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TASK 5 - RDR - Conceptual

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TASK 5 REPORT

CONCEPTUAL REMEDIAL DESIGN REPORT
FOR THE
LOCKPORT COAL TAR SITE

Prepared for:

New York State Electric and Gas Corporation
4500 Vestal Parkway East
Binghamton, New York 13902

Prepared by:

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July 1985

82C4495

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TASK 5 - CONCEPTUAL DESIGN REPORT

INTRODUCTION

The former coal gasification site located in Lockport, New York has been investigated in detail during the past two years. Data from these studies suggest that a near-subsurface source of coal tar exists at the site, and that a plume of coal tar derivitives and solute exists within the local ground water. The specific findings of these site studies have been reported in a series of reports (Task 1 through Task 4).

The plume of coal tar derived contaminants is thought to have spread offsite during the past 50 to 100 years. The on-site coal gasification plant was decommissioned and dismantled in the early to mid-1900's. The plume has migrated off-site in the general direction of ground-water flow, and has reached the surface waters within the Erie Barge Canal. The canal was excavated into bedrock and ground-water seepage into the canal occurs along the sides of the canal. Studies to date support the link between observed on-site contaminants and contaminants observed in seeps in the canal wall.

Previous tasks of this study have focused on problem identification and characterization. This task addresses the various remediation alternatives applicable to site conditions. Each alternative was evaluated with respect to technical feasibility, acceptability within the current regulatory framework, estimated cost, and maintenance requirements.

Three general approaches to the problem are apparent for the Lockport site. Since the contamination contributed by the Lockport site is judged to be a small component of a much larger contamination problem that is not associated with NYSEG operations, a no-action approach may be reasonable to consider.

wrong

The second approach to site remediation treats the source of contamination at the NYSEG site. Here, various ways of source isolation and removal are considered. If the source of ground-water contamination is isolated or removed at the site, the extent of ground-water contamination off-site should improve with time. After sufficient time has passed, the site would no longer contribute to the contamination of the ground water or canal water. The time term required to achieve this varies with the techniques employed, and the "as-built" performance success of the technique over a multi-year life.

The third approach to site remediation treats the ground-water plume emanating from the site. One alternative is in-situ treatment of contaminants using technologies such as microbiological alteration. Another alternative is an attempt to remove the plume waters by pumping. The latter alternative is the only one considered here because in-situ ground-water treatment of coal tar related compounds is a developing technology without sufficient precedent for cost or performance evaluation.

Estimated costs of the individual components of the various alternatives considered are presented in Table 1. The components are first discussed individually and then grouped into combination treatment packages so that an optimum plan (effective and cost efficient) can be selected.

CAPPING

One technique of source isolation at the site is to minimize the continued solution of coal tar components and their transport to the ground water below the site. This can be achieved by restricting the infiltration of surface waters by constructing a relatively impermeable cap over the site soils. An impermeable cap will reduce the amount of surface water infiltration into the soil and, consequently, the degree to which existing coal tar substances held within site soils are dissolved and carried downward into the ground water beneath the site. In a short-term time period of a few years, it is not likely that a cap or surface seal would be effective in reducing contaminant concentrations at the canal seeps. Therefore, site capping should be considered only os one potential component of a remediation program. Copping would not cut off or reduce the flow of ground water to the canal.

Three types of materials that could be used for site capping were compared. The merits and estimated costs associated with each are summarized as follows:

A. Synthetic Liners

Heavy duty (60 mils) plastic liners (see Figure l) are easy to install; can accommodate obstructions such as lightpoles, buildings, and steps; and are relatively inexpensive. The use of the synthetic liners to cap the site is the least expensive ($127,000) of the four possible materials but may require more maintenance than clay blankets, asphalt or concrete. The installation of a synthetic liner may present the least impact on site operations.

B. Asphalt or Concrete

These two materials are time proven materials which hove the highest life expectancy and the lowest maintenance cost, but are associated with fairly high initial capital costs ($215,000 and $260,000, respectively). A six-inch thick layer is conceptualized. Pavements hove a disadvantage in their tendency to crock, but ore generally inexpensive to patch.

C. Cloy Blanket

Cloy blankets ($225,000) are easy to install and maintain. The conceptual design of the cloy cap would require the excavation and potential disposal of about 2 feet of surface soils. The design envisages a two foot thick cloy blanket overlying one foot of clean sand fill. For protection of the clay blanket two feet of coarse grained protective would be placed on top resulting in on increase in grade elevation of about three feet.

SLURRY WALLS

Slurry walls are a common method of minimizing lateral migration of ground water in soil materials. A trench 24 to 30 inches wide is excavated using a backhoe, and the sides of the trench are supported by keeping the trench full of a slurry of bentonite (clay) and water. The trench is then backfilled with a mixture of bentonite and soil. Another approach is to use a slurry of bentonite and cement to support the sides of the trench excavation. In this case, the slurry hardens and becomes the permanent cutoff wall. The permeability of slurry walls is typically 10^{-6} cm/sec or lower. A slurry wall plan for the Lockport site perimeter is shown on Figure 2, and follows the fence line along the site. This slurry wall plan includes a wall founded on top of the bedrock surface.

Once the slurry wall cutoff wall is installed, the region within the wall will tend to fill as rainwater infiltration occurs. The vertical ground-water gradient will increase in the interior region, thereby increasing the flow into the underlying bedrock. Hence, to be effective, this technique must be accompanied with site capping. Even so, this alternative addresses only the lateral migration of contaminants within the soil underlying the site, and does not deal with migration through the bedrock immediately beneath the site. The cost of this component is estimated to be about $285,000.

GROUT CURTAIN

Grouting is a technique of injecting stabilizing agents into the soil or rock mass under pressure. The grout is forced into the soil or rock voids thus reducing the overall permeability. Grouting is most commonly considered for soils if the permeability of the deposit is somewhat greater than 10^{-3} cm/sec. On site soils are glacial tills typically of lower permeability than 10^{-3} cm/sec, therefore, grouting of overburden soils was not considered. The permeability of the rock fractures as inferred from slug test permeability testing, at the site, ranges from 1×10^{-3} to $1 \times$

10^{-6} cm/sec and is characterized by fracture flow rather than by flow in porous media. Grouting of rock fractures has a history of a few good successes and many failures. A completely successful fracture grouting program is not routinely achieved.

The grout curtain shown in Figure 3 extends 45 feet below the soil rock interface. This is about 10 feet below the level where observed seeps could be traced back from the face of the Canal. An advantage of grouting in the Rochester Shale would be the formation of a barrier about the perimeter of the site in the zone of relatively higher horizontal permeability. The grout holes (as shown) are angled to intercept as many vertical fractures as possible.

The limitations of a grout curtain are similar to those of the slurry wall: 1) fluctuations in the ground-water table and the high vertical downward gradient due to surface infiltration could induce flow of contaminated water through vertical rock fractures to rock members below those currently affected, 2) the contamination inside the grout curtain (where the curtain is effective) has been contained but not removed, and 3) grout curtains in rock have been relatively unsuccessful in reducing material permeability in rocks of this character. As for slurry walls, it is considered necessary to couple the grout curtain containment scheme with site capping.

REMOVAL

Removal and off-site disposal of the contaminated material removes the source of continued contamination. The material would likely be disposed of at the CE COS facility in Niagara Falls due to its proximity to the site. However, removal of large volumes is generally cost-prohibitive, results in loss of site use temporarily, and could result in some temporary environmental impact (primarily air quality). For complete excavation and removal the area would be stripped of all soil and the bedrock surface would be cleaned. The depth of the excavation would be to the water table (up to 15 feet) which means that excavation walls have to be braced. The average all-inclusive cost of excavation, removal, disposal and backfill is estimated to be $340 per cubic yard. This estimate does not include costs incurred by loss of site use, or any non-routine excavation or logistical difficulties.

Three removal plans were initially considered and are shown in Figures 4 and 5. These include extended excavation of the entire site area, limited excavation of portions of the site, and source specific removal of the sumps.

The largest of the three proposed removal schemes (see Figure 4) would remove approximately 5,400 cubic yards at on estimated cost of about 1.8 million dollars. The substation would likely be shut down for a period of months. Costs associated with the loss of substation use are not included in this analysis. For these reasons, the 'extended' excavation was not considered any further.

The smaller 'limited' removal (see Figure 4) involves the removal of approximately 3,000 cubic yards of the most highly contaminated soil at a price of 1 million dollars. A major advantage of 'limited' removal, which is about 50 percent of the 'extended' removal costs, is the removal of the chief source of contamination: the sumps. This removal scheme would remove this area and most of the adjacent soils that are contaminated. Due to the high cost of this measure, it was not considered in conjunction with any other measure.

The removal of the sumps only (see Figure 5) is less expensive, and should remove the major source of continued subsurface contamination. The estimated cost for this excavation is $82,000. Removal of the concentrated source at the sumps should significantly reduce further loading of contaminants to the ground water.

PUMPING

A system of pumping, treatment and discharge or reinjection can sometimes be employed to influence the size and movement of ground-water contaminant plumes. For example, the withdrawal of ground water from the three withdrawal wells shown in Figure 6 may create a cone of depression, thereby reversing local gradients and capturing the contaminated waters. Conceivably, pumping could reverse the local gradients to a substantial degree and draw some of the currently down gradient waters back to the site for removal. The water pumped out of the wells (estimated at approximately 45,000 GPD) would require treatment. A carbon adsorption treatment plant to be constructed on site is considered to be appropriate for this purpose. Heavy hydrocarbons and volatiles could be removed from the waters by carbon filtration. The water could then be discharged to the surface. The contaminated carbon would be removed from the site and disposed of periodically.

The advantage of pumping is that it attempts to remove rather than simply contain the contaminated water in the ground. This method, however, is accompanied by long term (at least 10 years) maintenance and high costs. The estimated minimum ten year pumping takes into consideration the viscous nature of the cool tors and the low permeability of the media through which the contaminants hove to travel to the well locations. The viscous nature of the coal tar and the presence of bacterial growth in existing monitoring wells may also cause clogging of the well filters, screens and pump valves thus increasing monthly maintenance and replacement costs. Given the performance of monitoring wells during the course of site studies, it is expected that maintenance and component replacement costs for this system will be high. At present, however, insufficient data exist to make an estimate of these costs. The cost of this system including 10 year operating costs in present-worth dollars is estimated to be $795,000 without considering any well or component replacement. Given the uncertainty in costs os estimated, a contingency budget of 20 to 25 percent is appropriate.

The major uncertainty concerning this system is its effectiveness in the fracture flow system that exists within the bedrock beneath the site and the length of time required for significant reduction in ground water contaminant levels. Site conditions may not provide enough interconnected bedrock fractures to allow a withdrawal system comprised of a few isolated wells to be effective. The removal of the sumps should be coupled with the pumping components to eliminate the major source of contaminant loading to the ground water.

RECOMMENDED REMEDIAL ACTION

The observations and data collected in the site studies conducted confirm that ground-water contamination in the site area exists. Observations further support the conclusion that contaminated ground water is seeping into the surface water of the Erie Barge Canal located just to the north of the site. A link between on-site coal tar materials and at least some portion of the observed ground-water contamination and contaminants entering the canal waters is supported by such studies. Hence, in response to these conditions, it appears appropriate to consider some level of remedial action.

The appropriate level of site remediation must be put in perspective. To establish this, a coincident endangerment assessment was made (Task 4 Report), such that risks could be identified and considered in evaluating site remediation. This assessment has concluded that essentially no impact on the locale exists from contamination of ground water, with the exception of its seepage into the canal water which impact has been assessed as negligible. As discussed below, the actual impact of seepage of ground water into canal waters is complex.

Ground water and canal waters were found to be contaminated by sources other than coal tar derivatives and solutes. Gasoline and fuel oil were found in some of the monitoring wells, and derivatives of these (and probably lubricating oils) were found in the canal waters. In fact, it appears from the endangerment assessment that contamination of canal waters by coal tar derivitives likely represents less than one tenth of one percent of the existing contamination using upper bound estimates of contaminant concentrations and inflow rates (flux). Significantly lower contribution percentages would be calculated using "most likely" and median values for concentration and flux estimates.

Dependent upon time of sampling the total concentration of polynuclear aromatic hydrocarbon (PAH) compounds in the canal ranges from near zero to about 4 ppm. The estimated quantity of contaminants discharged to the canal from the ground-water plume (flux) diluted by the average canal flow suggest that the contribution to canal water quality resulting from the cool tar represents only a small part of this total amount of PAH's.

The level of remedial action appropriate for this site must be judged, therefore, not only in terms of technical feasibility and general acceptability, but also in terms of the magnitude of the problem being addressed. Based on the general lack of identified risk to the environment, we conclude that, only cost-effective and standard technological remedial actions of predictable overall outcome be considered. Sophisticated and elaborate methodologies and techniques of remediation are not considered appropriate for evaluation or use at this site.

Table 2 lists the remedial action packages described on Table I which are considered based on their cost, public health effects, reliability, effectiveness and engineering feasibility. A major consideration throughout the conceptual design process has been the continued normal operation of the substation facility. The potentially significant costs associated with service interruption have not been included here.

The remedial action packages are ranked on Table 2 for their cost effectiveness utilizing the following criteria; inital and operational construction and maintenance costs, construction related public health risks, reliability, and effectiveness of the remedial package to reduce the flux rate of contaminants to the canal (solution effectiveness). Construction related public health risks are those associated with air quality impacts, potential spills and an increased opportunity for direct contact. Reliability is a measure of the expectation that the remedial package will meet performance specifications. The estimated construction related public health risks are low, thus, public health risks are judged to be less important than the other criteria. Each remedial package is ranked on a scale of 1 to 10. For example remedial package III (pumping) is rated at 9.5. In other words, pumping is assessed as having 95% chance of success in significantly reducing the flux of contaminants to the canal. In contrast, sump removal alone is rated at 2 or having only a 20%

chance of significantly reducing the flux rate. The weighted effectiveness measures are summed to obtain individual effectiveness ratings for each remedial package. The effectiveness rating is then divided by the sum of construction and long term costs to arrive at an overall cost effectiveness score. The sensitivity of the weighting factors was examined by increasing the factor for solution effectiveness to 3. The result was an inconsequential change in the effectiveness/cost ratios.

The site is encapsulated by low permeability barriers in Remedial Package I. A grout curtain (see Figure 3) will seal the rock discontinuities and reduce the lateral movement of contamination through the Rochester shale. A slurry wall will be constructed in the soil and keyed into rock. Finally the surface of the site will be covered with a synthetic membrane. The contaminated ground water and buried contamination source would be contained. A minor drawback lies with the possibility of minor seepage downward still deeper into rock or through partially sealed joints in the DeCew or Rochester Members. Although further downward migration is expected to be small, given the reduced infiltration of water from above caused by the capping of the system, the possibility exists, due to the increased downward gradients caused by variation of the ground-water table and the sinking of heavier than water contaminants. Remedial Package I has an overall Effectiveness Rating of 26 (one of the lowest) and a Cost Effectiveness Rating of 34.8 (fourth highest).

The disadvantage to Remedial Package I is that the waste is contained but not removed. Remedial Package II is a variation of Remedial Package I which includes the removal of the material in the sumps. Remedial Package II provides a relatively cost-effective method of removing the primary source of contamination and containing the contaminated soil and ground water. Remedial Package II is considered the second most effective solution but when costs are considered Remedial Package II is rated fourth for cost effectiveness.

Remedial Package III includes the installation of a pumping/recharge system in which the ground water is extracted, cleaned, and recirculated into the ground. This solution removes the contaminants from soil by systematically recycling the ground water. The major drawbacks in this method ore uncertain performance, high costs, long term maintenance costs and the possibility that the heavy coal-tar byproducts and micro-organisms may remain in the soil or constantly clog the wells and pumps. The sumps should also be removed os part of this package. This Remedial Package is considered the most effective but also has the highest cost. As a result it is rated the second most cost effective solution.

Remedial Package IV comprises a limited removal; (approximately 3000 cu.yds.) along the western portion of the site (see Figure 4). The major advantage of this solution is that it involves removal of large quantities of contaminated soil. Unfortunately, this is extremely expensive and may involve a number of unforeseen problems since air quality impacts during removal and the impact on substation operation must be considered. Remedial Package IV is rated lowest for cost effectiveness.

In Remedial Package V, the sumps ore removed. The concentrated source of pollution is thus removed while the remaining contaminated soil and ground water remains. This solution does not have a high Effectiveness Rating, however, it offers an inexpensive alternative which is highly cost-effective, and is appropriate in light of the virtually negligible risk associated with the site.

The endangerment assessment conducted coincident with this evaluation has identified negligible risks to the environment posed by the existing ground water contamination thought to be caused by the onsite cool tor compounds. Based on a negligible risk, large costs of site remediation con not be supported. Based on on overall review of the remedial measures, Remedial Package V is considered by far the most cost-effective solution. This solution removes the primary source of further contamination, the sumps, thus reducing the flux of contaminants to the ground water. It is recommended that Package V be accepted along with semi-annual ground and surface water monitoring. If the results of sampling indicate continued growth (indicated by an increase in contaminant concentration in monitoring wells) observed over the course of any given year, of the contaminant plume, additional measures may be considered at a later date to further reduce the off-site migration rate.

Tables

TABLE I

PROPOSED REMEDIAL PACKAGE COMPONENTS

Remedial Component	REMEDIAL PACKAGE I	II	III	IV	V	CAPITAL AND OPERATING COMPONENT COST
Containment						
Syn. Liner	X	X				127,000
Asphalt		or				215,000
Cloy Blanket		X				225,000
Concrete						260,000
Slurry Wall	X	X				285,000
Grout Curtain	X	X				285,000
Pumping			X			795,000*
Removal						
Limited				X		1,000,000
Extended						1,745,000
Sump Area		X	X		X	82,000
Package Cost	697,000	779,000	877,000**	1,000,000	82,000	

* With 25% contingency this would represent about $1,000,000 in cost.

**With 25% contingency this would represent about $1,080,000 in cost.

TABLE 2

COST EFFECTIVENESS MATRIX

REMEDIAL PACKAGE	COST MEASURES: CONSTRUCTION COSTS (millions of 1985 dollars)	COST MEASURES: LONG-TERM COSTS (millions of 1985 dollars)	EFFECTIVENESS MEASURES: CONSTRUCTION RELATED PUBLIC HEALTH RISKS	EFFECTIVENESS MEASURES: RELIABILITY	EFFECTIVENESS MEASURES: SOLUTION EFFECTIVENESS	EFFECTIVENESS RATINGS*	EFFECTIVENESS RATING / Σ COST RATINGS
WEIGHTING FACTORS	1	1	1	2	2		
I containment	.697	.05 .0741	2 / 2	6 .5 / 12	6 / 12	26	34.8
II containment and sump removal	.779	.05 .0829	3 / 3	6.5 .5 / 13	6.5 / 13	29	35.0
III pumping	.566	.309 .0875	9 / 9	6 / 12	9.5 / 19	40	45.7
IV limited soil excavation	1.0	.05 1.05	2 / 2	9 / 18	3 / 6	26	24.8
V sump removal	0.082	.05 .132	3 / 3	9.5 / 19	2 / 4	26	197.0

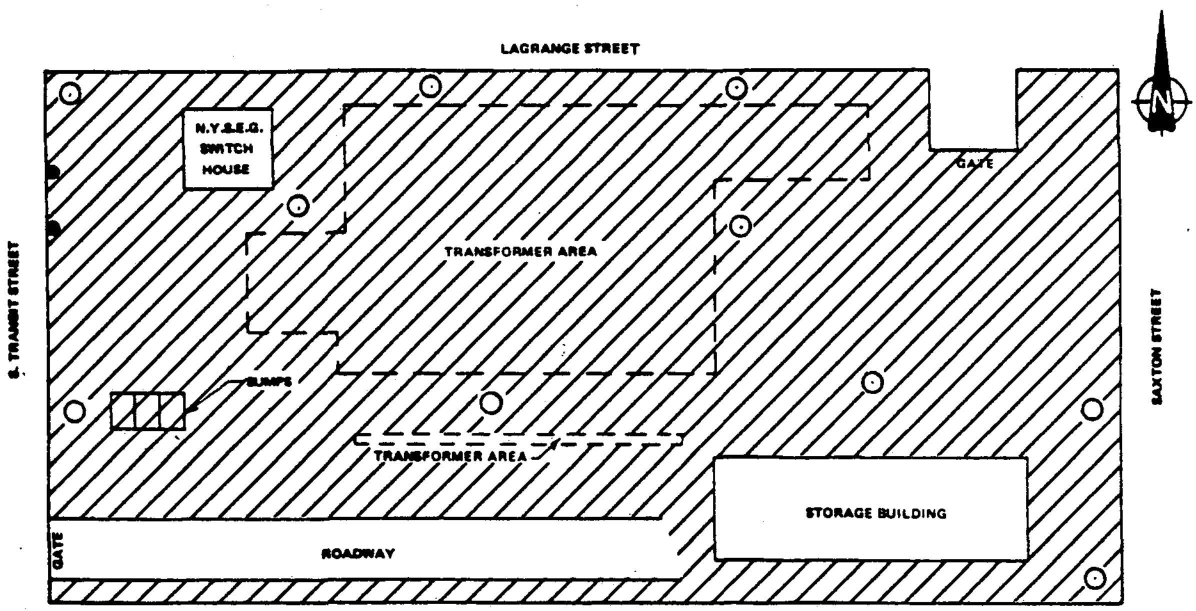
*Effectiveness Ratings are the sum of the products of the rank and weighting factors for each effectiveness measure.

LEGEND

Rank — 2 / 4 — Product of Rank and Weighting Factor

Woodward-Clyde Consultants

Figures

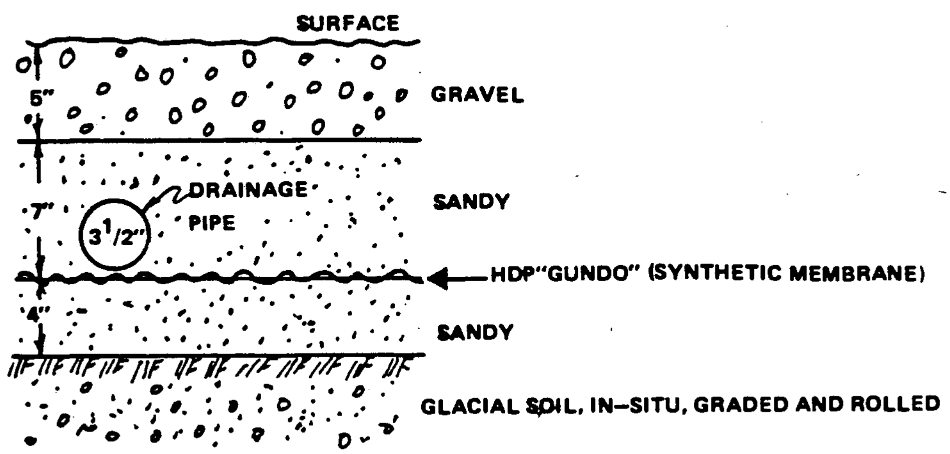


SITE PLAN

0 25 50 FT
SCALE

LEGEND

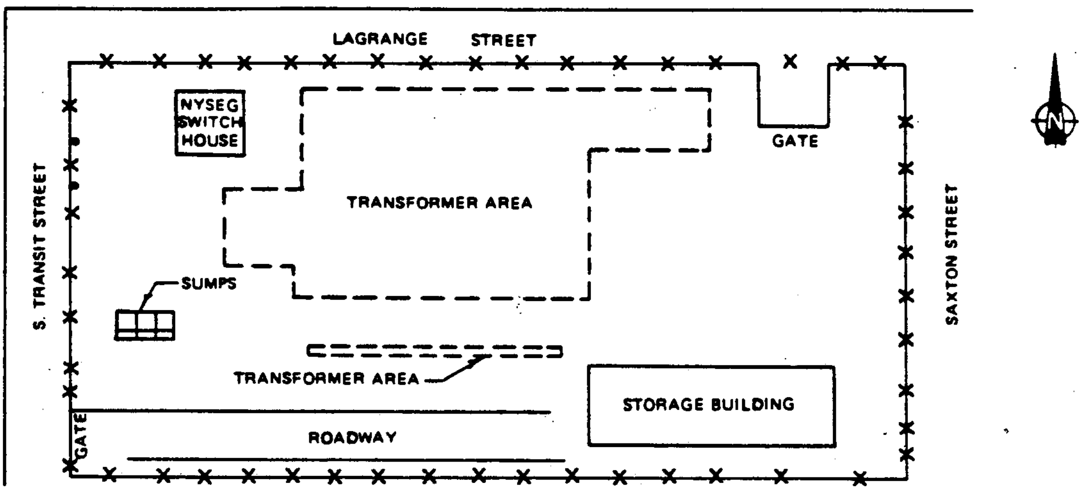
- SURFACE DRAINS
- AREA CAPPED W/PLASTIC



TYPICAL PROFILE
SACLE 1 IN. = 10 IN.

NOTES:
1. HIGH DENSITY PLASTIC SHEETS – 80 MILS THICK
2. DRAINAGE SYSTEM INSTALLED ON TOP OF PLASTIC/PVC PIPE
3. TEN SURFACE DRAINAGE PORTALS INSTALLED
4. PERFORATED PVC PIPE WITH SEDIMENT FILTERS

SYNTHETIC MEMBRANE SCHEMATIC		
WOODWARD—CLYDE CONSULTANTS CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS WAYNE, NEW JERSEY		
DR. BY: MKS	SCALE: AS SHOWN	PROJ. NO.: 82C4495
CK'D. BY: LF	DATE: 29 APR 1985	FIG. NO.: 1



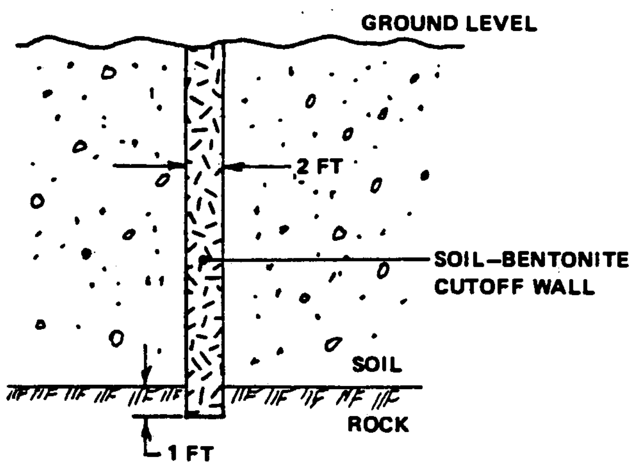
LEGEND

—X—X—X— SLURRY WALL

SITE PLAN

0 25 50 FT

SCALE



TYPICAL PROFILE

SCALE 1 IN. = 10 FT

NOTES:

1. SLURRY MIXTURE–SOIL/BENTONITE
2. k (PERMEABILITY) OF SLURRY–10^{-6} CM/SEC OR LESS
3. AVERAGE DEPTH TO BEDROCK–17 FEET
4. SLURRY WALL WILL BE KEYED ONE FOOT INTO ROCK
5. WIDTH OF SLURRY WALL–2 FEET
6. TOTAL CUTOFF WALL SURFACE AREA–15,800 FT^2

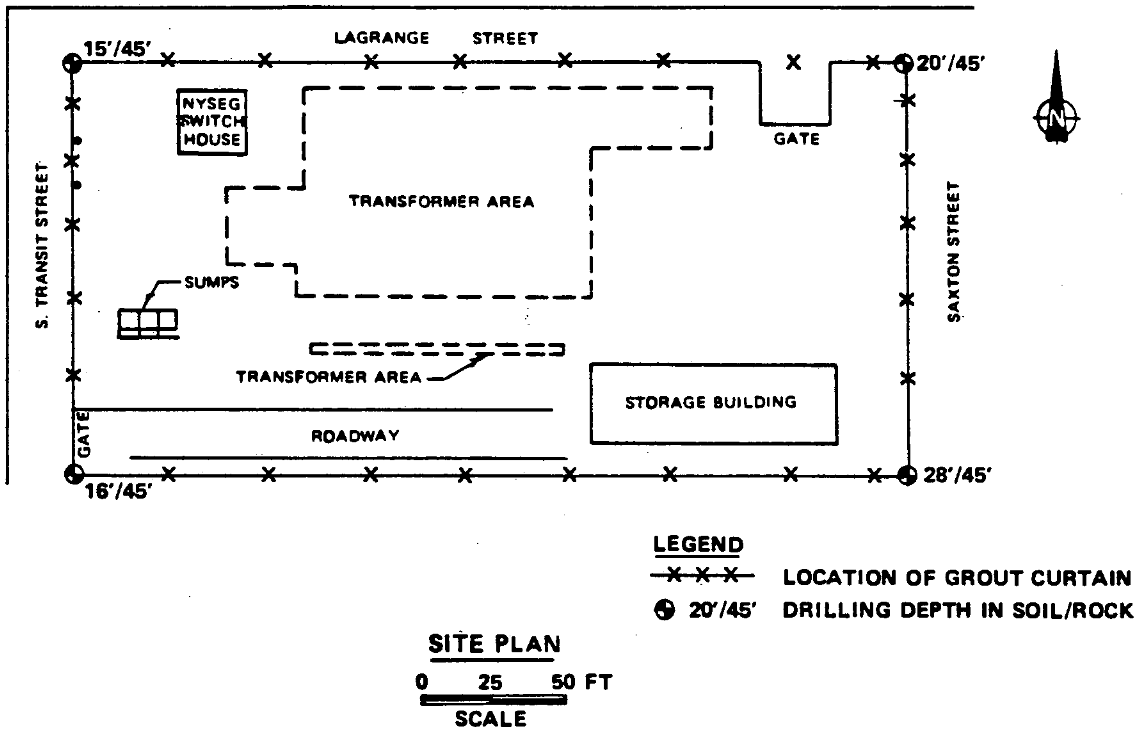
SLURRY WALL SCHEMATIC

WOODWARD—CLYDE CONSULTANTS

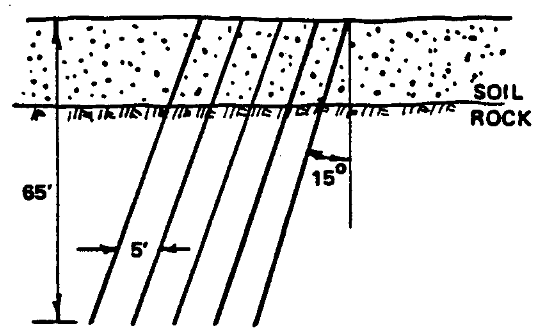
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

WAYNE, NEW JERSEY

DR. BY: MKS	SCALE: AS NOTED	PROJ. NO.: 82C4495
CK'D. BY: LF	DATE: 26 APR 1985	FIG. NO.: 2



SITE PLAN



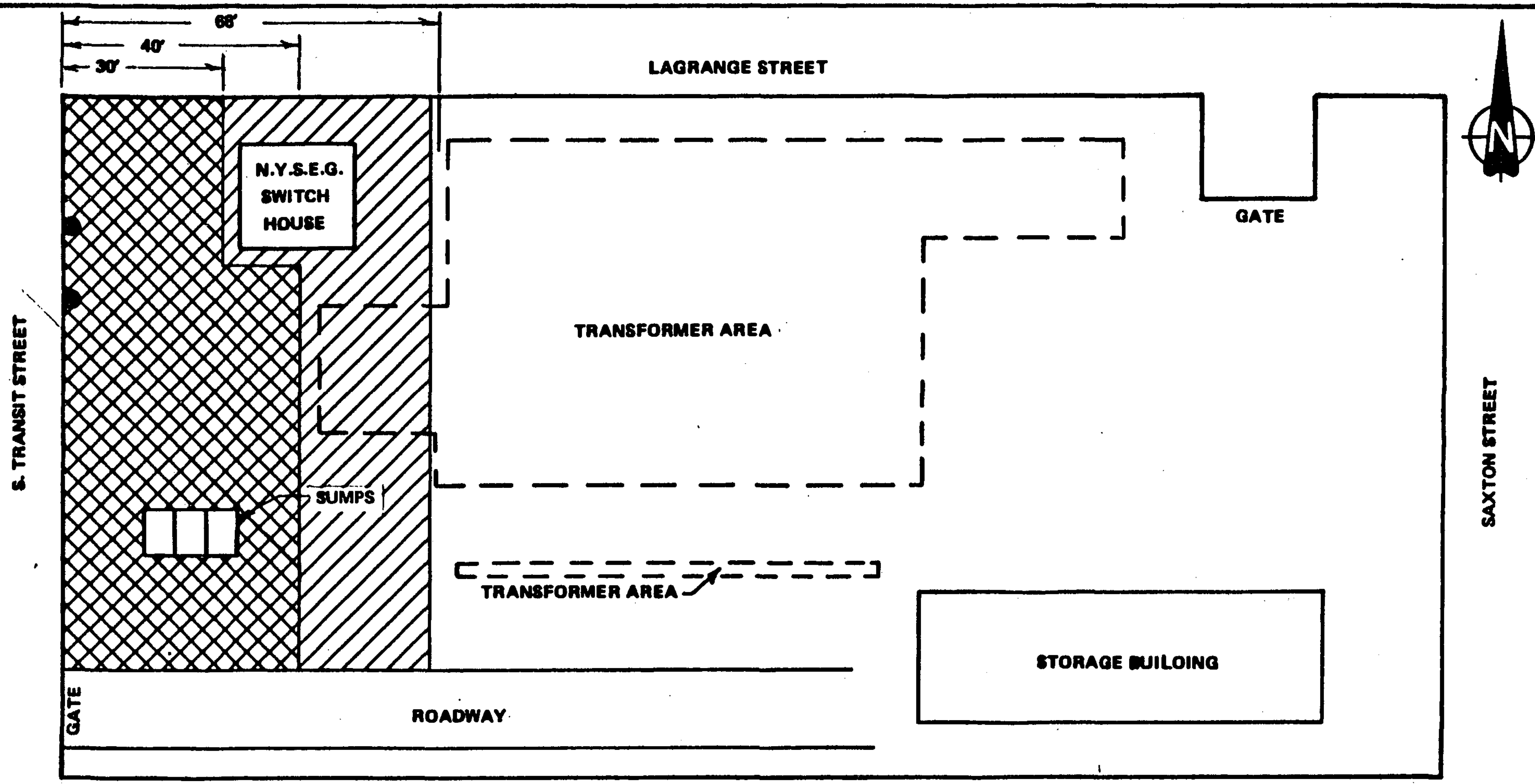
TYPICAL PROFILE

SCALE 1IN. = 40 FT

NOTES:

1. GROUT HOLES DRILLED 15° FROM VERTICAL
2. SINGLE ROW HOLE PATTERN @ 5 FT CENTERS
3. WET ROTATORY PERCUSSION DRILLING
4. 3 IN. DIA CASED HOLES IN SOIL/2 IN. DIA HOLES IN ROCK
5. AVERAGE GROUT TAKE FOR A MASSIVE LIMESTONE ½ BAG/FT
6. AVERAGE LENGTH OF HOLES 68 FT/NO. OF HOLE ~168
7. APPROXIMATELY 168 HOLES REQUIRED

GROUT CURTAIN SCHEMATIC		
WOODWARD—CLYDE CONSULTANTS CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS WAYNE, NEW JERSEY		
DR. BY: ORS	SCALE: AS NOTED	PROJ. NO.: 82C4495
CK'D. BY: LF	DATE: 26 APR 1985	FIG. NO.: 3



LEGEND

- LIMITED EXCAVATION
- EXTENDED EXCAVATION

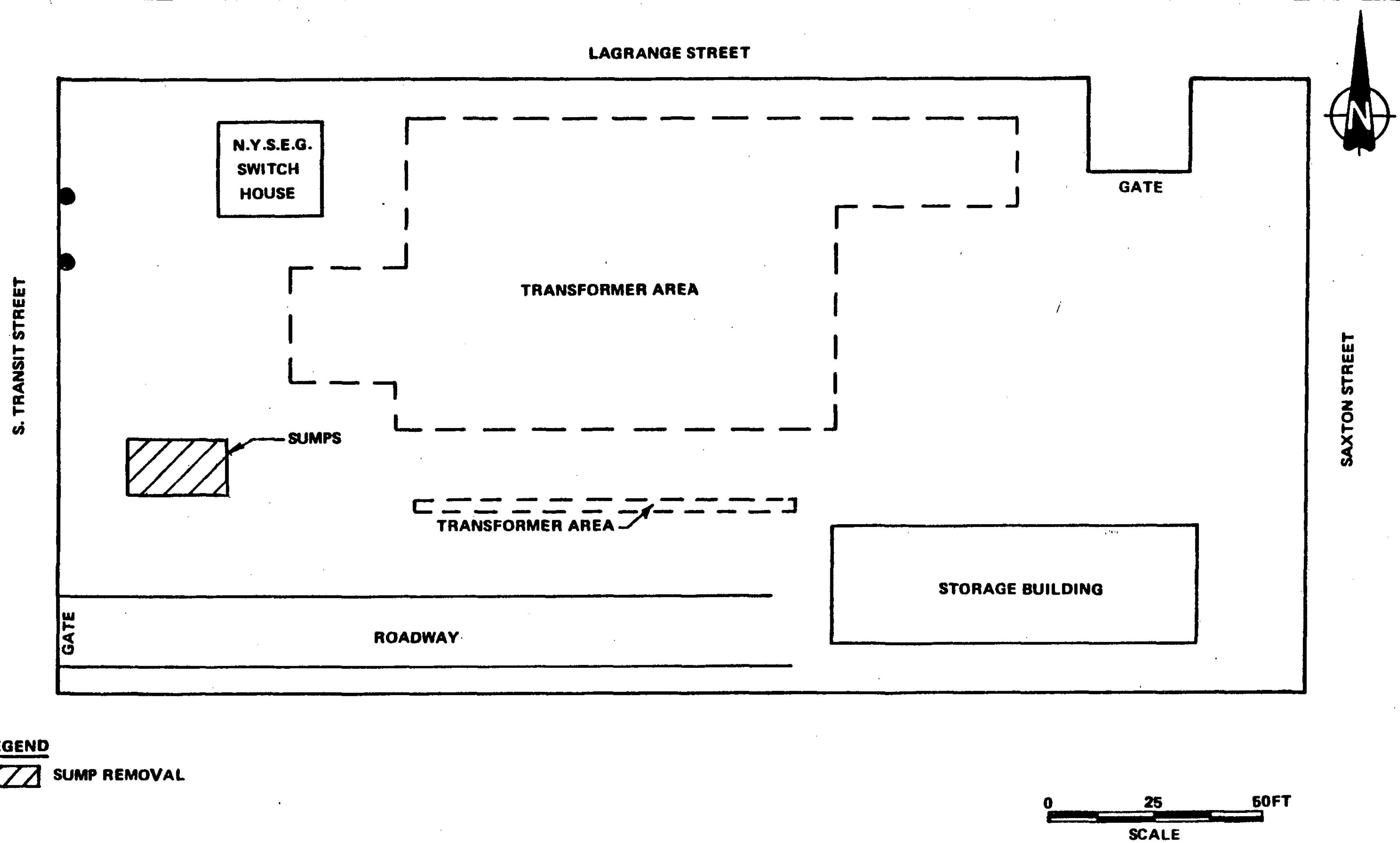
0 25 50FT
SCALE

NOTE:
LOCATIONS ARE APPROXIMATE

LIMITED AND EXTENDED EXCAVATION SCHEMES

WOODWARD—CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY

DR. BY: MKS	SCALE: AS SHOWN	PROJ. NO.: 82C4495
CK'D. BY: DRG	DATE: 12 JAN 1984	FIG. NO.: 4

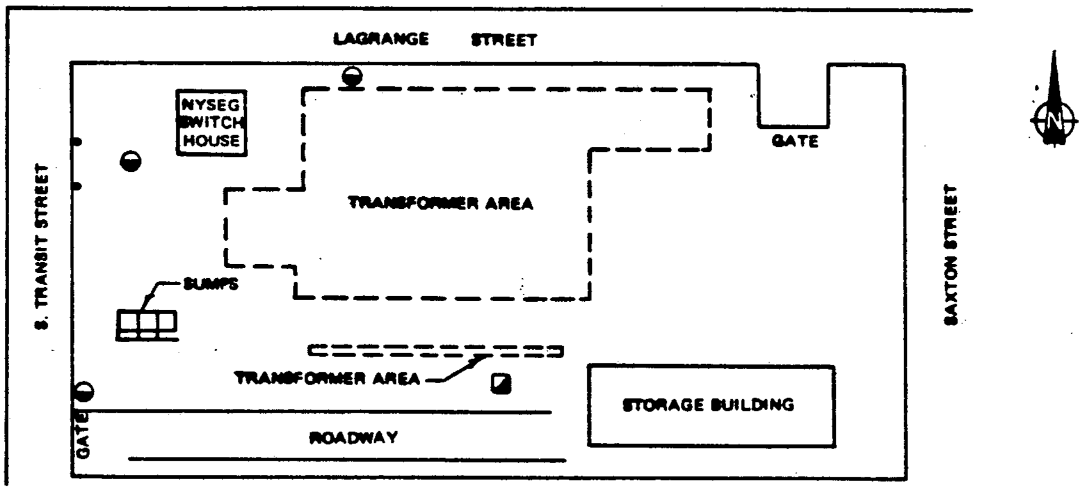


LEGEND

SUMP REMOVAL

NOTE:
LOCATIONS ARE APPROXIMATE

SUMP REMOVAL		
WOODWARD—CLYDE CONSULTANTS CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS WAYNE, NEW JERSEY		
DR. BY: MKS	SCALE: AS SHOWN	PROJ. NO.: S2C4495
CK'D. BY: DRG	DATE: 12 JAN 1984	FIG. NO.: 5



LEGEND

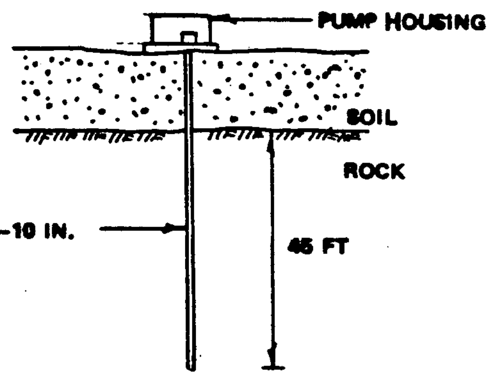
- PUMPING WELLS
- RECHARGE WELL AND FILTER STATION

SITE PLAN

0 25 50 FT

SCALE

SYSTEM



TYPICAL PROFILE

SCALE 1 IN. = 40 FT

NOTES:

1. 10 YEAR PUMPING PROGRAM
2. ASSUME 95% EFFICIENCY OF RECHARGE SYSTEM
3. WITHDRAWAL RATE 3–5 GPM/WELL
4. COAL–TAR RECOVERY SYSTEM INSTALLED/CARBON FILTERING
5. PROJECT LIFE 10 YEARS
6. DEPTH OF WELLS ~62 FT
7. WELL DIAMETER 6–10 INCHES

PUMPING SYSTEM SCHEMATIC		
WOODWARD—CLYDE CONSULTANTS CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS WAYNE, NEW JERSEY		
DR. BY: DRS	SCALE: AS NOTED	PROJ. NO.: 82C4495
CK'D. BY: LF	DATE: 26 APR 1985	FIG. NO.: 6

TASK 5 REPORT

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LOCKPORT COAL TAR SITE

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