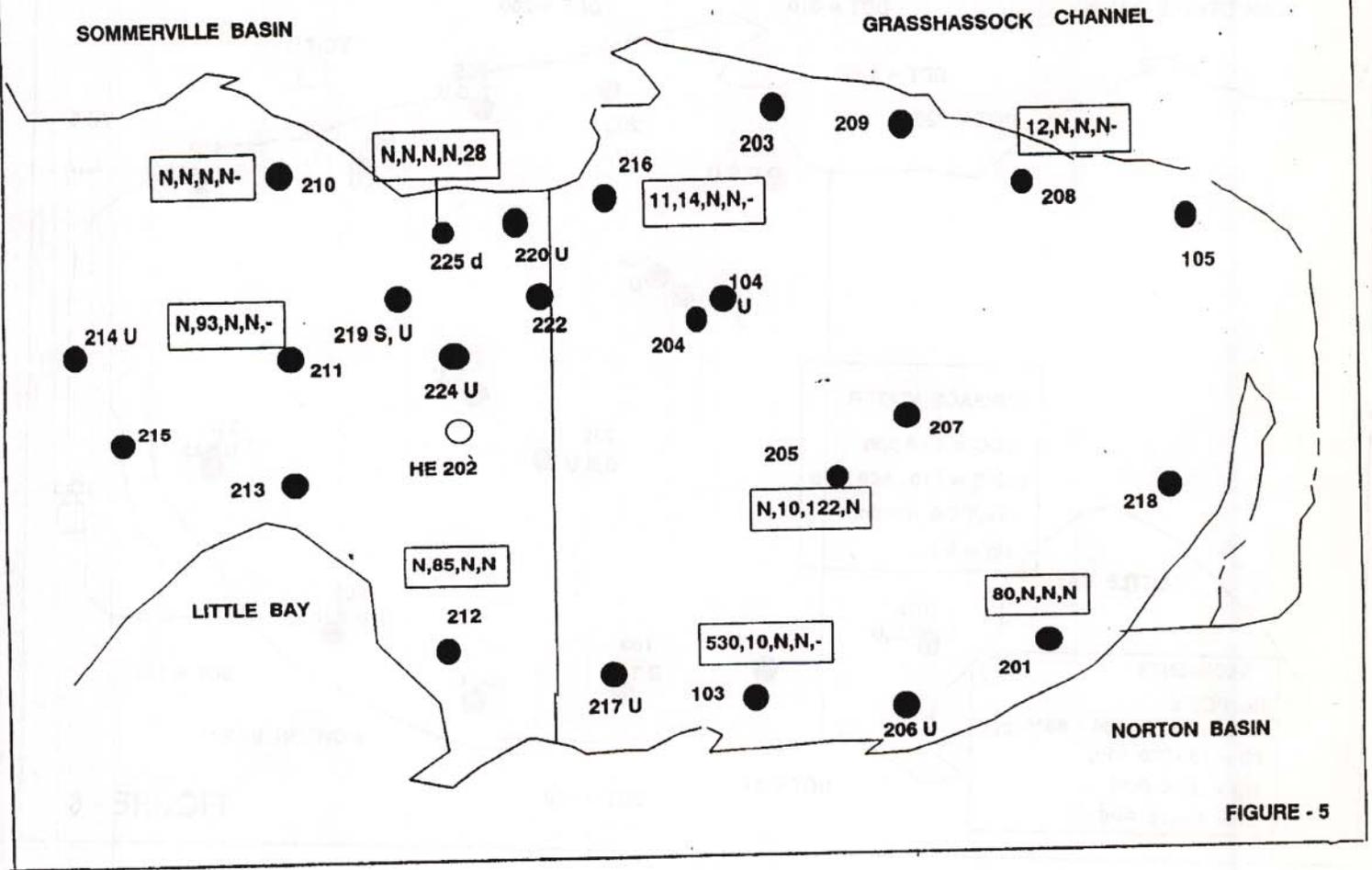


FIGURE - 5

EDGEMERE LANDFILL

SEDIMENT CONTAMINATION, PPB

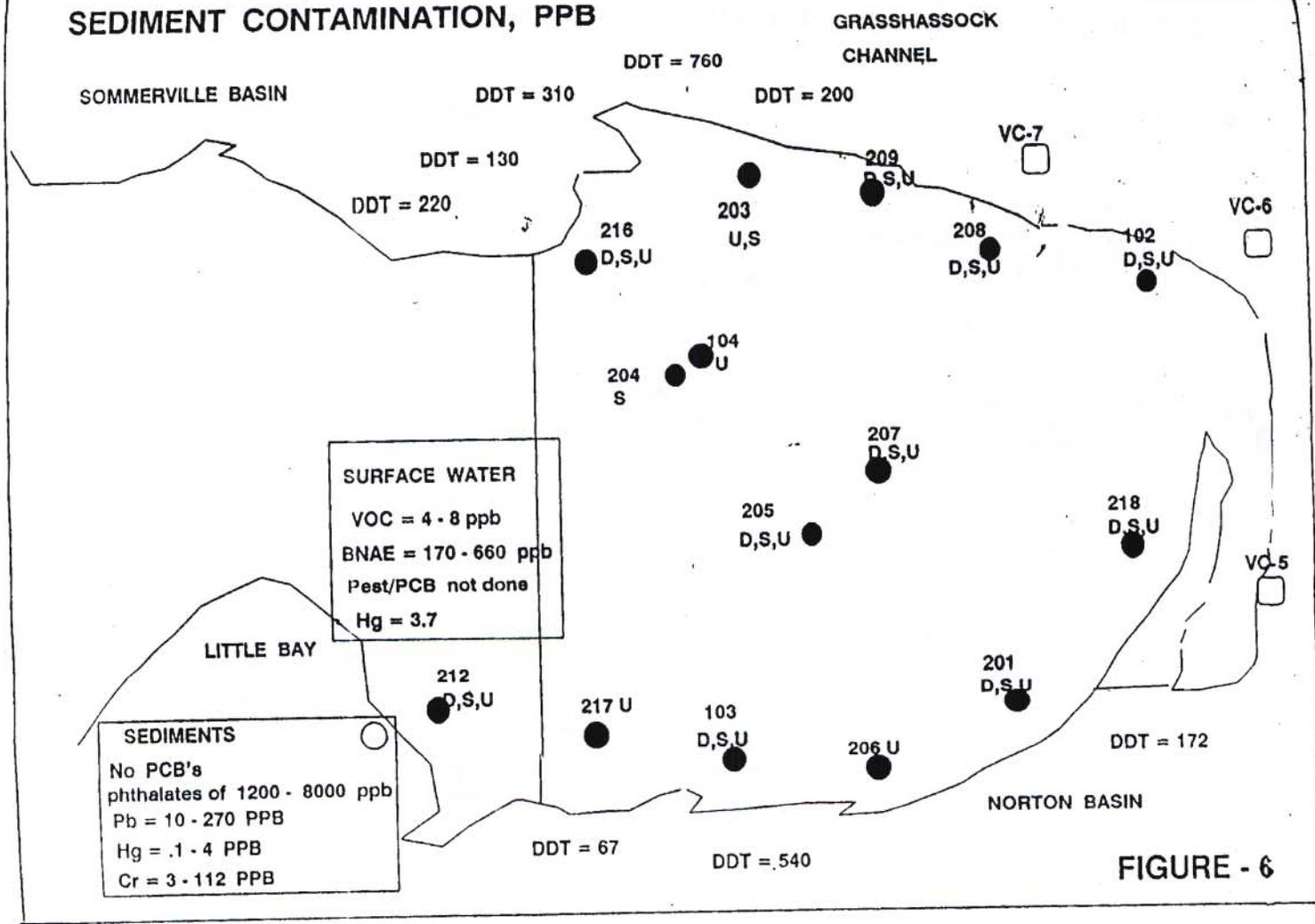


FIGURE - 6

TABLE - 1

SCREENING OF POTENTIAL TECHNOLOGIES

<u>Technology</u>	<u>Waste Characteristics</u>	<u>Site Characteristics</u>	<u>Technical Requirements</u>	<u>Retained for Further Evaluation</u>
<u>Groundwater Control</u>				
Subsurface barriers	yes	yes	yes	yes
Pumping	yes	yes	yes	yes
Subsurface drains	yes	yes	yes	yes
<u>Groundwater Treatment</u>				
On-site treatment:				
Activated carbon	yes	yes	yes	yes
Biological	no	yes	yes	yes
Precipitation flocculation and sedimentation	yes	yes	yes	yes
Ion exchange	no	yes	yes	no
Sorptive resins	yes	yes	no	no
Reverse osmosis	yes	yes	no	no
Air stripping	yes	yes	yes	yes
Chemical oxidation	yes	yes	yes	yes
Filtration	yes	yes	yes	yes
Off-site treatment	yes	yes	yes	yes
<u>Soils</u>				
In situ treatment:				
Biorreclamation	no	no	no	no
Chemical detoxification	no	no	no	no
Soil flushing	no	no	no	no
Immobilization	no	no	no	no
Heating	no	no	no	no
Surface capping	yes	yes	yes	yes
On-site treatment:				
Solidification	yes	no	yes	no
Off-site disposal (landfill, incineration)	yes	no	yes	no
<u>Landfill Gas</u>				
Passive	yes	yes	yes	yes
Active	no	yes	yes	yes
Landfill gas treatment	no	yes	yes	yes

TABLE - 2

CHARACTERISTICS OF REMEDIAL ACTION ALTERNATIVES

Alternative No.	I	II	III	IV	V
Landfill Cap	Yes	Yes	Yes	Yes	Yes
Compliance With 6NYCRR Part 360	No	Yes	Yes	Yes	Yes
Monitoring Program	Yes	Yes	Yes	Yes	Yes
Management Controls	Yes	Yes	Yes	Yes	Yes
Landfill Gas Management	No	Yes	Yes	Yes	Yes
Leachate Management	No	No	Yes	Yes	No
Groundwater Treatment	No	No	No	Yes	Yes

EDGEMERE LANDFILL

TABLE - 3

ESTIMATED COSTS OF ALTERNATIVES

	<u>ALTERNATIVES</u>				
	I	II	III	IV	V
Capitol Cost	17,300,000	32,900,000	54,900,000	56,200,000	36,400,000
Annual Cost	300,000	360,000	1,330,000	2,030,000	360,000
Present Worth of annual cost 7% for 15 years	2,700,000	3,300,000	12,100,000	18,509,000	3,300,000
Total Cost	20,000,000	36,200,000	67,000,000	74,700,000	39,700,000

TABLE 4

EDGEMERE LANDFILL LEACHATE

PARAMETER	EDGEMERE LEACHATE	EDGEMERE LEACHATE	PART 703.5 STANDARDS	DISCHARGE LIMITATIONS
	min/max., ppb.	MEAN, ppb	ppb.	
BOD, PPM	ND, 112.1	19.92		45
COD	100, 520	283.03		Monitor
TKN	39, 395	233.01		Monitor
AMMONIA, pp	31.5, 384	210.65		80
ALUMINUM	ND, 5760	1185.97		4000
ANTIMONY	ND, 34.7	3.57		100
ARSENIC	ND, 22.5	0.54	25	100
BARIUM	266, 2700	1038.97	1000	4000
CADMIUM	ND, 43	5.66	10	27
CHLORIDE, P	180, 4700	863.03	250	
CHROMIUM V			50	100
CHROMIUM T	ND, 110	20.99		1000
CYANIDE			200	*
COPPER	4.4, 184	52.33	1000	400
IRON	4700, 90800	36203.03	300	4000
LEAD	ND, 3680	244.42	25	56
MANGANESE	98.6, 999	382.29	300	2000
MERCURY	ND, 2	0.15	2	100
NICKEL	ND, 90.6	23.32		71
SILVER	ND, 180	13.8	50	
ZINC	37.3, 940	187.51	5000	1000
ETHYL BENZ	ND, 5	0.97		
NAPHTHALENE	ND, 330	41.3		10
PESTICIDES	ND, .431	0.06		
PHENOLS			1	
PCB'S	ND, 2.4	0.11		ND
CHLOROBEN	ND, 280	31.05		50
PHTHALATE	ND, 220	15.12	4200	100
COBALT	ND, 19.8	5.14		
XYLENE	ND, 37	3.82		50
ACETONE	ND, 40	5.94		

* Cyanide cleanup numbers will be supplied by Division of Water or will be technology based.

EXHIBITS

EXHIBIT A

ADMINISTRATIVE RECORD
EDGEMERE LANDFILL SITE
SITE # 241004

- Mar. 83 Fred C. Hart Associates, Inc., "Edgemere Landfill Air Monitoring Program", Prepared for NYSDOS.
- Sep. 83 Woodward-Clyde Consultants, Inc., "Engineering Investigations at Inactive Hazardous Waste Sites in the State of New York Phase-I Preliminary Investigation - Edgemere Landfill", Prepared for NYSDEC.
- Nov. 84 Gibbs & Hill, Inc., "Hydrogeologic Study - Fountain Avenue, Pennsylvania Avenue and Edgemere Landfill, Part I and Part 2 - Regional and Site Reports", Prepared for NYCDOS.
- Jul. 85 Environmental Factors Report, Edgemere Landfill", Prepared for NYCDEP.
- Nov. 85 - Gibbs & Hill, Inc., "Scope of Work for Remediation of Buried Drum Area at the Edgemere Landfill", Prepared for NYCDOS.
- Nov. 85 "Hazard/Risk Evaluation of Buried Drum Area at the Edgemere Landfill", Prepared for NYCDOS.
- Sep. 88 Gibbs & Hill, Inc., "Work Plan, Edgemere Landfill", Prepared for NYCDOS.
- Jan. 89 Weston Geophysical Corp., "Report of Geophysical Investigation Electromagnetic Conductivity and Magnetometer Surveys", Prepared for Gibbs & Hill.
- May 89 Gibbs & Hill, Inc., "Edgemere Landfill Site Characterization Report", pre-draft report, Prepared for NYCDOS.
- Aug. 89 Gibbs & Hill, Inc., "Exploratory Excavations at Edgemere Landfill", Prepared for NYCDOS.
- Nov. 89 EEA, Inc., "Jamaica Bay Literature Review", Prepared for Gibbs & Hill.
- Mar. 90 Weston Geophysical Corp., "Electrical Resistivity and Ground Penetrating Radar Surveys", Prepared for Gibbs & Hill.

- May 90 IT Corp., "Edgemere Landfill Post Excavation Soil Sampling Results", Prepared for Gibbs & Hill.
- Aug. 90 IT Corp., "Expedited Response Action Project Report, Edgemere Landfill", Prepared for NYCDOS.
- Oct. 90 NYCDOS, "Petition for Partial Delisting of the Edgemere Landfill from Inactive Hazardous Waste Registry".
- Nov. 90 H2M Group, "Tidal Hydraulic Study Vicinity of Edgemere Landfill, Prepared for NYCDOS.
- Dec. 90 Gibbs & Hill, Inc., "Qualitative Health Risk Assessment", Prepared for NYCDOS.
- May 91 Gibbs & Hill, Inc., "Edgemere Landfill Remedial Investigation, Final Report".
- Sep. 91 Gibbs & Hill, Inc., "Edgemere Landfill Feasibility Study - Preliminary Draft Report", Prepared for NYCDOS.
- Feb. 92 - Gibbs & Hill, Inc., "Edgemere Landfill Feasibility Study - Final Report", Prepared for NYCDOS.
- Nov. 92 "Proposed Remedial Action Plan", Prepared by NYSDEC.
- Feb. 93 Gibbs & Hill, Inc., "Responsiveness Summary on the Proposed Remedial Action Plan", Prepared for NYCDOS & NYSDEC.
- Mar. 93 "Record of Decision", Prepared by NYSDEC.

ANALYTICAL DATA AVAILABLE:

Air-X Surface Water-x Groundwater-x Soil-x Sediment-x

CONTRAVENTION OF STANDARDS:

Groundwater-x Drinking Water-X Surface Water-X Air-X

LEGAL ACTION:

TYPE.: Consent Order-EQBA State- X Federal-
STATUS: Negotiation in Progress- Order Signed- X

REMEDIAL ACTION:

Proposed-X Under design- In Progress- Completed-
NATURE OF ACTION: Drum removal.

GEOTECHNICAL INFORMATION:

SOIL TYPE: Sandy fill
GROUNDWATER DEPTH:

ASSESSMENT OF ENVIRONMENTAL PROBLEMS:

Surface water and groundwater analyses indicate that some heavy metals (e.g., arsenic) and other organics (e.g., cyanide) may occur at concentrations above State/Federal standards. Only limited organic chemical analyses have been completed. Environmental problems cannot be quantified at this time.

ASSESSMENT OF HEALTH PROBLEMS:

A fence limits site access; landfill employees could be exposed to on-site contaminants. Groundwater directly beneath the landfill is contaminated with heavy metals and organics. Groundwater is not used as a source of drinking water within five miles. Numerous leachate seeps enter Jamaica Bay waters and exposure to contaminants is possible through consumption of finfish and shellfish. Levels of PCBs in the fish are beneath the FDA tolerance level of 2 ppm. Limited commercial fishing occurs; net-fishing is restricted and taking of shellfish is prohibited for bacteriological reasons. Air sampling indicates volatile contaminants (benzene, toluene) in ambient air at the site but not off-site. Several thousand people reside within one-half mile of the site. Potential human exposures to contaminants at the site are to be addressed in the RI/FS.

EXHIBIT C

RESPONSIVENESS SUMMARY

**Responses to Questions and Comments
Raised at the Public Hearing of November 17, 1992
Concerning the Proposed Remedial Action Plan
for the Edgemere Landfill**

**Prepared by the NYS Department of Environmental Conservation
with the NYC Department of Sanitation**

January 11, 1993

Revised February 8, 1993

For Information Contact:

Shaminder Singh

NYSDEC

(718) 482-4996

Ted R. Nabavi

NYCDOS

(212) 837-8458

Edgemere Landfill Responsiveness Summary

1. Proposed Technology for Remediation of the Edgemere Landfill

**Q. Concern that Edgemere is the first landfill to undergo this type of capping?
Please list criteria that you used to select the remedial plan?**

A. Although Edgemere is the first landfill in the New York City area to undergo final capping, many landfills throughout the state and country have already been capped and closed in the same manner. Edgemere Landfill is not a prototype for the proposed capping process using a combination of clay, geomembrane or grading.

For example, the Croton Point Landfill in Westchester County has been designed with a similar cover and this design has been approved for construction. Other landfills with a geomembrane and clay cover include: the Whitestown Landfill in Oneida County, New York; the Blydenburgh Road Landfill in Islip Township, New York and the HMDC 1A Landfill in Hudson County, New Jersey.

The following is an overview of how the City evaluated different alternatives and the process for determining the final remediation of the Edgemere Landfill :

The Federal Government has CERCLA regulations and requirements in evaluating final cover alternatives to close municipal landfills and/or hazardous waste sites. The State of New York also has regulatory requirements which are detailed in 6 NYCRR, Part 360 - Solid Waste Management Facilities, Volumes I and II.

The City and its consultant evaluated the requirements of CERCLA in conjunction with the New York State DEC requirements and evaluated five remedial alternatives of landfill closure, which are:

1. No Action and Management Controls.

Alternative 1 is basically a reference point for evaluating the other "action" alternatives, and does not include an impermeable cap. It does require grading, revegetation, surface water and sediment control and management controls.

2. Final Cover, Landfill Gas Management Technologies, Monitoring, and Management Controls.

This alternative requires a Part 360 landfill cap, landfill gas management, and a groundwater, surface water and air monitoring program.

3. Final Cover, Landfill Gas and Leachate Management Technologies, Long-Term Monitoring, and Management Controls.

Alternative 3 adds leachate management which includes leachate treatment before discharge to Jamaica Bay.

4. Final Cover, Landfill Gas and Leachate Management Technologies, Monitoring, Groundwater Treatment Technologies, and Management Controls.

Alternative 4 is a final cover, landfill gas and leachate management, groundwater treatment and management controls. Alternative 4 is Alternative 3 with the addition of groundwater treatment in the neck area.

5. Final Cover, Landfill Gas Management Technologies, Long-Term Monitoring, Groundwater Treatment, and Management Controls.

Alternative 5 is actually Alternative 2 modified, which the City and State plan to implement. This alternative includes final cover, landfill gas management technologies, groundwater treatment in the Neck Area, monitoring and management controls.

The City of New York evaluated these technologies using the following criteria:

1. Compliance with Applicable or Relevant and Appropriate New York State Standards, Criteria and Guidance.
2. Protection of Human Health and the Improvement.
3. Short-Term Impacts and Effectiveness.
4. Long-Term Effectiveness and Permanence.
5. Reduction of Toxicity, Mobility and Volume.
6. Implementability - Evaluation of the Technical and Administrative Feasibility.
7. Cost - Capital and Operation and Maintenance Cost.
8. Citizens Participation.

Landfill Cover Material & Impacts of Trucking

Q. Where are you going to get the soil for the cover? Where is the dirt coming from? Could you give us a location? Does the city buy it privately? How much for a truck full? What is the depth of soil layer for the cover and trucks? Will trucking activity and their cumulative impact be evaluated prior to hauling and disposing of the capping and cover material? Has DOS investigated the possibility of barging capping materials to the site?

A. The methods of bringing materials for the final cover to the site were evaluated during the Feasibility Study (FS) process and will be further evaluated during the Final Design. Based on the conceptual design of the final cover, the total amount of material required for the final cover (top soil, granular fill, clay and clean sand) is approximately 476,000 cubic yards. It is proposed that the weight capacity of trucks delivering material to the site be restricted to the weight capacity of the garbage trucks that brought solid waste to the landfill for disposal. During the last days of operation of the landfill, approximately 120 truckloads of municipal wastes were delivered to the site daily.

With a volume capacity restriction of 12 cubic yards per truck, and a delivery schedule of 5 days per week, at the rate of 120 trucks per day, it is estimated that all the material will be delivered to the site within 16 months. The impacts of the delivery trucks for a short period of time will not create any greater impact than what was previously experienced from the garbage trucks. In addition, the daily number of trucks to the site can be controlled if necessary.

The barge delivery option was evaluated during the FS process. There are no existing facilities, on or near the site, suitable for barge delivery of cover materials. While the option exists to construct such a facility, construction costs, permitting obstacles, the time required for the construction of barging

facilities and the need for dredging would present an insurmountable challenge. In addition, a vendor survey for cover materials in 1991 identified only three suppliers capable of delivery by barge, and their willingness to deliver to the site assumes the existence of navigable barge channels and an off-loading facility. The final choice of cover material will be made during the final design.

Q. Will the same type of caps which are used for landfill projects across the United States be utilized at the Edgemere site?

A. Yes, although the specific final cover and liner that will be used at Edgemere is dependent on the final design. The final cover over the landfill will include the following from the first layer (over the garbage) to the top layer:

- 1) Filter fabric, which is a porous plastic mesh type of material on the garbage.
- 2) 12 inches of clean sand placed over the filter fabric which is used for gas venting. Once the garbage is covered by an impermeable clay cap, gases that are generated through natural decomposition will no longer be able to escape to the atmosphere. The sand layer will allow the gases to travel and be collected.
- 3) Another layer of filter fabric underneath clay material.
- 4) Geomembrane or Clay soil material - used because of its impermeable characteristics, which minimizes the infiltration of rainwater into the garbage.
- 5) A 24 inch layer of loose soil and,
- 6) A 6 inch layer of topsoil.

The final cover specifications will be detailed as part of the Final Design.

Groundwater Treatment

Q. The proposed Groundwater treatment indicated as part of the remedial activity appears to overlap with the remedial construction and we thought you had to complete the groundwater treatment before you began the remedial construction. Can this be done together?

A. The groundwater treatment project will be located in the Neck Area of the landfill where 7000 buried drums were excavated and disposed off-site. This project is separate from the landfill closure plan and will have no impact on the project schedules for closure of the landfill.

The groundwater treatment in the Neck area will be comprised of one or more of the processes of physical/chemical coagulation, sedimentation & filtration, air stripping and carbon adsorption to address the contaminated groundwater existing at the site. The treatment system includes groundwater extraction, treatment and reinjection. There are plans to continue semi-annual groundwater monitoring at the Edgemere Landfill.

The NYCDOS has a contract in place for the groundwater treatment in the Neck Area. The community will be notified and a public information meeting will be held in April to explain the groundwater treatment process. It is anticipated that the groundwater cleanup goals will be achieved within two years after start up.

All schedules at this time are tentative, awaiting public approval.

Methane Gas Burning

Q. Will there be open air burning (gas flares, vents on landfill)? Will these vents be contained within a building? Are you planning on selling the methane gas to local companies?

A. The landfill cover design includes a gas venting layer in which a gas management system (slotted pipes) will be installed to collect the landfill gas and deliver it to a central point for flaring or gas recovery. The landfill gas will be flared as open air burning.

The design process will include the assessment of selling the recovered landfill gas or the energy derived from it. This assessment involves a feasibility study, costs analysis, payback period and implementability in terms of schedule, community/environmental impacts and availability of technology and markets.

New York City has been operating a similar collection and recovery system at the Fresh Kills Landfill for many years. Utilities or potential vendors will be contacted to determine if it is feasible to recover the Edgemere Landfill gas and hopefully utilize it beneficially.

Lot Cleaning

The lot cleaning issue does not impact the Proposed Remedial Action Plan for the Edgemere Landfill. Community concerns will be addressed by the New York City Department of Sanitation.

2. Oversight Committee

Q. Primary Concerns of the elected officials and concerned community residents who spoke at the hearing are related to the protection of both the Edgemere & Rockaway community as well as preservation of Jamaica Bay and its water quality. The community would like to organize a monitoring and oversight committee.

Who will establish the Oversight committee? When the meetings will be scheduled? Will funding be available for this committee?

A. The NYSDEC and NYCDOS concur that the formation of an oversight committee is necessary. Representative individuals from each agency will be available to attend meetings as necessary.

The oversight committee should be established by the Queens Borough Presidents Office. The Oversight Committee is a voluntary organization and therefore funding from the NYSDEC will not be available for the committee.

3. Health Studies

Q. Will there be a cancer study conducted in the area?
Will the cancer studies include general lung diseases such as bronchial pneumonia, and asthma?

A. An Assessment of the potential risks to public health and the environment posed by chemical contamination at the Edgemere Landfill site has been prepared as part of the evaluation required by federal CERCLA and SARA regulations. The Risk Assessment addresses quantitatively the potential impacts on human health associated with the Edgemere Landfill site.

The baseline Risk Assessment is performed to evaluate the impact of the No Action remedial alternative and to assess if actual or threatened releases of hazardous substances pose potential risks to exposed individuals under current or possible future exposure circumstances. In addition, the Risk Assessment also evaluates the risk associated with future remedial actions to convert the landfill to a park and designated solid waste management facilities.

The 1990 Qualitative Health Risk Assessment evaluated the risks associated with air and soil media. This Assessment has been reviewed by the NYSDOH.

NYSDOH, in cooperation with the NYCDOH, will perform a cancer incidence study for the appropriate area near the Edgemere Landfill. NYSDOH and NYCDOH will evaluate the need for a study of lung disease in the same area.

4. **Impacts of Recycling Facility and the Proposed Composting Station**

Q. When will the future use of the site for the 50 ton per day recycling facility and/or composting stations be discussed and are there plans to place anything else on the site such as incinerators? Why wasn't there any kind of public hearing held regarding the recycling facility and the composting station? Are you aware of any composting facilities where there are not odors? Why do we have to take care of it in the city? Why not ship it outside the city?

A. The Comprehensive Solid Waste Management Plan, as approved by the City Council and the New York State DEC, calls for the construction and operation of two facilities at the Edgemere Landfill site:

- 1) A Self-Help Bulk Recycling Facility, and
- 2) A Leaf and Yard Waste Composting Facility.

1. Self Help Bulk Recycling Facility

This project provides residents with a facility where they can directly dispose of items such as appliances, furniture, and other materials, where the Department of Sanitation arranges for those materials to be recycled. In accordance with DEC Part 360 Regulations, no permit is required for such a recycling facility as long as it handles less than 50 tons per day. The NYCDOS applied for, and the NYSDEC granted the necessary exemption to build and operate this project.

The construction of this facility is complete and it is expected to begin operation as soon as operating funds are available. It will replace the less efficient self help facility which has been operating at the Edgemere Landfill for many years.

2. Leaf and Yard Waste Composting Facility

The NYCDOS submitted a permit application to the NYSDEC in January of 1991 to construct a leaf and yard waste compost facility in the Neck Area of the Edgemere Landfill. The Neck Area has been delisted from the "Registry of Inactive Hazardous Waste Sites in the State of New York" after removal of buried drums and contaminated soil.

The application has not been deemed complete, pending the resolution of some engineering design issues and the specific location of the facility at the landfill. An opportunity for public input will be provided by NYSDEC as part of the permitting process.

It must be pointed out that just because the composting facility is mentioned in the Proposed Remedial Action Plan (PRAP), will not in itself expedite the Department's approval of the necessary permit applications for this facility. This facility will still be subjected to SEQR and Part 360 Regulations. This process includes a public comment period which will provide elected officials and the public an opportunity to voice their concerns regarding this facility.

5. End Use

Q. Have you considered the end use of the property? What criteria were evaluated for end use? After the cap is placed, are there plans to convert the area into a park? What parts of the landfill are going to be designated as parkland? Will chemically stabilized sludge be used on the landfill as a capping material? Is the cover going to be clay bentonite?

A. The end use for Edgemere Landfill has been established by the original NYSDEC Consent Order, dated August 19, 1987. The Consent Order states that the areas that were not going to be utilized as solid waste management facilities (e.g. recycling and composting facilities) be turned over for parkland use.

A final cap is placed to protect the health and environment from exposure to hazardous waste. The DEC is paying 75 percent of the landfill remediation costs in accordance with the Environmental Quality Bond Act (EQBA) of 1986. One of the main concerns is that after placement of the final cap, the integrity of the cap is maintained to whatever final use that the site does possess. The NYSDEC will ensure that the cap does not get breached.

The exact location of the landfill which may be designated as parkland cannot be determined until the landfill is closed and will consider factors such as final capping, grading and land restoration.

Sludge

The DOS never proposed to use sludge or ash for covering the landfill. There are no plans for using process sludge on the landfill. The cover will be a combination of synthetic liners and clay bentonite.

6. Semi-Annual Reports

Q. Who will be receiving the semi-annual reports? Will they be available to the community boards, elected officials and borough presidents office?

A. The semi-annual reports will be submitted to the identified public repositories in accordance with the DEC guidance documents.

All reports and any addendum which occur during the project will be submitted to the repositories which have been previously identified. They include:

Mr. Jonathan Gaska, District Manager
Community Board #14 Office
19-31 Mott Avenue, Room 311
Far Rockaway, NY 11691
(718) 471-7300

Mr. Willie Simms, Manager
New York Public Library, Arverne Branch
312 Beach 54th Street
Arverne, NY 11692
(718) 634-4784

Ms. Teresa Moran, Queens Borough Hall
120-55 Queens Boulevard, Room 219
Kew Gardens, NY 11424
(718) 520-3280

Mr. Bill Hewitt
New York State Department of Environmental Conservation
47-40 21st Street
Long Island City, NY 11101

7. **Funding for the Edgemere Landfill**

Q. **How is the City going to pay for the Edgemere Landfill Proposed Remedial Action Plan (PRAP)?**

A. 75% of the funding for this project is available from the New York State Environmental Quality Bond Act of 1986 and administered by the NYSDEC.