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USATHAMA

U.S. Army Toxic and Hazardous Materials Agency

REPORT NO. CETHA-IR-CR-88160

SENECA ARMY DEPOT BURNING PIT/LANDFILL SITE INVESTIGATION

Final Report (Draft)
Task Order 1
Contract Number
DAAA15-88-D-0009

July 1989

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

A site investigation of the Seneca Army Depot Burning Pit/Landfill Area has been conducted to determine the nature and extent of contamination and to assess the need for interim response actions. This report presents the background, rationale, procedures, results, conclusions, and recommendations of the study. Supporting field, laboratory, and QA data are provided in appendices to the report. (continued on reverse side).

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The objectives of the task were to locate and define the limits of the contamination source(s); to verify the nature and extent of groundwater contamination; and to recommend specific interim remedial measures for source control and contamination reduction. Site investigations performed included soil-gas, electromagnetic induction (EM), and Ground Penetrating Radar (GPR) surveys, collection of groundwater and soil samples for USATHAMA-certified laboratory analysis, and aquifer testing of monitoring wells to provide data on groundwater flow parameters.

It was found that the landfill contains numerous buried-metal targets, soils with low to moderate metals concentrations, and a widespread source of volatile chlorinated solvent chemicals such as trichloroethylene, dichloroethylenes, and chloroform. A large area (12.9 acres) and volume (83,000 cubic yards) of landfill containing numerous soil-gas "hot spots" and buried objects that could be current or potential contaminant sources were defined. Contaminated groundwater is being released from the landfill and has migrated to the installation boundary. The contaminated groundwater is only known to exist in the shallow aquifer, which extends down to competent bedrock at a typical depth of 10 feet, and which has a very low transmissivity and yield. The potential health or environmental impacts arising from the contaminated groundwater are not known.

An analysis of interim response actions was completed, even though it is not clear whether there is any imminent threat from the prevailing situation. The most cost-effective interim response action appears to be interception and treatment of contaminated groundwater at or near the Depot boundary, by means of a permeable treatment bed containing activated carbon. The extensively-contaminated materials within the landfill may require further consideration of long-term remedial measures for both volatile organic materials and metals contamination. Consideration of permanent corrective or remedial measures at the site will require extensive remedial investigations addressing risk assessment criteria as well as hydrogeologic, contamination, and waste profile evaluations.

SENECA ARMY DEPOT LANDFILL/BURNING PIT SITE INVESTIGATION

FINAL REPORT (DRAFT)

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JULY 1989

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FINAL REPORT (DRAFT)

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1.0 INTRODUCTION

The United States Army Toxic and Hazardous Materials Agency (USATHAMA) has undertaken a site investigation of the Seneca Army Depot Burning Pit/Landfill Area, for the purpose of determining the nature and extent of contamination and assessing the need for interim response actions at the site. This investigation was conducted by ICF Technology Incorporated, under the authority of Task Order Number 1, Contract DAAA15-88-D-0009, during the period from September, 1988 to February, 1989.

This report presents background information studied, rationale developed, procedures followed, results obtained, conclusions drawn, and recommendations made during the course of the study. The objectives and scope of the investigation are presented in Section 1 of the report. Section 2 summarizes the available information and existing data used in formulating the task Work Plan. Section 3 describes the methods and procedures used and the data obtained during the site investigation. Section 4 summarizes the analysis, evaluation and correlation of results, and Section 5 summarizes the findings and conceptualizations regarding site characterization. Section 6 presents the conclusions of the study with regard to the nature and extent of contamination, and the desirability of, or requirements for, corrective measures. Potentially feasible remedies are discussed in Section 7, and recommended actions for the site are presented in Section 8. Supporting field, laboratory, and QA data are provided in appendices to the report.

1.1 TASK OBJECTIVES

The objectives of this task were to conduct a site investigation in the vicinity of the former burning pits, incinerator, and adjacent landfill at Seneca Army Depot; to locate and define the limits of the contamination source(s); to verify the nature and extent of groundwater contamination; and to recommend specific interim remedial measures for source control and contamination reduction.

1.2 SCOPE OF THE SITE INVESTIGATION

The scope of this limited site investigation encompassed several related activities, as follows:

- A soil-gas survey was conducted within the vicinity of the landfill and grease pit, and downgradient of the areas to determine likely locations of major sources of contamination and to supplement available information on the contaminant plume.

- Terrain conductivity surveys accomplished with the use of the low-frequency electromagnetic induction (EM) method and Ground Penetrating Radar (GPR) surveys were conducted across the study area to determine the limits of the disturbed soils within the landfill, the presence and location of buried drums or other metallic debris, and to clear locations where soil-gas and soil samples were collected. Both quadrature and in-phase EM fields were measured. In-phase measurements are sensitive to conductivity changes caused by buried metal objects, therefore, a separate magnetometer survey of the site was not performed.

- Soil samples were collected for USATHAMA-certified laboratory analysis, for volatile contaminants and metals. The sampling locations were developed from the results of the soil-gas and geophysical surveys.

- Samples were collected from several of the existing monitoring wells for USATHAMA-certified laboratory analysis for volatile contaminants and metals.

- Simple aquifer tests (slug tests) were performed on several of the existing monitoring wells, to provide data on groundwater flow parameters.

- Results were interpreted and correlated to assess the nature and extent of the contamination problem, the applicable regulatory requirements, and the general feasibility of alternatives for interim response actions at the site.

- Recommendations were made for immediate or interim corrective measures, and further site investigative activities that may be required to completely define ultimate corrective actions.

2.0 BACKGROUND

2.1 SITE HISTORY AND CHARACTERISTICS

The Seneca Army Depot (SEAD) is located in the Finger Lakes region of Central New York State, in Seneca County (Exhibit 2-1). It is on the west side of the highland separating Seneca Lake and Cayuga Lake. The Depot is approximately 80 kilometers (km) southeast of Syracuse and 50 km northwest of Ithaca. Geneva, the nearest city, is located approximately 24 km northwest of the installation. The depot consists of 27,013 hectares of land and a 1524-meter airstrip. Much of the depot area is wooded. Sparsely populated farmland covers most of the surrounding area.

Construction of the Seneca Ordnance Depot began in July 1941. Later expansion included incorporation of the airstrip from the former Sampson Air Force Base. Civilian employment peaked in 1943 at 2,500, and reached its low in 1946 at 600. At the present time, military employees number approximately 300 to 400 and civilian employees number approximately 700. In August 1963, Seneca Ordnance Depot was transferred from the Chief of Ordnance to the U.S. Army Supply and Maintenance Command and renamed Seneca Army Depot. On 1 July 1966, SEAD was reassigned to the Army Material Command (AMC). On 1 September 1976, the Depot and Supply Command (DESCOM) was activated with command and control over all AMC depots.

The general mission of the installation currently includes: providing for the receipt, storage, stock distribution, and care of conventional ammunition and explosives, General Services Administration Strategic and critical materials, and Office of Civil Defense engineering equipment; providing receipt, storage, and issue of items that support Special Weapons activity; and to perform Depot-level maintenance, demilitarization, and surveillance on conventional ammunition and special weapons.

The investigation included in this task order was conducted at the site of a former landfill and burning pits, located midway along the western boundary of the Seneca Army Depot (Exhibit 2-2). This site is a generally level area that gently slopes to the west. The site is grass-covered, with a number of small drainage ditches running east-west across it. Immediately to the north of the site is a swampy area. The area investigated encompasses approximately 25 acres.

The site contains a number of possible sources of contamination. These sources include:

- A former incinerator, used to incinerate trash between 1974 and 1979, and its associated cooling water pond;

- A landfill adjacent to the incinerator to the north and east that was used for the disposal of ash between 1974 and 1979;

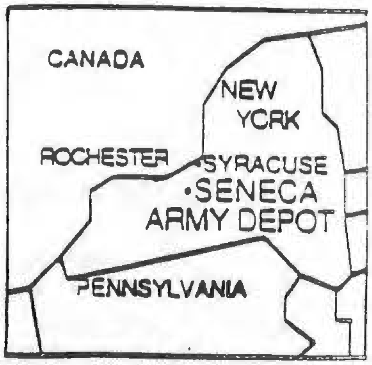
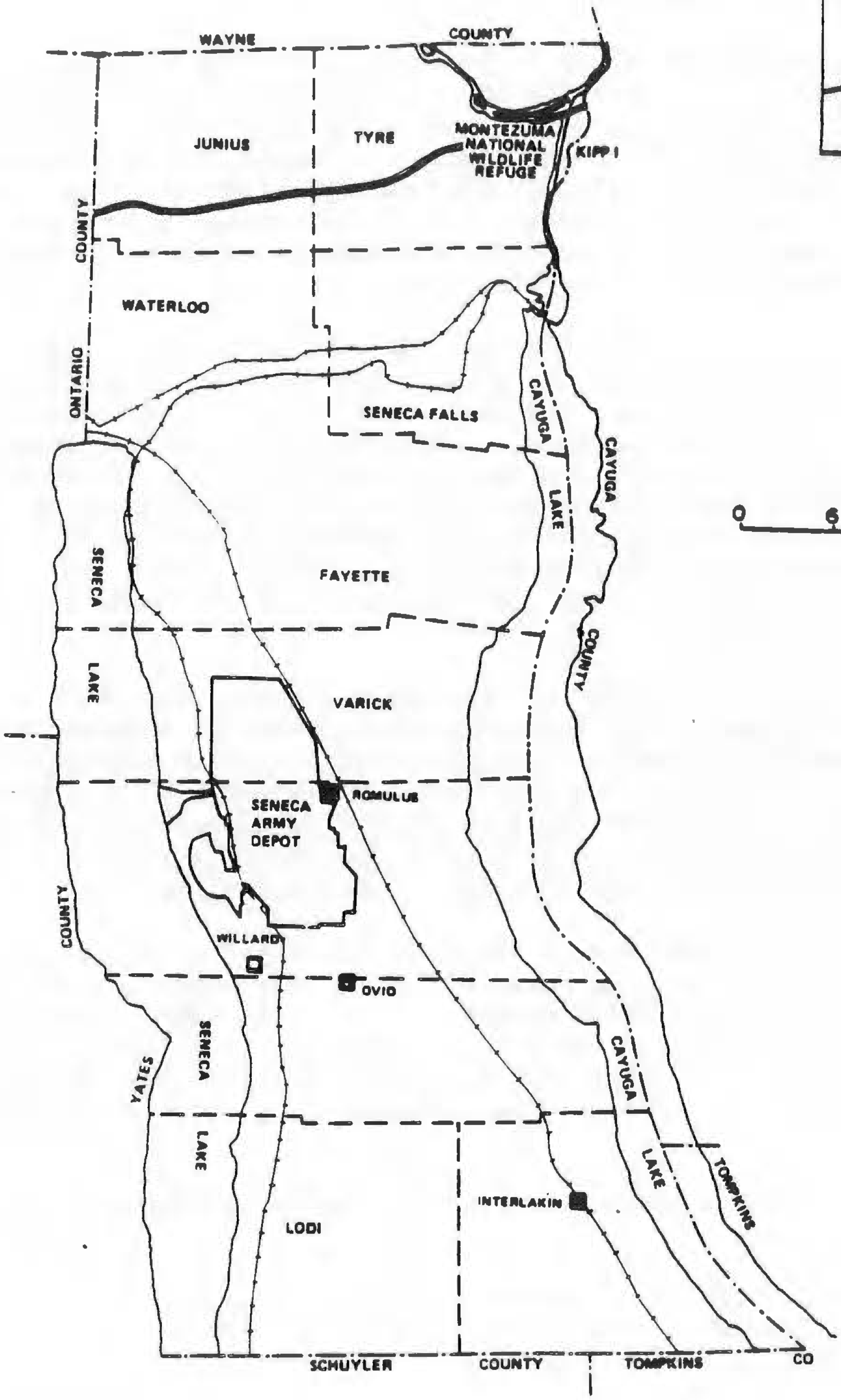


EXHIBIT 2-1

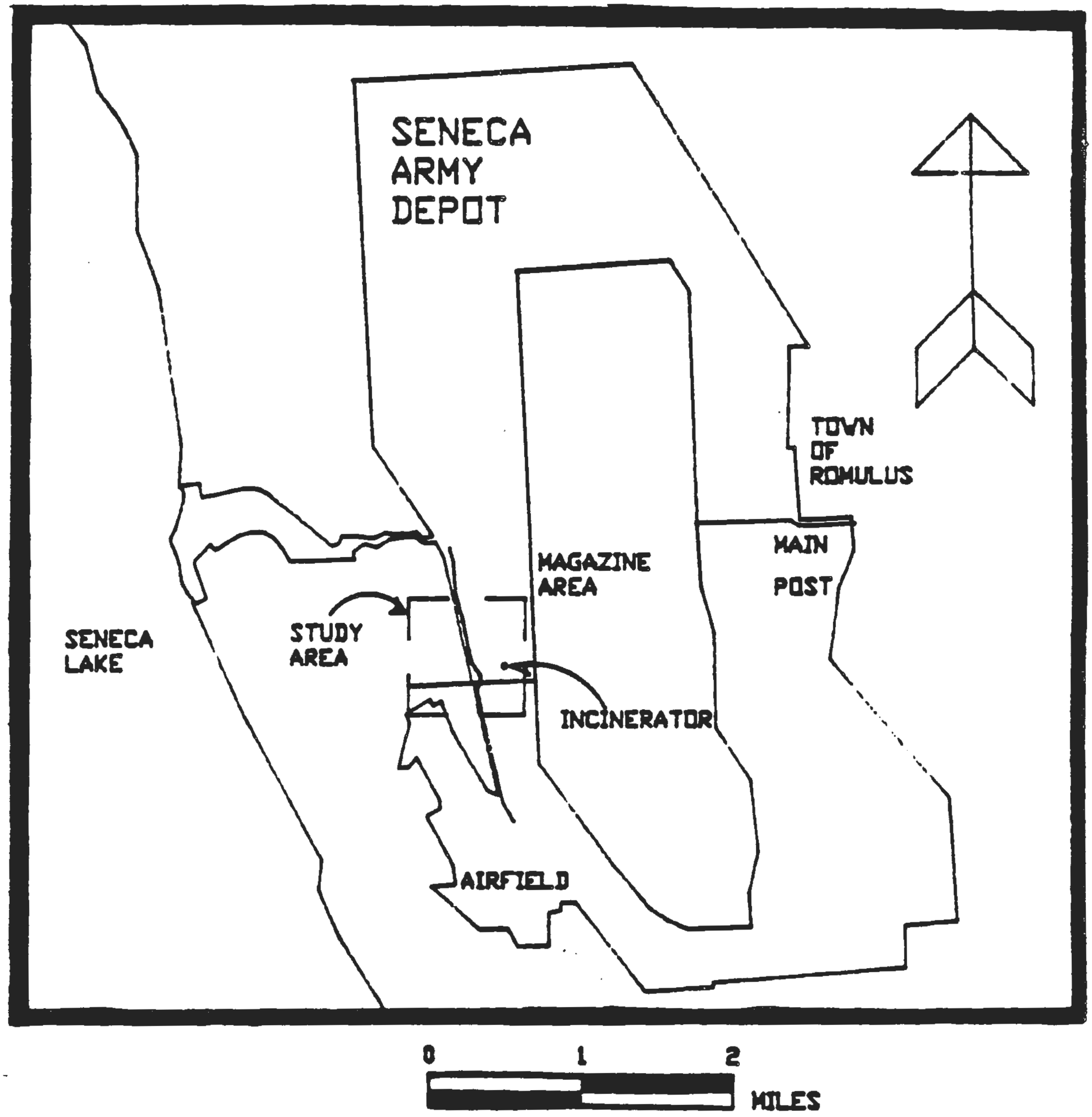
AREA MAP - SENECA ARMY DEPOT



From: Report No. 157, USATHAMA, January 1980, subject: Installation Assessment of SEAD.

EXHIBIT 2-2

LOCATION OF THE STUDY AREA



From: Geohydrologic Study No. 38-26-0310-88, Seneca Army Depot, Romulus, New York, 13-21 October 1987.

- Former burning pits, located just to the north of the incinerator and within the landfill area, which were used to burn uncontaminated trash from 1941 to 1974; and

- Grease pits - unlined pits reportedly used for the disposal of kitchen grease and located east of the landfill.

SEAD has applied for a RCRA permit for storing hazardous waste and for operating a deactivation furnace. The Hazardous and Solid Waste Amendments of 1984 to the RCRA require that a Part B permit must include identification and corrective action at solid waste management units (SWMU's) with continuing release of hazardous constituents. Recently, the U.S. Army Environmental Hygiene Agency (USAEHA) performed a review of the SWMUs at SEAD. The SWMUs in the area of this study include the old incinerator with its cooling water pond, the ash and burn pits, and two closed landfills. Thus, this study addresses the need for interim response measures at a SWMU site, as a precursor to or coincident with further corrective action.

2.1.1 Physical Setting

Seneca Army Depot is located in the Appalachian Plateau Physiographic Province. Fenneman (1938) made the distinction between this physiographic province and what has been termed the Central Lowlands Physiographic Province, immediately to the north. The dominant features of these provinces were developed by the southward progression and later recession of the Laurentide icesheet during the Pleistocene.

The Central Lowlands Province rises from an elevation of approximately 120 meters (400 ft.) in the north to an elevation of approximately 180 meters (600 ft) in the south. This province consists of generally north/south trending drumlins in the north that rise up to 90 meters (300 feet) above the surrounding terrain and in the south is an area of very little relief. The southern limit of the province is generally placed at the north end of Cayuga and Seneca Lakes. This boundary is marked by an almost imperceptible increase in altitude (Crain, 1974) as one moves to the south across the boundary. Further south in the vicinity of SEAD the terrain consists of uplands generally over 180 meters (600 ft) in elevation.

The Finger Lakes are contained in deep glacially scoured valleys between these uplands. The upland belt/Finger Lakes region of the Appalachian Physiographic Province drains to the north into the Oswego River Basin and Lake Ontario. A short distance to the south of the Finger Lakes is a recessional moraine of late Wisconsin age. This moraine forms the drainage divide for the north flowing Finger Lakes/Oswego River drainage system and the Susquehanna River system that flows to the south.

Glacial Drift in the northern Appalachians averages between 8 and 15 meters (25 and 50 feet) in thickness while in the Finger Lakes it is as much as 300 meters (1000 ft) thick (Hunt, 1974). The hillsides in the vicinity of the Seneca lakes are mantled by till, a non-stratified mixture of glacial debris. The valleys occupied by the Lakes themselves are floored by stratified meltwater deposits. As noted, these deposits may be very thick. Hunt (1974) states that the bedrock bottom of Cayuga and Seneca Lakes, as well as the Hudson River, were cut by glacial action to levels below present day sea-level and in the time following the erosive activity they have developed thick accumulations of sediment. Hunt also noted that the bedrock bottom of Lake Ontario is more than 150 meters (500 ft) below present day sea level. Exhibit 2-3 is a physiographic map of Seneca County, New York.

a) Site Physiography

SEAD is situated 64 km south of Lake Ontario in the immediate vicinity of Romulus, New York. The Depot lies on the western side of a broad north to south trending series of rock terraces mantled with glacial till, forming a divide, that separate Cayuga Lake on the east and Seneca Lake on the west. Elevations of SEAD range from a low of 137 meters above mean sea level on the west boundary to a high of 232 meters in the southeast corner.

Surface runoff from SEAD generally flows in two directions. Most of the streams flow to the west into Seneca Lake; however, one stream in the northeast corner of SEAD flows northward into Kendig Creek, a tributary to the Cayuga-Seneca Canal. Surface runoff in the extreme southeast corner drains to the east for a short distance offpost and then turns west across the depot into Seneca Lake.

The landfill, ash pit and former incinerator are located on gently sloping terrain between the magazine area and the western boundary of SEAD. The landfill proper was thought to occupy an area of approximately 5 acres, although evidence obtained during the current study indicates that buried materials may be found over a larger area. The area encompassed by this investigation is approximately 25 acres. This includes the landfill area, the incinerator building (Building 2207), and the down-gradient area between the landfill and the Depot boundary.

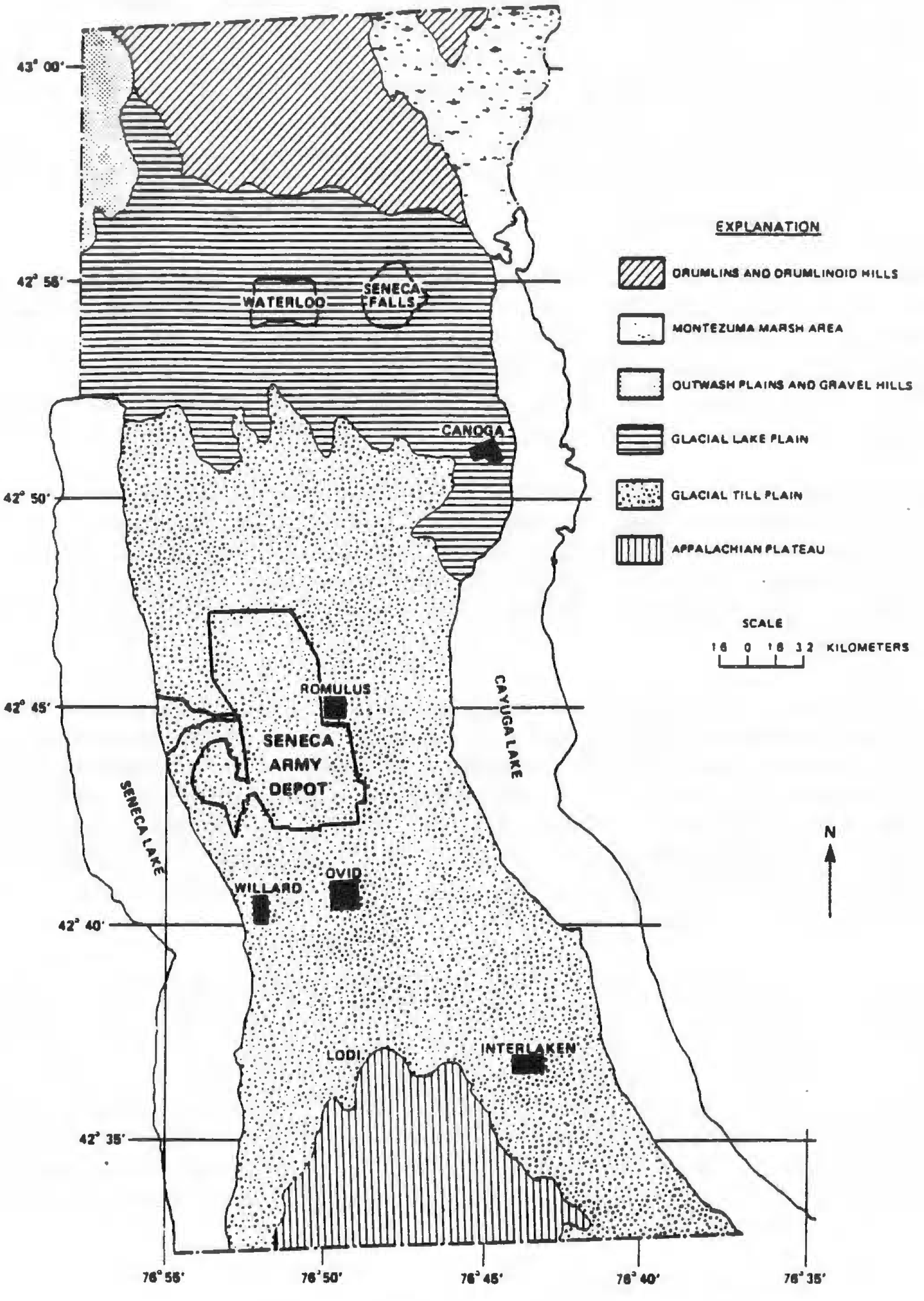
Except for roadways, the entire area is heavily vegetated with grasses and occasional brush thickets. The site slopes to the west-southwest; surface runoff collects in drainage ditches along the east-west roadway (W. Smith Farm Road) and the north-south roadway (West Patrol Road) that run parallel and perpendicular to the topographic relief of the site, respectively. Drainage leads to small, unnamed, perennial tributaries which discharge directly into Seneca Lake within or near Sampson State Park. Discharge of groundwater through seeps occurring west of the Depot boundary is likely, but was not observed during this study.

b) Surficial/Bedrock Geology

The overburden soils surrounding the landfill area at SEAD are comprised of erosional materials deposited during the last ice age. This mantle of unconsolidated glacial deposits, described as a glacial till, overlie Middle Devonian Age bedrock formations of the Hamilton Group. The overburden

EXHIBIT 2-3

PHYSIOGRAPHIC MAP OF SENECA COUNTY, NEW YORK



From: Report No. 157, USATHAMA, January 1980, subject: Installation Assessment of SEAD.

soils range in thickness from a few feet to upwards to 40 feet as detected during the installation of soil borings and monitoring wells at the site. Because these soils were deposited directly from glacial ice, they are characterized as a poorly sorted, heterogenous mixture of silts and clays with some sands. The abundance of these fine grained silts and clays, typical of glacial tills, reduce the amount of effective pore space within the soils and account for the low permeabilities encountered. The thickness of the overburden soils appears to increase east of the landfill area, with relatively constant thickness occurring from the landfill westward toward the Depot boundary. A significantly greater depth of unconsolidated materials was observed in Well PT-10, located east of the landfill. The wells located to the west of the landfill are relatively shallow, with bedrock detection (auger refusal) occurring at a depth of 6 to 10 feet below ground surface.

The relatively thin layer of overburden till is underlain by a series of Devonian shales collectively called the Hamilton Group. This group of shale formations includes the Moscow shale, Ludlowville shale, Skaneateles shale, and the Marcellus shale formations, in descending order. The composite thickness of these shale units is approximately 350 to 400 feet beneath SEAD. Beneath the Hamilton Group lies the Onondaga Limestone ranging in thickness for 70 to 80 feet. A generalized stratigraphic column for the formations is provided in Exhibit 2-4. These sedimentary rock formations dip at a shallow angle to the south-southeast across the area at a rate of approximately 50 feet per mile. Exhibits 2-5 and 2-6 show a geologic map and a generalized cross section of Seneca County, New York, respectively.

The Devonian shales that make up the Hamilton Group are comprised of calcareous shales with varying amounts of fracturing. These shales are also interbedded with relatively thin limestone strata occurring periodically. The surficial bedrock shale unit, the Moscow shale, is a soft spray calcareous shale, highly friable and easily susceptible to weathering. This formation has been eroded and is not present in its complete thickness beneath the site. Beneath the Moscow shale is the Ludlowville shale, a harder and more resistant calcareous shale responsible for the falls and cascades in several of the ravines and gorges in the area. This shale is not as fissile as most of the other shales in the region. The total thickness of the Ludlowville shale beneath the site is approximately 140 feet. The uppermost member of the Ludlowville shale is a thin limestone bed (approx. 5 ft) known as the Tichenor limestone. This limestone bed is used as a marker bed to define the upper limit of the Ludlowville shale and the base of the Moscow shale.

Beneath the Ludlowville shale, the Skaneateles shale, approximately 185 feet thick, is composed of dark fissile shale, more calcareous in the upper regions of the formation. The Marcellus shale, the oldest formation in the Hamilton group, consists of a black slatelike shale with occasional beds of limestone. The formation is approximately 50 feet thick beneath the site. These deeper shale formations also dip to the south similar to the overlying formations. The Skaneateles and Marcellus shales surface or outcrop beneath overburden soils north of the SEAD landfill area.

Beneath the shales of the Hamilton group are the Onondaga limestone. This formation is comprised of dark, dense limestone with well-developed joint

EXHIBIT 2-4

GEOLOGIC FORMATIONS IN SENECA COUNTY, NY AND THEIR WATER-BEARING PROPERTIES

s	Geologic formation		Maximum thickness (feet)	Character of material	Water-bearing properties
an	Hamilton group	Moscow shale	140±	Lower two-thirds of section is a fossiliferous, soft gray calcareous shale; upper third highly friable but less calcareous and fossiliferous. Staining by iron oxide very common. Concretions present in greater abundance in lower beds, but irregular calcareous masses occur throughout section. Joints parallel, tightly sealed, trending N. 65°E. and N. 25°-30°W.	
		Ludlowville shale	140±	Lower beds are thinly laminated, light-colored, fossiliferous, shaly passage beds; overlain by hard calcareous black shales 5 to 12 inches thick and rich in corals and brachiopods; hard layers responsible for falls and cascades. Middle beds are less fossiliferous, soft gray arenaceous shales, rich in concretions, calcareous lenses, and occasional thin sandstone layers. Upper beds (Tichenor limestone member) are thin, irregularly bedded gray shales becoming light blue gray upon exposure, calcareous, coarsely textured, and fossiliferous. Joints parallel, 2 to 20 inches apart, well developed but tight.	Extensively used for domestic and supply but wells are affected by drought conditions. Water contair bedding planes and fractures. Yie range from less than 1 to 60 gallc per minute and average 11 gallons minute. Wells range in depth from to 665 feet and average 105 feet. apparent correlation between yielc depth of wells. Dissolved solids hardness average 519 and 393 parts million, respectively; iron conter averages 3.63 parts per million.
		Skaneateles shale	185±	Basal beds composed of dark fissile shale. Upper shale more calcareous, grayish to bluish impure limestone layers. Joint pattern N. 75°E. and N. 30°W.; diagonal joints N. 50°E. Joints sealed, parallel and spaced 6 inches to 4 feet apart.	
		Marcellus shale	50	Black, slatelike, bituminous shale with occasional limestone layers in sequence, and containing zones rich in iron sulfides or calcareous concretions, often with septarian structures; very fissile, iron-stained and gray when weathered. Joint pattern N. 25°W., N. 65°E., 1 inch to 4 feet apart.	

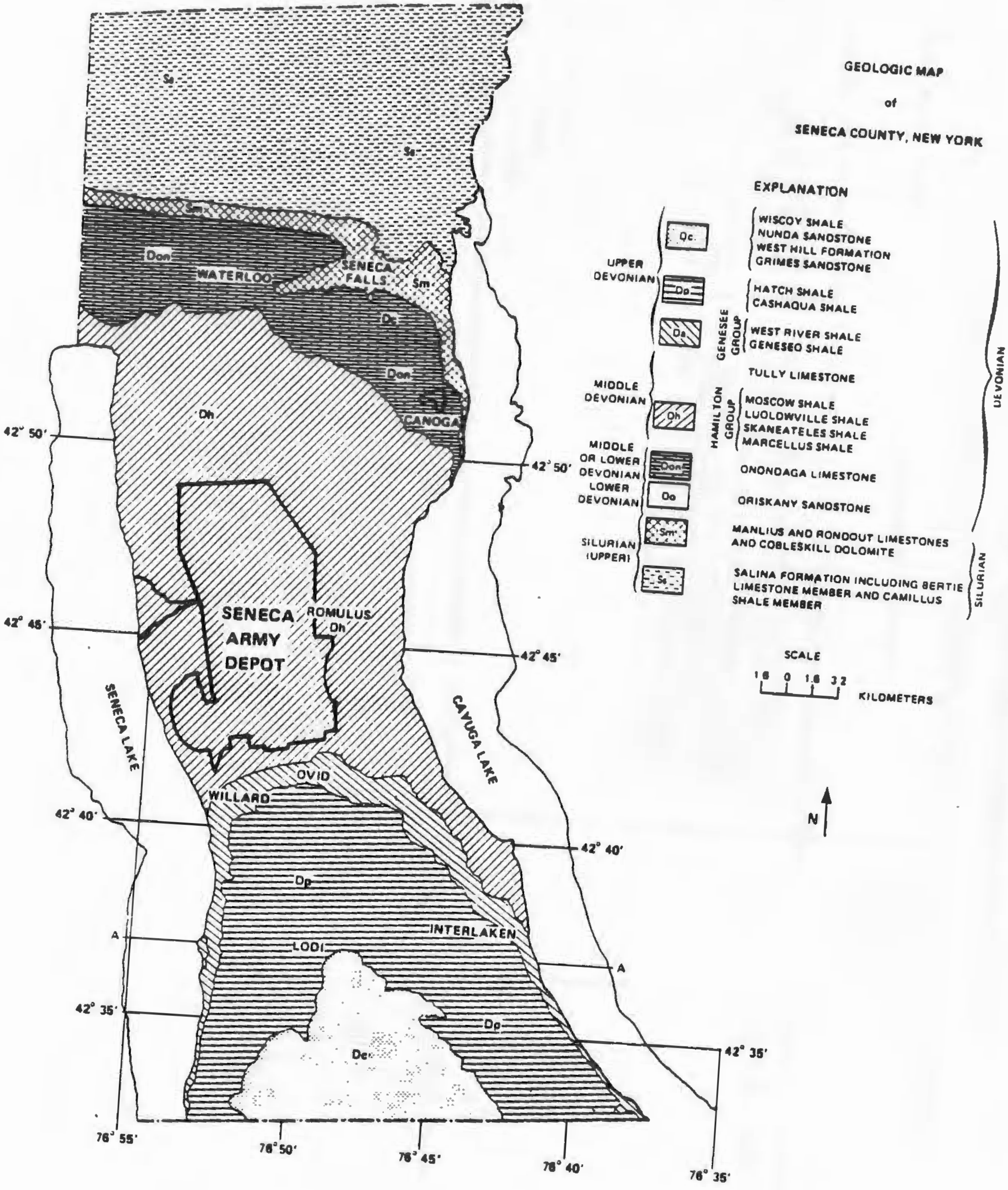
EXHIBIT 2-4
(Continued)

GEOLOGIC FORMATIONS IN SENECA COUNTY, NY AND THEIR WATER-BEARING PROPERTIES

e ies	Geologic formation	Maximum thickness (feet)	Character of material	Water-bearing properties
r or le nian	Onondaga limestone	80	Dark, dense-textured limestone becoming bluish-gray upon exposure. Beds up to 3 feet in thickness, frequently separated by finely laminated shale partings. Joints, bedding planes, and fractures show marked effects of solution. Joint trends N. 70°-75°E., N. 30°W., N. 50°E. Fossils abundant.	Best bedrock aquifer considering quantity and quality of water. range from 1 to 200 gallons per and average 33 gallons per minut few wells flow without being pum Best production from outcrop are especially in places where the limestone is overlain by permeab glacial outwash deposits. Wells in depth from 40 to 465 feet and average 112 feet. Dissolved sol hardness average 557 and 317 par million, respectively. Water co small amounts of hydrogen sulfid

EXHIBIT 2-5

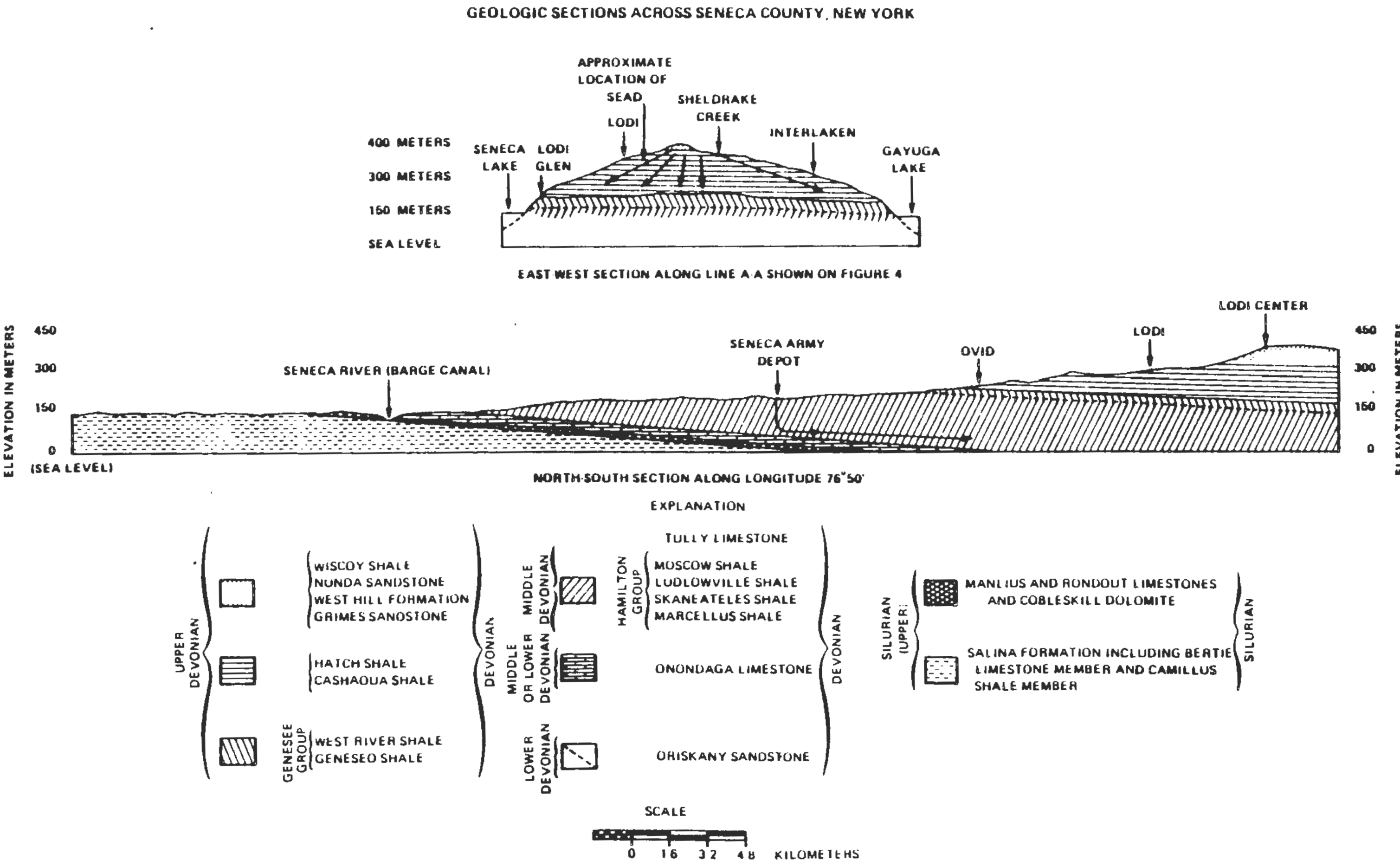
GEOLOGIC MAP OF SENECA COUNTY, NEW YORK



From: Report No. 157, USATHAMA, January 1980, subject: Installation Assessment of SEAD.

EXHIBIT 2-6

GEOLOGIC CROSS SECTIONS OF SENECA COUNTY, NEW YORK



From: Report No. 157, USATHAMA, January 1980, subject: Installation Assessment of SEAD.

openings enlarged by solution. It is on the order of 75 to 80 feet thick and consists of individual limestone beds up to 3 feet thick and separated by very thin beds of carbonaceous shale. The Onondaga limestone outcrops even further north than the overlying shales, in the vicinity of the Seneca River by Waterloo and Seneca Falls. The limestone aquifer is recharged predominantly from the areas north of SEAD.

In the vicinity of the landfill area, the shale bedrock surface slopes to the west, while the bedding planes gently dip to the south and east. Early geologic work by Luther (1909) indicated that a thin bed of resistant, calcareous rock was exposed within the study area. The results of our study indicate that this formation, although not recognizable on the surface in the area composing the site, probably still exists as a buried feature. During the geophysical survey, anomalies were identified in the landfill area which may be due to the subsurface outcrop of the Tichenor limestone bed beneath the overburden soil. The data obtained during shallow soil boring (for soil sampling) and probe insertion for soil gas analysis also show that a ridge of shallow bedrock crosses the site. The outcrop appears to project across the western edge of the site from the northeast to the southwest and dips to the south. The available data suggest that the limestone bed may separate the area into two units; in the eastern portion, the bedrock surface would be composed of the softer Moscow shale, whereas the western portion would contain the more resistant Ludlowville shale. This concept is consistent with the occurrence of shallow, unweathered bedrock west of the landfill, and the much greater depth to auger refusal in Well PT-10.

The existence of an outcrop of more resistant shale also correlates with the likely method used to create the landfill, and the observed depth to bedrock in the soil borings. During the soil sampling, consolidated materials were encountered at depths of less than 2 feet along the western side of the landfill. When the landfill was first opened, the softer or more weathered fractured shales would have been excavated to some extent, thus creating a depression which was rimmed along the western side by the limestone bed and the shallow, harder shale. Subsequent filling of the landfill would have occurred in the low areas preferentially, until the elevation approached that of the shale outcrop.

In addition to the major subsurface feature described above, it is possible that there are other low-amplitude ridges and associated low areas or pockets as a result of selective weathering.

c) Climate

Seneca County lies in the plateau district that parallels the southern shore of Lake Ontario. The average elevation in this area is lower than the surrounding elevations in New York State, with the exception of the Coastal region. SEAD is flanked by Seneca and Cayuga Lakes which, along with Lake Ontario, significantly affect the local climate. The average minimum and maximum temperatures recorded over a period of 23 years (1955 to 1978) in the adjacent town of Romulus are -3.8°C and 21.7°C, respectively. The hottest month of the year in the area is July, with an average temperature of 26.7°C.

The coldest month is January, with an average daily temperature of -15.6°C. The average annual precipitation is 75.5 centimeters (cm).

The average growing season has a length of 159 days. The first and last killing frosts usually occur October 11 and May 5.

d) Soils

Poorly-drained silty clay loam and clay loam soils are predominant at SEAD. These poorly-drained soils have been mapped by the Soil Conservation Service as part of the Davies Angola Association. Well-drained and moderately well-drained silt loams of the Honeoye-Lima Association are present along the western edge of SEAD and all land between the depot and Seneca Lake. The soil associations have been developed from the glacial till and underlying shale bedrock (Hutton, 1972). Exhibit 2-7 is a soil map of Seneca County, New York.

e) Hydrogeology

Except for an area in the southern part of the depot, any groundwater that might occur in the fractured or weathered shale exhibits unconfined to semiconfined conditions between the glacial till and unweathered shale bedrock. In the southern part of SEAD, groundwater is encountered in glacial and alluvial sands and gravels, as well as in the shale. Depths to groundwater on SEAD are generally shallow (between 0.3 and 7m below the surface), and recharge of the shallow system occurs through infiltration of rainwater, streams, or ponds. Late winter to early summer is the time of highest groundwater levels. Groundwater levels appear to be lowest in late summer to early winter.

The hydraulic conductivity of the fractured or weathered shales is low, but somewhat higher than either the overlying glacial till or the underlying unweathered shale. The shales below about 10 feet are essentially dry, although some groundwater undoubtedly flows through fractures.

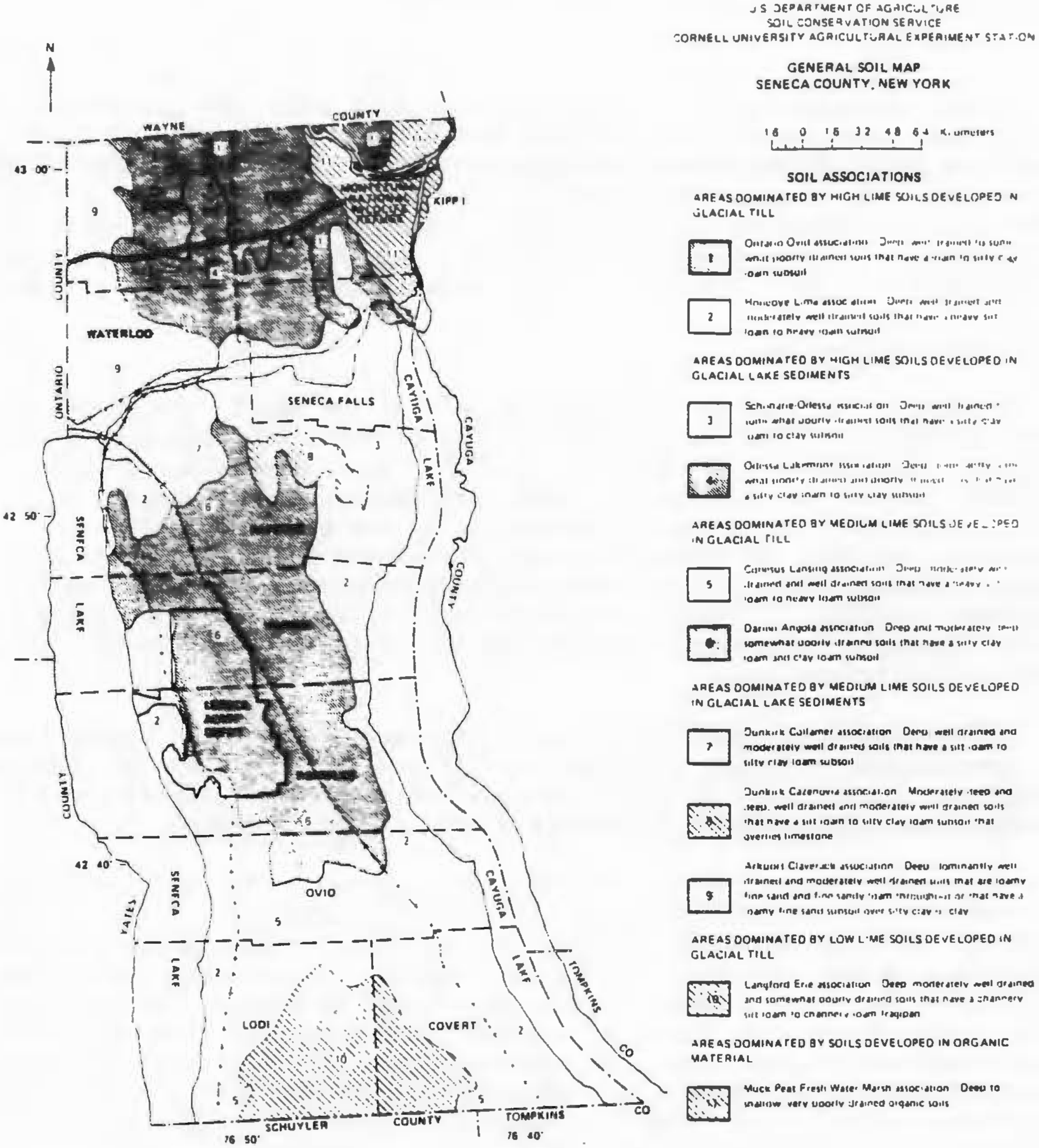
Within the landfill area, the shallow groundwater is contained within the overburden soils and weathered bedrock, at a depth of 5-8 feet below the surface. The groundwater generally flows across the site toward the west-southwest. Within the area east of the landfill, the thicker overburden and more highly weathered bedrock surface may result in higher flow rate and yield. Toward the west, however, the combination of very thin (3-5 feet) overburden and more resistant bedrock results in low transmissivity and a very low-yield aquifer system with low groundwater flow velocities. The swampy areas which exist to the north and northwest of the landfill may be surface discharge that would be expected along such an interface between higher- and lower-transmissivity aquifer materials.

f) Geological Aspects of Potential Migration

An east-west cross-sectional view of ground surface, groundwater, and bedrock surface elevations through the landfill area and extending to the Depot boundary is shown in Exhibit 2-8. Surface runoff from the incinerator and adjacent landfill area is to the west into Seneca Lake via culverts

EXHIBIT 2-7

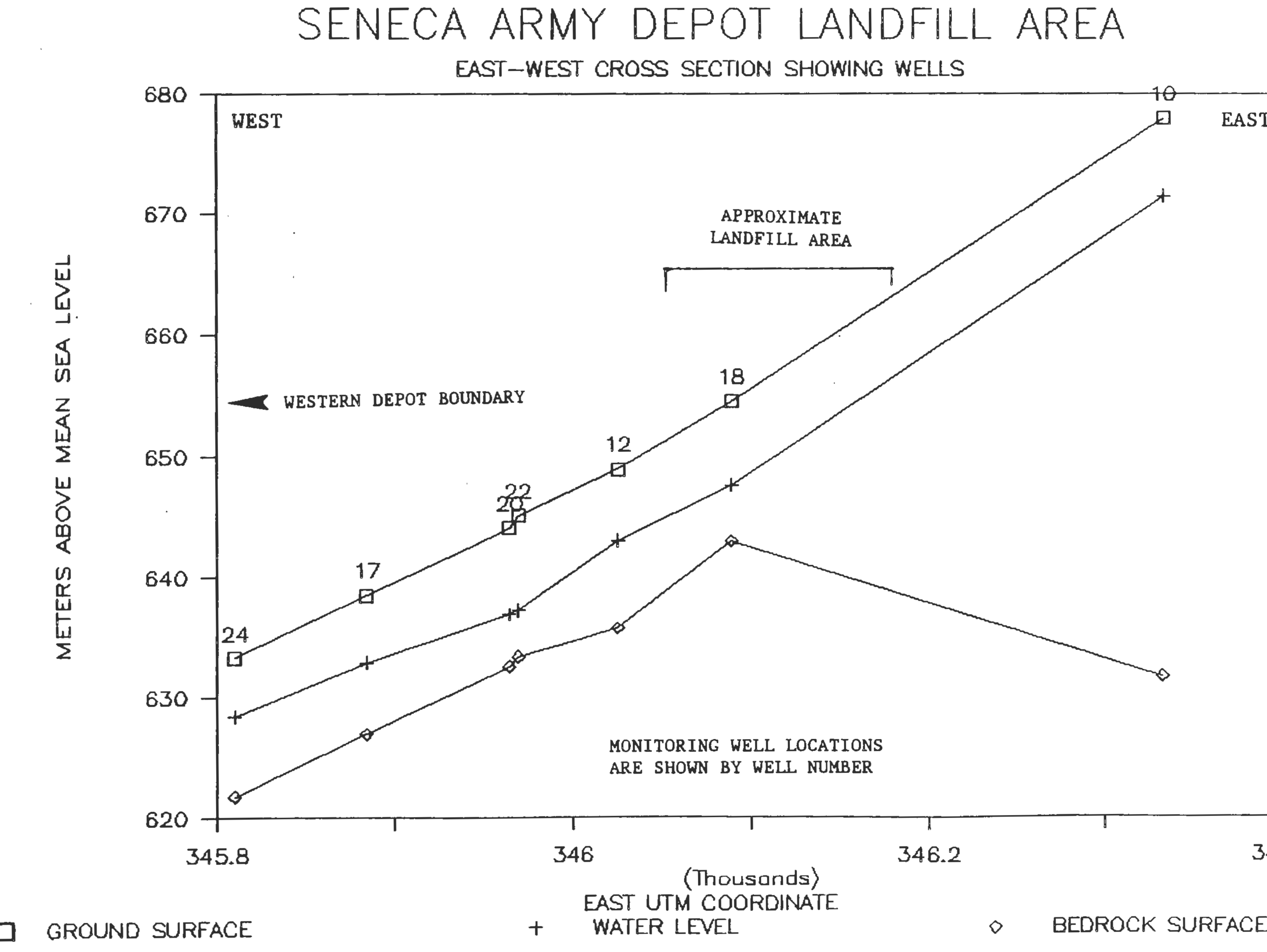
SOIL MAP OF SENECA COUNTY, NEW YORK



From: Report No. 157, USATHAMA, January 1980, subject: Installation Assessment of SEAD.

EXHIBIT 2-8

EAST-WEST CROSS SECTION THROUGH LANDFILL AREA



and/or ditches. Most drainage enters the small stream located near the north end of the Seneca Army Airfield, which eventually flows into Seneca Lake. In addition to surface runoff, the potential for contaminant migration within the shallow aquifer exists. In the SEAD landfill, the sources of contaminants are located within or near the more permeable weathered zone of the shale bedrock, at depths of from 3 to 10 feet below the surface, and upgradient of the limestone-shale outcrops described above. Contaminated groundwater may be discharging in the swampy areas formed at the juncture of the bedrock units. Contaminant migration within the low-yield system west of the landfill would occur at a very low velocity; however, soils disturbed by construction and utility line excavations may form more permeable channels for migration within the shallow groundwater downgradient of the landfill. Horizontal migration is generally to the west or southwest with localized flow directions controlled by the presence of the bedrock interfaces and permeable zones. There is no evidence that significant connection exists between the shallow groundwater and deeper aquifers, and contamination is expected to be limited to the upper water supplies. The deeper water-bearing strata beneath the shales of the Hamilton Group are recharged primarily from areas to the north of SEAD, rather than from over-lying strata. However, if vertical migration of contaminants from near-surface sources at SEAD should occur, southerly migration in the deeper aquifer would be expected.

2.1.2 Previous Investigations

An Installation Assessment was conducted in June, 1979, by the U.S. Army Toxic and Hazardous Materials Agency, with a report (USATHAMA Report No. 157) published in January, 1980. This investigation consisted of a records search and interviews conducted with present and former SEAD employees. The purpose of this program was to assess the environmental quality of SEAD with regard to the use, storage, treatment, and disposal of toxic and hazardous materials, and to define any conditions which may be adversely affecting health and welfare or result in environmental degradation. The review identified potentially contaminated areas at the facility including old landfills, the perimeter of the exclusion area, the demolition and burning area, radioactive burial sites, and certain areas which receive effluent from the sewage treatment plants.

The potential for groundwater contamination, it was concluded, existed in the vicinity of the former incinerator at Building 2207 and the adjacent landfill. Potential contaminants at the SEAD facility were speculated to include heavy metals (lead, zinc, chromium, and nickel), herbicides, explosives, and radioactive residues. The assessment also suggested that the potential for contamination of shallow groundwater at SEAD is enhanced by the presence of shale, limestone, and alluvial deposits present on-site.

In August, 1988, USATHAMA published an Update of the Initial Installation Assessment of Seneca Army Depot, NY as Report No. 157(U), which recommended that a site investigation be conducted for the vicinity of the former incinerator and the adjacent landfill.

Subsequent to publication of the Initial Installation Assessment report, several programs were initiated by SEAD to evaluate report recommendations. The US Army Environmental Hygiene Agency (USAEHA) conducted a monitoring program at the demolition burning ground to determine the existence of groundwater contamination related to past burning and disposal operations at the site. This monitoring program extended to the area of the incinerator and landfill. During the period from 1980 to 1987, USAEHA installed 15 groundwater monitoring wells in the vicinity, and collected samples for volatile organic contaminant analysis. Samples have also been analyzed from several of these wells on a semi-annual basis for general water-quality parameters.

The most recent analytical results of the program in the area of the incinerator are presented in USAEHA Geohydrologic Study No. 38-26-0313-88, dated October, 1987. The purpose of the monitoring program was to investigate the groundwater contamination associated with the former incinerator at SEAD, and to determine the direction, extent, and nature of the contaminant plume and the risk to human health. As presented in the study report, boreholes were installed across the incinerator site, and groundwater samples were drawn from these boreholes and sent to USAEHA labs and analyzed for volatile organic compounds. The data from these samples and from the existing monitoring wells indicated contamination by organic solvents, and outlined the general extent of a contaminant plume. New monitoring wells and additional sampling boreholes were completed at the site based on those samples. The study concluded that a definite contamination plume with two main constituents, trichloroethene and trans-1,2-dichloroethene, could be delineated. Chloroform, 1,2-dichloroethane, vinyl chloride, and a floating product that appeared to be diesel fuel were also detected.

Seneca Army Depot has instituted a sampling program for the privately-owned offpost well. No groundwater contamination has been detected offpost in sampled private wells. As reported in the USAEHA Geohydrologic Study, groundwater contamination was also not detected in the well installed in the far northeast corner of the airstrip (Well PT-26). However, it is reported that based on the results from the wells onpost near the facility boundary, the contamination has probably migrated offpost at levels exceeding drinking water standards. Surface water sampling also has indicated that contamination may extend to surface water, and may have moved offpost. It was suggested that the offpost surface water contamination may be due to contaminated groundwater seeping to the surface. Since that time, the generally dry conditions have not permitted collection of samples from seeps.

The USAEHA Geohydrologic Study Report recommended that contaminated surface water be collected and sampled before it flows offpost; that appropriate technologies for the collection and treatment of contaminated groundwater be investigated; that contamination source areas be excavated and cleaned; that contaminated materials be properly disposed of; and that corrective actions be negotiated with regulatory agencies, and the extent of the plume offpost be investigated.

During an initial site inspection conducted on September 13, 1988, an examination of drawings and discussions with SEAD personnel revealed the presence of an underground diesel fuel storage tank near the old incinerator building at the site, and two dry/wet wells (of uncertain construction and use) within the building. These additional potential source areas were addressed during the current site investigations.

3.0 SITE INVESTIGATION

All operations conducted during this task were performed in accordance with the specifications contained in the approved Work Plan for Task (Delivery) Order No. 1 -- Seneca Army Depot Burning Pit/Landfill Preliminary Assessment Site Investigation, and Contract No. DAAA15-88-D-0009. Specific requirements contained and referenced in the Task Order were addressed in the task Work Plan.

An initial site inspection was conducted on September 13, 1988, after which a draft Work Plan was submitted to USATHAMA in September, 1988. Field Operations were initiated on October 24 and completed on November 17, 1988, and the Final Work Plan is dated December, 1988.

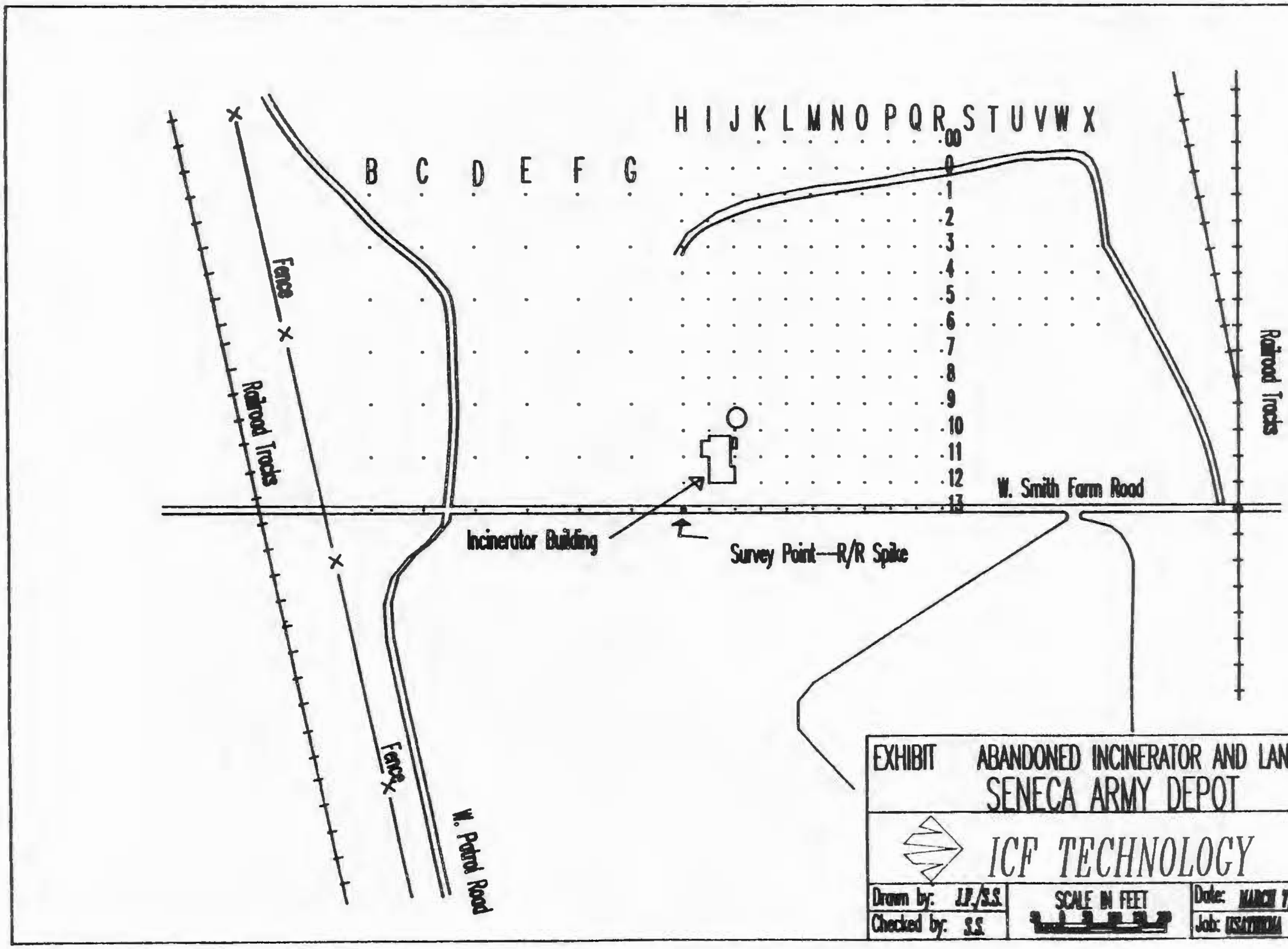
3.1 SITE AND GRID LAYOUT

Immediately after obtaining security passes and gaining access to the site, the field crew established a decontamination and contamination-control station adjacent to the incinerator building (Building 2207), began setting up the field laboratory for soil gas sample analysis in Building 4, and began the process of laying out survey lines to form a grid over the landfill and downgradient areas.

Surveying was performed by Obosnenko Partnership, Sharon Hill, PA. Using the railroad spike imbedded in the center of the roadway at Building 2207 (a fixed point which is referenced on available installation drawings and herein referred to as Point "A") as the origin, a survey line was established in an east-west direction along and very nearly parallel to the centerline of W. Smith Farm Road. Points were marked at 50 or 100-foot intervals upon this line (50 foot intervals were used east of Point "A", to encompass the landfill area, whereas a 100-foot interval was used in the area to the west which does not contain landfilled materials). At each 50-foot interval east of Point A, and at each 100-foot interval to the west, 90-degree angles were turned to form survey lines extending northward. Fifty-foot spacings (east of Point A) and 100-ft spacings (west of the reference point) were marked on each of the south-north lines to form the grid illustrated in Exhibit 3-1 over the entire area of interest. Grid points were defined by letters designating west-east lines (B to R) and numbers defining north-south points (1 to 13). Survey stakes were implanted at the corners of this grid, and metal-wire flags with the letter-number grid designations were placed at each grid point. The grid was extended eastward to cover the suspected area of the former grease pits upgradient of the landfill (lines S to X and points 4 to 6). Two additional lines (0 and 00) were also added to the north, after buried metal was detected outside of the area surveyed originally.

The prepared grid followed the same reference that was used during previous surveying at the site, as denoted on Depot Drawing No. 18-81, dated 8/8/80. The grid is congruent with the UTM coordinate system, to within about 0.25 degrees. It was planned to use the known coordinates of Point A to

EXHIBIT 3-1
OVERALL SURVEY GRID AT THE LANDFILL AREA



define the location of each grid point. However, a search through Depot files has not recovered the coordinates of the survey marker, and an alternate approach was used to map the grid and sampling points for the purposes of the site investigation. The UTM coordinates of the grid reference point (Point A) was obtained by best-fitting the coordinates of roadway intersections with the railroad tracks and other roads, as obtained from the USGS Quadrangle map, and using distance data contained on Drawing No. 18-81. In this manner, the UTM coordinates of each grid point could be determined, with an internal precision of better than +/- 10 centimeters and with an accuracy of about +/- 1 meters. The coordinates of all wells (except well PT-26, which is far-removed from the surveyed area) and other sampling locations were determined by measuring south-north and west-east distances from the nearest grid point, to within +/- 10 centimeters. Listings of UTM coordinates for all grid points, existing monitoring wells, and soil sampling locations are provided in Appendix A.

Once the grid was established across the landfill area, the EM survey and soil-gas sampling and analysis was initiated. All of the surveys were hampered by the high grass and thick shrubbery that covered the area, making access to sampling points and traverse of survey lines a difficult and time-consuming undertaking.

3.2 GEOPHYSICAL SURVEY INVESTIGATION

3.2.1 Objectives

The objectives of the geophysical surveys were: 1) to detect and delineate the presence and/or absence of buried metal within the landfill, grease pit and ash pit areas; 2) to determine the likelihood that buried metal could be drums or other likely contaminant sources; 3) to correlate with the soil gas survey to determine the location and extent of contamination sources and migration pathways; and 4) to scan areas selected for the soil gas survey for the presence of buried metal (ie, drums) and utilities, so that the soil gas probe would not encounter such items.

3.2.2 Methodology

To meet the objectives of the project under the environmental conditions existing at the site, use of electromagnetic induction (EM), which is commonly referred to as terrain conductivity, and ground penetrating radar (GPR) techniques were proposed. EM was used for the majority of surveillance and locating efforts, and all gridded portions of the site were surveyed using EM techniques. The GPR was used at selected locations to determine whether buried metal targets would yield container-like signatures, and to provide better depth discrimination needed to clear areas for the soil gas survey. Although the GPR survey was not performed specifically to identify lithology, the survey allowed determination of depth to bedrock in the areas containing significant subsurface contamination, and detected several features of the bedrock surface which had been previously postulated. These unexpected benefits resulted from the dryness and low conductivity of the ash, and the shallow depth to bedrock that was observed in some areas.

EM is based on placing a small coil (transmitter) on or near the earth's surface. An alternating-frequency current flows through the coil, and produces a primary magnetic field. The primary magnetic field induces a current into the subsurface which, in turn, produces a secondary magnetic field. This secondary magnetic field within the subsurface is sensed by another coil (receiver) located at a specified distance from the transmitter coil. The primary field is read directly by a meter and is compared to the sensed secondary field. The ratio of the primary field to the secondary field is linearly proportional to the earth's terrain conductivity.

Terrain conductivity can be defined as the ability of a subsurface material to conduct an electrical current. Conductivity is a function of the geohydrologic section and is influenced by the presence and/or absence of free ions. For example, a dry sand would have a lower conductivity than a saturated sand and a saturated clay would have a higher conductivity than a saturated sand. Changes in terrain conductivity can be mapped and associated with subsurface conditions, both natural and man-made. In particular, EM can accurately locate buried metal objects better than a similar magnetometer survey. Field studies performed by Drexel University (1984) and by the manufacturer of the terrain conductivity meter (Geonics Ltd.) have shown that the EM technique can locate a buried metal drum with greater accuracy than a magnetometer survey using similar survey grids.

A Geonics EM31DL Terrain Conductivity Meter was used during the survey. This apparatus can measure conductivities from 0 to 1000 millimhos per meter (mmhos/m). Depths of exploration can be varied from 0 to 3 meters (0.0 - 9.8 feet) and 1.5 to 6 meters (4.8 - 19.7 feet). This change in depth of exploration is accomplished by changing the orientation of the coils. Two coil orientations are possible with the EM31DL; horizontal dipole (HD) and vertical dipole (VD). The HD has a maximum exploration depth of 3 meters, while the VD has a maximum exploration depth of 6 meters. It should be noted that each dipole has a different response to the subsurface. The HD response is the greatest at the near surface and falls off monotonically with depth. In the VD mode near-surface materials add little to the total measurement with the greatest response coming from a depth of 1.5m and with decreasing response with additional depth to 6m. For this survey the VD mode was used exclusively. The choice of the VD mode was based on the alleged thickness of landfilled materials and the measured depth to groundwater.

In measuring the terrain conductance of the subsurface, more than one portion (phase) of the electromagnetic field can be measured. The quadrature phase is the 90-degree component of the electromagnetic field, and it is this portion which is linearly proportional to the earth's conductivity. While the quadrature phase is ideal for measuring general earth conductivity, it is also influenced somewhat by high-conductivity zones. The in-phase measures the 180-degree component of the electromagnetic field, and is extremely sensitive to high-conductivity objects such as buried metal. While the in-phase does not provide linear output and is not suitable for measuring general earth conductivity, it can be valuable in the detection of buried metal objects in highly conductive soils. If highly conductive subsurface conditions exist, such as in a landfill, use of the quadrature phase alone might not be able to adequately distinguish a buried metal object unless that object were located directly at that particular measurement station. By employing the in-phase the effect of the adjacent objects on the earth's conductivity can be detected, and the presence or absence of buried metal can be determined. For this survey, both the quadrature and in-phases were recorded and used for interpretation.

As with any geophysical method there are limitations to the use of EM. The EM was able only to identify anomalies in the subsurface caused by changes in conductance. It did not definitively determine the cause of these changes, although the cause can often be inferred or correlated with other observations. The initial site visit indicated that interferences would be minimal in the areas of the investigation, and this proved to be the case except near the incinerator building. There was a marked effect from the underground water lines at the site, which can be mapped from the EM data, and are shown in the graphs of EM data found in Appendix B.

GPR is another electromagnetic geophysical technique which uses electromagnetic waves for shallow (usually less than 30 feet) subsurface reconnaissance and exploration. With GPR an electromagnetic pulse is injected into the ground by a transmitting antenna, and the resulting reflection or transfer waves from a boundary layer or a buried object is detected by a receiving antenna. Significant changes in conductivity of layers or objects will cause the electromagnetic wave to be reflected. More conductive soil or rock strata, saturated zones, and buried metal objects provide good reflectors of radar waves. Reflected waves are amplified, processed, and recorded as images of target reflection strength along a vertical slice of survey line.

The propagation velocity of the electromagnetic waves in the ground is dependent upon the conductivity of the subsurface, which is largely governed by the moisture content of the soil and rock. The energy of electromagnetic waves passing through the earth is affected by the ability of a material to conduct an electrical charge (dielectric constant) and the conductivity of the ground. For example, clean, dry sand will propagate an electromagnetic wave at a higher velocity and with less attenuation than a saturated clay. Generally, higher conductivity of the subsurface material being explored results in slower wave propagation and greater attenuation of the wave, which leads to decreased depth of exploration.

For this survey the OYO Georadar Model 2441 system with a 250 MHz antenna was utilized. GPR antennas can be obtained with center-frequencies in the range of 80 to 900 MHz, with exploration depth varying inversely and target resolution varying directly with frequency. Experience has shown that antennas in the 200 - 300 MHz range represent a reasonable compromise, and are applicable to most soil and subsurface conditions. The 250 MHz antenna was chosen to allow detection of the relatively small objects and shallow depths that were likely to be encountered in the landfill.

The Model 2441 radar allows the transmitter and receiver antennas to be separated. During normal surveying techniques, the transmitter and receiver are kept as close together as possible. This allows the reflected wave to be sensed (received) by the receiver from the reflecting object with the maximum amount of resolution. However, by separating the antennas it is possible to determine the propagation velocity of the wave and, thus, the depth to a reflecting object. These types of measurements are known as wide angle measurement (WARR). WARR measurements were performed at the site with the subsequent propagation velocities used to estimate the depths to the reflectors. The depth measurements are considered to be estimates because of the wide range and sudden changes of subsurface conditions encountered in a landfill environment, affecting the accuracy of the depth calibration. The values calculated represent reasonably precise estimates of comparative object depths.

GPR was only used in those areas where the EM survey indicated the presence of buried metal, and which were locations of soil-gas sampling. Generally, the GPR survey was able to explore to a depth of 6-8 feet over the area of interest. However, the survey was hampered by the variably-heavy vegetation over the landfill area, which caused the antenna to rise up and resulted in variable coupling of the signal to the ground surface. This effect reduced the interpretability of the GPR records for detailed analysis of target strength and location.

3.2.3 Field Measurements

Prior to making any measurements, the EM31DL was calibrated in strict accordance with the manufacturer's instructions contained in the operating manual. Calibrations were performed in the area near Well PT-10 where ground disturbance was not evident and where no materials or utilities were thought to be buried. During the period of measurements with the EM31DL, calibration and quality control tests were performed three times a day; prior to the initiation of the daily survey, once at noon, and at the end of the survey day. No significant changes in the conductivity were found in the calibration area. The HD readings varied from 5.3 - 5.5 mmhos/m, while the VD readings varied from 9.0-9.5 mmhos/m. This variability in the readings is within the expected 10% tolerance stated in the manufacturer's manual. These relatively small changes can be attributed to inherent resolution of the instrument, as well as to changes in atmospheric conditions and soil moisture content during the time of the calibration measurements.

The background conductivity readings obtained indicate a relatively low conductivity for the subsurface materials, which correlates with the low moisture content of the soils. The background readings were used as the basis for interpretation of the EM data on the landfill, ash pit, and grease pit areas.

Field measurements were made along the survey grid discussed in Section 3.1. Measurements were made on 50-foot centers in the landfill, ash pit, and grease pit portions of the site and on 100-foot centers in the portion of the site downgradient from the landfill.

Measurements on-site were made in both the HD or VD modes, but most data were collected in the VD mode, because of the reasons given in Section 3.2.2. Initially, test measurements were made in both the HD and VD modes over the landfill. These measurements indicated that the VD mode was more reactive to changes in subsurface conductivity than the HD. Both the quadrature and in-phase measurements were made and recorded simultaneously by a digital recorder, the Omnidata Polycorder. The Polycorder allowed recording of both the EM data and designations of the survey line and direction as well as annotations of any surface conditions or other observations which might affect interpretation of the EM data. The EM data were recorded by the Polycorder as voltage output at each measurement point. The voltages are later converted to millimhos/m via a computer program provided by the manufacturer of the EM31DL.

EM measurements were made every 20 feet along each 50-foot and 100-foot survey line in both the north-south and east-west directions. This 20-ft increment was chosen to ensure adequate detection capability, according to the following reasoning. The distance between the transmitter and receiver coils on the EM31DL is approximately 12 feet, and the influence of a buried drum can be sensed by the EM31DL over a distance of about 10 feet from the transmitter coil when using the in-phase portion of the field. Therefore, an approximate path width of 22 feet was determined for the EM31DL. The 20-foot measurement stations were located by means of a device known as a "hip-chain". This device uses a small knurled wheel which is attached to a counter, around the wheel a heavy thread is wrapped with one end tied to a fixed object in the field and the other to the "hip-chain". As the operator walks the thread is played out from the "hip-chain" and the counter advances. The counter has an accuracy of +/- 1%. To check this accuracy the operator would check the counter to the surveyed grid and if necessary make adjustments to the "hip-chain" meter.

Initially, the survey lines were traversed in the north-south direction over the landfill, followed by surveys along east-west directions. At periodic measurement stations, the common axis between the coils was rotated 90 degrees and the new measurement noted. This rotation of the common axis allowed the operator to determine the reliability (precision) of the measurements. For example, if the measurement differed significantly between the two orientations, the operator could assume that these changes were being caused by a localized anomaly. These situations were noted for more detailed subsequent investigations.

After measurements over the 50-foot grid in the landfill area were completed, the 100-foot grid area west of the landfill was traversed in both north-south and east-west directions.

The collected data were dumped from the Polycorder memory to a Toshiba 3100/20 personal computer (PC) on a twice-daily basis, using software supplied by Geonics Ltd. Backup copies of the data were then made on 3 1/2" disks and on the PC internal hard disk. The data were interpreted daily to identify areas indicating buried metal anomalies to be avoided by the soil-gas survey, and for re-surveying on smaller grids. When needed, smaller grids were established by measuring to the nearest established grid points.

Additional data measurements were performed on 10-foot centers in the area surrounding the diesel fuel tank adjacent to the incinerator building. Since the stations were in close proximity to the incinerator building, these data were performed only in the quadrature phase and two(2) data values were recorded at each station, rotating the EM31DL between measurements to ascertain the effect of the building upon the measurement. The two data values were averaged and recorded for subsequent interpretation.

Upon reviewing the EM data, the survey grid was extended along the northern end of the landfill by 100 feet, creating survey lines 0 and 00, because EM anomalies indicating buried metal were noted to be present on the northernmost original survey line (line #1). The survey lines were also extended from the grease pit area into the landfill and ash pit gridded areas, to establish continuity between the two areas. In total, approximately 21,500 linear feet were surveyed using EM.

After the EM survey data was reviewed, areas interpreted to be free of buried metal were delineated and the soil gas survey commenced in these areas. In some areas where soil gas readings were to be taken, the EM data indicated the presence of buried metal. In these areas, GPR surveys were conducted to provide better definition of depth and location of suspected targets.

Initially, the GPR antenna was pulled by a vehicle over the surface of the landfill and ash pit areas along the survey lines at 50 foot intervals. However, it was found that resolution of the GPR records was compromised due to the bouncing of the antennas over the vegetation and variable surface of the site. Thus, it was necessary to hand-pull the GPR antenna across each survey line at a very slow rate (1 to 2 ft/sec). At each 50-foot station, the GPR record was marked electronically to calibrate the distance scale of the record. The GPR surveys were all performed in the north-south direction, along the path of less resistance through the vegetative ground cover

Prior to starting each survey line, the GPR was set to maximize the depth of interpretation and to record clear records. This process entailed adjusting both low and high pass filters and performing other enhancement procedures as described in the OYO Georadar Model 2441 manual. A location map of the GPR survey lines and copies of all GPR records obtained during the survey are provided in Appendix B.

3.2.4 Data Interpretation

The EM data were interpreted using two approaches. The data from each survey line were plotted as distance versus conductivity (x-y plot), with both the quadrature (solid line) and in-phase (dashed line) measurements shown on each plot. This interpretation was accomplished by using software (DAT31Q) provided by the manufacturer of the EM31DL, Geonics Ltd, yielding the plots shown in Appendix B. This plotting technique served well for noting changes in subsurface conductivities associated with the landfill boundaries and buried metal.

Detection of buried metal entailed analysis of high-conductivity readings (both quadrature and in-phase), while detection of contaminated groundwater by some organic solvents depended on analyzing the data for low conductivities. These interpretations for buried metal and groundwater contamination were aided by contouring the data using Contix, a computer program offered commercially by Interpex, Inc. This program was used to grid the data and contour it, using a minimum-curvature algorithm that has been shown to provide adequate representation of the EM parameters. Results of the contouring are shown in Exhibits 3-2 to 3-7. Typical grid-line plots are shown in Exhibits 3-8 and 3-9, and all survey plots obtained during the survey are provided in Appendix B.

The contouring plots were constructed to enhance interpretation of the data and improve the understanding of conditions at the site. A contour plot of the EM readings taken in the north-south direction, Exhibit 3-2, shows EM readings from 0 to 120 mmhos/m contoured in 20 mmhos/m increments. These parameters were chosen so that features related to defining the general limits of the landfill would be evident, without creating inordinately busy graphs. EM readings were obtained that are significantly higher than the values used to limit the contours, but are not included to enhance readability for this small-scale map. This contour map clearly indicates the buried water line that runs through the area from east to west past the incinerator building.

Interpreting the contours shown in Exhibit 3-2 as buried metal and/or highly conductive landfill materials, the landfill is noted to encompass an area approximately 400 feet wide and 1400 feet long, and is irregularly shaped. These dimensions yield a total acreage of approximately 12.9 acres for the landfill areas as interpreted from the EM readings. The grease pit area, located in the eastern portion of the plot, does not indicate any significant changes in conductivity readings and we do not believe that this area contains buried metal or other landfilled materials similar to those observed adjacent to the incinerator.

Exhibit 3-3 is the same EM measurements (north-south) which have been contoured using values from 0 to 8 mmhos/m at a contour interval of 2 mmhos/m. The purpose of this particular plot was to determine whether low conductivity values might be associated with those areas where groundwater is contaminated with organic (non-ionic) materials. The conductivity of the groundwater generally is high, varying from 600 to 1800 millimhos/cm in this area; significant concentrations of organics, thus, might be detectable in the overall terrain conductivity. The contours shown in the exhibit indicate isolated conductivity lows, both within the limits of the landfill and in down-gradient areas. Although there are areas of low conductivity shown on the plot, some of which correlate with results of the soil gas survey and monitoring well sampling data, the EM results do not seem to indicate any plume configuration moving downgradient from the landfill area. It is noted that some of the lows are associated with locations between two high-conductivity areas, such as the low indicated on lines M and N. Although some of the isolated low-conductivity areas may be associated with significant groundwater contamination, it is concluded that the concentration of the contaminants is sufficiently low that variations in conductivity values are not discernable with any degree of confidence.

EM measurements taken in the east-west direction are shown in Exhibits 3-4 and 3-5. Both exhibits generally indicate similar patterns to those

EXHIBIT 3-2
EM DATA CONTOURS SHOWING LIMITS OF THE LANDFILL
(NORTH-SOUTH DIRECTION)

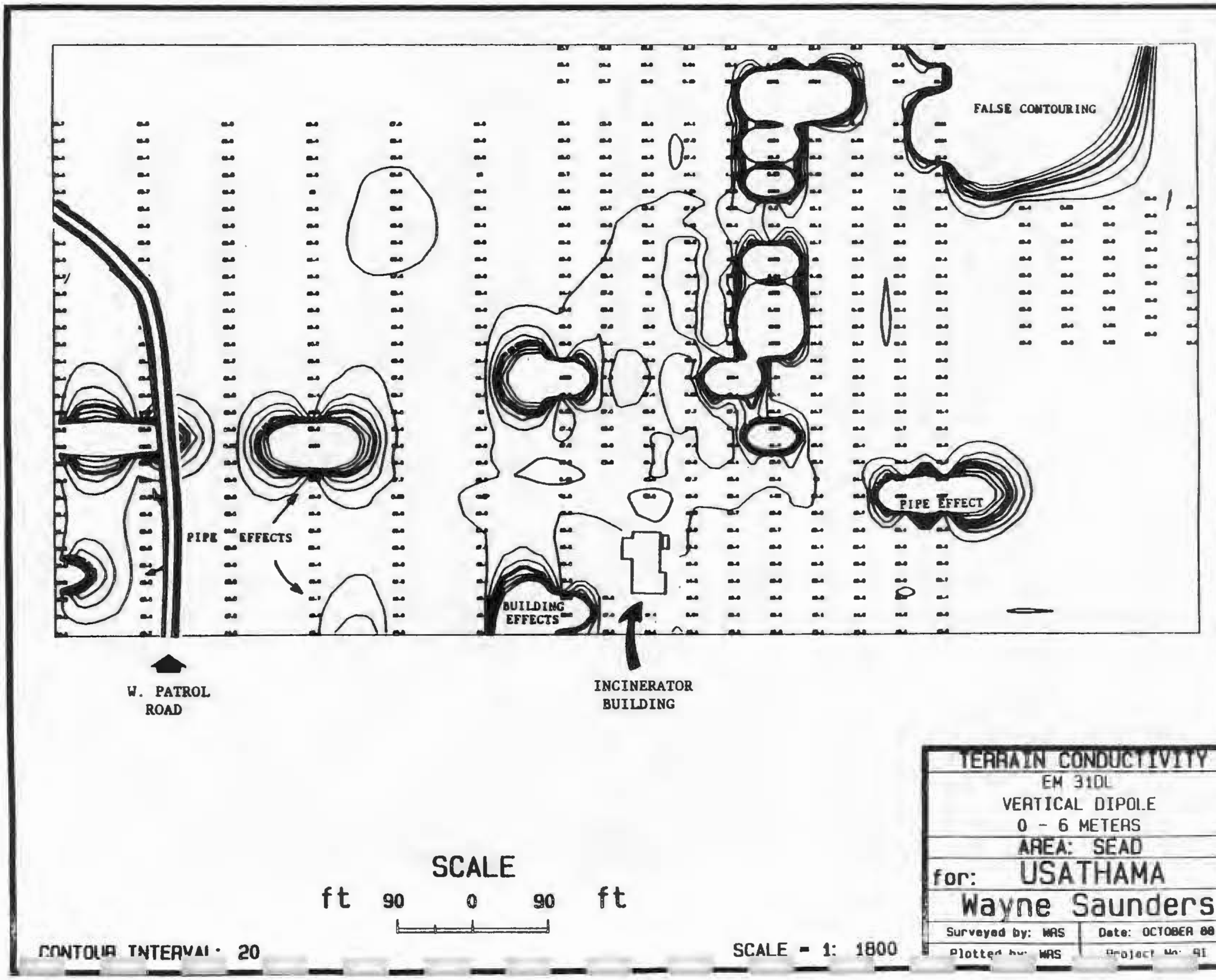


EXHIBIT 3-3
EM DATA CONTOURS SHOWING LOW-CONDUCTIVITY VALUES
(NORTH-SOUTH DIRECTION)

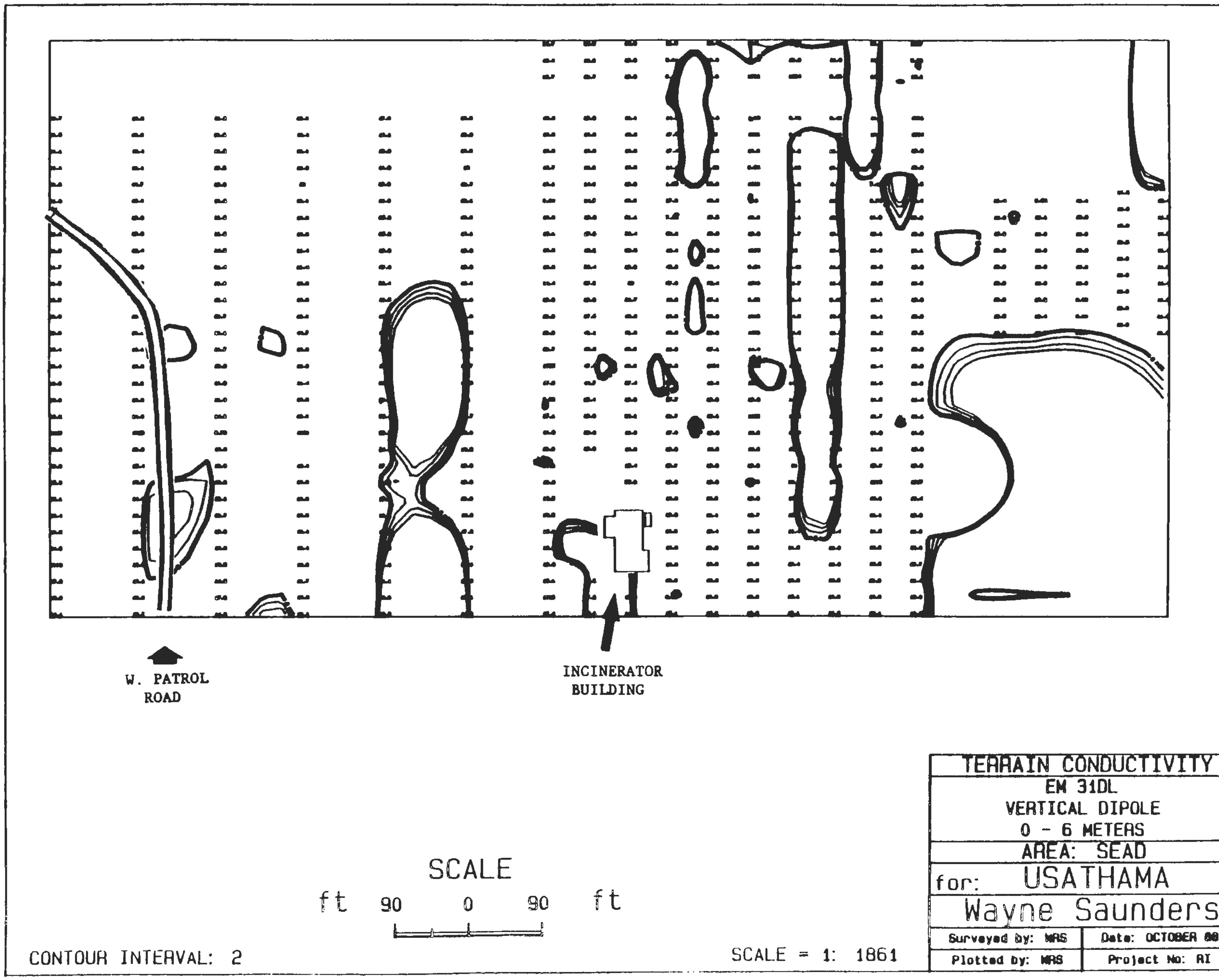


EXHIBIT 3-4
EM DATA CONTOURS SHOWING LIMITS OF THE LANDFILL
(EAST-WEST DIRECTION)

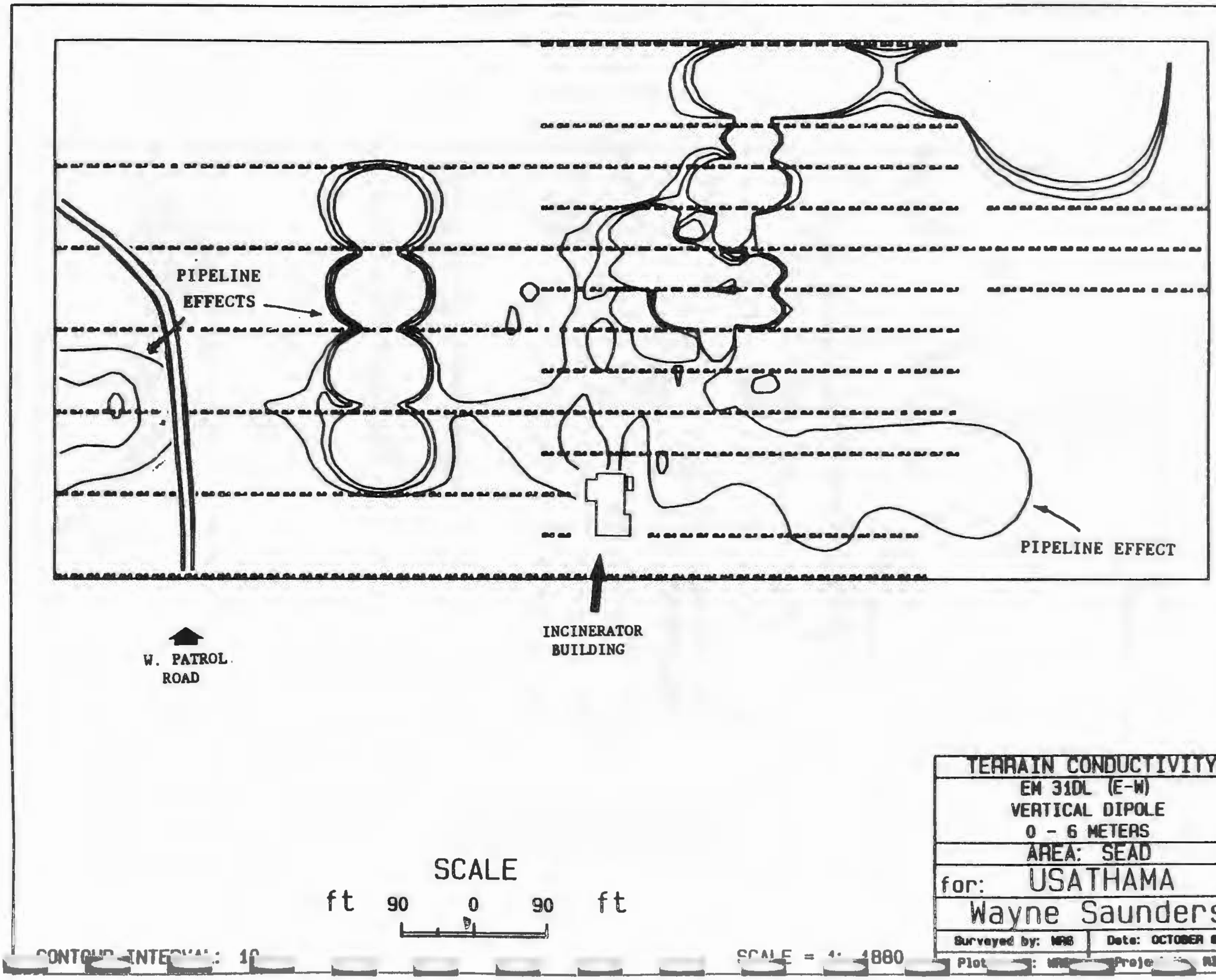


EXHIBIT 3-5
EM DATA CONTOURS SHOWING LOW-CONDUCTIVITY VALUES
(EAST-WEST DIRECTION)

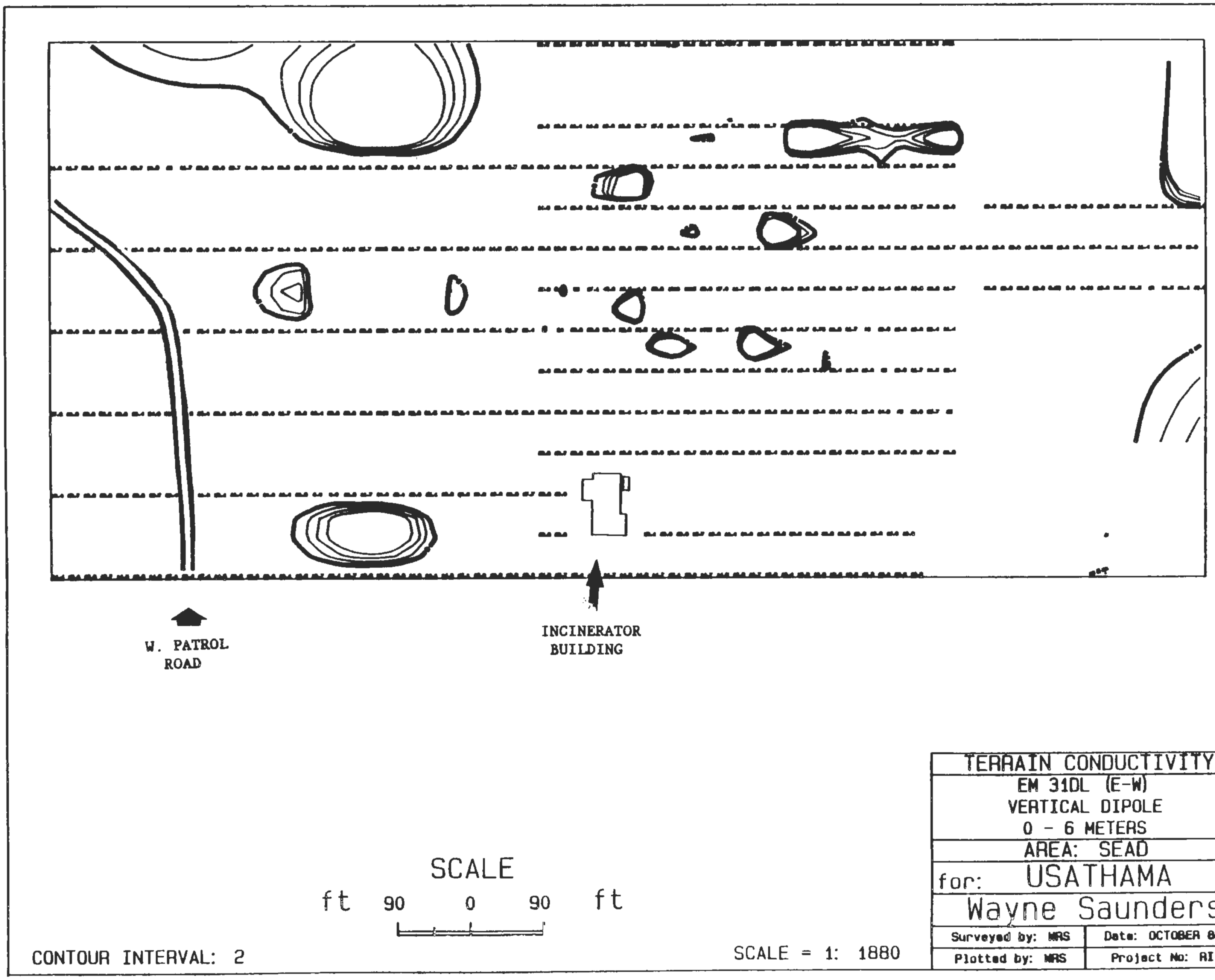


EXHIBIT 3-6
IN-PHASE DATA CONTOUR PLOT ILLUSTRATING BURIED METAL
(NORTH-SOUTH DIRECTION)

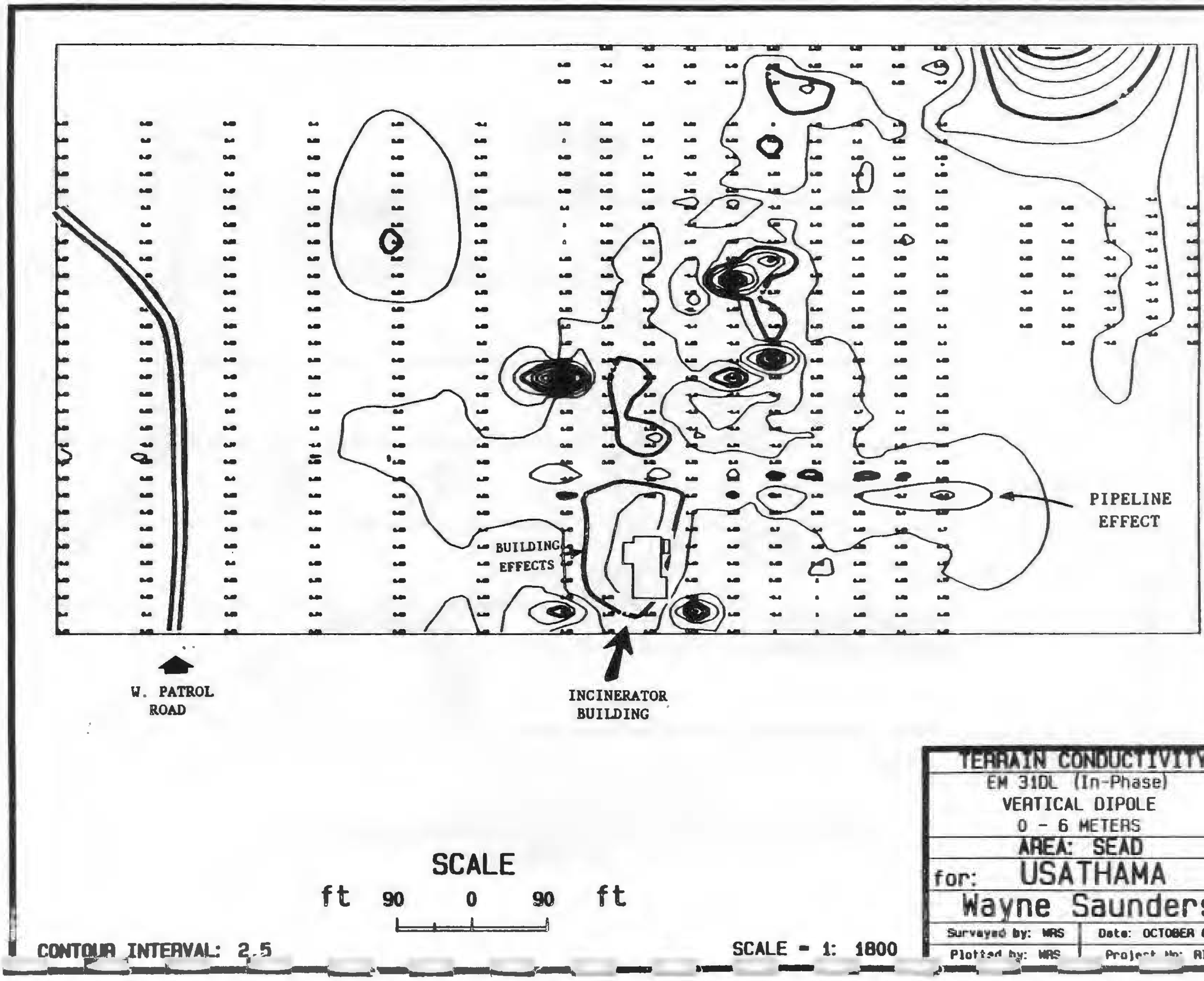
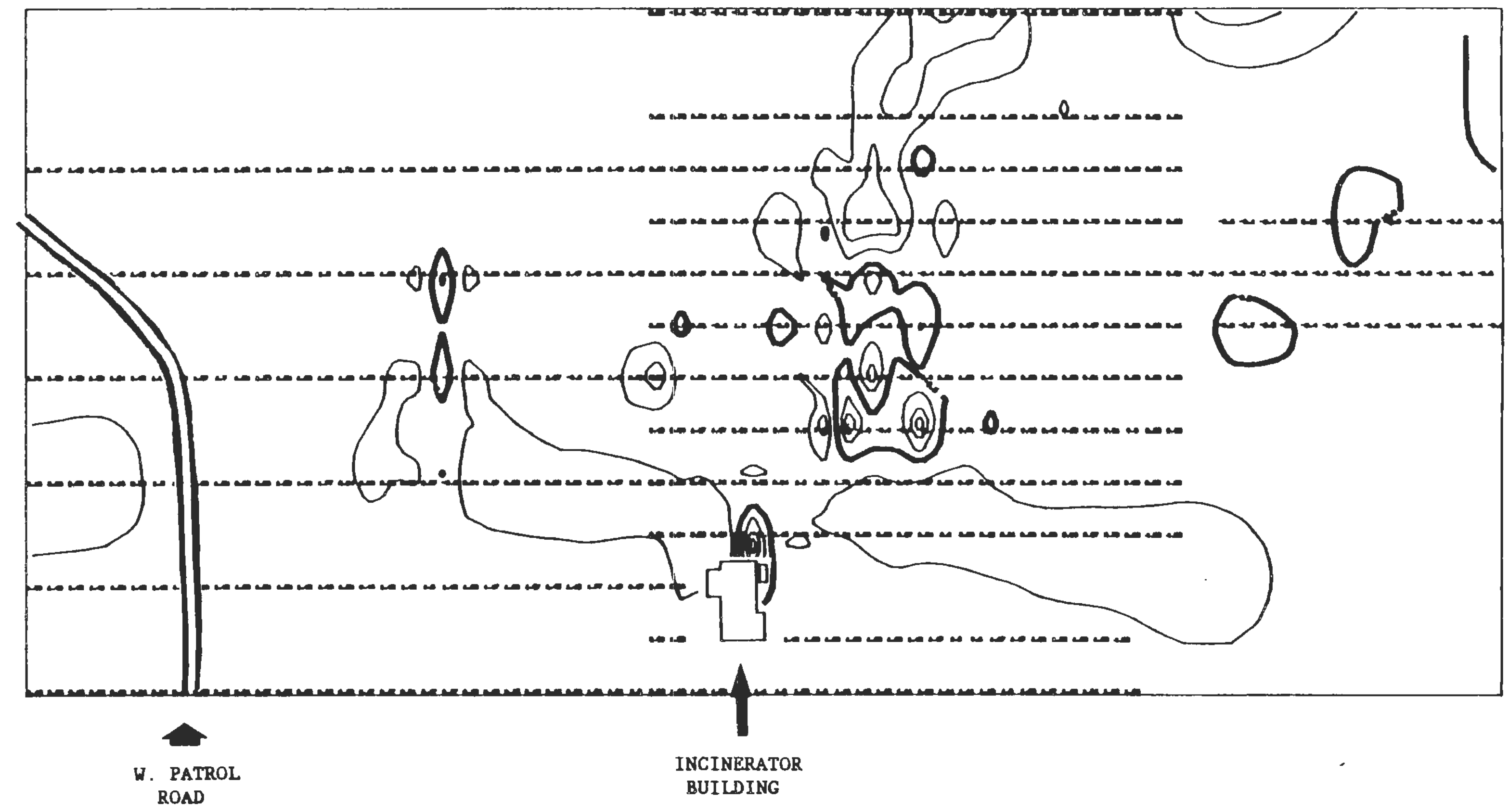


EXHIBIT 3-7
IN-PHASE DATA CONTOUR PLOT ILLUSTRATING BURIED METAL (EAST-WEST DIRECTION)



SCALE

ft 90 0 90 ft

CONTOUR INTERVAL: 3

SCALE = 1: 1880

TERRAIN CONDUCTIVITY (E-W)
EM 31DL (In-Phase)
VERTICAL DIPOLE
0 - 6 METERS
AREA: SEAD
for: USATHAMA
Wayne Saunders

Surveyed by: WRS	Date: OCTOBER 88
Plotted by: WRS	Project No: RI

EXHIBIT 3-8
TYPICAL X-Y DATA PLOT OVER THE LANDFILL AREA

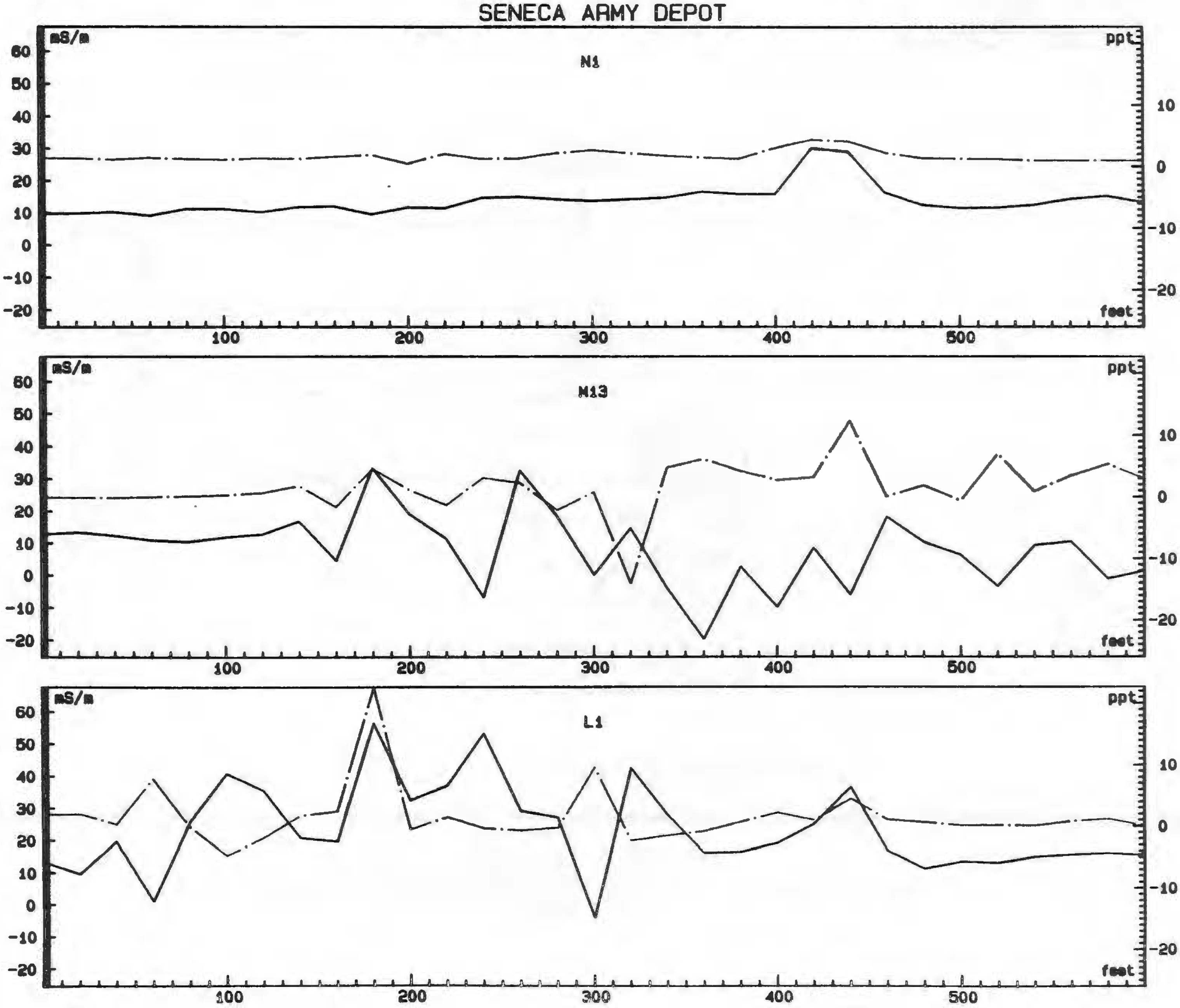
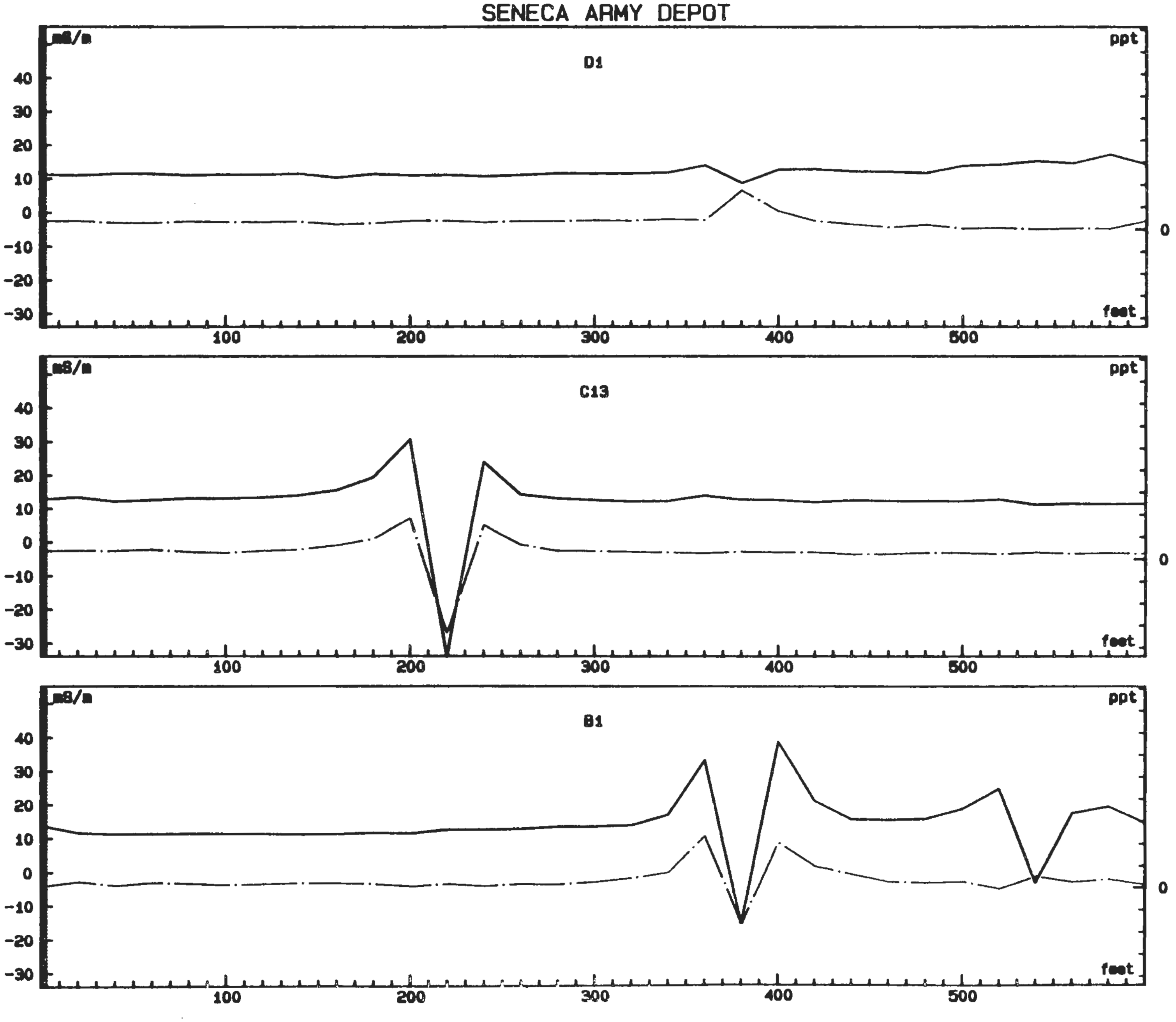


EXHIBIT 3-9

TYPICAL X-Y DATA PLOT OUTSIDE THE LANDFILL AREA



discussed above. Noticeable changes probably are more related to the change in orientation of the EM31DL than to differences in terrain conductivity.

A contour map of the in-phase readings taken in the north-south direction over the grid is shown in Exhibit 3-6, and the east-west data are shown in Exhibit 3-7. These plots indicate the direction and location of the water lines that traverse the site, and the metal-clad incinerator building. In addition, this exhibit indicates areas where significant elevated readings were recorded (near grid points H-7, J-8, L-7, L-5, M-7/8, and M-0). These significantly elevated in-phase readings indicate significantly higher density of buried metal than in other areas within the landfill, an interpretation which was confirmed in some instances by the GPR survey. The contoured in-phase data shown in Exhibits 3-6 and 3-7 also indicate the same general shape and limits of the landfill as determined from the quadrature phase contour maps, providing confirmation of the form and probable contents of the landfill.

In all of the previously mentioned exhibits, some contour lines will be noted in areas where no measurements were performed. These anomalies are caused by the algorithm used by the contouring program. The contouring process attempts to interpolate data to areas within a rectangle for which measurements do not exist. In our case, the grease pit area was an appendage to the rectangular grid surveyed over the other portions of the site, and the grid was extended in the area north of the landfill. These deviations from a rectangular grid cause the program to draw inferred contours in those areas between the rectangular portion of the grid and the appendages, which should be ignored in evaluating the plots. Only those areas containing measurement stations should be considered.

Exhibits 3-8 and 3-9 are typical X-Y plots along two selected survey lines where EM readings were performed. The readings in both the quadrature and in-phases have been plotted versus distance along the line. Exhibit 3-8 shows data from three survey lines, starting at points N1, M13, and L1, and extending in a north-south direction across the landfill area. Lines M13 and L1 both indicate significant changes in conductivity in both the quadrature and in-phases. These changes, corresponding to the sharp peaks, are indicative of buried metal. In comparison, line L1 shows little change in the conductivities along the survey line, indicating the absence of metal objects, although both the quadrature and in-phase levels are high. The high readings are probably due to homogeneous distribution of conductive landfill contents, such as incinerator ash.

Exhibit 3-9 depicts EM data beginning at points D1, C13, and B1, and extending in a north-south direction. These three lines represent data from the area downgradient of the landfill. Both the quadrature and in-phase plots are generally relatively smooth and are representative of background conductivities. However, anomalies are noted on line C13 at a distance of 220 feet and on line B1 at distances of 380 and 540 feet. The shape of these features indicate possible buried pipes, and the anomalies are, in fact, associated with buried water lines depicted on installation maps. In general, these particular EM X-Y plots do not provide good indications of where landfilled materials exist, nor of a groundwater contamination plume.

A map based on the interpretation of the EM data (both quadrature and in-phase) and showing where buried metal is suspected is provided in Exhibit 3-10. Although the form of individual objects cannot be gleaned from the data, it appears that buried metal is scattered throughout the 12 acres of the landfill and more heavily concentrated along the J, K, L, and M survey lines. Further information on the identity of the buried metal was provided by interpretation of the GPR survey data.

Generally, the GPR survey confirmed the existence of buried metal in areas identified by the EM survey. A map indicating those areas which were surveyed by GPR, and the principal targets detected, is given in Exhibit 3-11. The GPR data provide a variety of signatures and particular patterns characteristic of typical landfilled or buried objects. For example, a characteristic hyperbolic reflection pattern is produced when the GPR passes over a drum (laying on its side) at an angle perpendicular to the drum axis. Different and more complex patterns are produced if the drums occur in other orientations, if the GPR traverse is parallel to the drum axis, or if the drums are crushed or partially crushed. Interpretation of the GPR data, taking into account possible variations in signatures of buried drums and other targets, showed numerous targets that are similar to drums in a typical landfill situation. A table of target interpretations for survey line K1-K11, showing potential drum locations and subsurface bedrock conformations, is provided in Exhibit 3-12. Better definition of the targets in the landfill would require multiple traverses with changes in transmitting and recording parameters and survey line orientations, and clearing of the ground cover to provide more consistent coupling of the antenna to the ground. The GPR survey performed at the landfill provides corroboration of metal locations rather than details of potential drum orientation.

Approximately 3200 lineal feet of GPR data were obtained, all in a north-south direction, in the landfilled section of the site. All GPR records and interpretations can be found in Appendix B, and a map indicating those areas where GPR signatures indicate the possible presence of buried drums is shown in Exhibit 3-11. Note that these signatures could also be produced by cylindrical objects other than drums, such as pipes, cables, or sections of culvert. However, the correlation of the GPR target locations with metal signatures from the EM surveys show that the objects very likely are composed of metal. The available data do not allow the sizes of the objects to be determined definitively.

The GPR records indicate numerous areas where buried drums may be located, with the depth of burial ranging from just beneath the surface to 5 feet. In some areas (see Exhibit 3-11), the drum signatures are grouped close together, while in other locations only isolated responses are noted on the record.

The GPR records also show signatures related to reflections from the bedrock surface, and indicate that depth to bedrock varies from very shallow (less than two feet) to depths greater than the range of the radar (greater than six feet). The GPR records also show reflections that correlate with the

EXHIBIT 3-10
BURIED METAL LOCATED BY EM MEASUREMENTS

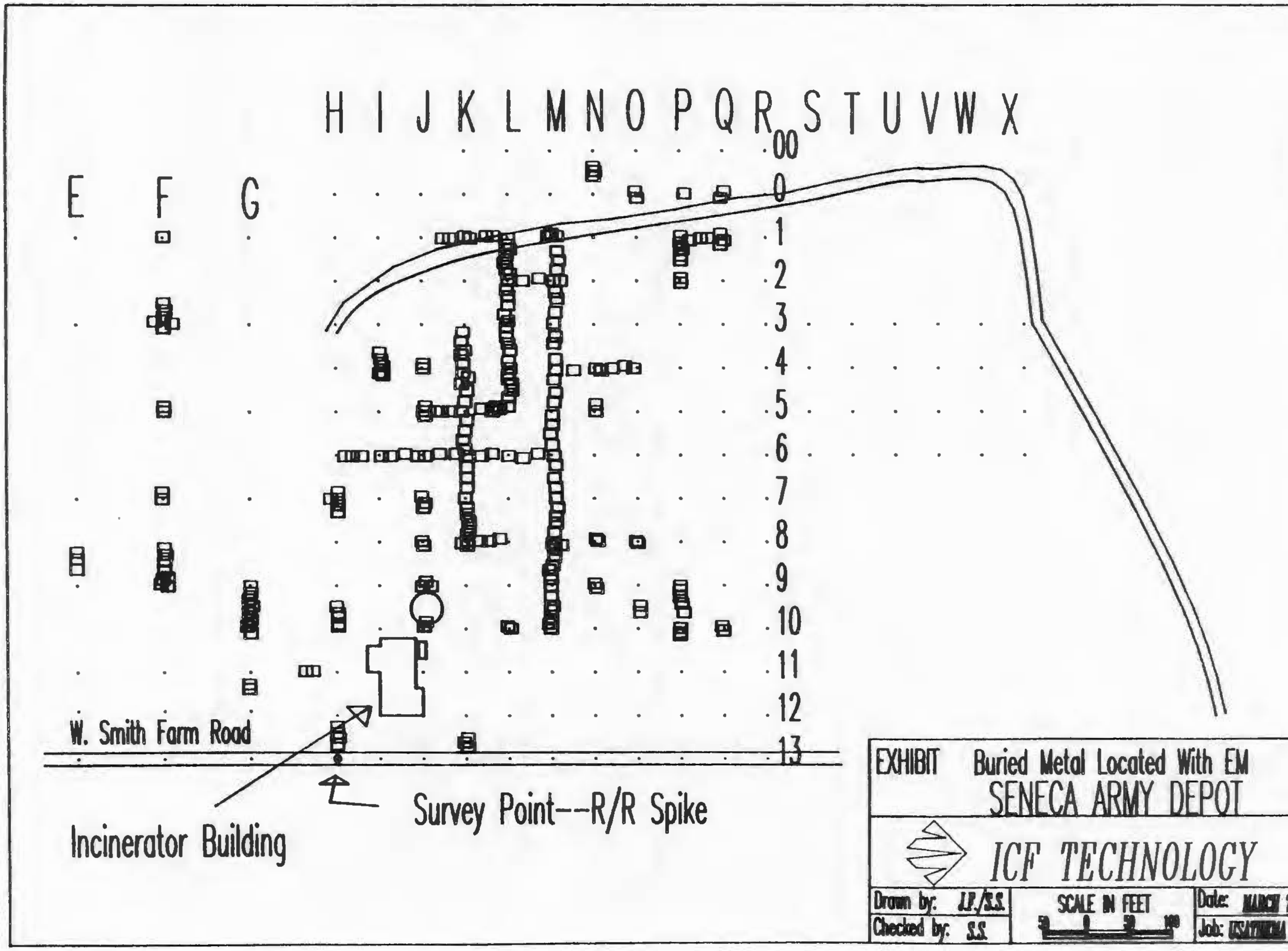


EXHIBIT 3-11
SURVEYED AREA AND BURIED OBJECTS LOCATED WITH RADAR

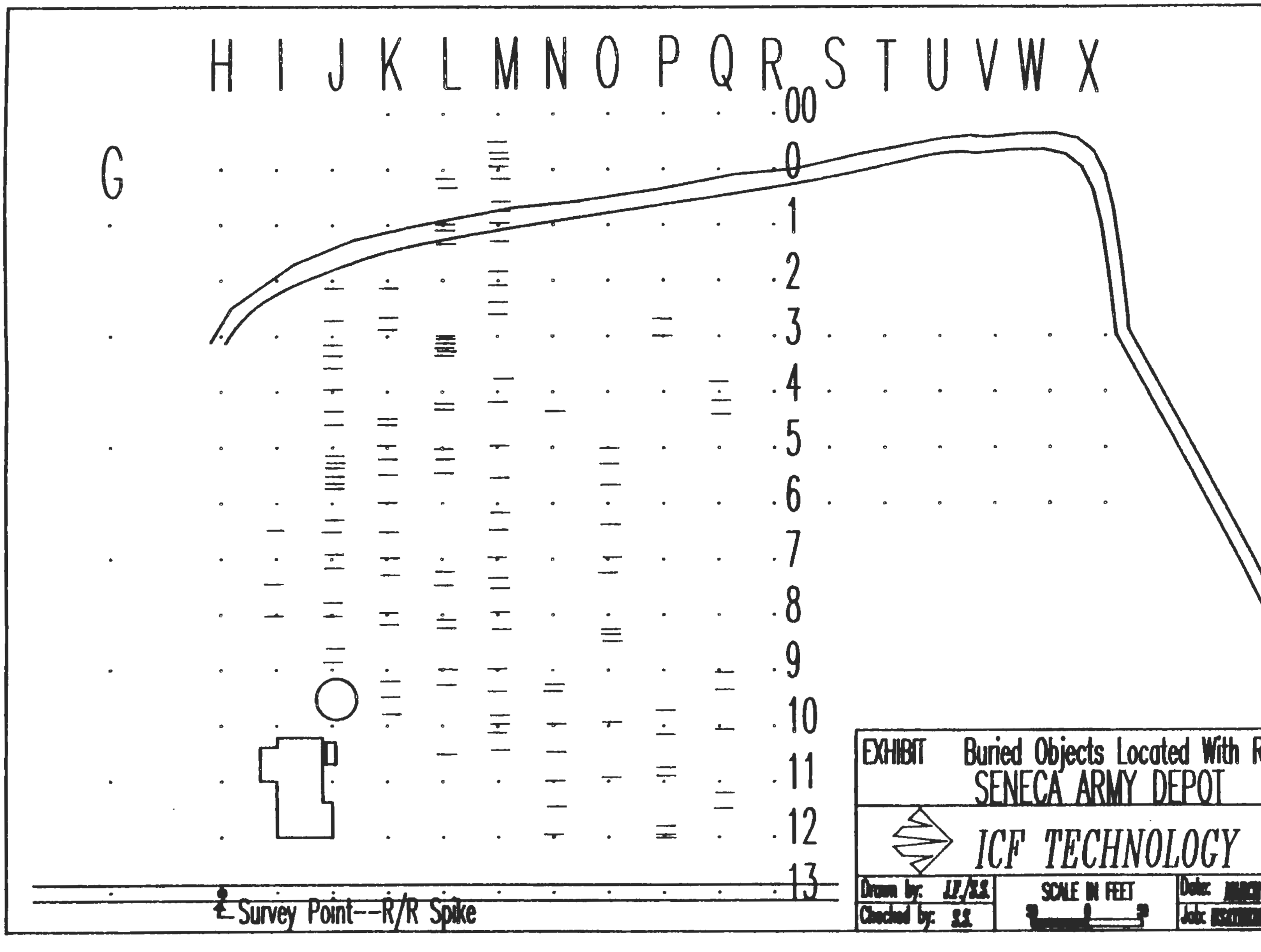


EXHIBIT 3-12

TARGET INTERPRETATIONS FOR GPR SURVEY
LINE K1 - K11

Location	Interpretation	Depth (ft)
0+14	Bedrock	3.0
0+19 to 0+42	Contamination	3.3
0+45	Bedrock w/Limestone	2.0-3.0
0+73	Bedrock	3.5
0+93	Buried Drums	3.5
0+95	Buried Drums	3.5
0+113	Buried Pipe/Drum	3.8
0+135	Bedrock/Edge of Excavation	4.2
0+207	Bedrock/Edge of Excavation	4.2
0+238	Buried Drums	3.3
0+285	Bedrock/Edge of Excavation	3.3
0+299	Bedrock/Edge of Excavation	3.3
0+301	Buried Pipe/Drum	3.3
0+315	Bedrock/Edge of Excavation	4.0
0+344	Buried Pipe/Drum	5.0
0+352	Buried Pipe/Drum	4.5
0+411	Buried Pipe/Drum	3.5
0+454	Edge of Excavation	2.6
0+461	Buried Drum	2.0
0+467	Edge of Excavation	2.6
0+485	Buried Wastes/Pipe	3.0
0+523	Buried Wastes	3.3
0+530	Buried Pipe	3.6
0+535	Buried Drum	2.8
0+541	Buried Pipe/Drum	8.0

Note: Locations are measured from grid point K-1, located at 0+00. Depths are approximate and are calculated from ground surface.

postulated dipping bedding planes of the bedrock formations. From the GPR data, the southerly or westerly dip appears to occur at an approximate angle of 23 degrees, and the location of the shallow bedrock appears to coincide with postulated subsurface outcrops shown in previous geological reports of the New York State Geological Survey.

One example showing the location and dip of the bedding plane is provided in record K1-11, where the outcrop is observed near grid station K2 (Exhibit 3-12). Between stations K1 and K2, it appears that bedrock is dipping and that a bowl-like depression occurs behind the outcrop. Within this "bowl" a very dark band is noted on the GPR record at an approximate depth of 3.3 feet. This area may be representative of some kind of contamination, as also indicated by the high volatiles concentration found in the soil-gas sample from this location. Other GPR records also exhibited these dark bands, and it would appear that at least some of these signatures could be related to subsurface contamination sources. The dark bands are generally associated with areas showing high conductivities.

In general, the EM and GPR surveys provided good correlation of the location and extent of the principal landfill area, and indicated the presence of a large number of potential discrete contaminant sources. Landfilled materials and contaminant sources appear to be located in one or more depressions in the bedrock surface, which is likely associated with the interface between different bedrock formations. The possibility of buried drums exists, and buried drums may be contributing to the observed groundwater contamination. None of these concepts, however, were proven by the geophysics, and direct intrusive methods (borings, test pits, monitoring wells, and sampling) would be required to confirm the geophysical interpretations.

3.3 SOIL-GAS SCREENING SURVEY

3.3.1 Objectives

The primary objective of the soil-gas screening survey was to provide indications of likely source locations within the landfill area, for correlation with the geophysical survey data, and for determining best locations for the subsequent soil sampling. Secondary objectives of the survey were to investigate downgradient contaminant migration patterns in relation to the locations of existing monitoring wells, and to determine whether a nearby underground diesel fuel storage tank is leaking.

3.3.2 Methodology and Procedures

Collection of subsoil air samples and testing for suspected volatile contaminants can be an effective method for determining probable source locations and, in some cases, the general direction and extent of contaminant migration. Volatile constituents from high-concentration sources, whether adsorbed onto the soil matrix, dissolved in groundwater, or directly released from leaking buried containers, will tend to volatilize into the interstitial air spaces within the unsaturated zone. The rate of volatilization and concentrations found within soil gas are complex functions that depend on sampling procedures and contaminant solubility, the partitioning coefficients of the contaminant between soil, water and gas phases, and the porosity and degree of saturation throughout the aquifer and soil column. Generally, few of these factors are known or controllable for a given site; however, the technique can be useful without developing exact quantitative models describing observed soil gas concentrations. By interpretation of general patterns and relative levels of soil-gas constituents within an area, a cost-effective tool is provided for indicating source locations and defining locations for more precise and accurate sampling and analysis.

It was felt that the Landfill and Burning Pit area at SEAD represented a good candidate for use of soil-gas surveys in defining probable source locations and for providing additional details on contaminant plumes. Available evidence indicated that the depth of landfill contents was less than 10 feet, and that buried containers or contaminated soils likely would be encountered within 4-10 feet of the surface. Thus, shallow soil-gas samples were expected to provide a good indicator of the source locations for the volatile chlorohydrocarbons and hydrocarbons that have been detected in the groundwater downgradient from the site. The shallow aquifer, consisting of a thin layer of weathered shale approximately five feet below the surface, is overlain with low-permeability glacial till. It was expected that volatilized contaminants from the more permeable aquifer zone would tend to be trapped within the less permeable unsaturated zone, and higher concentrations within the groundwater were expected to be detectable in down-gradient soil-gas samples.

The soil-gas surveys across the landfill and downgradient areas were performed by collecting samples of air obtained from shallow, small-diameter holes placed into the unsaturated zone. Collected samples were analyzed for the presence and relative abundance of suspected volatile constituents, using a field-operated gas chromatograph that provided a measure of discrimination between the various chlorohydrocarbon and hydrocarbon contaminants that had been found previously in groundwater samples. This ability to detect various volatile species was expected to be useful in evaluating source locations as well as potential degradation that could be occurring in the ash-laden landfill matrix. The method was also used to determine whether the underground diesel fuel storage tank at Building 2207, containing several hundred gallons of product, is leaking. The tank is 15-17 years old, is situated within a partially saturated, slightly acidic medium, and has no cathodic protection. It was felt that leakage could be related to the observation of hydrocarbon product within a nearby monitoring well in 1987. Because the investigations required detection of both volatile hydrocarbon and chlorinated constituents, a capillary-column gas chromatograph with a photo-ionization detector was used at the site for analysis of the soil-gas samples, to provide a reasonable degree of discrimination and sensitivity for the contaminants likely to be encountered.

Soil-gas sampling was performed across the survey grid established at the beginning of the field work. Initially, approximately 80 samples were collected from points spanning the entire grid, with greater focus on the suspected area of the landfill. The EM survey was used to screen sampling locations for potential presence of buried containers, and it was necessary to move several feet away from the grid points for collection of some samples. In addition, samples along W. Smith Farm Road (survey line 13) were collected from immediately adjacent to the roadway rather than through the asphalt roadbed. Samples were collected from the vicinity of the diesel fuel tank and toward previous borehole BH-29, where a floating product had been observed; from the vicinity of the "grease pits" east of the landfill area; and from within the former sludge pond. On-site analysis of these initial samples led to collection of additional samples in the areas where higher levels of volatile contaminants were observed. The grid and sampling locations were extended farther to the north than originally planned, because of the detection of buried metal in that direction and positive soil-gas results along the north side of the landfill. In addition, the density of sampling in the down-gradient direction was increased to encompass all 100-ft grid points, because volatile constituents were detected in the first samples obtained near the western Depot boundary, and it was desirable to determine whether the apparent contamination was localized or was associated with groundwater contamination. Because of these extensions in area, the degree of planned over-sampling (i.e., replicates and higher density of points) was curtailed. A total of 164 soil-gas samples were collected and analyzed, which was 24 more samples than originally planned.

At each sampling location, a 0.5-inch diameter hole was punched into the soil, using a stainless steel bar with slide hammer, to a depth of 3-4 feet. Each sampling location and depth was chosen to avoid underground utilities and any indication of buried objects noted by the previously-conducted EM survey. The depth of a few samples was reduced to two feet, which permitted collection of samples where the GPR clearly showed anomalies at greater depths. All samples were collected from the unsaturated zone, although some samples clearly penetrated into the upper portions of the weathered shale bedrock.

After the stainless steel bar was removed from the hole, a 0.5-inch stainless steel probe was inserted into the hole. Following evacuation of approximately 25 void-space volumes to the atmosphere, air from the hole was pumped into a pre-evacuated, septum-capped glass vial at 2 atmospheres (15 psig) pressure. Sample vials were immediately placed into labeled Whirl-pak bags, stored in darkness, and delivered several times daily to the on-site laboratory for analysis. Occasionally, duplicate samples were collected from the same hole prior to removal of the probe.

After all samples from a given location were collected and the tube was removed, the bar and probe were cleaned by scrubbing with Contrad cleaner in distilled/de-ionized water, rinsed with distilled water, and dried with paper towels. The interior of the probe was then flushed for 30 seconds with ultra-zero grade nitrogen at 20 psig. Immediately prior to sampling, approximately 100 volumes of the sampling probe and associated tubing, valves, and injection needle was flushed with filtered ambient air. The system was then flushed with 25 volumes of air from the next sampling hole prior to collection of the sample, as described above.

Samples were taken to the on-site laboratory established in Building 4 at SEAD, and immediately logged in and placed in a cooler containing the analytical batch queue. Analysis was performed within 24 hours by withdrawing a portion of the sample with an air-tight syringe and directly injecting it into a Photovac Model 10-S-70 portable gas chromatograph equipped with a photo-ionization detector and a capillary column operated at ambient temperature. The ambient conditions in the laboratory room were maintained as constant as possible, considering the poor climate control of the room and the variable outside temperatures during the site work. The chromatograph was calibrated three times daily using instrument response curves and injection of known concentrations of three standards; trans-1,2-dichloroethene (T12DCE), toluene, and trichloroethene (TRCLE), which have respective relative retention times of approximately 29, 48, and 65 seconds under the room-temperature conditions. Retention times of the standards were used to approximately identify the peaks in the chromatogram of the samples, and the response factors of nearest-fit standards were used to calculate the gaseous sample concentrations. In addition, total peak areas were integrated to provide a "Total Volatiles" concentration, essentially a qualitative and relative indicator of all components eluting from the sample.

Due to the limited ability to control run conditions, the retention times of compounds varied considerably between samples, and the simple apparatus did not provide a high degree of discrimination between compounds of similar constituency. Thus, whereas concentrations of substances eluting close to the standard toluene peak were calculated and reported as toluene, the peak(s) could be due to any number of compounds with similar structure, molecular weight, boiling point, or column partition coefficient. Similarly, the concentrations reported as TRCLE or T12DCLE do not necessarily represent these exact constituents, although the chromatogram clearly show that these two compounds can be differentiated. It is believed that the "toluene" peak could be due to the presence of various di- and trichloroethanes, chloroform, carbon tetrachloride, or possibly even C6 to C10 aliphatic hydrocarbons, as well as to toluene, xylenes, and other aromatics.

Between 25 and 35 samples per day were analyzed by this procedure, and the analysis generally kept pace with the sample collection. Carrier gas blanks were analyzed at the rate of one per 10 samples and prior to each batch, and target analyte standards (toluene, trichloroethylene, trans-1,2-dichloroethylene) at concentrations corresponding to expected sample concentrations were analyzed prior to and following each batch. Analysis of sample blanks (obtained after cleaning of sampling probe) or carrier gas (method) blanks were performed at the rate of one per 10 samples. Eight days were required for on-site analysis of 164 field samples and the associated QC samples.

At the end of each analytical run, results were interpreted and the concentration of target analytes were tabulated and mapped. These results were used to guide the next round of sample collection, and to determine the location for subsequent soil sampling for laboratory analysis.

All field sample collection (location, sample number, and depth) was recorded on log sheets, and on-site laboratory activities and results were documented in permanently-bound logbooks. All chromatogram were immediately attached to the appropriate pages of the field logbooks.

A summary of results obtained during the soil-gas sampling is provided in Exhibit 3-13, which shows a plot of total volatiles concentrations across the site. More complete data and representative chromatograms from the soil-gas analysis are included in Appendix C.

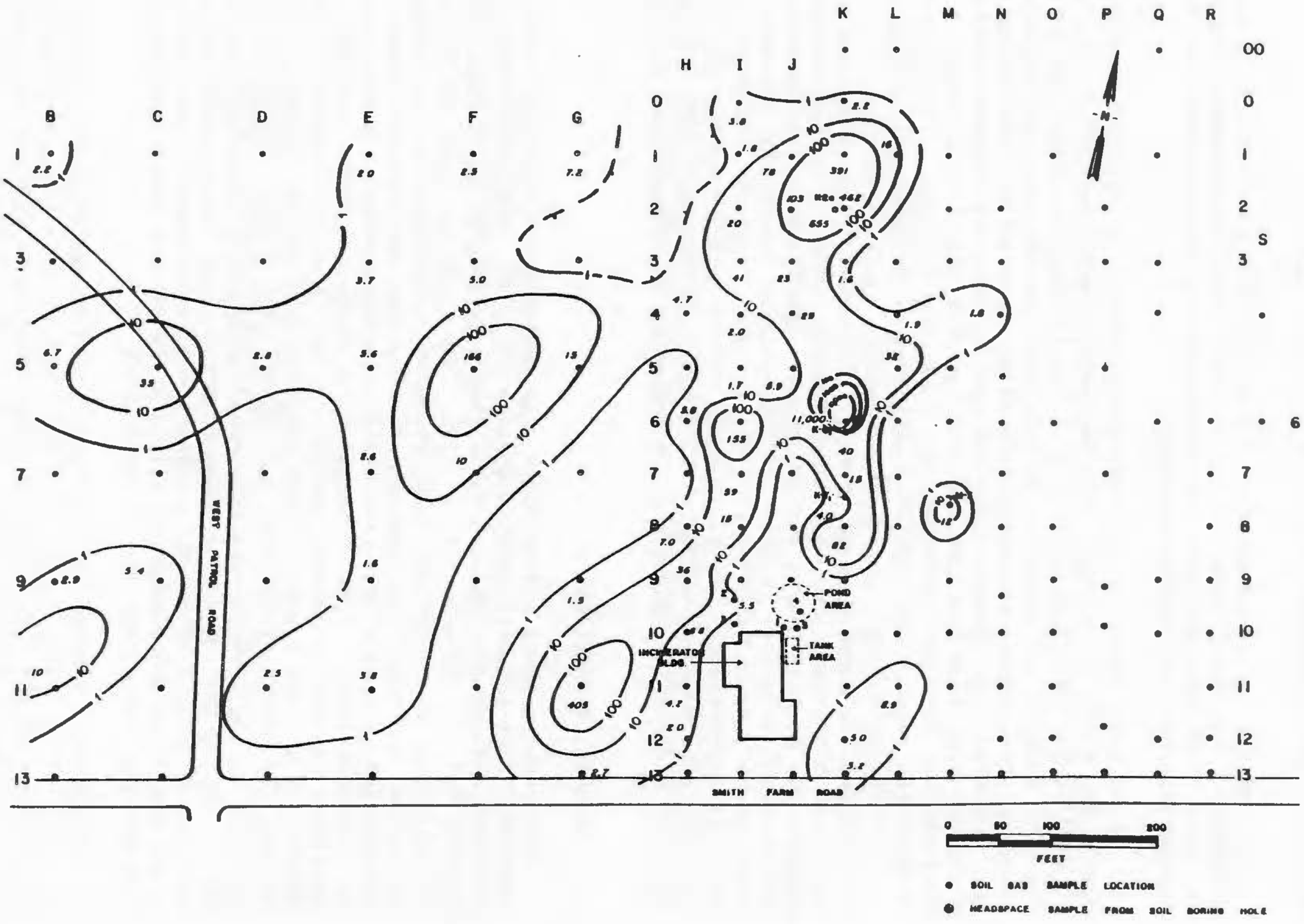
Sample holes near the apparent middle of the landfill were monitored with an HNu probe to determine whether hazards warranted use of respirators. At one location near grid point K-6, a liquid substance was observed on the steel bar when it was removed from the hole, and the area was immediately evacuated until proper precautions could be implemented. HNu readings in the hole indicated high (greater than 100 ppm) of volatile organics, and portions of the soil gas from locations K-6 and K-8 were sent to the Target Environmental Services laboratory for overnight analysis. GC analysis revealed the presence of typical diesel fuel or kerosene constituents, and a wide variety of volatile chlorinated species. Because of the uncertainty, the K-6 location was sampled using Level B (SCBA) protection, and eight other locations in the same area were sampled using Level C (full-face respirator) protection. Because nearby samples showed significantly reduced HNu readings and levels of volatiles in the field GC analyses (including adjacent soil boring SS-02), it is believed that the incident involved a very localized source of contaminants. It is possible that a small container of liquid waste was penetrated by the steel bar. No similar difficulties were encountered in any other areas while conducting the remainder of the soil-gas surveys.

3.4 GROUNDWATER SAMPLING

Groundwater level measurements were performed in all wells within and surrounding the Landfill area on October 24, 1988. Additional water level data were collected in the ten wells that were sampled on October 27-28, November 8-9, and November 16-17, 1988. The depth to water and the depth of the well from the top of the well casing was determined with an Olympic Model 100 sounder and steel tape measure, and the tape was used to measure the casing stick-up. Data were recorded in a bound notebook and used to calculate the five equivalent volumes of water to be purged prior to sampling. The location of the wells (except for Well PT-26, which is located outside of the landfill area) with respect to the sampling grid was determined by measuring the east and north offsets from the nearest grid point. The HNu reading for each well casing interior was determined immediately upon removing the well cap, to verify that hazardous volatile constituent levels would not compromise the planned Level D work. No readings were found above 2.1 ppm, and readings in all wells reached background within a few minutes after opening; all wells were sampled without the use of respirators

Groundwater samples were collected from 10 existing monitoring wells at the site during the time that the field surveys were being performed. Wells were sampled in the order of increasing contaminant concentrations found in prior studies, as follows: PT-10, PT-15, PT-25, PT-24, PT-17, PT-20, PT-21, PT-22, PT-12, and PT-18. To avoid any possibility of cross-contamination

EXHIBIT 3-13
CONCENTRATION OF TOTAL VOLATILES IN SOIL-GAS SAMPLES



between the two efforts, wells were not sampled in a given area during the time that soil-gas determinations were being conducted. Duplicate samples from all 10 wells were collected in 40-mL VOA vials for volatile organic constituent analysis, and samples from five wells (PT-10, PT-12, PT-18, PT-22, and PT-24) were collected in 1-L polyethylene bottles for metals analysis.

Prior to sample collection, the water level with respect to the top of the casing was measured with a clean electric well probe and recorded in the field notebook. An initial sample was withdrawn for pH, conductivity, and temperature measurements. Wells were purged using a clean PVC bailer until 5 equivalent volumes (including both well volume and sand pack) were removed, or until the well was evacuated. In all cases, wells went dry prior to evacuation of 5 EV. The wells were allowed to recharge for approximately 30 minutes, then evacuated again. Samples were then collected as soon as sufficient volume became available in the well. Measurements of pH, temperature, and conductivity were made at the completion of the first evacuation, and immediately after the purge/recharge was completed. Samples were collected with the same PVC bailer used for purging.

Sampling equipment was not permitted to come in contact with the ground around a well, to avoid contamination of the water in the well bore. Bailers being used were placed on top of the well protective casing while recharging occurred. All well purging equipment was thoroughly cleaned between wells using distilled water for scrubbing and rinsing, at the site decontamination station. A sample of the distilled water to be used was analyzed for target analytes prior to the field efforts by standard EPA methodology (Methods 624 and ICAP metals). This sample showed a copper concentration of 100 ug/L, and the findings were discussed with the USATHAMA Project Officer. It was decided to continue the sampling work in spite of the high copper concentration found in the distilled water, primarily because copper in the groundwater at the site was not a principal concern. A second sample of the distilled water was sent to the laboratory for analysis along with the groundwater samples collected on October 25-26, 1988. A rinse blank, using the same distilled water, was also collected after cleaning the bailer used in Well PT-12. These samples showed copper concentrations of 117 and 118 ug/L, respectively, confirming the presence of copper in the distilled water supply. (Copper was not detected in any of the samples from the monitoring wells).

All sample containers used in the field were cleaned in the laboratory according to USATHAMA QA Plan specifications and were shipped to the site, with required preservatives in vials taped to the neck of each bottle, in the same insulated shuttle that would be used for shipping filled containers back to the laboratory. Chain of Custody forms, carbonless-copy Field Parameter Forms, and sealed Blue Ice packs were contained in each shuttle. Tamper-proof, serialized chain of custody seals were used for shipping bottles to the field and for shipment of samples to the laboratory. Sample tracking began when the sample bottles were shipped, and additions were made to the tracking report after the samples were received by the laboratory. Received condition, analyses requested, analysis dates to meet holding time limitations, and any special instructions pertinent to each sample (e.g., possible high concentration or other characteristics obtained from the Field Parameter forms) were included in the tracking report.

Samples for metals analysis were filtered through a clean 0.45 micron Millipore filter, using Ultrapure nitrogen for additional filtering pressure. Each container was rinsed with three portions of the filtrate prior to filling with the sample, which was then preserved with nitric acid to pH 2. Samples for volatile organic analysis were not filtered, and were placed directly into the vials from the sampling bailer. Immediately after collection, samples were placed in the sample shuttle and maintained at 4°C by frozen Blue Ice packs. The Blue Ice packs were frozen for 24 hours prior to use in the refrigerator located in Building 4. Shuttles were packed, together with copies of the completed sampling data sheet and Chain of Custody forms and fresh Blue Ice packs, and sent by Federal Express overnight service to the laboratory at least every other day. The 10 wells were sampled in two days, and only two shuttles were required for the water samples.

All measurements and a record of sampling activities were recorded in a permanently-bound logbook with prenumbered pages, and appropriate data were also recorded on the sample transmittal forms contained in the sample shuttle, at the time of sampling. Information recorded included: well identification, water level and total well depth measurements; calculated water purge volume; field measurement results for temperature, conductivity, and pH of the purge water; observations during purging activity such as water color, depth to water level, whether the well went dry, actual total quantity of water extracted from the well, date and time sample was collected; the analytical parameters sampled for at the site, sampling procedures (i.e., samples filtered, chemical preservatives used), and the name of the samplers. All logbook pages and the sample data sheets associated with each day's activities were reviewed and signed by the Sampling Team Leader.

Problems were encountered in completing the process of sampling and analyzing for volatile organic constituents. The initial sampling occurred on October 27-28 with no difficulties, but the laboratory missed the holding times for volatiles samples (7 days for the unpreserved samples) before analysis could be initiated. (Because of an internal laboratory contamination problem, the samples were not immediately introduced into the analytical queue, and holding times were exceeded before the problem could be resolved). A second round of sampling, for volatile constituents only, was conducted on November 8-9, but some of these samples were frozen in the shuttle during shipment. Because the contents of one of the samples from the most highly contaminated well (Well PT-18) had been released into the shuttle, it was decided that the entire shipment would be discarded. A third round of sampling for volatiles analysis was conducted on November 16-17, 1989.

A summary of pertinent information and field data on the wells and water samples collected during the study is given in Exhibit 3-14. Results of the pH, temperature, and conductivity measurements are provided in Appendix D.

3.5 SOIL SAMPLING

Ten subsoil samples were obtained for volatile organic contaminant analysis from locations that were selected on the basis of preliminary results

EXHIBIT 3-14
GROUND SURFACE, WATER LEVEL, AND WELL DATA

WELL NO.	EAST COORDINATE (UTM)	WELL CASING HT. (FT)		SURFACE ELEVATION (FT)	WELL DEPTH (FT)	DEPTH TO WATER FROM TOP OF CASING (FT)				WATER LEVEL ELEVATIONS (FT)			' WELL BOTTOM ELEV(FT)	WEA BE DEP
						10-19-87	10-24-88	11-08/09-88	11-16/17-88	10-24-88	11-08/09-88	11-16/17-88		
PT- 10	346332	3.67	ss	677.9	46.15		10.11	9.46	9.83	671.5	672.1	671.7	631.8	
PT- 11	346143	3.67	ss	654.8	19.43		9.17			649.3	658.5	658.5	635.4	
PT- 12	346025	3.25	ss	649.0	13.23		9.20	8.67	9.18	643.1	643.6	643.1	635.8	
PT- 15	345894	3.67	ss	634.4	19.39		10.20	9.94	9.83	627.9	628.1	628.2	615.0	
PT- 16	345819	2.08	*?	635.2	10.87		6.25			631.0	637.3	637.3	624.3	
PT- 17	345884	1.95	*?	638.5	11.50		7.51	6.92	8.58	632.9	633.5	631.9	627.0	
PT- 18	346089	2.33	ae	654.6	11.58	5.92	9.29	9.29	9.08	647.6	647.6	647.8	643.0	
PT- 19	345994	4.25	ae	644.0	12.64	5.46	8.81			639.4	648.3	648.3	631.4	
PT- 20	345964	2.50	ae	644.1	11.50	6.67	9.67	8.42	8.50	636.9	638.2	638.1	632.6	
PT- 21	345971	1.79	ae	645.8	19.31	18.71	9.06	13.73	15.50	638.5	633.9	632.1	626.5	
PT- 22	345969	2.50	ae	645.1	11.68	6.50	10.32	10.00	9.58	637.3	637.6	638.0	633.4	
PT- 23	345874	2.42	ae	638.6	11.81	5.42	8.06			633.0	641.0	641.0	626.8	
PT- 24	345810	2.33	ae	633.3	11.50	4.79	7.16	6.52	6.33	628.5	629.1	629.3	621.8	
PT- 25	345852	2.50	ae	634.0	11.84	5.67	11.03	10.33	10.08	625.5	626.2	626.4	622.2	
PT- 26		2.50	ae	617.5	13.70	5.17	11.98			608.0	620.0	620.0	603.8	
PT- 13			ss	635.2	6.00									
PT- 14			ss	638.5	15.50									

WELLS PT 18 - PT-26 DRILLED 10/16/87 - 10/18/87
WELLS PT-10 - PT-15 DRILLED 07/28/79 - 08/02/79
WELLS PT-16 & PT-17 DRILLED 09/24/87

ss - SURVEY DATA, SEAD DWG NO. 18-81, DATED 8/8/80

*? - ASSUMES WELL 17 IS SAME AS REPLACED WELL 14
AND WELL PT-16 IS SAME AS REPLACED WELL PT-13

ae - FROM AEHA WELL SUMMARY LOGS (REPORT NO. 38-26-0313-88)

BOH - BOTTOM OF HOLE FROM BORING LOGS

from the soil-gas and geophysical surveys. Most of these samples were obtained from the general vicinity of the landfill, at or near where high soil-gas readings had been obtained. Samples were collected from three down-gradient locations, and also along a transect through the middle of the landfilled area. Four samples from within the landfill and a background sample were collected for metals analysis. A background sample for volatiles analysis was not collected because these contaminants are not indigenous in SEAD soils, and the sampling for volatiles was focused on determining the location of sources of contamination.

The location of all soil sample points was obtained by measuring the east and north offsets of the soil boring from the nearest grid point or monitoring well. The coordinates and a description of the sampling locations are given in Appendix A. A wooden stake labeled with the field sample number was driven at each sampling location. Periodically, the borings were monitored with an HNu instrument to determine whether hazardous levels of volatile constituents were present. In general, readings were at or near background, except in boring SS-02, where an indication of 4-5 ppm was noted when the sample was collected at a depth of 2.5 feet. These readings, and the proximity of the location to grid point K-6, prompted collection of an additional sample from the same boring at a greater depth.

Duplicate subsoil samples were collected into clean 40-mL septum-topped, screw-capped VOA vials. A boring was made to a depth of about three feet (depending on the depth used for adjacent soil-gas samples, and sometimes limited by auger refusal in the weathered shale) using a 2.5-inch diameter stainless steel bucket auger. Upon reaching the desired depth, a sample was obtained with the auger, and plugs from the auger barrel were then cut with a clean 0.5-inch diameter metal cork borer and placed into the VOA vial. The plugging process was repeated, with tamping of the vial contents using a clean Teflon rod, until the vial was overfilled and zero air space remained. The overfill and any soil remaining on the vial top and threads were carefully removed using the Teflon rod, and the vial was immediately sealed with the teflon-lined septum cap. The entire process of auger removal, subsampling, and sample collection required approximately 25 seconds. For location number SS-02, separate samples labeled SS-02A and SS-02B were collected from depths of 2.5 feet and four feet, respectively.

Difficulties in using the hand auger were encountered at all locations within the vicinity of the landfill. Most locations required several attempts, each with slight offset, to penetrate greater than about one foot into the landfill debris. For example, we were forced to move ten feet away from grid point K-6, where the high soil-gas reading had been obtained, before a depth of more than a few inches could be obtained. Pieces of wood, large solid shale fragments, slag-like material, rags, and other obstructions were often encountered. Except for a thin (0.5-1 foot thick) surface covering, large areas of the site apparently contain primarily landfilled materials other than soil. At two locations (SS-11 and SS-12), augering proved impossible and an 8-inch wide by 5-foot long by 2-foot deep trench was dug with pick and shovel into the weathered rock and slag-like material at each location. Samples were then collected from the bottom of each trench using the cork borers.

Samples for metals analysis were collected in clean 500-mL wide-mouth polyethylene bottles (except background sample number SS-01, which was placed in a 1-L polyethylene bottle), using the bucket auger and a clean stainless steel spatula. Packing of samples into their respective shuttles, completion of all logbooks and sample transmittal forms, and shipment of samples to the laboratory proceeded as described for water samples in Section 2.4. All sampling tools were cleaned as described in Section 2.4. A rinse blank was collected after cleaning of the auger following collection of sample number SS-02B.

3.6 BUILDING INSPECTION

The incinerator building was inspected for the possible presence of contaminant sources within the Dry Well and Wet Well that are denoted on Depot drawings of the building. Entry occurred on October 24, 1988, using Level B protection, and an organic vapor analyzer (OVA) and Explosimeter were used to survey the interior. The OVA was used to determine whether volatile organic contaminants were present within the ambient air of the building interior or the sumps. Both the upper and lower levels of the building were inspected.

The upper level of the building is an open area (no structures or furniture), with plywood flooring. Large deposits of bird droppings were found on the floors, arising from the use of the building eaves as roosts by a large population of pigeons. (Pigeon droppings have been associated with the presence of the fungus <u>cryptococcus</u> <u>neoformans</u>, which causes an infectious disease (cryptococcoses) characterized by the production of nodular lesions or abscesses in the lungs, subcutaneous tissue, the brain, and meninges. It is not known whether the fungus is present in the droppings within the building-- no sampling or analysis was performed during this study-- but it is suggested that appropriate precautions be taken by any personnel entering the building).

The lower level of the building was found to contain a main area where the incinerator ovens, conveyor belts, sumps, and associated structures are located. Several individual rooms are present, which were apparently used for the incinerator control systems. The sumps contained standing water over a layer of sediment, and residual incinerator ash was noted in the ovens. The entire area was covered with a layer of fine dust of unknown origin.

No readings indicating the presence of volatile contaminants were found during the building survey. Although OVA measurements indicated the absence of volatile contaminants, two samples were collected from water contained in the sumps. However, these samples were included in the initial batch of water samples for which holding times were exceeded, and no analysis was performed. Because there was no indication that volatile contaminants were contained within the water or sediment, the sumps were not subsequently re-sampled.

The primary purpose of the building inspection was to ascertain whether the sumps could be a source for observed groundwater contamination, and no indications were found that such is the case. Sampling and analysis of the dust and ash within the building were not performed, and it is not known whether the building contains hazardous quantities of heavy metals or combustion by-products.

An inspection was made of the area around the underground diesel fuel tank, which is located along the east side of Building 2207. The filler pipe and vent pipe were located, but all connecting lines to the incinerator are located underground, within the steep embankment adjacent to the building. There was no visual or olfactory evidence of tank leakage or of major spills having occurred, although the odor of fuel is obvious in the tank vent pipe. Several soil-gas samples were collected from immediately adjacent locations, in a depression at the foot of the embankment containing the tank. One of the soil borings was located at the nearest down-gradient point from the tank, on the opposite (west) side of the building.

3.7 AQUIFER TESTING

3.7.1 Objectives

The objective of aquifer testing conducted in the landfill area was to generate the data needed to estimate the permeability of the water-bearing materials beneath the site. The rate of groundwater flow, which influences contaminant migration, was then estimated from the permeability values. The aquifer tests (slug tests) were performed on four shallow groundwater monitoring wells which are screened in the overburden and upper, weathered portion of the bedrock, and one monitoring well which extends nine to ten feet into the bedrock. These wells were chosen because of adequate thickness of the water column in the well and areal location down-gradient of the landfill area. The permeability data generated from these tests were used in conjunction with soil porosity data and groundwater elevation data (flow gradients) to develop estimates for the rate of groundwater flow.

3.7.2 Methodology and Procedures

The slug test is generally used in a single-well situation where the permeability of the surrounding soil is too low to perform a conventional pump test. Two data-gathering procedures conducted during the slug test are the falling-head portion, and the rising-head portion of the test. Both are initiated by causing an instantaneous change of the water level in the monitoring well through a sudden introduction (falling-head), or removal (rising-head), of a volume of water or a solid cylinder of known volume (a slug). In the falling-head test, the approach toward equilibrium of the water level is measured, after the introduced slug initially increases the original water level in the well. In the rising-head test, the rise in water level is recorded over time, after slug removal causes a decrease of the original water level in the well. These data are then used to compute the permeability of the soils surrounding the well. The relative amount of water displaced during the slug test is small, so the permeability values determined are only representative of the aquifer materials in the immediate proximity (within a few feet) of the monitoring well screen. Thus, to obtain representative permeability estimates, slug tests should be conducted at a large number of locations within an area of interest.

The construction of the existing monitoring wells at the site severely limited the number of slug tests that could be performed and the degree of success attained; in many cases, either the short water columns provided an inadequate amount of water that would be displaced, or recoveries were too slow for proper measurements to be made. The first set of groundwater level readings collected at the site on October 24, 1988, identified ten wells with a water column height of less than 4.5 feet, which is the minimum height needed for use of five-foot long slugs. All of the wells are constructed of two-inch PVC casing. Therefore, two slug lengths (two feet and five feet), each constructed of 1-inch Schedule 40 PVC casing, filled with clean sand and fitted with threaded end caps, were used during the testing. Initially, most of the 15 existing wells were tested qualitatively to determine whether the slug tests would be expected to provide interpretable results. For example, Well PT-10 (a deeper background well which had a sufficiently long water column) was not chosen because preliminary testing showed that very little water-level change would be observed during the tests. Based on the initial data, five wells were selected which appeared to have moderate to good potential for testing and were distributed properly in the area of interest. The location, depth, and water-column thickness for these five monitoring wells are shown in Exhibit 3-15.

Data were collected in the field using an Enviro-Labs^{R} Model EL-200 digital memory data logger outfitted with an Enviro-Labs^{R} pressure probe. The pressure probe, which is small enough to be used in two-inch diameter wells, has a resolution of about ±0.1 inches at shallow depths. The range of 0 to 10 psi can provide high-resolution data for water column heights of 0 to 23 feet. During each test, the water level in the well was displaced by a mechanical slug. The size of the slug depended on the height of the initial water column in the well; one of the two slug lengths was selected to displace the maximum amount of water without disturbing the one-foot long pressure probe at the bottom of the well. Between tests, the PVC slug, pressure probe, and cable were thoroughly decontaminated with distilled water to prevent cross-contamination between wells.

The field testing procedures included the recording of the initial depth of water with an Olympic Model 100 electric water level indicator, then lowering the pressure probe into the well to a depth approximately four to six inches from the bottom of the well. The pressure probe and connecting line displaced a small volume (approximately 200 mL) of water in the well, and the water level was allowed to return to equilibrium before beginning the test. At the start of the falling-head test, the data logger was activated and the slug was quickly lowered into the well. Pressure measurements were recorded automatically by the data logger every 10 seconds, until the water level returned to equilibrium. After completion of the falling head test, the rising-head test was conducted by quickly removing the slug. Data were then recorded as the water level rose, to determine the response of the water level in the well under rising head conditions.

EXHIBIT 3-15

MONITORING WELLS USED FOR THE SLUG TESTS

Monitoring Well Designation	Location	Well Depth (Ft)*	Thickness of Water Column in Well (ft)*
PT-11	South of landfill, across roadway	19.43	10.26
PT-12	West of, and close to landfill	13.23	4.03
PT-15	Southwest of landfill	19.39	9.19
PT-21	West of landfill	19.31	10.25
PT-23	Northwest of landfill	11.81	3.75

*Well depth and water level readings were measured on 10-27-88

3.7.3 Data Analysis

The method of interpreting the water level versus time data generated by the slug tests is based on the methodology presented by Bouwer and Rice, "A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells," Water Resource Research, 12 (1976). This analysis assumes the monitoring well fully penetrates an aquifer of homogeneous, isotropic, infinite medium in which both soil and water are incompressible. This methodology was selected because it best described the shallow, overburden, water table conditions for most of the monitoring wells in the landfill area. The field data for each test were tabulated and plotted on semi-logarithmic graph paper. For the wells tested, these graphs are presented in Appendix D. These data were then used to calculate the hydraulic conductivity of the surrounding soils based on the Bouwer and Rice (1976) equation for screen length less than or equal to aquifer thickness (a reasonable assumption, as noted in Exhibit 3-15):

$$K = \frac{r_c^2 \ln (R_e/r_w)}{2L} \quad \frac{1}{t} \quad - \ln \frac{Y_o}{Y_t}$$

Where:

k = Hydraulic conductivity, in feet per second (ft/sec) [reported as centimeters per second (cm/sec)];

r_c = Radius, in ft; derived from the actual radius of the casing and the porosity and thickness of the filter pack;

R_e = Re-effective radius (the effective radial distance over which the head is dissipated), in ft; must be obtained by using equations and a graph presented in the original paper;

r_w = Well bore radius, in ft;

L = Length of screen, in ft;

t = Time, in seconds;

Y_o = Pressure at y-intercept on graph, in psi; and

Y_t = Pressure at time t, in psi.

A computer program (Slugix, by Interpex, Inc.) which solves this equation was used to reduce the data and compute the average permeability values for the aquifer materials at each monitoring well. The average permeability values obtained for the falling head and rising head tests are presented in Exhibit 3-16. The computer-generated work sheets showing the input data and the average calculations for each of the wells tested are provided in Appendix D.

Most of the permeability values obtained from the slug tests are on the order of 10^{-5} cm/sec. Typical tight clay soils range in permeability from 10^{-9} to 10^{-6} cm/sec, while more permeable silty soils range in permeability from 10^{-4} to 10^{-3} cm/sec (Davis, "Porosity and Permeability in Natural Soils, 1969). Thus, the permeability values obtained are in the range that would be expected for the silty, clayey soils which are found in the vicinity of the landfill.

The variability in the data and the applicability of the method of interpretation probably limit the accuracy of these values to about one order of magnitude. However, data from the falling-head and rising-head tests generally agreed to within experimental error except for Well PT-21. The data generated from the rising-head slug test performed on this well, which is screened in the bedrock, indicates the shale beneath the top weathered surface has a very low permeability. Throughout the duration of the rising-head test, almost no recovery of groundwater occurred in the well, other than the instantaneous change in the water level when the slug was recovered. This information was confirmed during the pre-sampling purge activities conducted before the well was sampling. Only half of the five well volumes needed for purging were removed before the well went dry, and after more than a one hour waiting period, barely enough water had recharged into the well to collect the groundwater sample. Also, during subsequent sampling events, the well was noted not to have fully recovered after 7 days had elapsed. It is suspected that the well is not screened in a water-bearing zone, and that the presence of water in the well is attributed to leakage around the seal from upper zones.

3.8 LABORATORY ANALYSIS

Groundwater and soil samples were analyzed for volatile organic contaminants and metals, for which the ETC Laboratory is currently certified. For volatile organic compounds, EPA Method 624 was followed for analysis of compounds according to USATHAMA certified Methods EJ8 and EW9. Certified analytes and reporting limits are provided in Appendix E. Certified parameters include several of the site-specific target analytes (trichloroethylene, trans-1,2-dichloroethene, chloroform, carbon tetrachloride, xylenes) and 14 other related compounds.

Water samples were analyzed for metals (cadmium, chromium, copper, zinc, magnesium, calcium, and sodium) by ICAP-based USATHAMA-certified Method EG8, following EPA Method 6010. Soil samples were similarly analyzed for cadmium, chromium, copper, lead, and zinc by USATHAMA Method ER9. Reporting limits for these metals are provided in Appendix E.

Following analysis of each sample lot, control charts and conformance summaries (see Appendix E) were prepared according to the requirements of the 1987 USATHAMA QA Program, and submitted to USATHAMA. Several situations were encountered where points were found to lie outside of the control limits, but were judged to be artifacts of very tight control limits arising from the initial certification data. All of the analyses were determined to be in-control and the results of acceptable quality for use in site assessment.

EXHIBIT 3-16

PERMEABILITY VALUES GENERATED FROM SLUG TESTS ON MONITORING WELLS IN THE LANDFILL AREA

	Permeability	
Monitoring Well Designation	Falling Head Test	Rising Head Test
PT-11	9.39×10^{-5} cm/sec	6.55×10^{-5} cm/sec
PT-12	3.48×10^{-5} cm/sec	3.09×10^{-5} cm/sec
PT-15	5.64×10^{-6} cm/sec	1.30×10^{-6} cm/sec
PT-21	1.25×10^{-5} cm/sec	5.87×10^{-11} cm/sec
PT-23	3.08×10^{-5} cm/sec	7.30×10^{-4} cm/sec

The other quality problem encountered -- the presence of copper at concentrations exceeding 100 ug/L in the distilled water used for equipment cleaning -- has been discussed in Section 3.4. This problem could affect the concentration of copper found in water and soil samples; however, copper in water samples was not found at levels above the detection limit, and levels of copper found in the soil samples (9-200 ug/g) would have been affected only insignificantly by traces of the copper-contaminated rinse water remaining on the equipment. Rinse blanks for the groundwater and soil sampling were found to be free of any volatile target compounds.

A laboratory sample tracking report for each sample was initiated when clean bottles were sent to the field, and entries noting date and condition of samples were entered when the samples reached the laboratory. Copies of the laboratory sample tracking report were used by each analytical station to plan the analysis tasks, and each step of the extraction, analysis, and reporting process were reported into the tracking system. Samples and extracts were stored securely at 4 degrees Celsius until checked out by the analyst performing an analytical step. Samples will continue to be stored until release is obtained from the USATHAMA Project Officer.

Upon release of the analytical data by the laboratory QC Coordinator, after determining that the analysis was in control, data were entered into a case file, with all supporting information and paperwork. The electronically-stored data were then transmitted in ASCII-text format for entry into IRDMS Level 1 files along with the field sampling information. These files were processed through the IRDMS error-checking routines before final validation by the QA Manager and transmission to the Edgewood Area 3Com LAN. For ease in manipulation, the ASCII data files were also translated into Lotus 123 spreadsheet formats.

Summaries of contaminant concentrations above the certified reporting limits for all samples collected are shown in Exhibits 3-17 and 3-18. A copy of all analytical results, in the form of submissions to the validated IRDMS data files, are provided in Appendix D.

EXHIBIT 3-17

CONCENTRATIONS OF VOLATILES IN GROUNDWATER AND SOIL

WELL/SMPL NUMBER	CONCENTRATION IN UG/L (WATER) OR UG/G (SOIL)			
	t-1,2-DICHLOROETHENE	TRICHLOROETHENE	CHLOROFORM	CH2CL2
---GROUNDWATER---				
PT-10	BCRL	BCRL	BCRL	BCRL
PT-12	2730.0	1530.0	BCRL	BCRL
PT-15	BCRL	BCRL	BCRL	BCRL
PT-17	56.8	226.0	BCRL	BCRL
PT-18	436.0	9460.0	456.0	BCRL
PT-20	52.6	41.8	BCRL	BCRL
PT-21	BCRL	BCRL	BCRL	BCRL
PT-22	85.1	41.8	BCRL	BCRL
PT-24	71.1	BCRL	BCRL	BCRL
PT-25	BCRL	BCRL	BCRL	BCRL
(CRL)	1.10	2.40	2.10	15.70
---SOIL---				
SS-01	NA	NA	NA	NA
SS-02A	BCRL	BCRL	BCRL	20.00
SS-02B	19.60	2.21	BCRL	3.30
SS-03	NA	NA	NA	NA
SS-04	NA	NA	NA	NA
SS-05	NA	NA	NA	NA
SS-06	BCRL	BCRL	BCRL	20.40
SS-07	BCRL	BCRL	BCRL	19.20
SS-08	BCRL	BCRL	BCRL	19.20
SS-09	BCRL	BCRL	BCRL	17.00
SS-10	BCRL	BCRL	BCRL	7.30
SS-11	BCRL	2.50	BCRL	17.80
SS-12	BCRL	BCRL	BCRL	9.50
SS-13	BCRL	BCRL	BCRL	10.90
(CRL)	0.58	0.90	0.61	1.08

NA = NOT ANALYZED FOR THIS PARAMETER

BCRL = BELOW CERTIFIED REPORTING LIMIT

EXHIBIT 3-18
CONCENTRATIONS OF METALS IN GROUNDWATER AND SOIL

WELL/SMPL NUMBER	CONCENTRATION IN MG/L (WATER) OR UG/G (SOILS, WET WT.)								
	CD	CR	CU	PB	ZN	MG	CA	NA	K
-- WATER SAMPLES --									
PT-10	BCRL	BCRL	BCRL	NA	0.06	35.7	80.8	36.1	2.53
PT-18	BCRL	BCRL	BCRL	NA	0.11	30.4	25.3	120	3.75
PT-12	BCRL	BCRL	BCRL	NA	0.13	37.5	30.3	30	3.46
PT-22	BCRL	BCRL	BCRL	NA	0.09	24.1	190	70.1	2.02
PT-24	BCRL	BCRL	BCRL	NA	0.07	14.2	130	17.4	2
-- SOIL SAMPLES --									
SS-01	BCRL	20.3	15.3	9	52.9	NA	NA	NA	NA
SS-04	2	28.8	98.5	215	159	NA	NA	NA	NA
SS-03	2.8	28.7	61.7	250	321	NA	NA	NA	NA
SS-05	2.6	36.2	200	52.5	296	NA	NA	NA	NA
SS-02A	1.1	22.3	67.6	210	65.3	NA	NA	NA	NA

4.0 INVESTIGATION RESULTS

4.1 HYDROGEOLOGIC ASSESSMENT

Groundwater Flow

Calculation of groundwater elevations from the results of the water level measurements in the monitoring wells indicates the shallow groundwater flow direction should be southwesterly from the landfill area, toward Seneca Lake. Groundwater elevations are typically four to seven feet below ground surface, indicating that shallow water-table conditions exist within the overburden soils and the thin weathered zone of the bedrock surface. Data on ground surface, groundwater, and well elevations were presented in Exhibit 3-6, and a cross-sectional plot of the elevation data for selected wells in the area of the landfill is shown in Exhibit 4-1. A map showing the lateral location of monitoring wells and soil sampling points is given in Exhibit 4-2.

An estimate of groundwater flow rates were obtained from the aquifer permeability data obtained from the slug tests, the groundwater gradient, and the soil porosity. The average linear velocity ($\bar{V}$) can be calculated using the following equation (Bear, 1972):

$$\bar{V} = \frac{Ki}{N_e}$$

Where

$\bar{V}$ = average flow velocity (units of length/time)

K = average permeability (units of length/time)

i = groundwater hydraulic gradient (dimensionless)

N_e = effective porosity of the soils (dimensionless)

The groundwater flow gradient in the area was calculated using the following relationship:

$$i = \frac{\Delta h}{L}$$

where i = hydraulic gradient (dimensionless);
h = change in groundwater elevation across the site; and
L = distance across the site

The distance between Wells PT-18 and PT-17, which lie along the general direction of maximum gradient, is approximately 680 feet, and the change in groundwater elevation between the two wells (as measured on October 24, 1988) is 14.8 feet. Thus, the gradient obtained for the area of interest is 0.022.

EXHIBIT 4-1
GROUND SURFACE AND WATER LEVEL ELEVATIONS

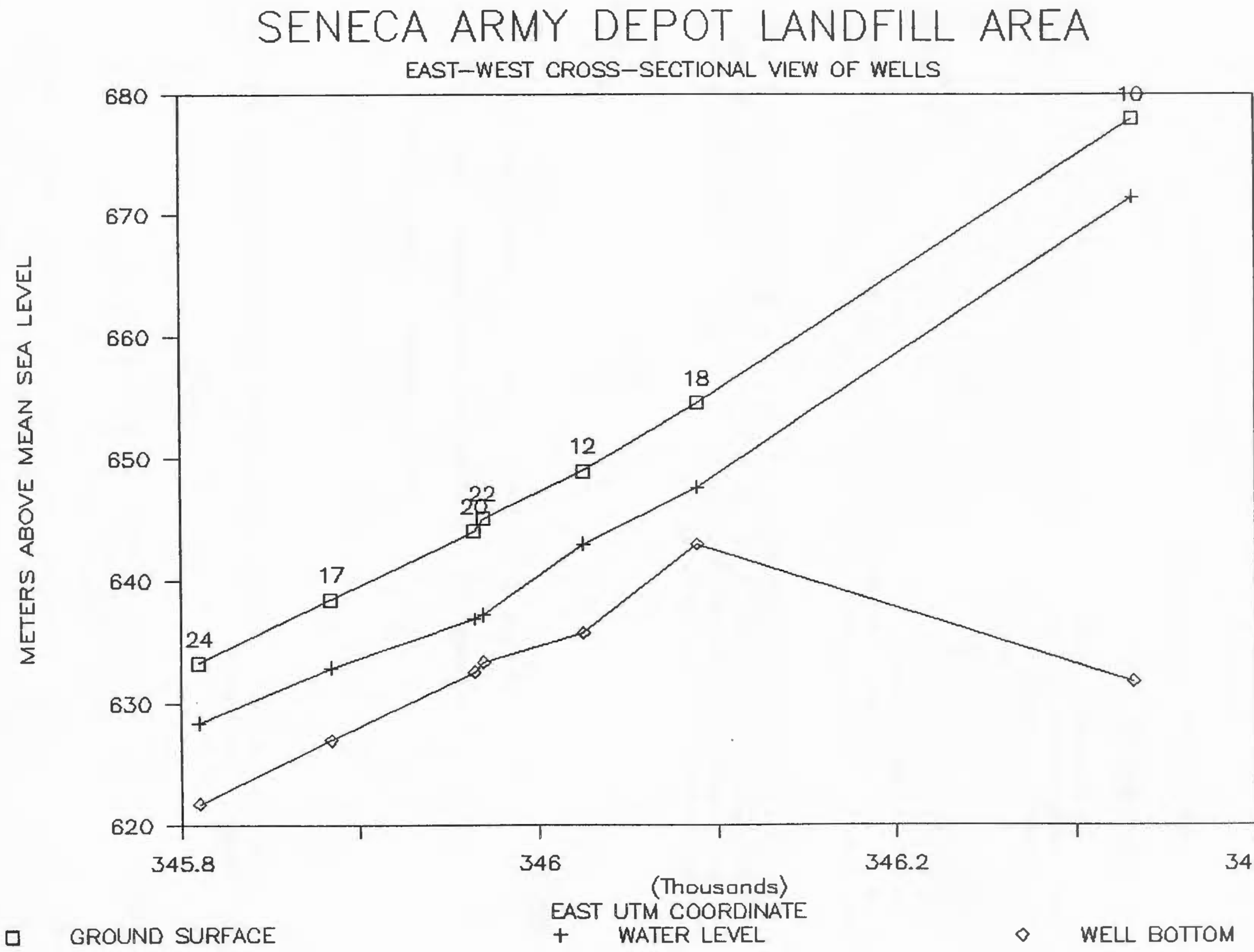
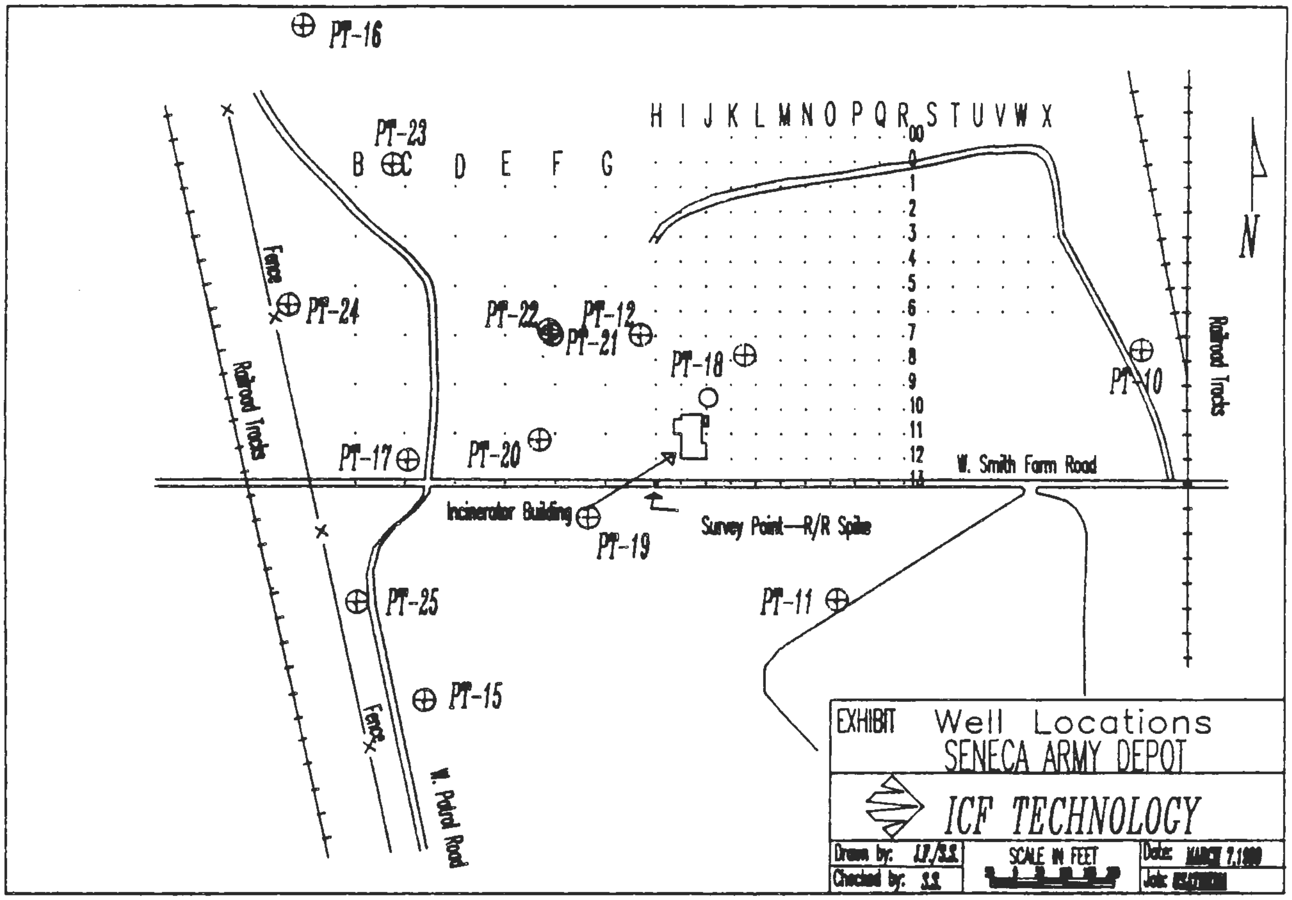
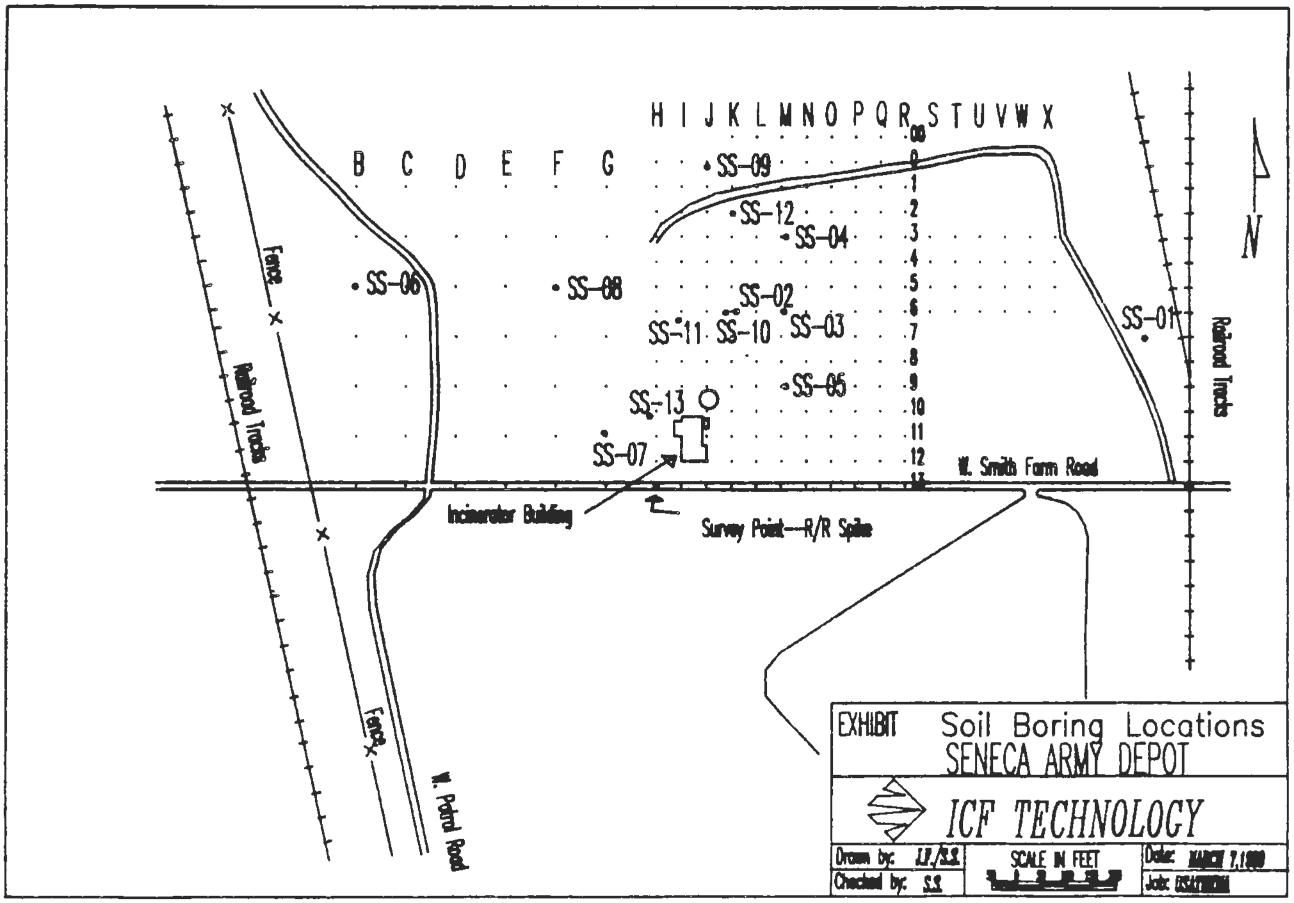


EXHIBIT 4-2
MONITORING WELL AND SOIL BORING LOCATIONS





The effective porosity of the aquifer was estimated from typical values for silty clays and shale bedrock to be about 0.11 (USGS, 1967). The permeability obtained from the slug tests in Well PT-12. which is located between Wells PT-18 and PT-17, averaged 3.3 X 10^{-5} cm/sec (1.08 X 10^{-6} ft/sec). These values for gradient, effective porosity, and average permeability yield an estimated groundwater flow velocity through the aquifer of 2.2 X 10^{-7} ft/sec. Thus, the annual rate of groundwater movement would be about 7 ft/yr, and the time required for groundwater to flow from the vicinity of Well PT-18 to Well PT-17 would be approximately 98 years. Even if the higher permeability values obtained from Well PT-11 are used, the flow rate would be estimated at 16 ft/year, and approximately 42 years would be required for migration of groundwater from the landfill to areas near the Depot boundary.

Previous postulates that the shallow groundwater may be discharging to the surface to the west of the site were not verified during the study. Although the surface elevation continues to fall west of the Depot fence line, and small perennial streams leading to Seneca Lake emanate from the vicinity of the Airfield, it is not known whether the groundwater flowing from the landfill area is directly connected to these discharge areas. Attempts by USATHAMA to sample surface seeps have continued to be inopportune, and it is not clear whether the absence of seeps is related to the continuing dry climate that has prevailed in the area for the past two years. (An indication of the degree of dryness is provided by the percentage moisture values for the subsoil samples collected from the borings at the site. Percent moisture at depths of 2.5 to 4 feet were on the order of 3-6%, whereas the normal water content for soils in this area would be in the range of 10-15%.) The available data were analyzed to determine whether there were any indications that groundwater is trending toward discharge in the down-gradient direction. A cross-sectional plot of ground surface, water level, and depth of wells is given in Exhibit 4-2, for all monitoring wells in the immediate vicinity. It is noted that the water table essentially mimics the topography, and there does not appear to be any trend toward shallower depth to groundwater in the western direction.

The inordinately slow groundwater flow rate that was calculated, when combined with other chemical evidence, suggests that groundwater flow may not be entirely controlled by the flow gradient. Given the estimated range in transport time (42-98 years), and assuming that contaminants move at the same velocity as the groundwater (likely, at the low concentrations observed), sufficient time may not have elapsed for the contaminant plume to have reached the Depot boundary even if the landfill contaminant sources date from the earliest use of the burning pits (circa 1941). The discrepancy is greater for the contaminant sources in the northern portion of the landfill, which more likely date from the 1970s or later. Also, although the data are sparse, it appears that the contaminant plume may not follow the groundwater gradient in the area downgradient of the landfill. The potentiometric surface is definitely lower in wells to the south of the landfill (Wells 11, 19, 15 and 25), as shown in Exhibits 4-3 and 4-4, which should result in a preferred southwesterly flow direction. However, the concentration of contaminants in the monitoring wells (see Exhibit 3-17) would indicate that flow is occurring in a more westerly direction. Thus, one or more preferential pathways that may be due to the presence of either natural or man-made permeable zones is

EXHIBIT 4-3
GROUND SURFACE, WATER LEVEL, AND BEDROCK ELEVATIONS OF WELLS

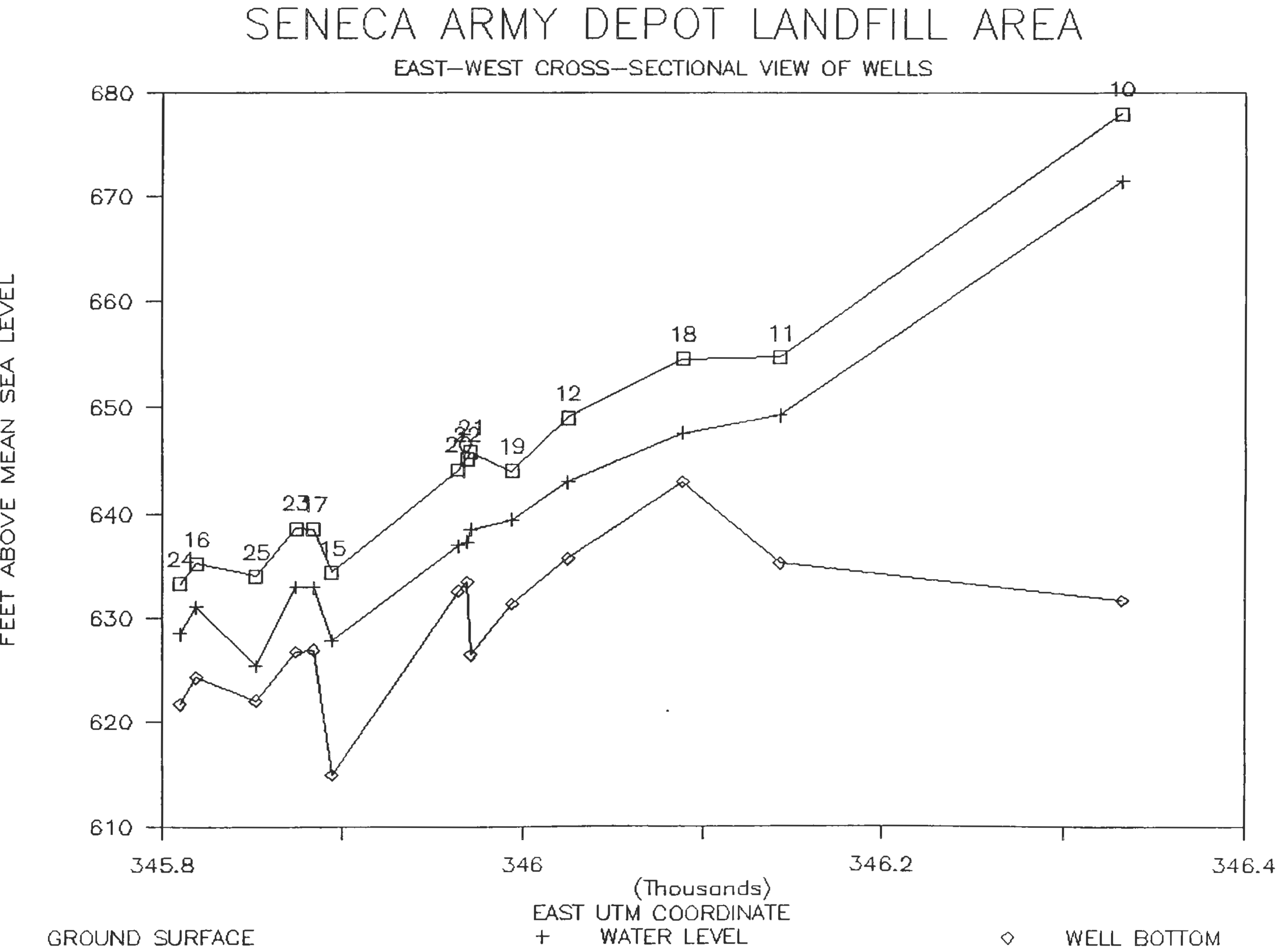
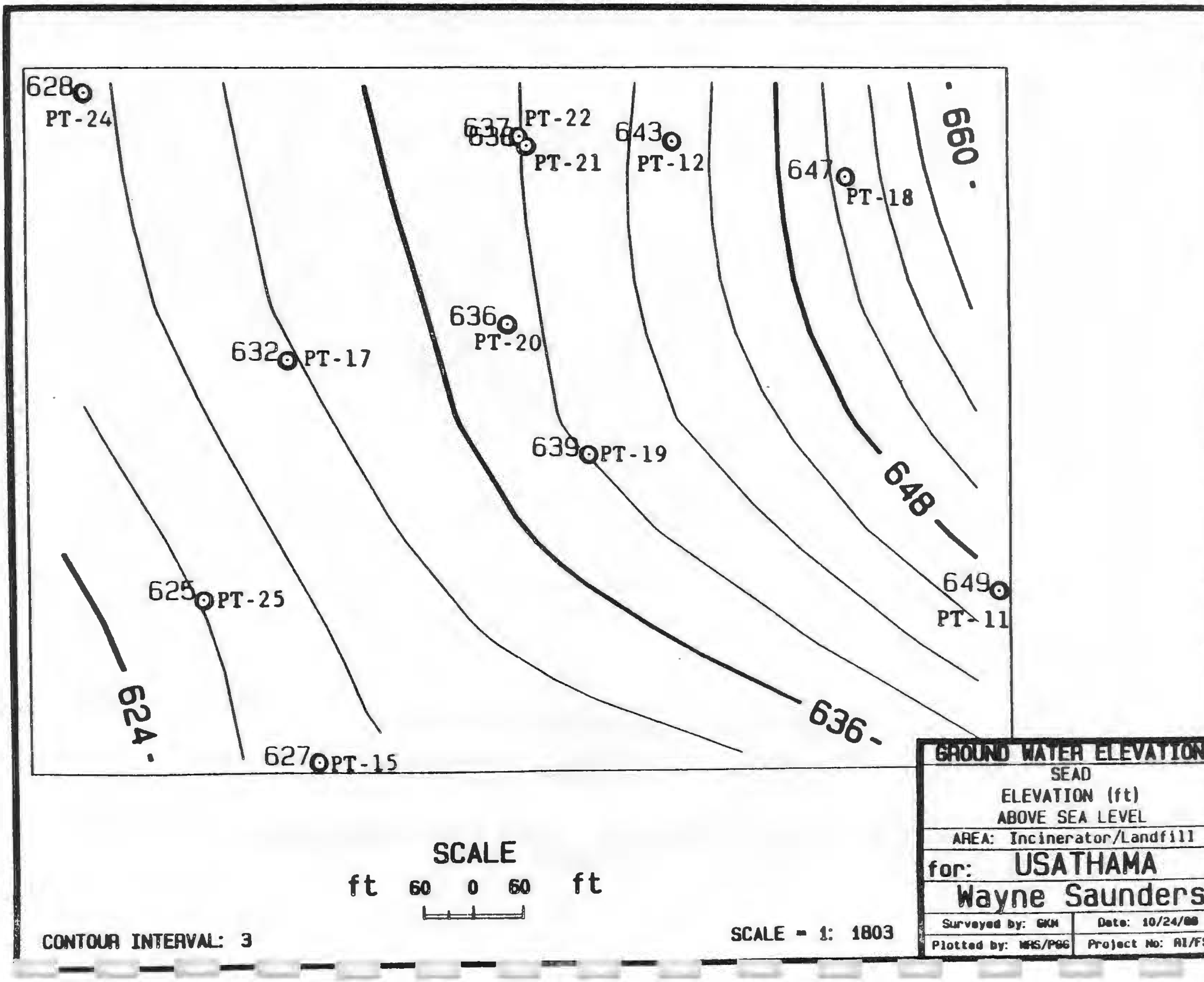


EXHIBIT 4-4
POTENTIOMETRIC SURFACE IN THE LANDFILL AREA



postulated. The geophysical surveys indicated large EM anomalies around an old water line, which traverses the area beginning at Building 2207 and extends westward to a point just east of the West Patrol Road (see Exhibits 3-2 and 3-4). An extended branch water line also continues westward to a point near the Depot boundary. Older installation maps, and the Initial Installation Assessment Update (USATHAMA, 1988), both show an old roadway along this water line.

4.2 ANALYTICAL RESULTS AND CONTAMINATION ASSESSMENT

4.2.1 Groundwater

Data from analysis of groundwater samples in monitoring wells in the area, both from this study and previous efforts, are tabulated in Exhibit 4-5. Although differences in the ratios of species concentrations are noted, the current data generally confirm the previous findings. A plume of contamination from one or more sources in the landfill area has migrated to, and likely extends beyond, the western boundary of the Depot. The overall pattern indicates that a narrow plume exists between the source areas and Well PT-17, extending in a west-southwestern direction. Concentrations in wells further upgradient (PT-20 and PT-22) are of the same order or less than in Well PT-17, and contaminant levels drop by roughly two orders of magnitude from Well PT-18 (near the source) to Well PT-17. The very volatile constituent chloroform was detected only in Well PT-18. The reduction in concentration along the transport pathway is possibly due to loss of the volatile constituents from the slow-moving, shallow groundwater. There is also considerable variation in the relative concentrations of the chlorinated species, with no obvious overall correlation to location or position within the plume. For example, the ratio of TRCLE to T12DCLE falls from about 20:1 in Well PT-18 to about 0.5:1 in Well PT-12, but is higher again in wells further downgradient (being about 4:1 in Well PT-17). These observations might be indicative of multiple sources, as suggested previously by USAEHA, or could represent a combination of preferential contaminant transport, degradation within the aquifer, and more rapid volatilization of the more volatile species. It is suspected that degradation of trichloroethylene or highly chlorinated ethanes has occurred, and accounts at least in part for the levels and distribution of T12DCE in the groundwater.

The general pattern of contamination shows a relatively narrow plume extending almost linearly between Well PT-12 and PT-17, except that T12DCLE was also found in Well PT-24. The pattern fits the general idea that contamination is migrating westward along the buried water line and/or the old adjacent roadway which is noted on several installation drawings. Once the end of the water line is reached (around grid point D-9 for the main line, and B-9 for the extension), the local groundwater gradient (which lies in a more southwesterly direction than the plume axis), may provide more influence on flow direction. This scenario accounts for the relatively high contamination found in Well PT-17, as well as the higher soil gas readings along the line between grid points G-11 and B-9.

EXHIBIT 4-5
COMPARISON OF CURRENT AND PRIOR MONITORING WELL RESULTS

		CONCENTRATION IN UG/L				
WELL NO.	DATE	t-1,2-DICHLOROETHENE	TRICHLOROETHENE	1,2-DICHLOROETHANE	VINYL CHLORIDE	CHLO
PT-10	MAR 87	BDL	BDL	BDL	BDL	
	SEP 87	BDL	BDL	BDL	BDL	
	OCT 87	BDL	BDL	BDL	BDL	
	NOV 88	BCRL	BCRL	BCRL	BCRL	
PT-12	MAR 87	570	540		11	
	SEP 87	95	94		BDL	
	OCT 87	92	94	BDL	BDL	
	NOV 88	2730	1530	BCRL		
PT-15	MAR 87	BDL	BDL	BDL	BDL	
	SEP 87	BDL	BDL	BDL	BDL	
	OCT 87	BDL	BDL	BDL	BDL	
	NOV 88	BCRL	BCRL	BCRL		
(PT-14)	MAR 87	100	160		BDL	
(PT-14)	SEP 87	172	192		79	
PT-17	OCT 87	172	192	BDL	BDL	
	NOV 88	56.8	226	BCRL		
PT-18	OCT 87	160	8800	BDL	BDL	
	NOV 88	436	9460	BCRL		
PT-20	OCT 87	39	14	BDL	BDL	
	NOV 88	52.6	41.8	BCRL		
PT-21	OCT 87	6	BDL	BDL	BDL	
	NOV 88	BCRL	BCRL	BCRL		
PT-22	OCT 87	220	110	9	BDL	
	NOV 88	85.1	41.8	BCRL		
PT-24	OCT 87	66	BDL	BDL	BDL	
	NOV 88	71.1	BCRL	BCRL		
PT-25	OCT 87	BDL	BDL	BDL	BDL	
	NOV 88	BCRL	BCRL	BCRL		

It is suspected that the contamination found in Well PT-24 may be related to a similar but different preferential pathway, perhaps associated with the deep ditch which extends from grid point H-5 (near the landfill) to below grid point E-5, in the direction of Well PT-24. The depth of this ditch below nominal ground surface is 4-5 feet, which would be very close to the groundwater surface at a time when the water table is high. (Soil sample SS-08 was collected at a depth of 1.9 feet below the bottom of the ditch, without encountering groundwater, during the very dry conditions existing in October, 1988). Volatiles were also detected in the soil gas at several points along the ditch, and in the area immediately east of, and upgradient from, Well PT-24. None of the existing upgradient monitoring wells effectively intercept this pathway, nor any other groundwater contamination that may be migrating from landfill locations north of about grid line 4. It is not at all certain whether the probable source areas identified around grid point K-2 are being monitored by any of the wells.

As found in previous studies, higher levels of volatile contaminants were found in Well PT-22 than in nearby Well PT-21, which is completed at a lower depth. This observation may be interpreted as showing lower contamination in the less-permeable lower zone of the aquifer but may also be related to the exceedingly low yield observed for Well PT-21, due to screen placement below the permeable weathered-bedrock zone. The sample from this well was collected as soon as sufficient water had recovered, and may represent water which had experienced a long residence time in and around the well bore. Thus, loss of volatiles from the system that was sampled may have occurred.

No detectable concentrations of chromium, cadmium, or copper were found in the groundwater from the five wells that were sampled. Modest levels of zinc (64-135 ug/L) and high concentrations of magnesium (14.2-35.7 mg/L), calcium (30.3-190 mg/L), sodium (17.4-120 mg/L), and potassium (2.0-3.8 mg/L) were found in all of the groundwater samples. However, relatively high levels of these low-toxicity metals also were found in background Well PT-10, and the evidence that the concentrations are influenced by landfill leachate is not convincing. The metals concentrations found are in line with the relatively high (700 to 2000 micromhos per centimeter) conductivities measured during purging of the wells, with the higher values observed in Wells PT-18 and PT-12.

4.2.2 Soils

Volatile organic constituents detected in the soil-gas samples consisted primarily of one or more constituents with retention times between those of T12DCE and TRCLE, and near that of toluene. Such constituents were found at greater concentrations within the west-central portion of the landfill, and also near the northwestern corner of what was thought to be the landfill area. (The EM survey and the soil gas measurements detected buried metal and volatiles further north than the anticipated landfill boundary). Major source locations appear to be distributed along the line between grid points K-8 and K-1, i.e., along the western edge of the landfill. No indication of volatiles contamination was found within the entire eastern half of the landfill.

Considerably lower concentrations of other volatile species were found during the soil-gas survey, and it appeared that the levels of lower-boiling components (e.g., T12DCE) were somewhat higher in a few locations, but less widespread, than for the compounds with elution times similar to trichloroethylene. In general, the soil-gas survey was conclusive regarding two source areas of volatile materials in the landfill (near grid points K-6 and K-2), but less conclusive about whether actual sources or simply major migration pathways were being detected in other areas. The source area of unknown extent that was indicated in the vicinity of grid point K-2 is farther to the north than the landfilled area was believed to extend, and the direction of migration of contaminants from this area is uncertain. In the areas downgradient of the landfill, data points generally showed very low total volatiles content, and the "plumes" shown in Exhibit 3-13 should be interpreted with caution.

The subsoil samples collected for volatiles analysis did not provide much information regarding source areas, except to show that a number of locations where positive soil gas results were obtained apparently do not contain major deposits. The presence of methylene chloride in most soil samples at modest levels (often near 20 ug/g) is considered to be a laboratory contamination problem. The only soil samples in which other volatiles were detected were the deeper sample (SS-02B) from the boring near grid point K-6, which contained low concentrations of TRCLE and T12DCE; and sample SS-11, from a 2-3 foot deep black, ashy deposit located about 100 feet west of K-6 (and very near the roadway around the landfill), which contained a low level of TRCLE.

There are several reasons why both the soil gas survey and groundwater sampling apparently detected the presence of volatiles in many areas, whereas the soil sampling did not. For the most part, the findings are consistent with the differences in sensitivity and detection limits, and the dry conditions which prevailed during the field work. The results are interpreted as follows:

- The absence of high concentrations of volatiles in the soil borings is consistent with the principal sources being located below the depth of the soil samples that were taken, i.e, below about four feet. We believe that the bulk of the volatile materials is located at or below the water table, either as a separate phase or in the dissolved state. Because all of the volatile chlorinated hydrocarbons are more dense than water, any quantity of these materials that exceeds the solubility would occur as a separate phase below the water layer in the landfill.

- Contaminants would be present in the unsaturated soils above a deposit because of volatilization from the saturated zone and either readsorption onto the soil matrix or entrainment in the soil gas phase. The primary mechanism for adsorption of the volatiles on the soil matrix in the unsaturated zone is through solution in water contained in the soil pore spaces. However, the extreme dryness of the soils (less than 5% moisture) in the SEAD landfill would inhibit adsorption of contaminants onto the soil matrix, and the majority of soil pore spaces would be filled with soil gas. The primary partitioning would be between dissolved or suspended contaminants in the saturated zone, and volatilized contaminants in the soil gas of the unsaturated zone.

- Analytical detection limits for the compounds in soil are not low enough to detect the small quantities that would be contained in the soil gas in a sample of the soil matrix. For a typical certified reporting limit of 1.0 micrograms per gram in soil, and a percent moisture of 4%, a detectable quantity in the soil would require a concentration in soil pore space water of greater than 25 ppm. On the other hand, a typical soil-gas detection limit was on the order of 1 ppm for a sample compressed to 2 atm pressure, which is equivalent to about 0.5 ppm in the soil gas. Thus, a compound having a gas-water partition coefficient greater than about 0.02 ppm(air)/ppm(water) could result in the compound being detectable in the soil gas but not in the soil samples. As an example, for TRCLE Henry's Law constant = 8.9×10^{-3} atm-m^3/mole = 0.36 ppm(air)/ppm(water) at STP. Thus, TRCLE would be detectable in the landfill soil gas even when not detectable in the soil by standard analytical methods. Other volatile compounds such as T12DCE and chloroform would have similar characteristics of preferential detection in the gas phase.

- Compounds which are not detectable in the unsaturated soil matrix could be detected in the underlying saturated zone, because the detection limit in water solution is typically about 0.001 ppm. Therefore, (assuming equilibrium between the water and gas phases), a partition coefficient greater than about 500 ppm(air)/ppm(water) would be required for a compound to be detectable in the gas phase but remain undetectable in the groundwater. The only materials with partition coefficients of this magnitude are insoluble permanent gases, such as oxygen and nitrogen. Even vinyl chloride, with a Henry's Law constant of 0.69 atm-m^3/mole (28 ppm(air)/ppm(water)), would be detectable both in the groundwater and in the soil gas.

Apparently, the typical volatile contaminants would have been detected in the soil borings only if the sample penetrated into a zone with significant amounts of "free" contaminants, i.e., within a deposit or source area. From the soil sampling results, the only locations where the sampling approached major deposits are near grid point K-6. In other locations where sources were identified by the soil-gas results, the borings did not penetrate sufficiently close to the contaminant source. It is noted that sample SS-11 was obtained from outside the area where the bedrock occurs near the surface.

The concentrations of metals found in soil samples show that the metal content of the landfill definitely is elevated above background. The four samples collected from the fill material contain levels of copper and lead that are 4 to 13 and 6 to 28 times the concentrations in the background soil, respectively. Three of the four samples showed lead levels of 200 ug/g or higher. Somewhat higher concentrations of zinc and slightly higher concentrations of cadmium also were found in the samples from the landfill, but the levels for chromium were approximately the same as that in the background soil sample.

4.3 SOURCE AREAS AND LOCATIONS

The EM and GPR data show that the total area of the landfill is about 5.5 million square feet (12.9 acres), and that buried metal (some of which could be containers) or other high-conductivity materials extend over the greater portion of this area. The data show that the landfilled area may extend farther to the north and to the west than is currently presumed, including areas beneath and beyond the present roadway around the site. However, the data indicate considerable inhomogeneity in the landfill contents, and not all of the area may require consideration of corrective actions. For example, the soil-gas results clearly show that sources of volatile organics are concentrated along the western side of the total area outlined by the geophysical surveys, and within the area bounded by grid lines J and M and grid points 2 and 9. Also, the density of sources that appear to be contributing to the current contamination problem is greatest within the 30,000 square foot area bounded by grid lines J and L and grid points 2 and 8. Consideration of potential problems from metals-contaminated soils, however, would require that a much larger area be addressed. The available data do not allow determination of whether other potential sources identified by the geophysics may ultimately contribute to the groundwater contamination.

Reliable data are not available on the depth profile of the landfill, although the GPR records, soil borings, and the depth of Well PT-18 indicate variable depth to bedrock and a likely "bowl" shape of the landfill contents. It is presumed that the depth to bedrock in Well PT-18, about 7 feet, represents a reasonable depth for the center of the bowl, although the average depth over the entire 12.9-acre area likely is much less. Assuming that the bottom of the landfill is smoothly contoured, the average depth of landfilled mass and potentially contaminated soil over the 12.9 acres might be on the order of 4 feet. The 30,000 square foot area containing the bulk of organic contaminants, however, would have an average depth of 6-7 feet.

5.0 SUMMARY OF FINDINGS

The source of contamination at the site is a landfill which contains fill materials with numerous buried-metal targets and low to moderate metals concentrations, and in which is located a widespread source of volatile chlorinated-solvent chemicals such as TRCLE, T12DCLE, and chloroform. The most heavily-contaminated zone within the landfill encompasses an area of approximately 250 feet (West-East) by 800 feet (South-North), if both metals and volatiles contamination are addressed, and an area of about 100 feet by 300 feet if only volatile organic sources are considered. Metals-contaminated soils may extend from the surface to a depth of approximately 7 feet, based on the depth of well PT-18. Thus, the volume of materials that might require excavation to remove the source of metals contamination would be approximately 1.4 X 10^6 cubic feet (52,000 cubic yards).

For volatiles only, the source locations are bounded by an area of 150 feet by 700 feet, between grid lines J and M (West-East) and grid points 9 and 2 (South-North), with a 30,000 square foot area representing the most significantly contaminated zones. The depth of contamination extends into the weathered shale and groundwater, perhaps to 10-12 feet, and simple capping of the area to reduce infiltration will not prevent releases. If materials are removed to eliminate the sources, the volume of landfill materials that would have to be excavated ranges from about 8,000 to 39,000 cubic yards. From the concentration of volatile materials found in the soil borings, it would appear that the top 3 feet may not require treatment for volatile contamination. Thus, the volume of material requiring treatment would be in the range of 5,000 to 27,000 cubic yards. From the estimated groundwater velocity of 7 ft/year, flushing of contaminated groundwater after the source is removed (but with no supplemental remedial measures) would require approximately 100 years.

Available data indicate that the landfill is situated in a "bowl" formed either naturally by the strike and dip of shale strata and perhaps other interspersed sedimentary beds, or which may have been artificially formed by past removal of soil and weathered shale down to competent bedrock. The absence of volatiles contamination within the soils and the presence of contamination within the groundwater suggest that these solvents either were placed in the landfill at or near the water table, or have migrated downward into the water in the bowl. This scenario would result in slow release of contaminated groundwater for a very long time, even if the total mass of contaminants within the bowl is relatively small. Groundwater within the landfill is contaminated with volatile chlorinated hydrocarbons, at levels which result in formation of a down-gradient plume extending at least to the limits of the Depot property. Release of contaminants from the source probably occurs continuously, through the more permeable weathered-bedrock zone, by virtue of groundwater flowing through the area. Infiltration during periods of precipitation would enhance the release.

The complete absence of detectable hydrocarbon contamination in the groundwater and soil samples did not confirm the previously-suspected contamination of the area by diesel fuel. The reporting of toluene in the soil gas survey is deemed to be an artifact of the limited chromatographic resolution; the peak in the chromatogram likely is due to a chlorinated species.

Groundwater contamination data clearly show that the landfill "cap" is not effective in preventing release of contaminants, possibly because of infiltration through the cap but more likely due to the location of sources and/or contaminated media below the water table. The available data suggest that one or more preferential groundwater migration pathways may exist, accounting for the narrow plume, and that degradation, volatilization, and potential multiple sources may all be factors for consideration in assessing contaminant migration and potential remedial measures. The observed levels of volatile chlorinated constituents near the Depot boundary, and the presence of lead in the landfill soils, are of such magnitude that remedial measures other than reliance on the present "cap" should be considered.

The major portion of contaminated groundwater from the landfill exists in a narrow plume in a west-southwest direction. The contaminated groundwater is only known to exist in the shallow aquifer that extends down to competent bedrock, which occurs at a typical depth of 10 feet. The breadth of the plume and, therefore, the required length of an interception system varies between 250 and 400 feet at distances of 200 to 500 feet down-gradient of the source. The velocity of groundwater flow (7-16 ft/year) would require 30-70 or 12-29 years before groundwater contamination at the Depot boundary would be removed if the plume were completely intercepted at 200 and 500 feet, respectively. The transmissivity and yield of the aquifer are so low that only an extremely large number of collection wells, each operating with a very short duty cycle, would be effective in intercepting the plume. On the other hand, the shallow depth and thinness of the contaminated aquifer would make interception trenches an attractive collection scheme. The feasibility of either withdrawal wells or trenches might be enhanced if the permeable-pathway concept proves to be valid; one would need to intercept the groundwater only in the vicinity of the permeable zones where contamination is being transported.

6.0 EVALUATION OF POTENTIAL REMEDIAL MEASURES

6.1 METHODOLOGY

In preceding sections, results of the geophysical surveys, aquifer tests, and soil-gas screening studies were combined with the laboratory analytical results for soil and groundwater samples to provide the basic data for contamination assessment, including the location and identity of contaminant sources and the nature and extent of groundwater contamination plumes. In this section, contaminant levels will be compared to risk-based health criteria and to Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs), defined in state and federal regulations, to determine applicable and relevant or appropriate requirements (ARARs) for remedial responses at the site. These regulatory requirements and action criteria determine the need for and extent of interim response measures (IRMs), and/or further investigations to delineate longer-term remedies. Potential IRMs, including source removal and groundwater contamination control, are evaluated for effectiveness in meeting the corrective action requirements. Given the uncertainties that still exist, the most cost-effective feasible alternative is outlined. This analysis forms the basis for the recommendations made in the next Section for suitable interim response measures, and for further remedial investigations/feasibility studies (RI/FS).

6.2 ARARs

6.2.1 Introduction

This section provides a definition of ARARs and TBCs, the "role" of ARARs in the site investigation/remediation process, and presents lists of location-, chemical-, and action- specific ARARs from which a preliminary list of ARARs has been selected for SEAD.

Identification of applicable or relevant and appropriate requirements (ARARs) is done on a site-specific basis and involves a two part analysis: first, a determination whether a given requirement is applicable; then , if it is not applicable, a determination whether it is nevertheless both relevant and appropriate.

Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance at a CERCLA site.

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site.

The determination that a requirement is relevant and appropriate is also a two-step process: (1) determination if a requirement is relevant and (2) determination if a requirement is appropriate. In general, this involves a number of site-specific factors, including the characteristics of the remedial action, the hazardous substances present at the site, or the physical circumstances of the site, with those addressed in the statutory or regulatory requirement. In some cases, a requirement may be relevant, but not appropriate, given site-specific circumstances; such a requirement would not be ARAR for the site.

To-be-Considered Material (TBCs) are non-promulgated advisories or guidances issued by Federal or State government that are not legally binding and do not have the status of potential ARARs. However, in many circumstances TBCs will be considered along with ARARs as part of the site risk assessment and may be used in determining the necessary level of cleanup for protection of health or the environment.

The Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final (October 1988), prepared by the Office of Emergency and Remedial Response (OERR), US EPA describes how ARARs are to be incorporated into the RI/FS process. The CERCLA Compliance with Other Laws Manual, Draft Guidance (August 8, 1988), also prepared by OERR contains detailed information on identifying and complying with ARARs.

Section 121 (d)(2)(A) of CERCLA incorporates into law the CERCLA Compliance policy, which specifies that Superfund remedial actions meet any Federal standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate requirements. Also included is the new provision that State ARARs must be met if they are more stringent than Federal requirements. Federal statutes that are specifically cited in CERCLA include the Solid Waste Disposal Act (SWDA), the Toxic Substances Control Act (TSCA), the Safe Drinking Water Act (SDWA), the Clean Air Act (CAA), the Clean Water Act (CWA), and the Marine Protection Research and Sanctuaries Act (MPRSA).

Section 121 (d)(4) of CERCLA identifies six circumstances under which ARARs may be waived:

- The remedial action selected is only a part of a total remedial action (interim remedy) and the final remedy will attain the ARAR upon its completion.
- Compliance with the ARAR will result in a greater risk to human health and the environment than alternative options.
- Compliance with the ARAR is technically impracticable from an engineering perspective.

- An alternative remedial action will attain an equivalent standard of performance through the use of another method or approach.

- The ARAR is a State requirement that the state has not consistently applied (or demonstrated the intent to apply consistently) in similar circumstances.

- For Section 104 Superfund-financed remedial actions, compliance with the ARAR will not provide a balance between protecting human health and the environment and the availability of Superfund money for response at other facilities.

A preliminary identification of potential ARARs and To Be Considered (TBC) information in the scoping phase is used to assist in initially identifying remedial alternatives. Early identification of potential ARARs allows for better planning of field activities. Because of the iterative nature of the remedial process, ARAR identification continues throughout the process as a better understanding is gained of site conditions, site contaminants, and remedial action alternatives.

ARARs may be categorized as chemical-specific requirements that may define acceptable exposure levels and therefore be used in establishing preliminary remediation goals; as location-specific requirements that may set restrictions on activities within specific locations such as floodplains or wetlands; and as action-specific, which may set controls or restrictions for particular treatment and disposal activities related to the management of hazardous wastes.

Potential chemical- and location-specific ARARs are identified on the basis of the compilation and evaluation of existing site data. A preliminary evaluation of potential action-specific ARARs may also be made to assess the feasibility of remedial technologies being considered. In addition to Federal ARARs, more stringent State ARARs must also be identified. Other Federal and State criteria, advisories, and guidance and local ordinances should also be considered, as appropriate, in the development of remedial action alternatives.

For documentation purposes, a list should be maintained of potential ARARs as they are identified for a site. As the RI/FS progresses, each ARAR is defined.

ARARs must be attained for hazardous substances remaining on-site at the completion of the remedial action. In addition, EPA intends that the implementation of remedial actions should also comply with ARARs and TBCs (as appropriate) to protect public health and the environment. All remedial actions should attain action- specific requirements that have been identified as ARAR while the remedial action is being conducted, unless a waiver is justified. However, if ARARs are not being met before the commencement of a remedial action, it is not necessary to invoke a waiver to justify their non-attainment during the action.

Generally, it is EPA's policy to attain ARARs pertaining either to contaminant levels or to performance or design standards to ensure protection at all points of potential exposure.

6.2.2 Seneca Army Depot (SEAD)

The following presents definitions of the three groups of ARARs; location-, chemical-, and action-specific ARARs and identifies a list of preliminary ARARs for SEAD for each category. The determination of ARARs is an iterative process and should be identified and considered at multiple points in the remedial planning process. A master list of location-, chemical-, and action-specific ARARs are presented in Appendix F, Attachments A, B, and C, respectively.

Location-Specific ARARs

Location-specific requirements are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they occur in special locations. Some examples of special locations include floodplains, wetlands, historic places and sensitive ecosystems or habitats. An example of a location-specific requirement is the substantive CWA §404 prohibitions of the unrestricted discharge of dredged or fill material into wetlands.

There are no location-specific ARARs applicable to the interim response actions proposed for implementation at SEAD.

Chemical-Specific ARARs

Chemical-specific requirements are usually health- or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment.

The following potential ARARs and TBCs have been identified for SEAD as a result of a review of data on organics and metals detected in ground water monitoring wells and soils. Although the water under the site is not a current source of public drinking water, water quality criteria (MCLs, Ambient Water Quality Criteria) have been identified as probable relevant and appropriate requirements because although unlikely, the water may be used directly for drinking water in the future. EPA's ground water protection strategy is a TBC; the classification of groundwater use and conditions at a site and potential impacts to human health and the environment.

Chemical	ARAR
1,2-Dichloroethane	SDWA Maximum Contaminant Level - .005 mg/l
Trichloroethylene	SDWA Maximum Contaminant Level - .005 mg/l; MCLG- 0 ug/L; AWQC- 2.7 ug/L
t-1,2-Dichloroethylene	SDWA Maximum Contaminant Level - (NONE); MCLG- 70 ug/L; AWQC- .033 ug/L
Vinyl Chloride	SDWA Maximum Contaminant Level .002 mg/l
	CWA Water Quality
Chloroform	
Cadmium	RCRA Maximum Concentration Limit - .01 mg/l
	SDWA Maximum Contaminant Level - .01 mg/l
Chromium	RCRA Maximum Concentration Limit - .05 mg/l
	SDWA Maximum Contaminant Levels - .05 mg/l
	Proposed Maximum Contaminant Level Goals - 0.12 mg/l
Copper	Proposed MCLG - 1.3 mg/l
Lead	RCRA Maximum Concentration Limit - .05 mg/l
	SDWA Maximum Contaminant Level - .05 mg/l
Zinc	Secondary Maximum Contaminant Level under the Safe Drinking Water Act - 5 mg/l

Action-Specific ARARs

Performance, design, or other action-specific requirements are usually technology- or activity-based requirements or limitations on actions taken with respect to hazardous wastes. As with chemical-specific ARARs, action-specific ARARs include all Federal requirements and any State requirements that either are more stringent than Federal ARARs or specify requirements where no federal ARARs exist. Attachment C presents a detailed list of action-specific ARARs established under the Resource Conservation and Recovery Act (RCRA) and the Clean Water Act (CWA).

The consideration of action-specific ARARs in the remedial process begins as options are identified. ARARs become more definitive as the site is better characterized and routes of exposure are identified and long-term alternatives are defined. At the conclusion of screening, sufficient information should exist on the technologies and the most probable configurations of technologies so that the action-specific ARARs can be better defined.

Based on the results of the field investigation at SEAD, this report presents interim response actions that could be implemented at the site to minimize the release of contaminants from sources and to remove contamination from groundwater. The interim response actions described in subsequent sections do not involve excavating, grading, or other measures that propose moving contaminated materials from one place to another or in other ways disturbing them. RCRA standards may be relevant and appropriate to SEAD depending upon the scope of the interim measure selected (e.g., minimum technological requirements).

6.2.3 Corrective Action Requirements

The preceding sections show that contaminant levels observed in groundwater at the installation boundary have approached or exceeded one or more regulatory criteria that could dictate cleanup requirements. For the most part, the criteria of concern are the SDWA Maximum Contaminant Levels for the chlorinated species found in the shallow groundwater near the Depot boundary. However, the applicability of these criteria are not obvious, because it is not known whether the shallow groundwater is being, or could be, used for drinking-water purposes. In addition, the potential for contamination of deeper drinking-water source(s) has not been completely defined, although available evidence indicates that minimal connection with the shallow system would be expected. The potential environmental risk from runoff of contaminated surface water or from discharge of contaminated groundwater to surface systems has not been addressed because of a lack of data. Finally, no effort has been made to evaluate potential receptors or to model potential future variations in contaminant levels at points of exposure. Thus, it is not possible to evaluate whether corrective measures would be necessary, based on evaluation of actual or potential risks to human health or the environment.

Because of the lack of data to support a risk-based determination of cleanup requirements, it was determined that the relevant and appropriate, rather than the applicable, requirements would be used to establish the need for consideration of response actions. On this basis. it was concluded that corrective measures should be addressed, although it remains unclear whether an imminent threat to human health or the environment is present that would demand implementation of an interim response action.

6.3 POTENTIALLY FEASIBLE OPTIONS FOR INTERIM RESPONSE ACTIONS

Given the findings of this study, i.e., that the landfill area will act as a continuing source of groundwater contamination, and that contaminants have and will continue to migrate off-post at levels exceeding regulatory criteria, some type of corrective action is required to minimize the release of contaminants from sources, and/or to remove contamination from groundwater. However, the requirements for interim response actions, which must immediately prevent or reduce threats to human health or the environment, are different than for long-term or permanent solutions. Several factors which are considered to be long-term corrective actions were not addressed in the current analysis, including the following:

- Removal and treatment or proper disposal of highly-contaminated materials within the landfill would be the most practical means to ensure long-term source control. However, the factor resulting in the greatest potential risk -- off-post migration of contaminants -- would not be significantly altered for a period of several years by even complete source removal. Thus, removal or any other means of source control is not considered to be an interim response action at this site, primarily because of the low transmissivity of the aquifer and the level of contamination that would remain between the source and the impact areas.

- Increasing the effectiveness of the landfill cap might reduce source releases somewhat, but will provide reduction in down-gradient concentrations only slowly and over a long time. Also, because principal sources may be located below the water table in the landfill, any cap would be only partially effective in preventing releases, and would need to be combined with other actions that ensure control of releases.

- For similar reasons, complete isolation of the source area (e.g., by upgradient and down-gradient groundwater diversion or cutoff and a permanent cap) was not considered to be in the realm of an interim response action.

- Any long-term solution which might involve unlimited use of the area will need to address the contamination of soils by lead and other metals. At another Army installation (Alabama AAP) where unrestricted use of land containing lead-contaminated soils was considered, it was found necessary to treat soils containing greater than 117 ug/g of lead. Lead was found in the landfill soil at levels above 200 ug/g. However, such considerations also are not relevant to an interim response action dealing with the current restricted use and isolated nature of the site.

- It is noted that no new data on the potential for migration of contaminants via surface water were obtained during this study. Therefore, the nature and extent of surface water problems are not known with certainty, and response actions are not considered for control and treatment of runoff except in concert with actions dealing with groundwater.

With these restrictions in mind, there are few interim response actions that would be possible in reducing the risk immediately and effectively, and all relate to removing contamination from the migration pathways at or near the boundary. Potentially feasible actions regarding removal or treatment of contaminated groundwater are as follows:

- Installation of groundwater pumping wells;
- Installation of a collection trench:
- Installation of adsorption media directly into the aquifer;
- Collection and treatment of both surface water and groundwater removed by wells or trenches;
- Implementation of a program to perform additional site investigations, continue and expand the monitoring program; and
- Control use of groundwater or other impacts at discharge areas through implementation of institutional controls.

6.4 ANALYSIS OF INTERIM RESPONSE ACTIONS

6.4.1 Installation of Pumping Wells

Installation of groundwater extraction wells at or near the boundary would require better determination of exact flow characteristics prior to design and construction. It would be necessary to delineate the presence and location of permeable zones and preferred migration pathways, as well as more precise determination of transmissivity and yield throughout the region near the boundary. If such a system were to be considered as an interim response action, the well field would need to be installed near the Depot boundary (or off-site) for benefits to be noticed within the next few years. Reversal in the flow direction could not be depended on to limit migration down-gradient from a collection system placed closer to the sources, because of the low yield and limited distances over which dewatering would have an influence.

The sparse data on contaminant plume dimensions, well yield, and formation permeability determined to date show that a very large number of wells, spaced very close together, would be required to intercept and remove contaminated groundwater. The zone of influence about a pumping well will not extend for more than a few feet, and it is estimated that wells would need to be installed every 5 feet along the entire breadth of significant contamination. The available data suggest that this distance extends at least from Well PT-17 to Well PT-24, i.e., a minimum distance of about 320 feet. Thus, at least 64 wells would need to be installed. It is expected that at least half of these wells would need to be installed as a "test" case, to determine permeability variations, before the feasibility of the concept could be evaluated. Thus, it may not be known whether the concept is feasible until a large fraction of the cost has been committed.

Advantages of the pumping well field include: relative economy for installation because wells need be only about 15 feet deep, with only 3-5 feet of screen; and the ability to use economical, low-volume centrifugal pumps, each of which would need to be operated only a small fraction of the time to completely dewater the aquifer. Partially offsetting this advantage would be the fairly extensive maintenance requirements of the withdrawal and collection system. Protection would be necessary, for example, of the pumps and plumbing system in the winter, because flow rates would not be adequate to keep unprotected water-filled components from freezing. This factor would require either burial of the collection system pumps and piping or application of external heating sources, either of which would increase maintenance costs significantly.

6.4.2 Installation of Collection Trenches

The occurrence of both the contaminated groundwater and the confining aquiclude at shallow depths makes a linear trench-collection dewatering system attractive. Standard narrow-blade trenching tools could be used to excavate the required 10-15 foot deep trench down to competent bedrock. Relatively modest shoring of the trench sides would be needed to prevent caving, and a grout seal could be used to anchor the opening to bedrock and prevent leakage. Water collecting in the bottom of the trench could be removed by one to a few sump pumps, depending on the consistency of bedrock slope along the trench. All pumps and piping could be contained within the trench opening, and a simple cover should be sufficient to prevent the systems from freezing while allowing easy access for maintenance.

The total distance over which a trench would extend should be the same as for a well field, i.e., about 320 feet. Unlike the well-collection system, little advantage would be gained by reducing trench lengths and including several segments to intercept only permeable zones; the additional complexity necessary to tie together several trench segments would more than offset the additional cost of constructing one long trench.

The volume of water that would be removed by a trench is not large. The groundwater flow velocity is about 20 ft/year, or about 0.055 ft/day, and the thickness of the saturated zone is about 5 feet. Assuming the effective porosity of the aquifer is about 10%, a 320-ft long trench would collect, in one day, about $(0.055 \text{ ft/day})(0.10)(5 \text{ ft})(320 \text{ ft}) = 9 \text{ ft}^3 = 280$ liters per day, or about 27,000 gallons per year. Withdrawn volumes would be similar if wells were used for groundwater withdrawal. It is noted that each of the 64 or so wells required to effect drawdown would pump about 4.4 liters per day.

6.4.3 Collection and Treatment of Withdrawn Water

Regardless of the dewatering method, the groundwater would need to be collected and treated prior to discharge. Because of the low volumes involved and the non-essential nature of the shallow aquifer, it should not be necessary to consider reinjection of the treated water. Rather, direct surface discharge of the relatively small volumes of water would be appropriate. Based on the contamination found in Well PT-17, a daily volume would contain about (300 ug/L) (280 L) = 0.08 grams of chlorinated volatile compounds. Treatment would be necessary, then, for about 30 grams of materials per year, contained in 102,000 liters (27,000 gallons) of water. Treatment, even by one of the more expensive methods, would require about one pound of activated carbon per year, or about 10 pounds if the efficiency (because of the relatively high salts loading, etc.) were 10%. More logically, the withdrawn water would be collected in a shallow basin, from which most of the volatiles would escape in a short time. After a residence time of a week or so, final treatment could be made with activated carbon before discharge, if necessary. This finish treatment would require an infinitesimal amount of adsorbent.

An advantage of this treatment system would be that surface runoff during periods of high precipitation (if found to be contaminated with volatiles) could also be collected and treated. A major disadvantage, however, would be up-scaling required for periodic treatment of very much larger volumes than are obtained from the groundwater withdrawal. Runoff from the area including the landfill and downgradient slope (approximately 600,000 square feet) would be on the order of 40,000 gallons per day for moderate precipitation (0.1 inches of runoff), i.e., more than the entire annual treatment requirement for groundwater.

6.4.4 Installation of Permeable Treatment Beds into the Aquifer

The low volumes and concentrations that would be obtained from groundwater withdrawal prompted consideration of an in situ treatment method, Permeable Treatment Beds, which eliminates the need for pumping, separate treatment, and discharge of the water. In this concept, a similar trench to that used for dewatering would be excavated and sealed to competent bedrock with bentonite grout. Continuous or sealed-seam permeable geotextile fabric would be placed against the grouted bottom of the trench, and extended up each side to a depth above the groundwater level. This trough would then be filled with activated carbon, or a sand-carbon mixture, through which groundwater would pass. The geotextile would be sealed at the top, forming a bag of filter-adsorbent, which directly intercepts groundwater flow in the aquifer across the entire length of the trench. The trench would then be filled and capped with clay to minimize infiltration.

Removal of contaminants by the activated carbon would take place as groundwater flowed through the trench. Based on the level of contamination in Well PT-17, only a small fraction of the trench filter would need to be activated carbon, with sand or other inert filler of similar grain size comprising the bulk of the mixture. Assuming an over-design of 1000% (to eliminate worrying about breakthrough at any "hot spots" along the plume) and an efficiency of 10%, 1000 lbs (160 cubic feet) of activated carbon would be sufficient for about 50 years of treatment. For a two-foot wide trench, the mixture would be approximately 3% (by volume) activated carbon.

The primary advantages of this action would be the low cost of initial installation and the very low maintenance cost. Because the trench would be open only temporarily, shoring could be much less elaborate than if an open trench were to be maintained. Advantages also include:

- Non-disruption of groundwater flow, and

- Elimination of treatment and discharge requirements.

The process would supplement, and become a part of, a permanent corrective action such as landfill capping or removal. If used as the "final treatment" part of a long-term remedy, a design lifetime of 50 years would be sufficient to remove all traces of contamination remaining in the aquifer following a source-control operation at the landfill.

It is likely that the permeable treatment bed would never need to be removed or disturbed. The over-designed adsorptive capacity should be sufficient to retain the contaminants for many decades, and biodegradation of the chlorinated compounds should be enhanced within the activated-carbon substrate. However, if subsequent removal were deemed necessary, it would be a simple, inexpensive matter to excavate the adsorptive bed, remove any remaining volatile materials by heating, and dispose of the sand/carbon mixture.

The use of permeable treatment beds for <u>in situ</u> remedies at waste disposal sites is discussed in the <u>Handbook. Remedial Action at Waste Disposal Sites</u>, EPA/625/6-85/006, U.S. EPA Hazardous Waste Engineering Research Laboratory, Cincinnati, OH, October, 1985. A cost analysis summary, using data from this reference, is provided in Exhibit 6-1. Costs are provided for the minimum required length (320 feet) of the system; depending on the safety factor desired, a length of 30%-50% greater should be considered.

Monitoring wells would need to be installed downgradient of the treatment bed, to monitor performance of the system. It is assumed that at least six such wells would be installed prior to design of the treatment bed, to provide additional data on the contamination profile and the possible presence of permeable zones.

The location of the collection trench and permeable treatment beds near the Depot western boundary is shown in Exhibit 6-2.

EXHIBIT 6-1

ESTIMATED COST FOR A PERMEABLE TREATMENT BED LANDFILL AREA, SENECA ARMY DEPOT, NEW YORK

Item	Quantity Req'd	Unit Cost[a]	Subtotal	Pg. Ref.[b]
Trench Excavation, backhoe, 320' X 2' X 15'	356 cubic yards	\$ 2.27/yd^3	\$ 810	9-60[c]
Bentonite Seal, 320' X 2' X 0.5'	320 cubic feet	\$ 2.50/ft^3	\$ 800	after 3-12
Geotextile Fabric "Bag", 350' X 15'	583 square yds.	\$ 3.75/yd^2	\$ 2,186	3-12
Activated Charcoal, 1000 lb	160 cubic feet	\$ 4.60/lb	\$ 4,600	10-10
Clean Sand	178 cubic yards	\$12.60/yd^3	\$ 2,243	3-12
Mix & Place in Bag/Trench	180 cubic yards	\$63.00/yd^3	\$ 11,340	Est.
Backfill	180 cubic yards	\$ 3.90/yd^3	\$ 700	9-60
Imported Clay Cap 350' X 3' X 1'	39 cubic yards	\$14.60/yd^3	\$ 546	3-12
Monitoring Wells, 15' deep (USATHAMA Spec.)	6	\$100/ft	\$ 9,000	Est.
Mobilization	-	-	\$ 3,000	Est.
Engineering Design			\$ 15,000	Est.
Documentation and Proof Testing			\$ 15,000	Est.
Fee/Profit	-	-	\$ 9,775	
	TOTAL ESTIMATED COST		\$ 75,000	
	WITH CONTINGENCY (10%)		\$ 82,500	

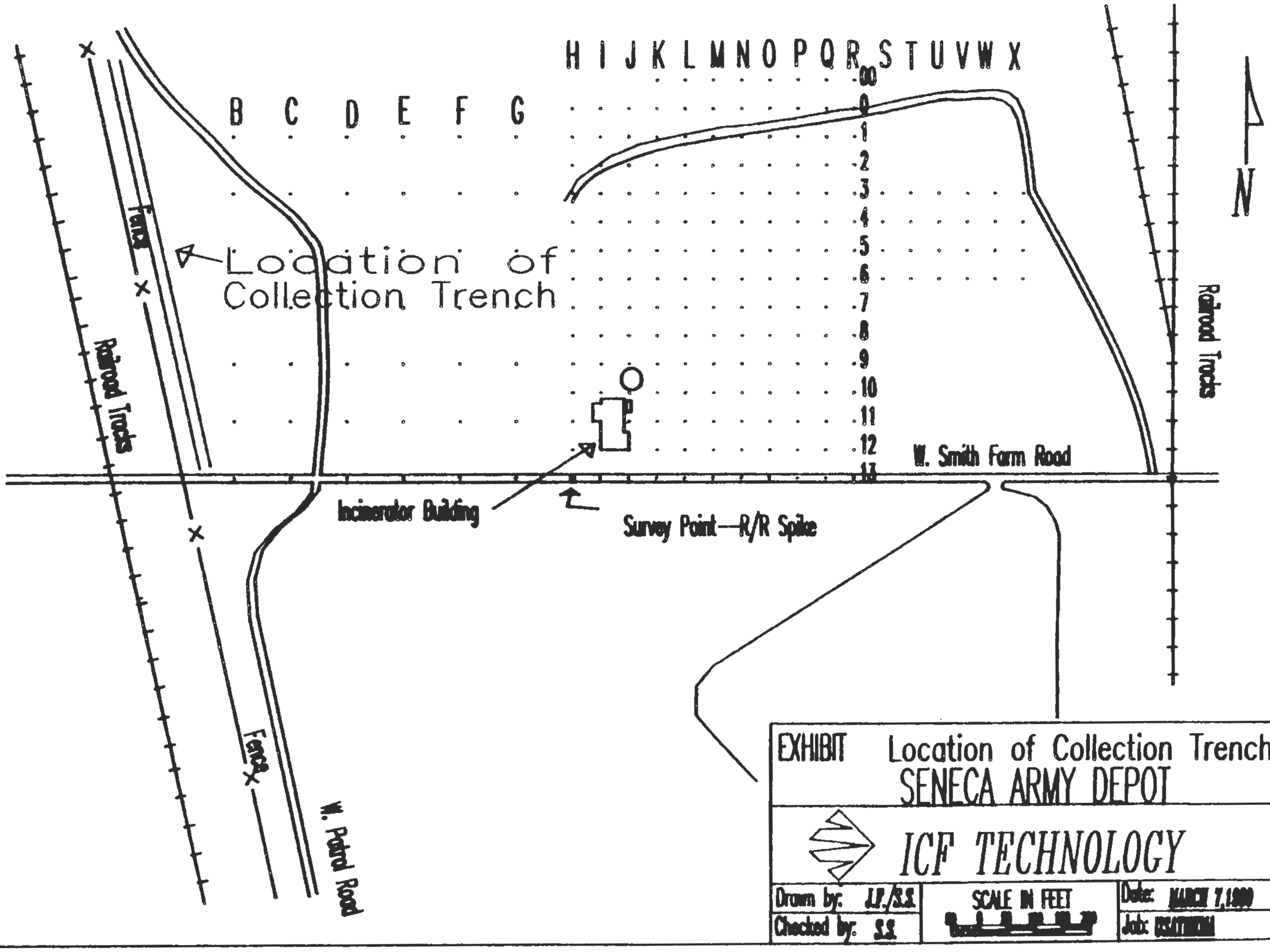
[a] Costs are escalated by 20% above 1985 estimates.

[b] Page references are from Handbook, Remedial Action at Waste Disposal Sites, EPA/625/6-85/006, unless otherwise noted.

[c] McMahon, Leonard, 1988. Dodge Heavy Construction Data, McGraw-Hill.

EXHIBIT 6-2

Location of Collection Trench Near Boundary



7.0 CONCLUSIONS

7.1 NEED FOR ACTION

- A large area (12.9 acres) and volume (83,000 cubic yards) of landfill containing numerous source "hot spots" and buried objects that could be current or potential contaminant sources was defined. Sources of contamination within the landfill have contributed, and likely will continue to contribute, to contaminated groundwater that requires corrective action. An analysis of interim response actions was completed, even though it is not clear whether there is any imminent threat from the prevailing situation.

- The extensively-contaminated materials within the landfill may require consideration of long-term remedial measures for both volatile organic materials and metals contamination. However, all interim response actions must address contamination control at or near potential points of exposure to be effective.

- Lack of data forced consideration only of interim response measures dealing with contaminated groundwater.

7.2 UNKNOWNS AND DATA GAPS

- Uncertainties exist about the form and shape of, and materials contained in, the landfill. Additional data is required to evaluate the mechanism of groundwater contamination and release of contaminants from the northern portion of the landfill.

- Additional data are required to determine release potential and migration pathways for sources in the northern portion of the landfill, to investigate potential preferred groundwater migration pathways, and to demonstrate conclusively whether vertical migration to potable water supplies could occur.

- Data are required on recharge and discharge characteristics of shallow groundwater from the landfill area, and on potential human and environmental receptors associated with contaminated media.

- A complete profile of waste material concentrations and configurations in the landfill will be required if permanent corrective measures and effective closure are to be evaluated.

7.3 INTERIM RESPONSE ACTIONS

- The most cost-effective interim response action appears to be interception and treatment of contaminated groundwater at or near the Depot boundary, by means of a permeable treatment bed containing activated carbon.

8.0 RECOMMENDATIONS

8.1 RECOMMENDED ADDITIONAL SITE INVESTIGATIONS

- Consideration of permanent corrective or remedial measures at the site will require extensive remedial investigations addressing risk assessment criteria as well as hydrogeologic, contamination, and waste profile evaluations. Initially, an assessment of potential impacts and receptor communities should be performed, to better determine whether any form of response is demanded, and additional data on hydrogeologic and chemical parameters at-- and beyond-- the Depot boundary should be collected.

- Additional source-characterization studies should be performed in the landfill area. Soil borings and/or test pits, with continuous air monitoring and collection of samples for volatiles and metals analysis, should be excavated in the locations where high soil-gas and buried-metal readings were obtained. Sufficient borings/pits should be made to allow the type and volume of wastes potentially requiring removal to be mapped.

- A quarterly monitoring program is recommended, to include sampling of the six nominally contaminated wells; correlation of analytical results with historical rainfall methods; and sampling of off-post seeps and wells.

8.2 RECOMMENDED INTERIM RESPONSE MEASURES

- Because of the low initial and continuing maintenance costs, and also because it would supplement any other potential corrective measure at the site, it is recommended that a permeable treatment bed be designed and installed. Additional data defining the extent of the plume and details of groundwater flow in the area of interception will be required prior to design; much of these data could derive from monitoring wells that would be required as part of the response.

- Consideration of source removal, landfill capping, or other source-control measure is not recommended without prior collection of considerable additional data.

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APPENDIX A

COORDINATES AND LOCATIONS OF GRID POINTS, MONITORING WELLS, AND SOIL SAMPLES

EXHIBIT A-1. UTM COORDINATES OF GRID POINTS AT SEAD

GRID POINTS		GRID COORDINATES(FT)		UTM COORDINATES (METERS)	
GP	(E , N)	EAST	NORTH	EAST	NORTH
B- 1	-12 , 12	-600	600	345851.1	4732456.9
B- 3	-12 , 10	-600	500	345851.1	4732426.4
B- 5	-12 , 8	-600	400	345851.1	4732395.9
B- 7	-12 , 6	-600	300	345851.1	4732365.4
B- 9	-12 , 4	-600	200	345851.1	4732335.0
B- 11	-12 , 2	-600	100	345851.1	4732304.5
B- 13	-12 , 0	-600	0	345851.1	4732274.0
C- 1	-10 , 12	-500	600	345881.6	4732456.9
C- 3	-10 , 10	-500	500	345881.6	4732426.4
C- 5	-10 , 8	-500	400	345881.6	4732395.9
C- 7	-10 , 6	-500	300	345881.6	4732365.4
C- 9	-10 , 4	-500	200	345881.6	4732335.0
C- 11	-10 , 2	-500	100	345881.6	4732304.5
C- 13	-10 , 0	-500	0	345881.6	4732274.0
D- 1	-8 , 12	-400	600	345912.1	4732456.9
D- 3	-8 , 10	-400	500	345912.1	4732426.4
D- 5	-8 , 8	-400	400	345912.1	4732395.9
D- 7	-8 , 6	-400	300	345912.1	4732365.4
D- 9	-8 , 4	-400	200	345912.1	4732335.0
D- 11	-8 , 2	-400	100	345912.1	4732304.5
D- 13	-8 , 0	-400	0	345912.1	4732274.0
E- 1	-6 , 12	-300	600	345942.6	4732456.9
E- 3	-6 , 10	-300	500	345942.6	4732426.4
E- 5	-6 , 8	-300	400	345942.6	4732395.9
E- 7	-6 , 6	-300	300	345942.6	4732365.4
E- 9	-6 , 4	-300	200	345942.6	4732335.0
E- 11	-6 , 2	-300	100	345942.6	4732304.5
E- 13	-6 , 0	-300	0	345942.6	4732274.0
F- 1	-4 , 12	-200	600	345973.0	4732456.9
F- 3	-4 , 10	-200	500	345973.0	4732426.4
F- 5	-4 , 8	-200	400	345973.0	4732395.9
F- 7	-4 , 6	-200	300	345973.0	4732365.4
F- 9	-4 , 4	-200	200	345973.0	4732335.0
F- 11	-4 , 2	-200	100	345973.0	4732304.5
F- 13	-4 , 0	-200	0	345973.0	4732274.0
G- 1	-2 , 12	-100	600	346003.5	4732456.9
G- 3	-2 , 10	-100	500	346003.5	4732426.4
G- 5	-2 , 8	-100	400	346003.5	4732395.9
G- 7	-2 , 6	-100	300	346003.5	4732365.4
G- 9	-2 , 4	-100	200	346003.5	4732335.0
G- 11	-2 , 2	-100	100	346003.5	4732304.5
G- 13	-2 , 0	-100	0	346003.5	4732274.0
H- 00	0 , 14	0	700	346034.0	4732487.4
H- 0	0 , 13	0	650	346034.0	4732472.1
H- 1	0 , 12	0	600	346034.0	4732456.9
H- 2	0 , 11	0	550	346034.0	4732441.6
H- 3	0 , 10	0	500	346034.0	4732426.4
H- 4	0 , 9	0	450	346034.0	4732411.2

EXHIBIT A-1. UTM COORDINATES OF GRID POINTS AT SEAD

GRID POINTS		GRID COORDINATES(FT)		UTM COORDINATES (METERS)	
GP	(E , N)	EAST	NORTH	EAST	NORTH
H- 5	0 , 8	0	400	346034.0	4732395.9
H- 6	0 , 7	0	350	346034.0	4732380.7
H- 7	0 , 6	0	300	346034.0	4732365.4
H- 8	0 , 5	0	250	346034.0	4732350.2
H- 9	0 , 4	0	200	346034.0	4732335.0
H- 10	0 , 3	0	150	346034.0	4732319.7
H- 11	0 , 2	0	100	346034.0	4732304.5
H- 12	0 , 1	0	50	346034.0	4732289.2
H- 13	0 , 0	0	0	346034.0	4732274.0
I- 00	1 , 14	50	700	346049.2	4732487.4
I- 0	1 , 13	50	650	346049.2	4732472.1
I- 1	1 , 12	50	600	346049.2	4732456.9
I- 2	1 , 11	50	550	346049.2	4732441.6
I- 3	1 , 10	50	500	346049.2	4732426.4
I- 4	1 , 9	50	450	346049.2	4732411.2
I- 5	1 , 8	50	400	346049.2	4732395.9
I- 6	1 , 7	50	350	346049.2	4732380.7
I- 7	1 , 6	50	300	346049.2	4732365.4
I- 8	1 , 5	50	250	346049.2	4732350.2
I- 9	1 , 4	50	200	346049.2	4732335.0
I- 10	1 , 3	50	150	346049.2	4732319.7
I- 11	1 , 2	50	100	346049.2	4732304.5
I- 12	1 , 1	50	50	346049.2	4732289.2
I- 13	1 , 0	50	0	346049.2	4732274.0
J- 00	2 , 14	100	700	346064.5	4732487.4
J- 0	2 , 13	100	650	346064.5	4732472.1
J- 1	2 , 12	100	600	346064.5	4732456.9
J- 2	2 , 11	100	550	346064.5	4732441.6
J- 3	2 , 10	100	500	346064.5	4732426.4
J- 4	2 , 9	100	450	346064.5	4732411.2
J- 5	2 , 8	100	400	346064.5	4732395.9
J- 6	2 , 7	100	350	346064.5	4732380.7
J- 7	2 , 6	100	300	346064.5	4732365.4
J- 8	2 , 5	100	250	346064.5	4732350.2
J- 9	2 , 4	100	200	346064.5	4732335.0
J- 10	2 , 3	100	150	346064.5	4732319.7
J- 11	2 , 2	100	100	346064.5	4732304.5
J- 12	2 , 1	100	50	346064.5	4732289.2
J- 13	2 , 0	100	0	346064.5	4732274.0
K- 00	3 , 14	150	700	346079.7	4732487.4
K- 0	3 , 13	150	650	346079.7	4732472.1
K- 1	3 , 12	150	600	346079.7	4732456.9
K- 2	3 , 11	150	550	346079.7	4732441.6
K- 3	3 , 10	150	500	346079.7	4732426.4
K- 4	3 , 9	150	450	346079.7	4732411.2
K- 5	3 , 8	150	400	346079.7	4732395.9
K- 6	3 , 7	150	350	346079.7	4732380.7
K- 7	3 , 6	150	300	346079.7	4732365.4

EXHIBIT A-1. UTM COORDINATES OF GRID POINTS AT SEAD

GRID POINTS		GRID COORDINATES(FT)		UTM COORDINATES (METERS)	
GP	(E , N)	EAST	NORTH	EAST	NORTH
K- 8	3 , 5	150	250	346079.7	4732350.2
K- 9	3 , 4	150	200	346079.7	4732335.0
K- 10	3 , 3	150	150	346079.7	4732319.7
K- 11	3 , 2	150	100	346079.7	4732304.5
K- 12	3 , 1	150	50	346079.7	4732289.2
K- 13	3 , 0	150	0	346079.7	4732274.0
L- 00	4 , 14	200	700	346095.0	4732487.4
L- 0	4 , 13	200	650	346095.0	4732472.1
L- 1	4 , 12	200	600	346095.0	4732456.9
L- 2	4 , 11	200	550	346095.0	4732441.6
L- 3	4 , 10	200	500	346095.0	4732426.4
L- 4	4 , 9	200	450	346095.0	4732411.2
L- 5	4 , 8	200	400	346095.0	4732395.9
L- 6	4 , 7	200	350	346095.0	4732380.7
L- 7	4 , 6	200	300	346095.0	4732365.4
L- 8	4 , 5	200	250	346095.0	4732350.2
L- 9	4 , 4	200	200	346095.0	4732335.0
L- 10	4 , 3	200	150	346095.0	4732319.7
L- 11	4 , 2	200	100	346095.0	4732304.5
L- 12	4 , 1	200	50	346095.0	4732289.2
L- 13	4 , 0	200	0	346095.0	4732274.0
M- 00	5 , 14	250	700	346110.2	4732487.4
M- 0	5 , 13	250	650	346110.2	4732472.1
M- 1	5 , 12	250	600	346110.2	4732456.9
M- 2	5 , 11	250	550	346110.2	4732441.6
M- 3	5 , 10	250	500	346110.2	4732426.4
M- 4	5 , 9	250	450	346110.2	4732411.2
M- 5	5 , 8	250	400	346110.2	4732395.9
M- 6	5 , 7	250	350	346110.2	4732380.7
M- 7	5 , 6	250	300	346110.2	4732365.4
M- 8	5 , 5	250	250	346110.2	4732350.2
M- 9	5 , 4	250	200	346110.2	4732335.0
M- 10	5 , 3	250	150	346110.2	4732319.7
M- 11	5 , 2	250	100	346110.2	4732304.5
M- 12	5 , 1	250	50	346110.2	4732289.2
M- 13	5 , 0	250	0	346110.2	4732274.0
N- 00	6 , 14	300	700	346125.4	4732487.4
N- 0	6 , 13	300	650	346125.4	4732472.1
N- 1	6 , 12	300	600	346125.4	4732456.9
N- 2	6 , 11	300	550	346125.4	4732441.6
N- 3	6 , 10	300	500	346125.4	4732426.4
N- 4	6 , 9	300	450	346125.4	4732411.2
N- 5	6 , 8	300	400	346125.4	4732395.9
N- 6	6 , 7	300	350	346125.4	4732380.7
N- 7	6 , 6	300	300	346125.4	4732365.4
N- 8	6 , 5	300	250	346125.4	4732350.2
N- 9	6 , 4	300	200	346125.4	4732335.0
N- 10	6 , 3	300	150	346125.4	4732319.7

EXHIBIT A-1. UTM COORDINATES OF GRID POINTS AT SEAD

GRID POINTS		GRID COORDINATES(FT)		UTM COORDINATES (METERS)	
GP	(E , N)	EAST	NORTH	EAST	NORTH
N- 11	6 , 2	300	100	346125.4	4732304.5
N- 12	6 , 1	300	50	346125.4	4732289.2
N- 13	6 , 0	300	0	346125.4	4732274.0
O- 00	7 , 14	350	700	346140.7	4732487.4
O- 0	7 , 13	350	650	346140.7	4732472.1
O- 1	7 , 12	350	600	346140.7	4732456.9
O- 2	7 , 11	350	550	346140.7	4732441.6
O- 3	7 , 10	350	500	346140.7	4732426.4
O- 4	7 , 9	350	450	346140.7	4732411.2
O- 5	7 , 8	350	400	346140.7	4732395.9
O- 6	7 , 7	350	350	346140.7	4732380.7
O- 7	7 , 6	350	300	346140.7	4732365.4
O- 8	7 , 5	350	250	346140.7	4732350.2
O- 9	7 , 4	350	200	346140.7	4732335.0
O- 10	7 , 3	350	150	346140.7	4732319.7
O- 11	7 , 2	350	100	346140.7	4732304.5
O- 12	7 , 1	350	50	346140.7	4732289.2
O- 13	7 , 0	350	0	346140.7	4732274.0
P- 00	8 , 14	400	700	346155.9	4732487.4
P- 0	8 , 13	400	650	346155.9	4732472.1
P- 1	8 , 12	400	600	346155.9	4732456.9
P- 2	8 , 11	400	550	346155.9	4732441.6
P- 3	8 , 10	400	500	346155.9	4732426.4
P- 4	8 , 9	400	450	346155.9	4732411.2
P- 5	8 , 8	400	400	346155.9	4732395.9
P- 6	8 , 7	400	350	346155.9	4732380.7
P- 7	8 , 6	400	300	346155.9	4732365.4
P- 8	8 , 5	400	250	346155.9	4732350.2
P- 9	8 , 4	400	200	346155.9	4732335.0
P- 10	8 , 3	400	150	346155.9	4732319.7
P- 11	8 , 2	400	100	346155.9	4732304.5
P- 12	8 , 1	400	50	346155.9	4732289.2
P- 13	8 , 0	400	0	346155.9	4732274.0
Q- 00	9 , 14	450	700	346171.2	4732487.4
Q- 0	9 , 13	450	650	346171.2	4732472.1
Q- 1	9 , 12	450	600	346171.2	4732456.9
Q- 2	9 , 11	450	550	346171.2	4732441.6
Q- 3	9 , 10	450	500	346171.2	4732426.4
Q- 4	9 , 9	450	450	346171.2	4732411.2
Q- 5	9 , 8	450	400	346171.2	4732395.9
Q- 6	9 , 7	450	350	346171.2	4732380.7
Q- 7	9 , 6	450	300	346171.2	4732365.4
Q- 8	9 , 5	450	250	346171.2	4732350.2
Q- 9	9 , 4	450	200	346171.2	4732335.0
Q- 10	9 , 3	450	150	346171.2	4732319.7
Q- 11	9 , 2	450	100	346171.2	4732304.5
Q- 12	9 , 1	450	50	346171.2	4732289.2
Q- 13	9 , 0	450	0	346171.2	4732274.0

EXHIBIT A-1. UTM COORDINATES OF GRID POINTS AT SEAD

GRID POINTS		GRID COORDINATES(FT)		UTM COORDINATES (METERS)	
GP	(E , N)	EAST	NORTH	EAST	NORTH
R- 00	10 , 14	500	700	346186.4	4732487.4
R- 0	10 , 13	500	650	346186.4	4732472.1
R- 1	10 , 12	500	600	346186.4	4732456.9
R- 2	10 , 11	500	550	346186.4	4732441.6
R- 3	10 , 10	500	500	346186.4	4732426.4
R- 4	10 , 9	500	450	346186.4	4732411.2
R- 5	10 , 8	500	400	346186.4	4732395.9
R- 6	10 , 7	500	350	346186.4	4732380.7
R- 7	10 , 6	500	300	346186.4	4732365.4
R- 8	10 , 5	500	250	346186.4	4732350.2
R- 9	10 , 4	500	200	346186.4	4732335.0
R- 10	10 , 3	500	150	346186.4	4732319.7
R- 11	10 , 2	500	100	346186.4	4732304.5
R- 12	10 , 1	500	50	346186.4	4732289.2
R- 13	10 , 0	500	0	346186.4	4732274.0
S- 3	11 , 10	550	500	346201.6	4732426.4
S- 4	11 , 9	550	450	346201.6	4732411.2
S- 5	11 , 8	550	400	346201.6	4732395.9
S- 6	11 , 7	550	350	346201.6	4732380.7
T- 3	12 , 10	600	500	346216.9	4732426.4
T- 4	12 , 9	600	450	346216.9	4732411.2
T- 5	12 , 8	600	400	346216.9	4732395.9
T- 6	12 , 7	600	350	346216.9	4732380.7
U- 3	13 , 10	650	500	346232.1	4732426.4
U- 4	13 , 9	650	450	346232.1	4732411.2
U- 5	13 , 8	650	400	346232.1	4732395.9
U- 6	13 , 7	650	350	346232.1	4732380.7
V- 3	14 , 10	700	500	346247.4	4732426.4
V- 4	14 , 9	700	450	346247.4	4732411.2
V- 5	14 , 8	700	400	346247.4	4732395.9
V- 6	14 , 7	700	350	346247.4	4732380.7
W- 3	15 , 10	750	500	346262.6	4732426.4
W- 4	15 , 9	750	450	346262.6	4732411.2
W- 5	15 , 8	750	400	346262.6	4732395.9
W- 6	15 , 7	750	350	346262.6	4732380.7
X- 3	16 , 10	800	500	346277.8	4732426.4
X- 4	16 , 9	800	450	346277.8	4732411.2
X- 5	16 , 8	800	400	346277.8	4732395.9
X- 6	16 , 7	800	350	346277.8	4732380.7

EXHIBIT A-2. UTM COORDINATES AND ELEVATIONS OF WELLS

WELL NO.	GRID REFERENCE POINT	DISTANCE FROM REFERENCE (FT)		UTM COORDINATES (METERS)			WELL ELEV. (FT)
		EAST	NORTH	EAST	NORTH		
PT-10	X-6	179	-78	346332.4	4732356.9		
			SURVEYED	346338.7	4732360.1	**	677.9
PT-12	H-7	-29	7	346025.2	4732367.6		
			SURVEYED	346024.6	4732363.4	**	649.0
PT-15	C-13	41	-434	345894.1	4732141.7		
			SURVEYED	345893.6	4732142.1	**	634.4
PT-17	C-11	7	-53	345883.7	4732288.3		
		(PT-14)	SURVEYED	345882.2	4732287.9	**	638.5
PT-18	L-8	-20	12	346088.9	4732353.9		654.6
PT-20	F-11	-31	-12	345963.6	4732300.8		644.1
PT-21	F-7	-6	2	345971.2	4732366.1		645.8
PT-22	F-7	-12	12	345969.4	4732369.1		645.1
PT-24	B-7	-134	62	345810.3	4732384.3		633.3
PT-25	B-13	4	-237	345852.3	4732232.2		634.0
PT-16	B-1	-106	324	345818.8	4732555.7	**	
		(PT-13)	SURVEYED	345809.7	4732558.3		635.2
PT-19	G-13	-33	-68	345993.5	4732253.3		644.0
PT-23	B-1	75	46	345874.0	4732470.9		638.6
PT-11	O-13	15	-233	346145.3	4732203.0		
			SURVEYED	346143.3	4732203.1	**	654.8

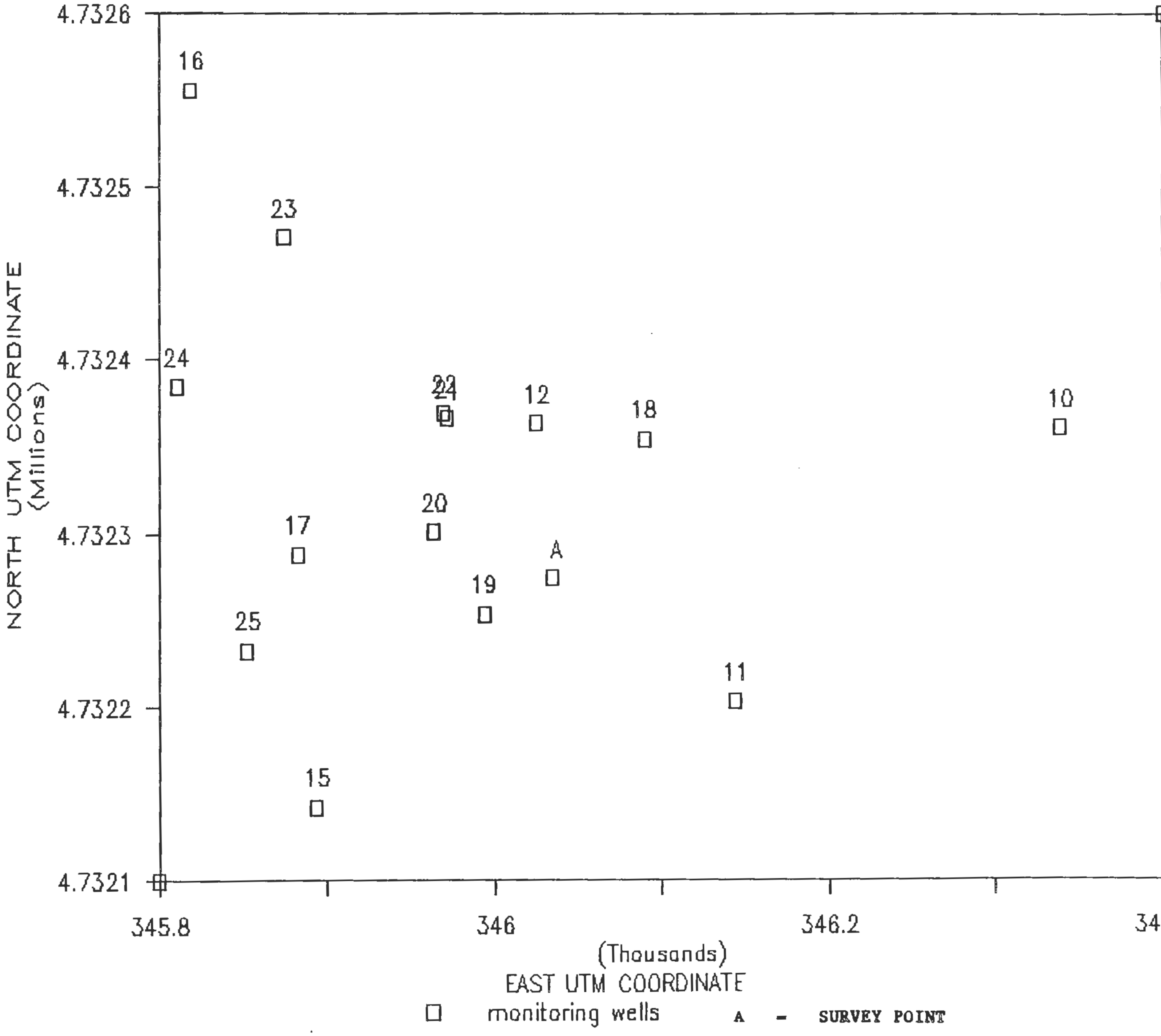
** LOCATION USED IN MAPPING

EXHIBIT A-3. UTM COORDINATES AND DEPTHS OF SOIL SAMPLING POINTS

SOIL SAMPLE NO.	GRID REFERENCE POINT	DISTANCE FROM REFERENCE (FT) EAST	NORTH	UTM COORDINATES (METERS) EAST	NORTH	SAMPLE DEPTH (FT)
SS-01	PT-10	0	25	346338.7	4732367.7	2.5
SS-02A	K-6	10	0	346082.8	4732380.7	2.4
SS-02B	K-6	10	0	346082.8	4732380.7	3.9
SS-03	M-6	6	0	346112.0	4732380.7	1.9
SS-04	M-3	10	0	346113.2	4732426.4	1.7
SS-05	M-9	10	0	346113.2	4732335.0	1.8
SS-06	B-5	-1.5	0	345850.7	4732395.9	3.0
SS-07	G-11	-3	6	346002.6	4732306.3	3.1
SS-08	F-5	0	-2	345973.0	4732395.3	1.9
SS-09	J-0	0	-10	346064.5	4732469.1	2.9
SS-10	K-6	-12	-2	346076.1	4732380.1	2.9
SS-11	I-6	-6	-18	346047.4	4732375.2	2.6
SS-12	K-2	2	-3	346080.3	4732440.7	1.6
SS-13	H-10	-12	-10	346030.3	4732316.7	1.9

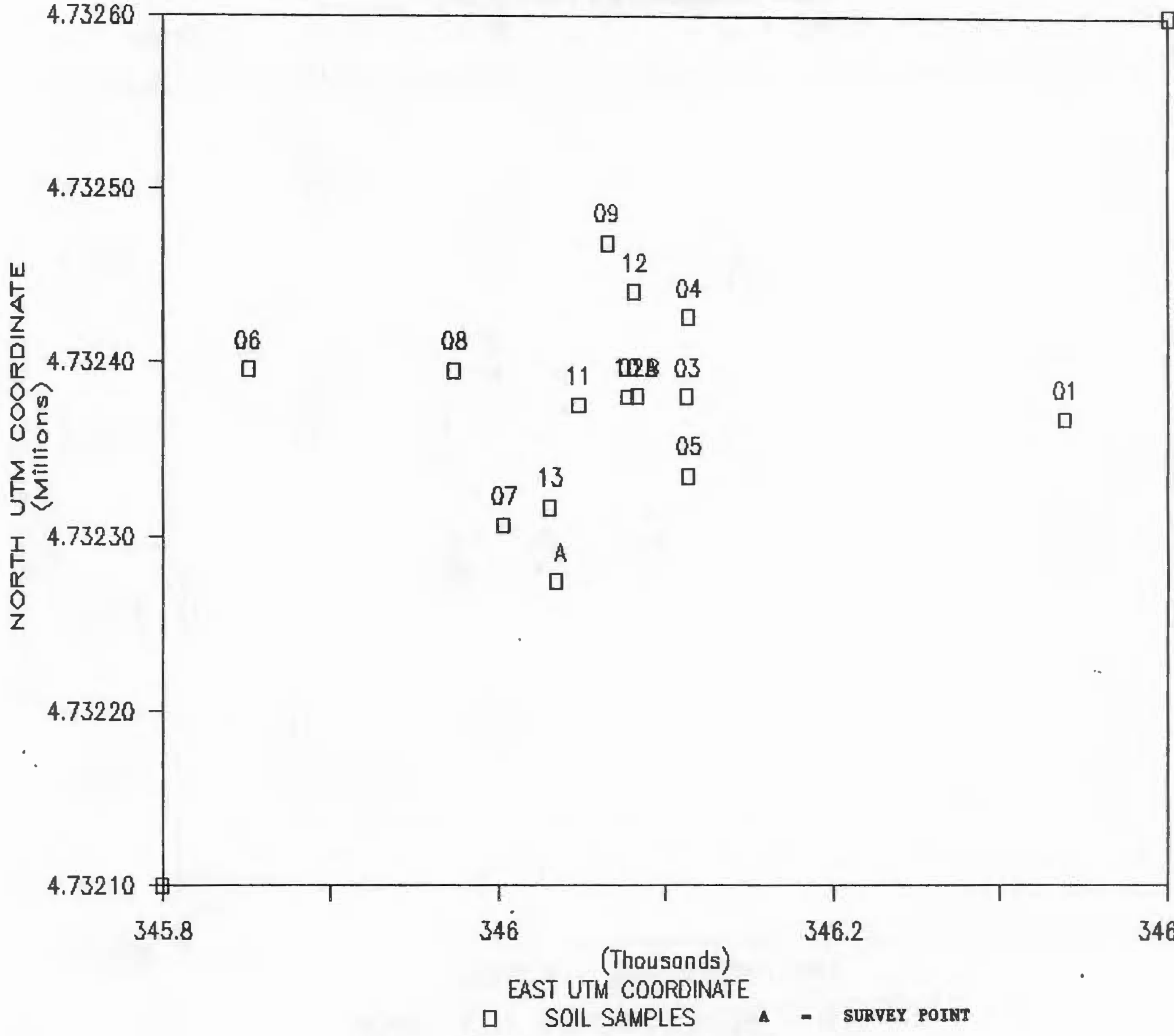
MAP OF MONITORING WELLS

SENECA ARMY DEPOT LANDFILL AREA



MAP OF SOIL SAMPLING LOCATIONS

SENECA ARMY DEPOT LANDFILL AREA



APPENDIX B

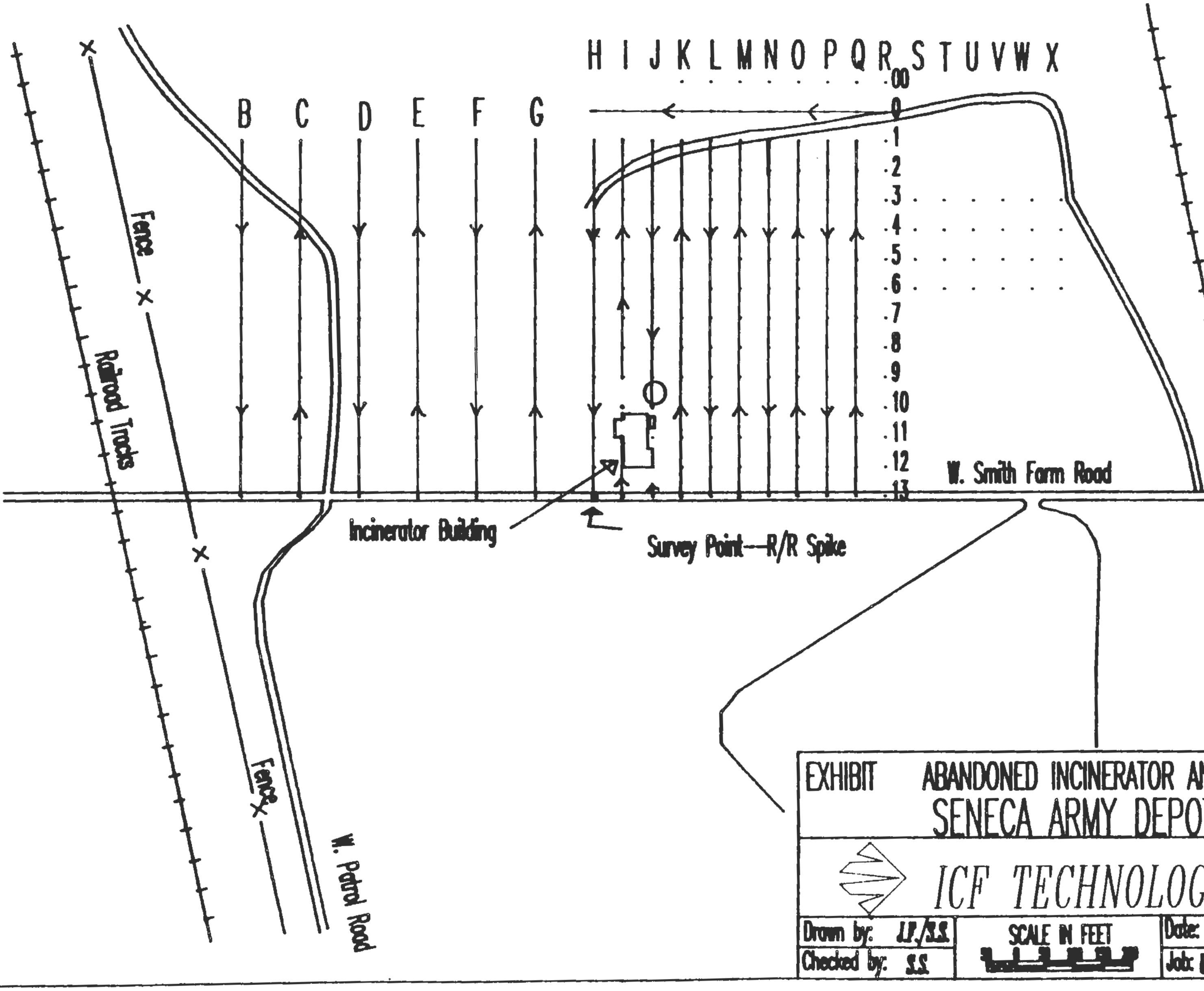
GEOPHYSICAL SURVEY DATA AND INTERPRETATIONS

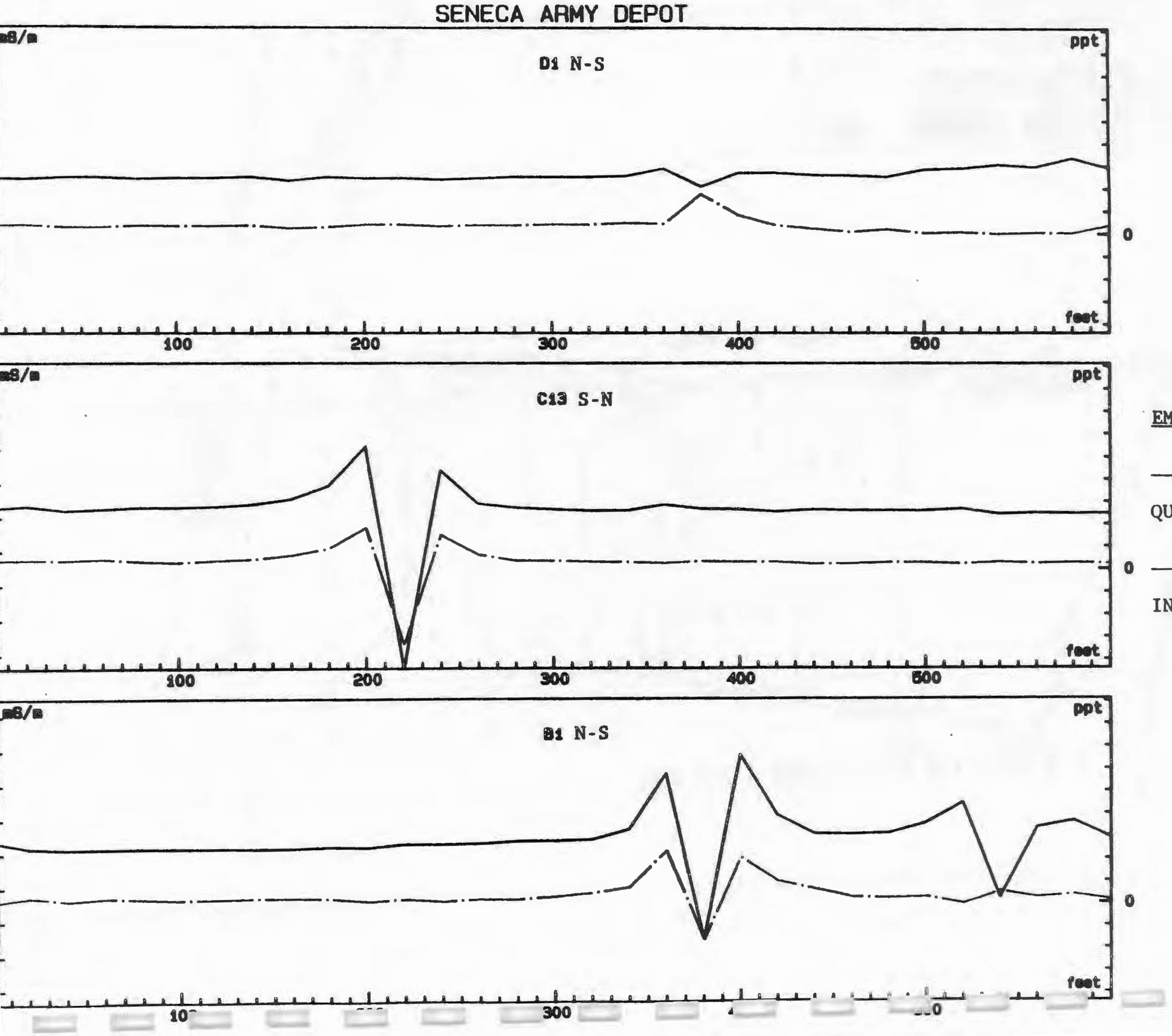
ELECTROMAGNETIC SURVEY

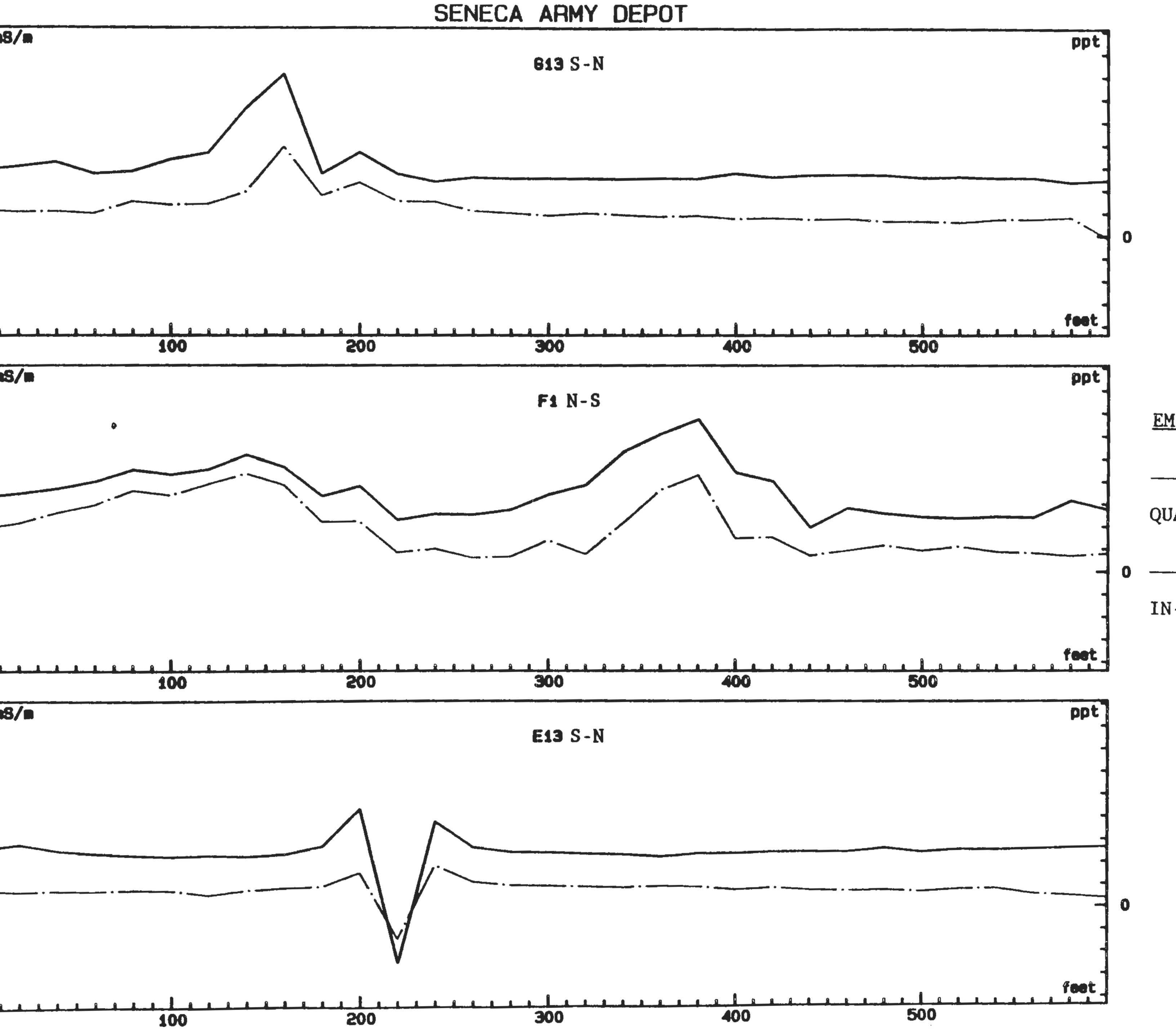
AMPLITUDE VERSUS DISTANCE (X-Y) PLOTS

MAPS SHOW DIRECTION OF SURVEY LINES

PLOTS ARE LABELED WITH SURVEY STARTING POINT


H I J K L M N O P Q R S T U V W X
B C D E F G
00
0
1
2
3
4
5
6
7
8
9
10
11
12
13
W. Smith Farm Road
Incinerator Building
Survey Point—R/R Spike
Fence
Railroad Tracks
Fence
W. Patrol Road
EXHIBIT
ABANDONED INCINERATOR A
SENECA ARMY DEPO
ICF TECHNOLOG
Drawn by: J.F./S.S.
Checked by: S.S.
SCALE IN FEET
Date:
Job:


SENECA ARMY DEPOT
mS/m
ppt
D1 N-S
0
feet
100
200
300
400
500
mS/m
ppt
C13 S-N
0
feet
100
200
300
400
500
mS/m
ppt
B1 N-S
0
feet
100
300
EM
QU
IN


SENECA ARMY DEPOT
mS/m
G13 S-N
ppt
0
feet
100
200
300
400
500
mS/m
F1 N-S
ppt
0
feet
100
200
300
400
500
mS/m
E13 S-N
ppt
0
feet
100
200
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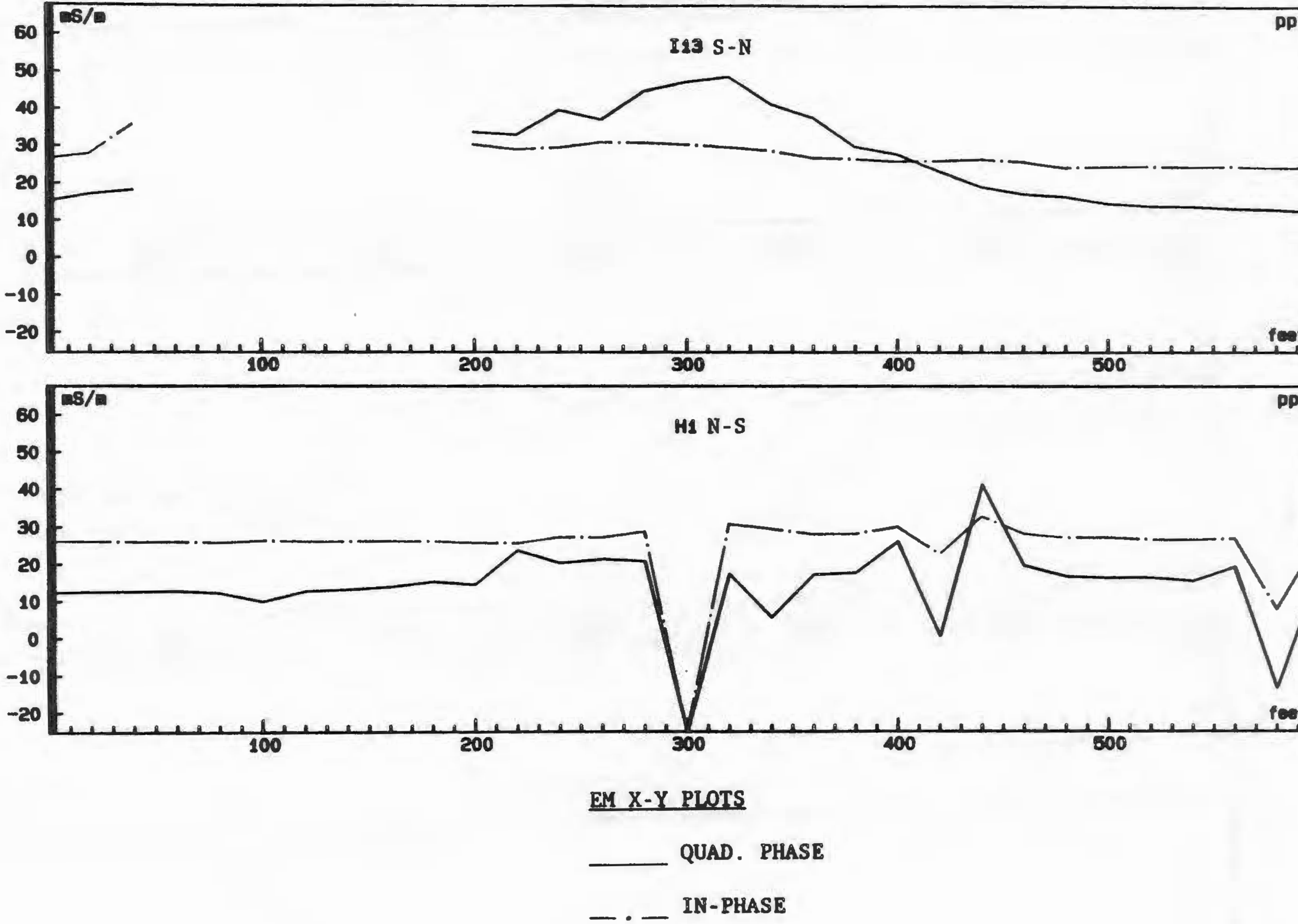
500
EM
QUA
IN

SENECA ARMY DEPOT



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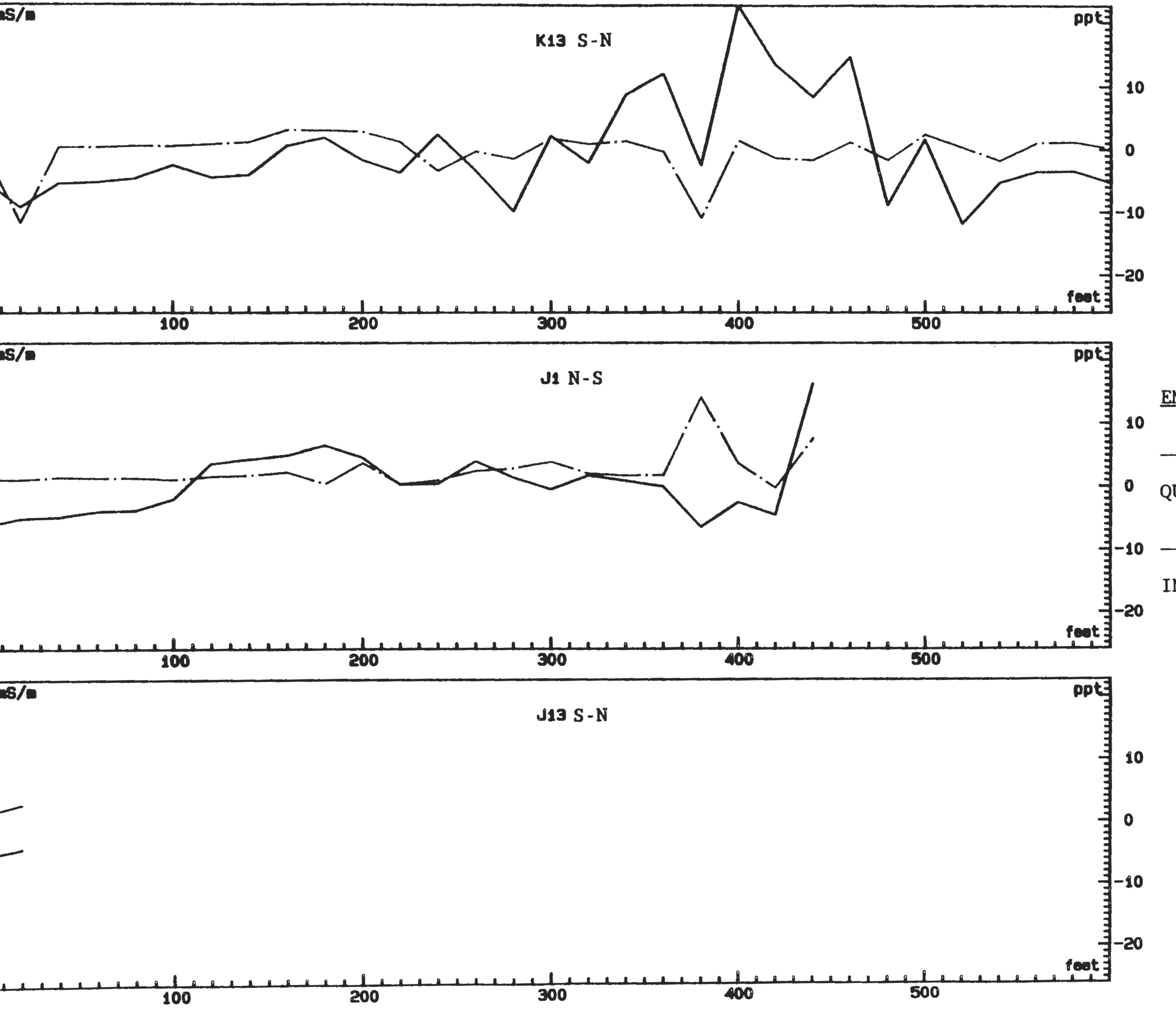

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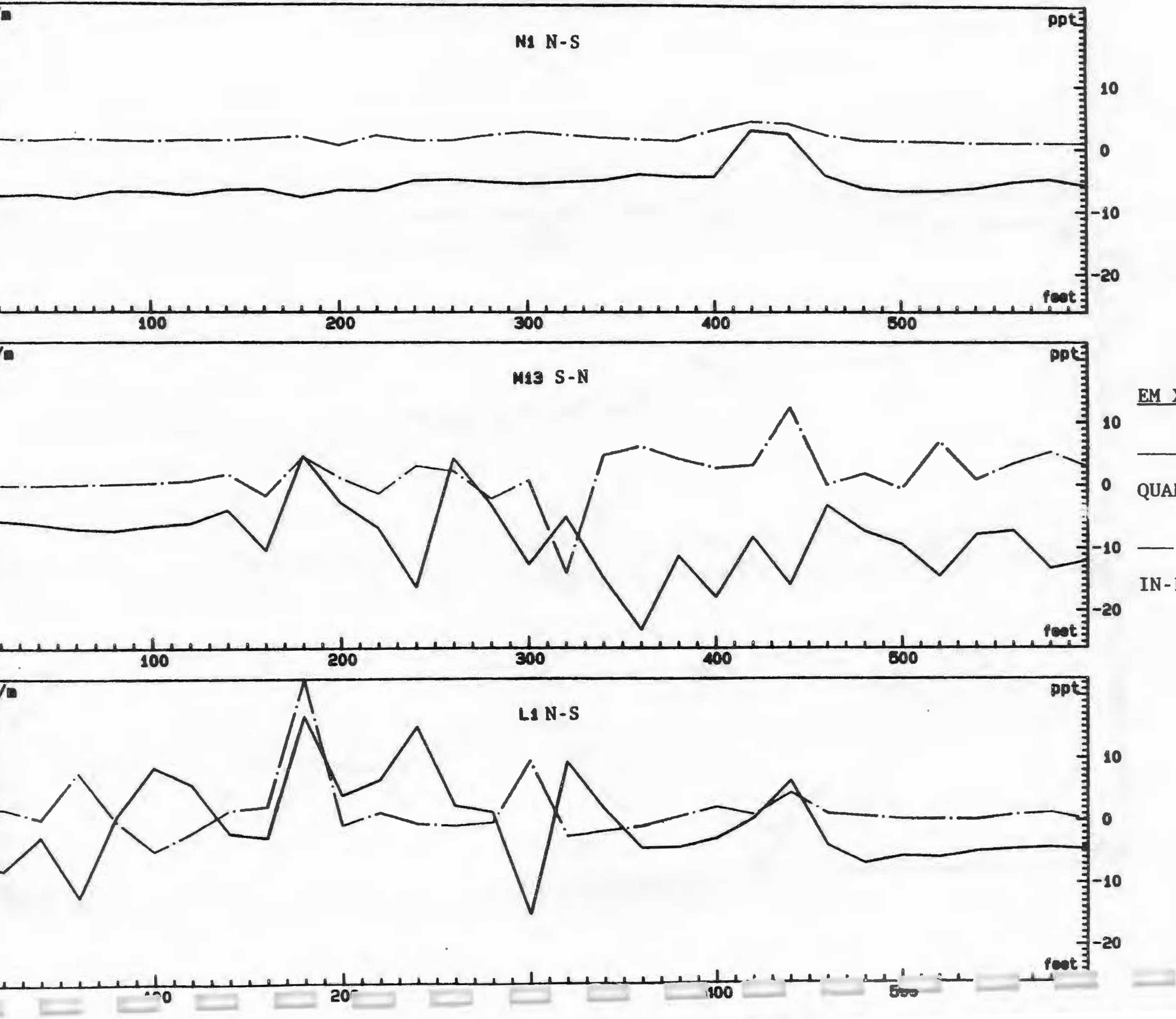

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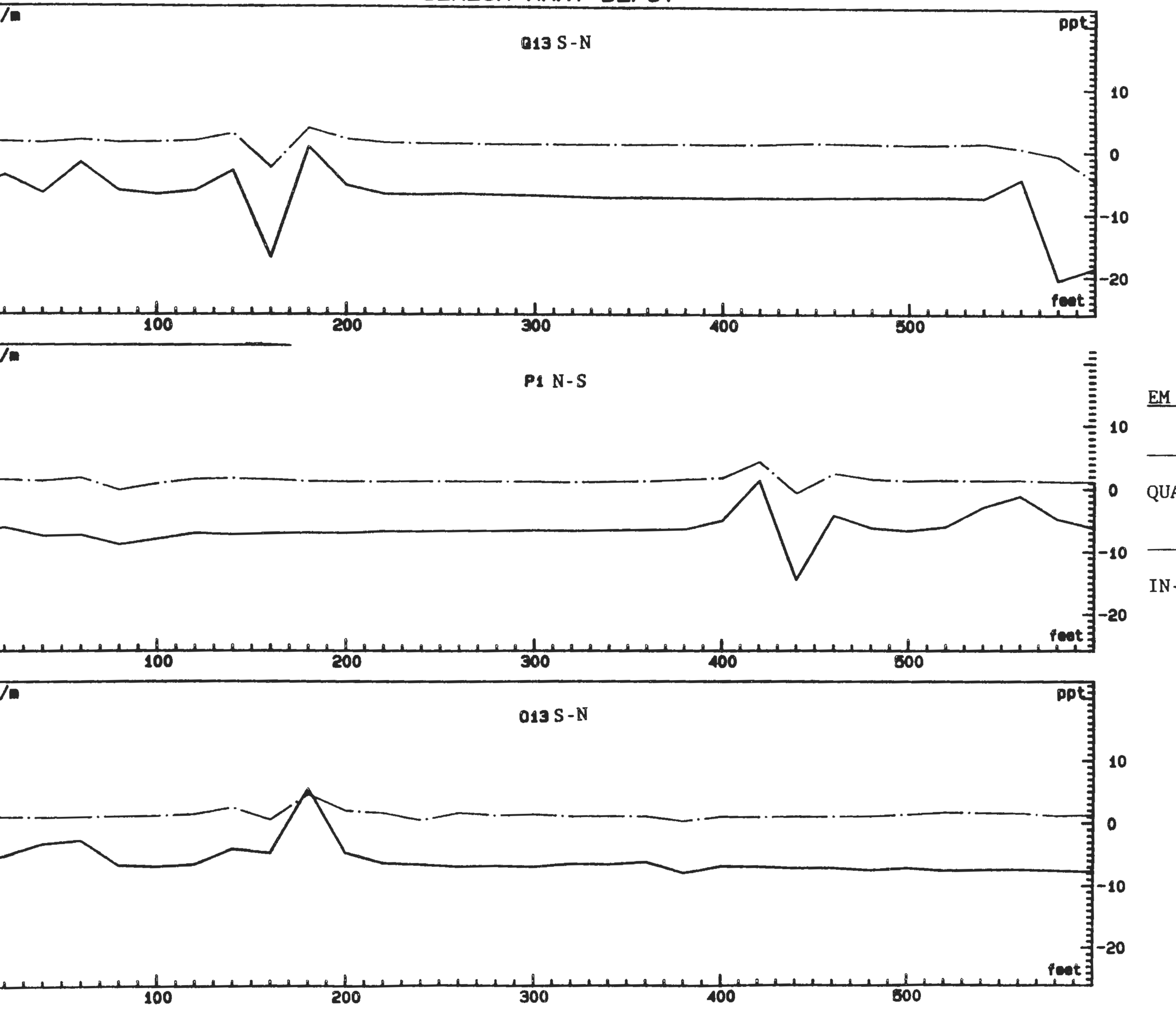
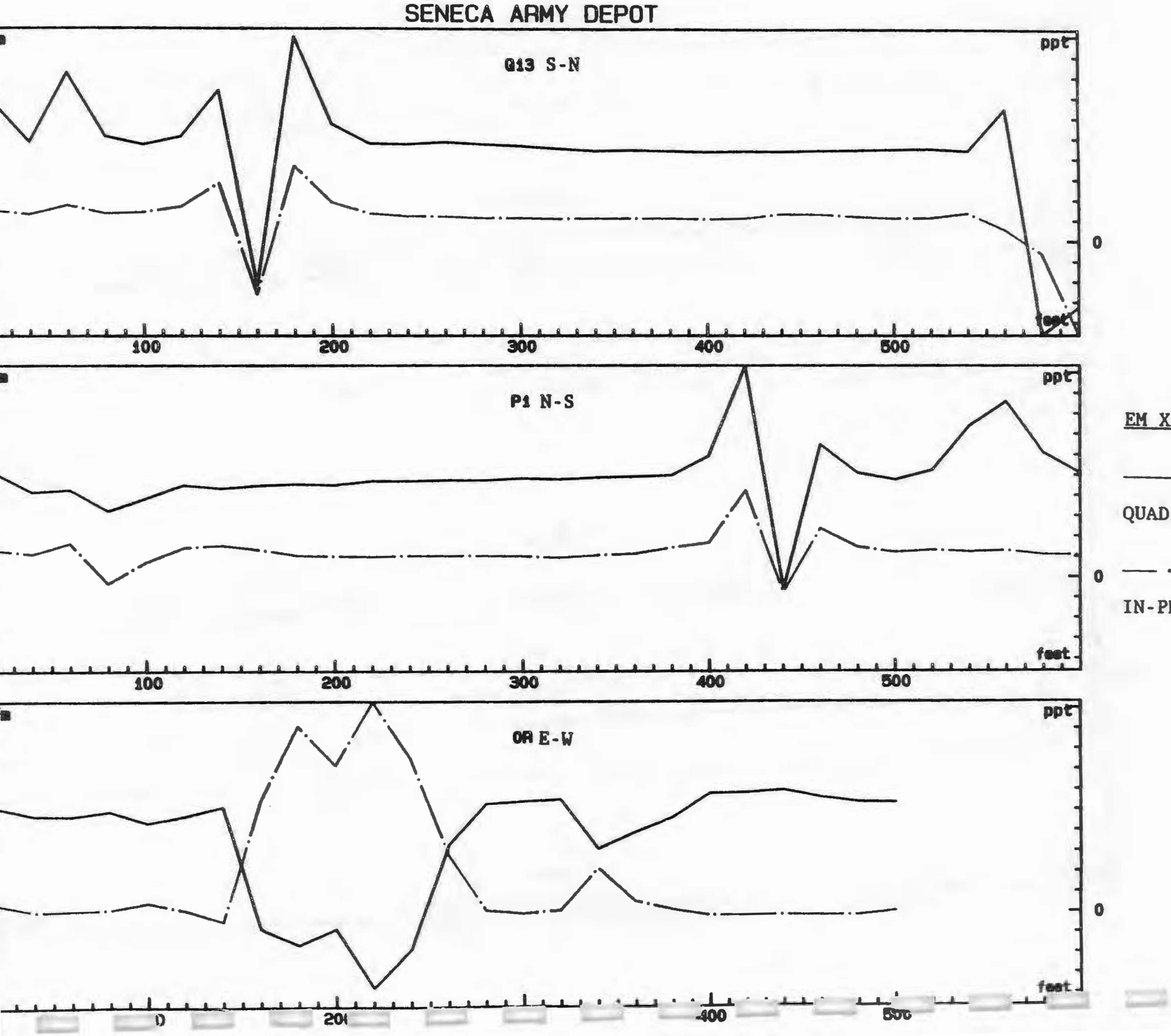



SENECA ARMY DEPOT
Q13 S-N
P1 N-S
OR E-W
ppt
0
feet
100
200
300
400
500
EM X
QUAD
IN-P

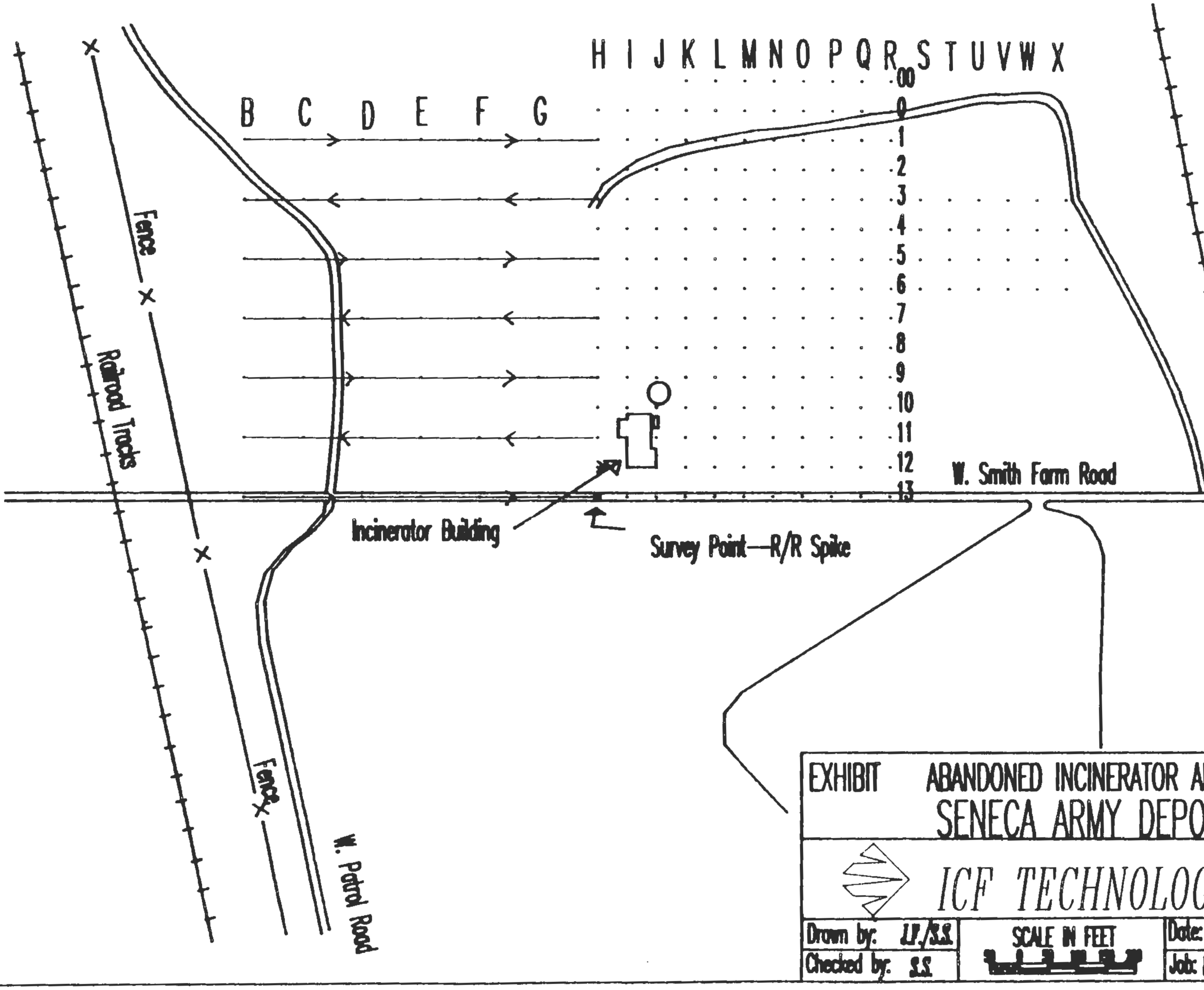


EXHIBIT ABANDONED INCINERATOR A

SENECA ARMY DEPO

ICF TECHNOLOG

Drawn by: J.P./S.S.

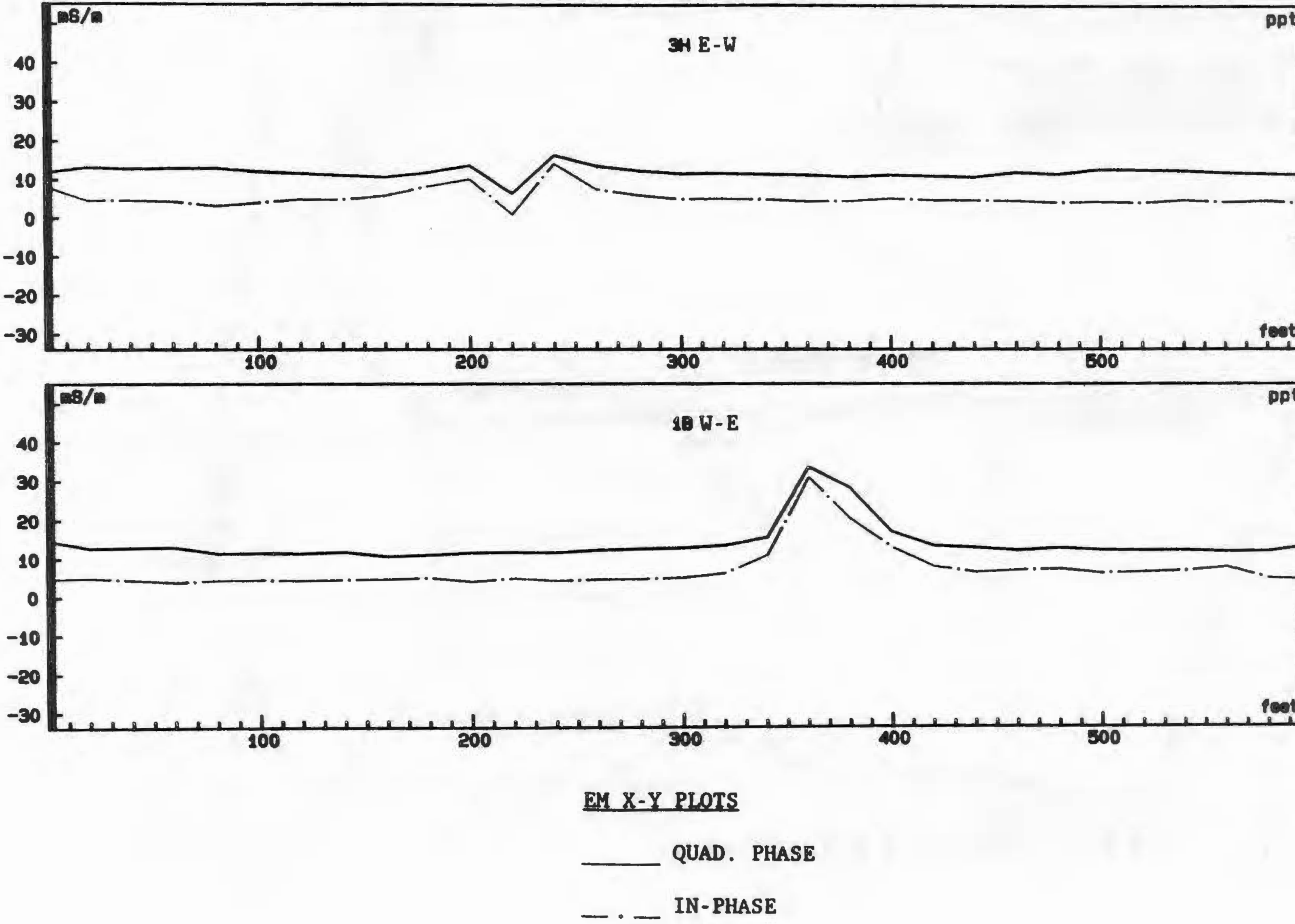
Checked by: S.S.

SCALE IN FEET

Date:

Job:

SENECA ARMY DEPOT



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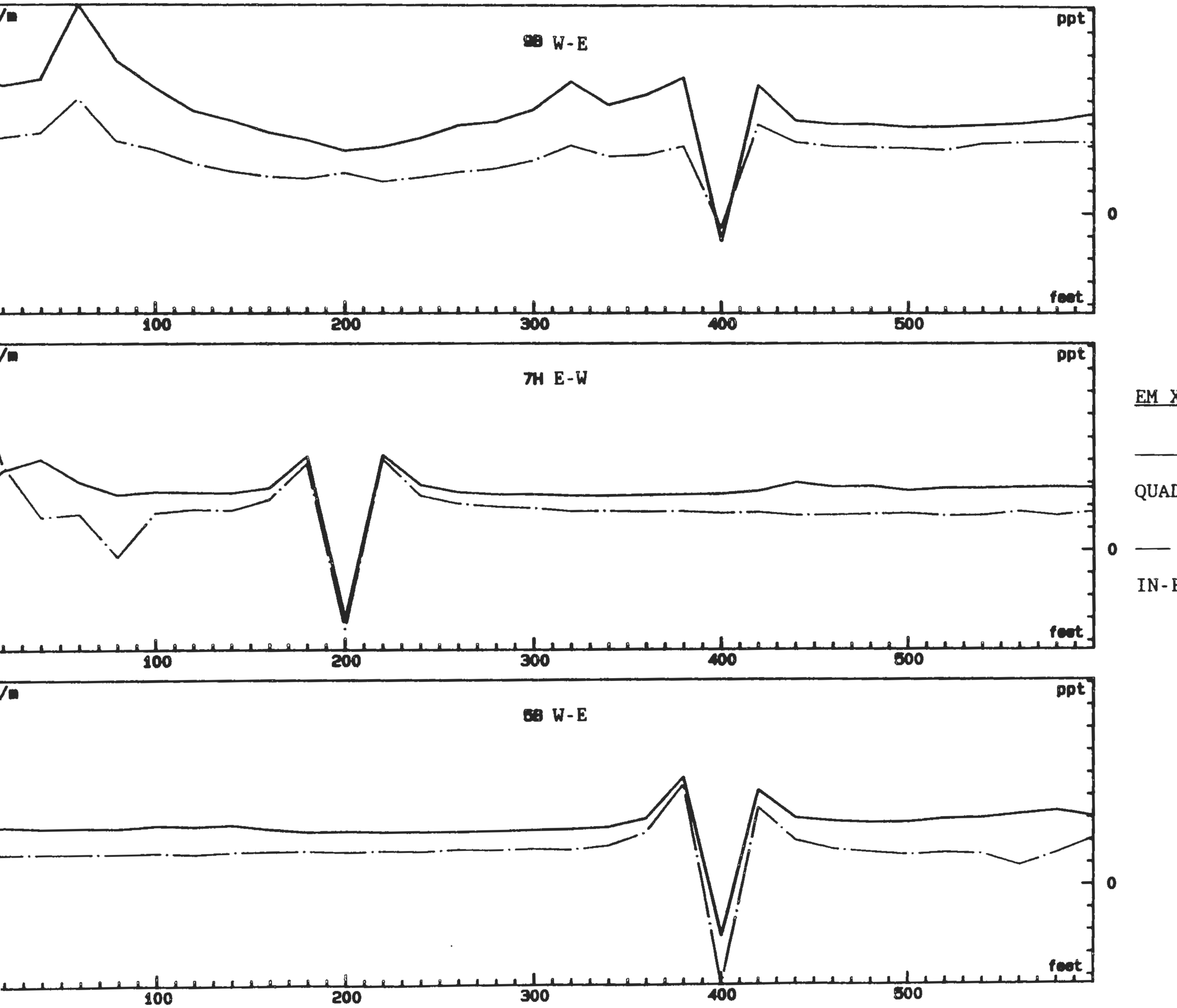

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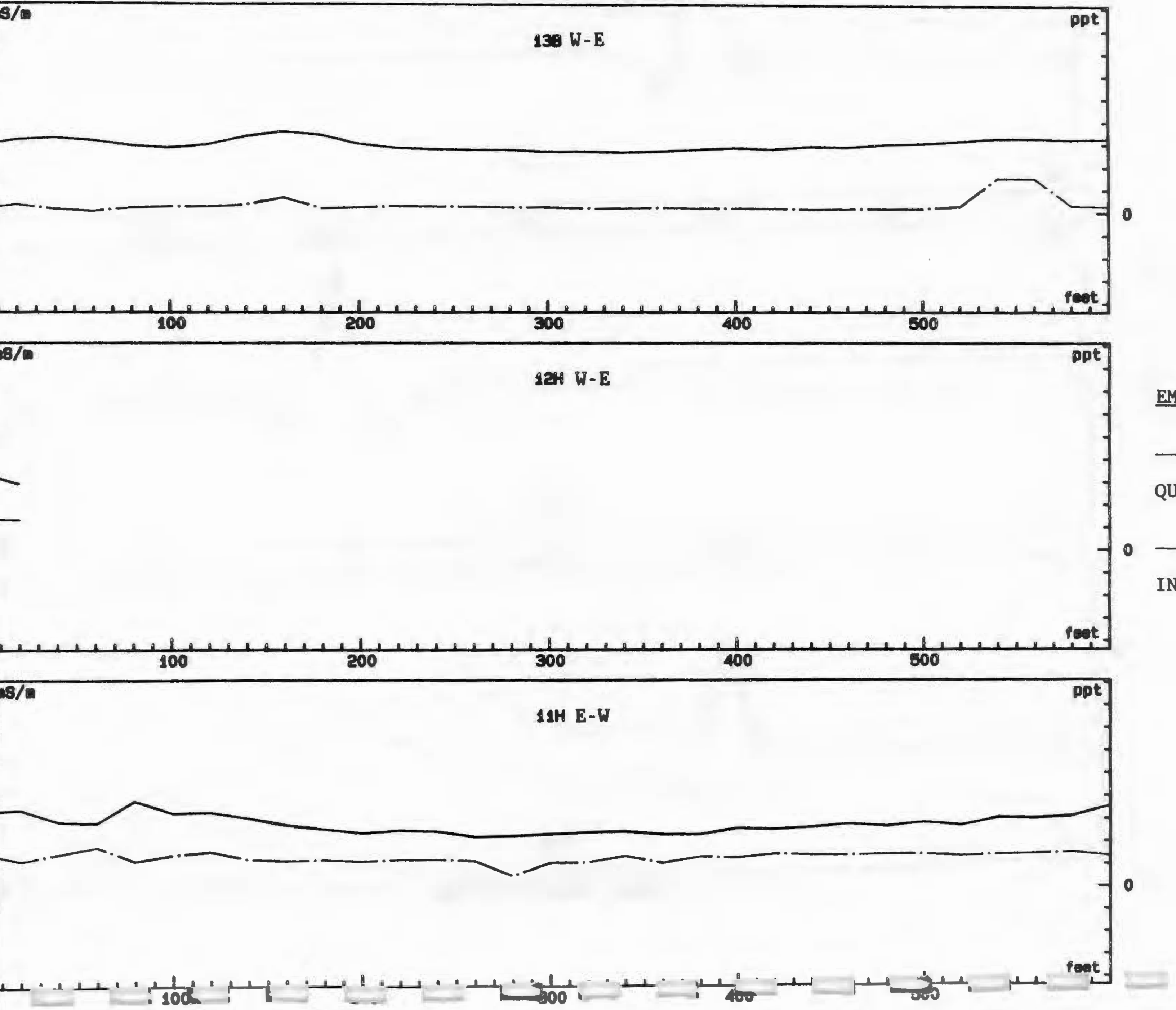


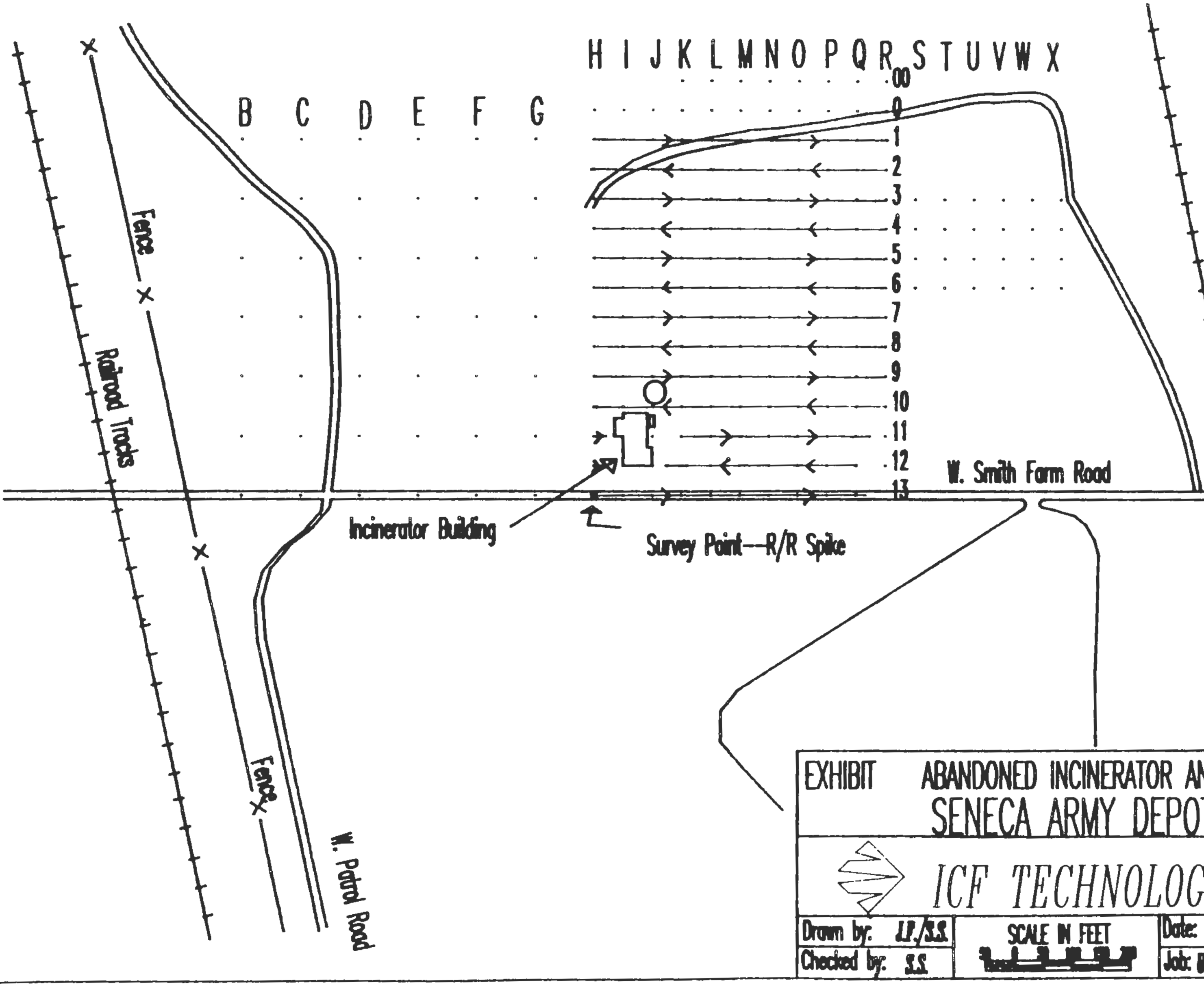


EXHIBIT ABANDONED INCINERATOR AN

SENECA ARMY DEPO

ICF TECHNOLOG

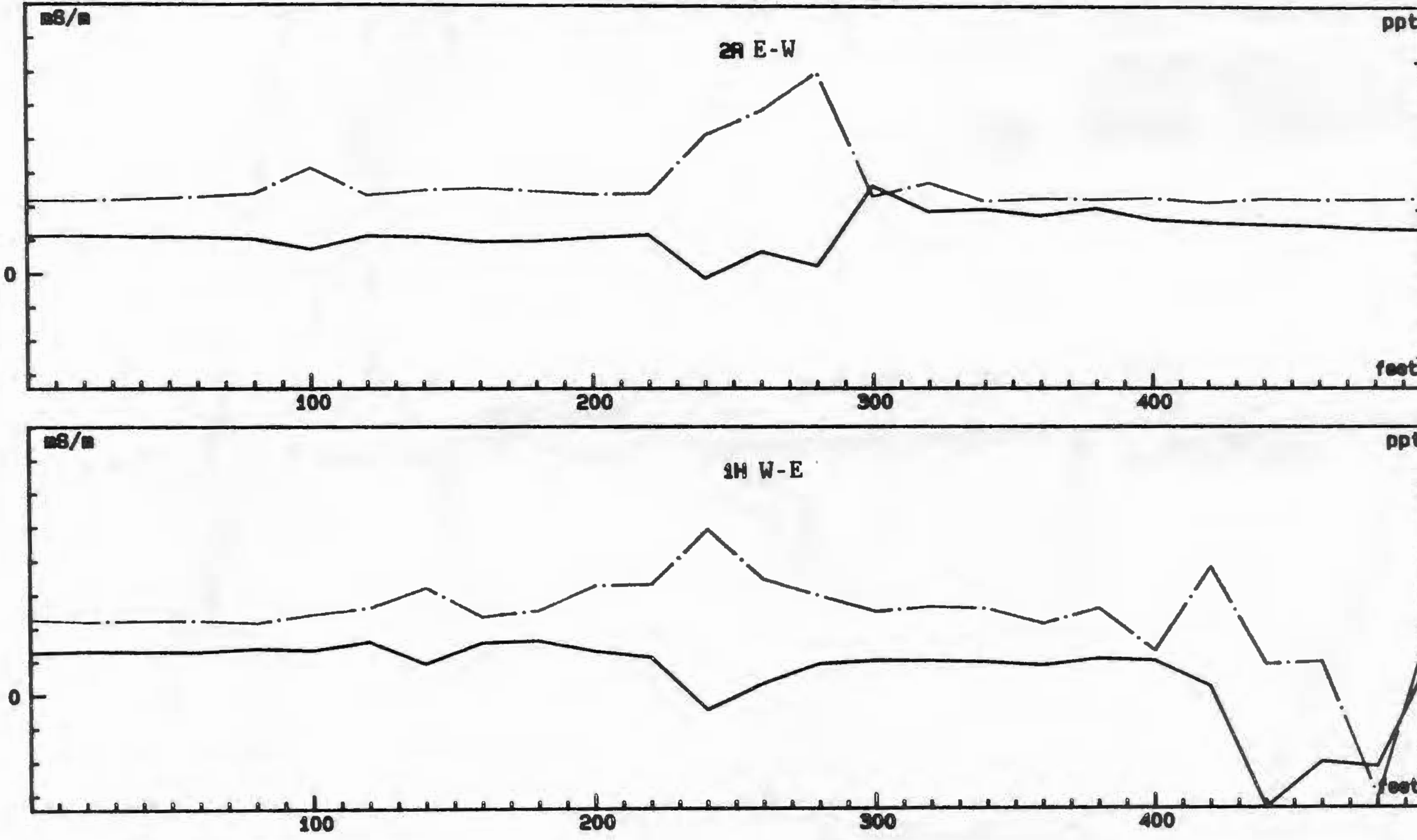
Drawn by: J.P./S.S.

Checked by: S.S.

Date:

Job:

SENECA ARMY DEPOT

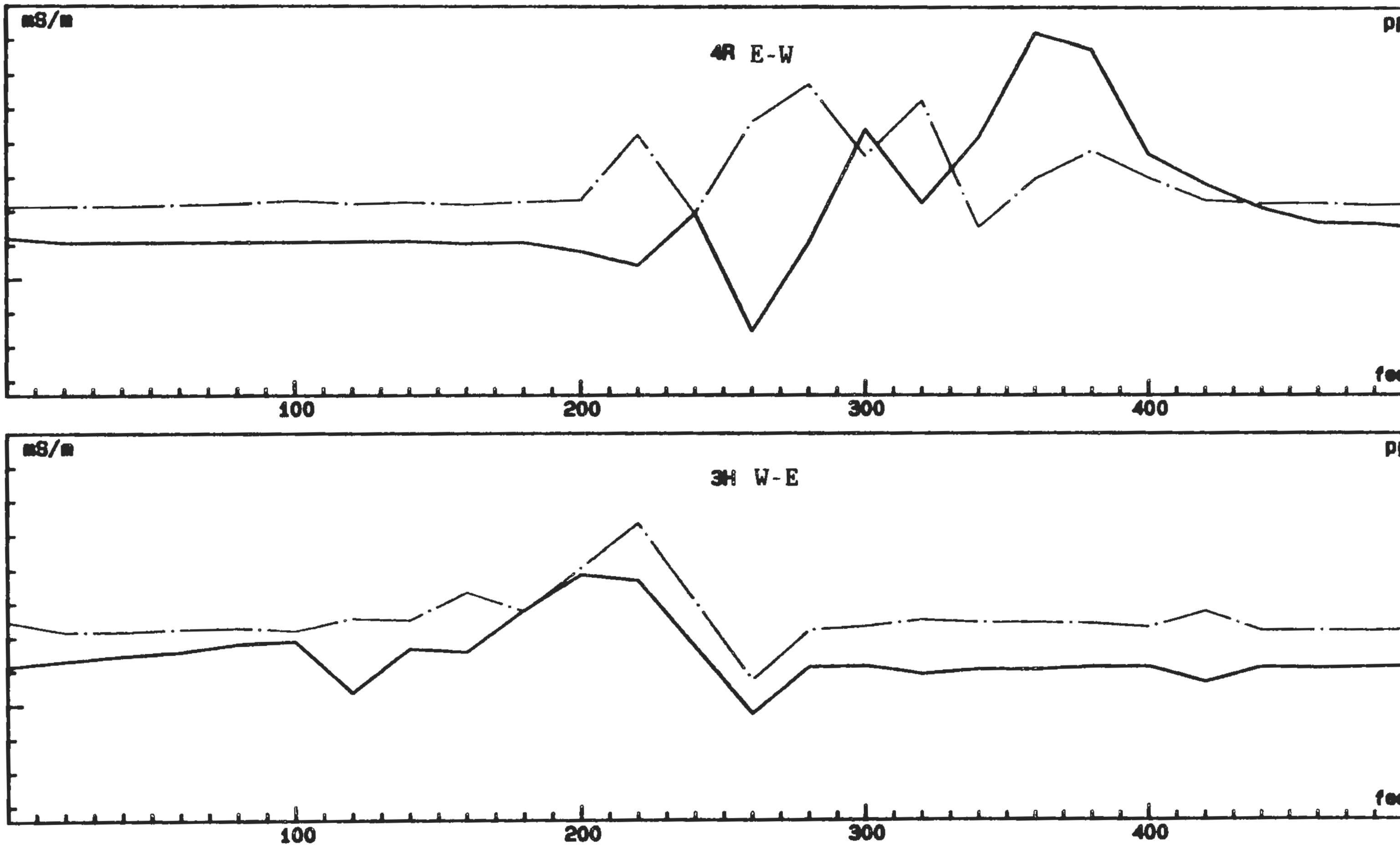


EM X-Y PLOTS

———— QUAD. PHASE

—·— IN-PHASE

SENECA ARMY DEPOT

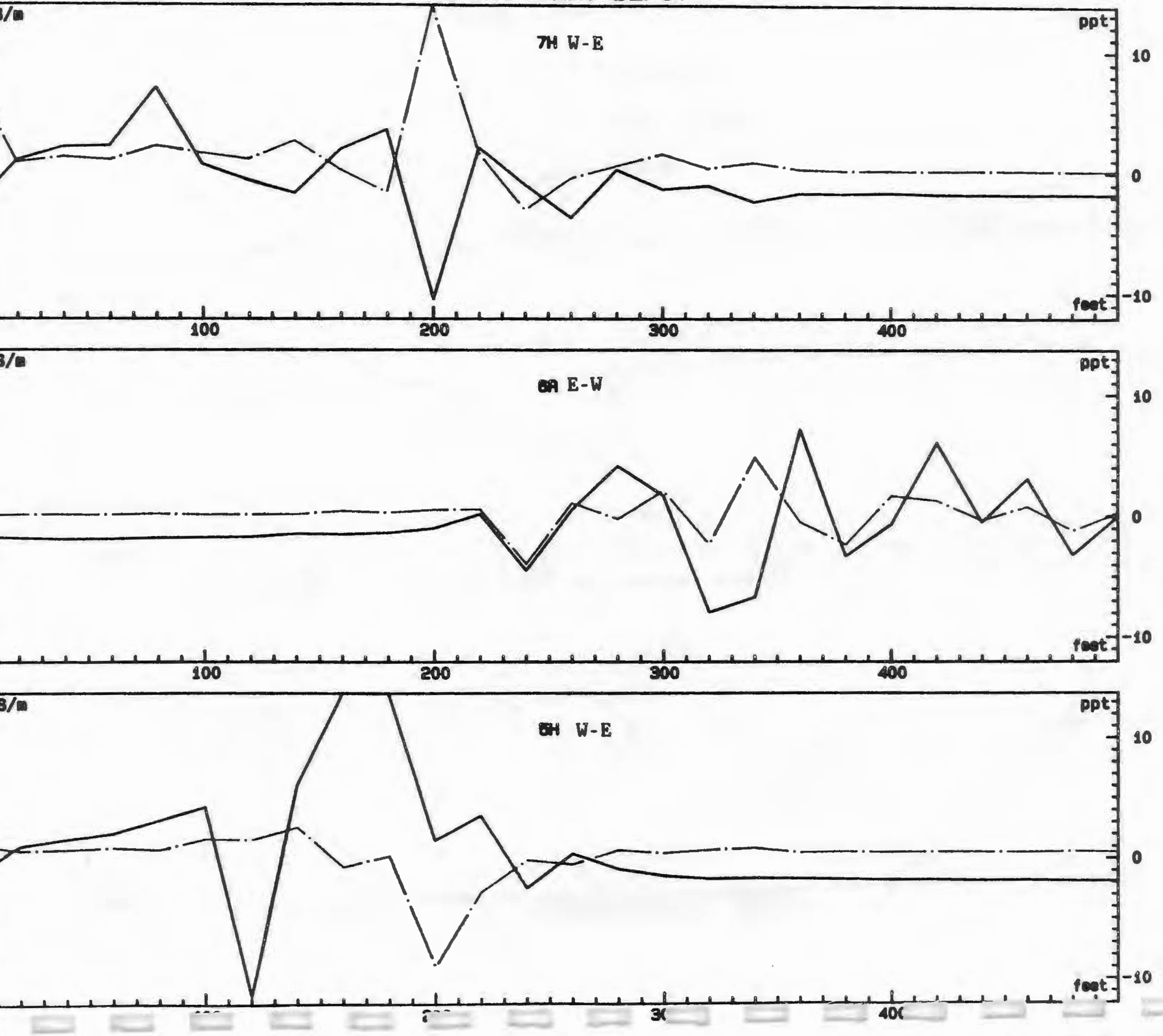


EM X-Y PLOTS

______ QUAD. PHASE

_ . _ IN-PHASE

SENECA ARMY DEPOT

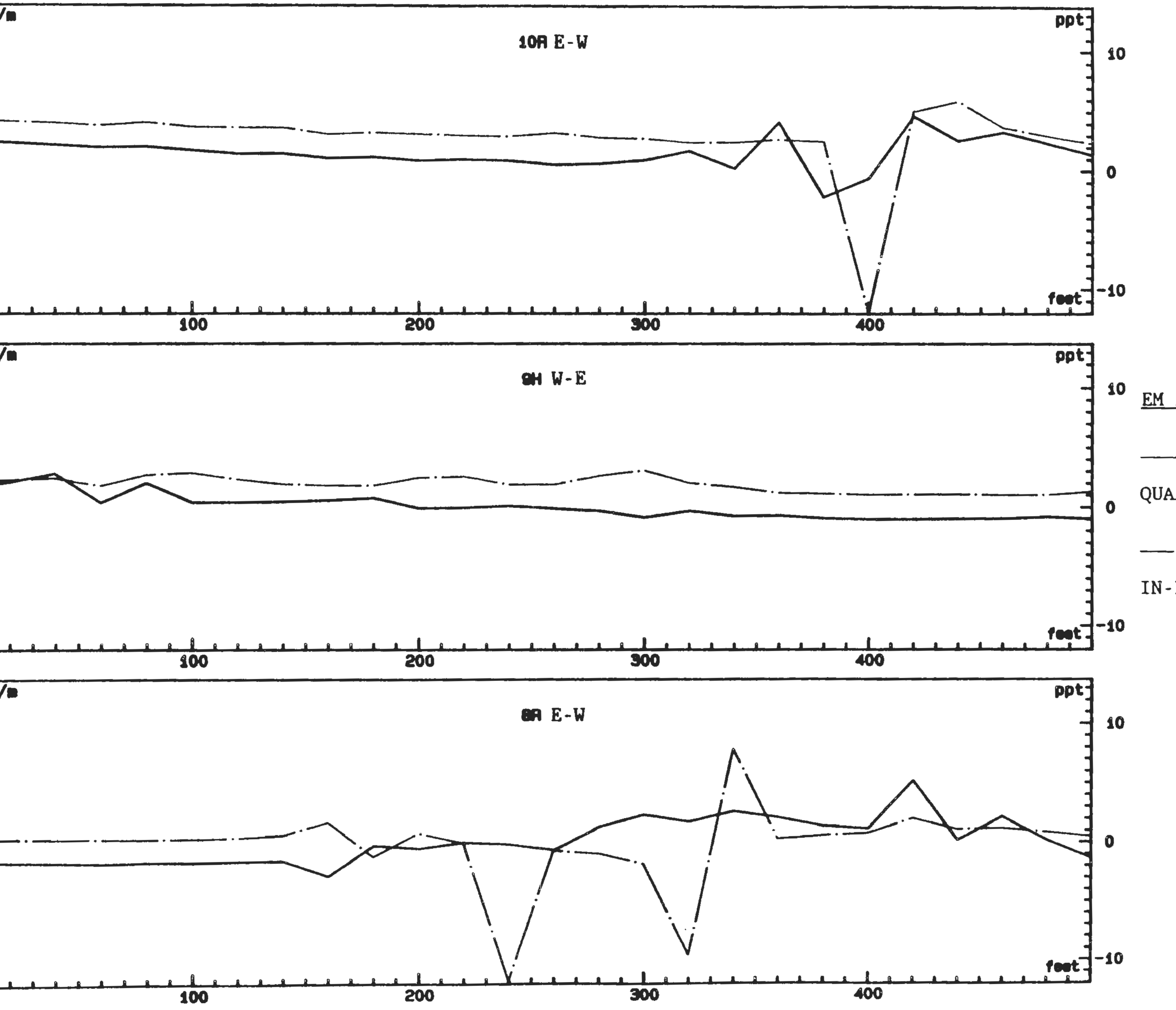


EM

QU

IN

SENECA ARMY DEPOT



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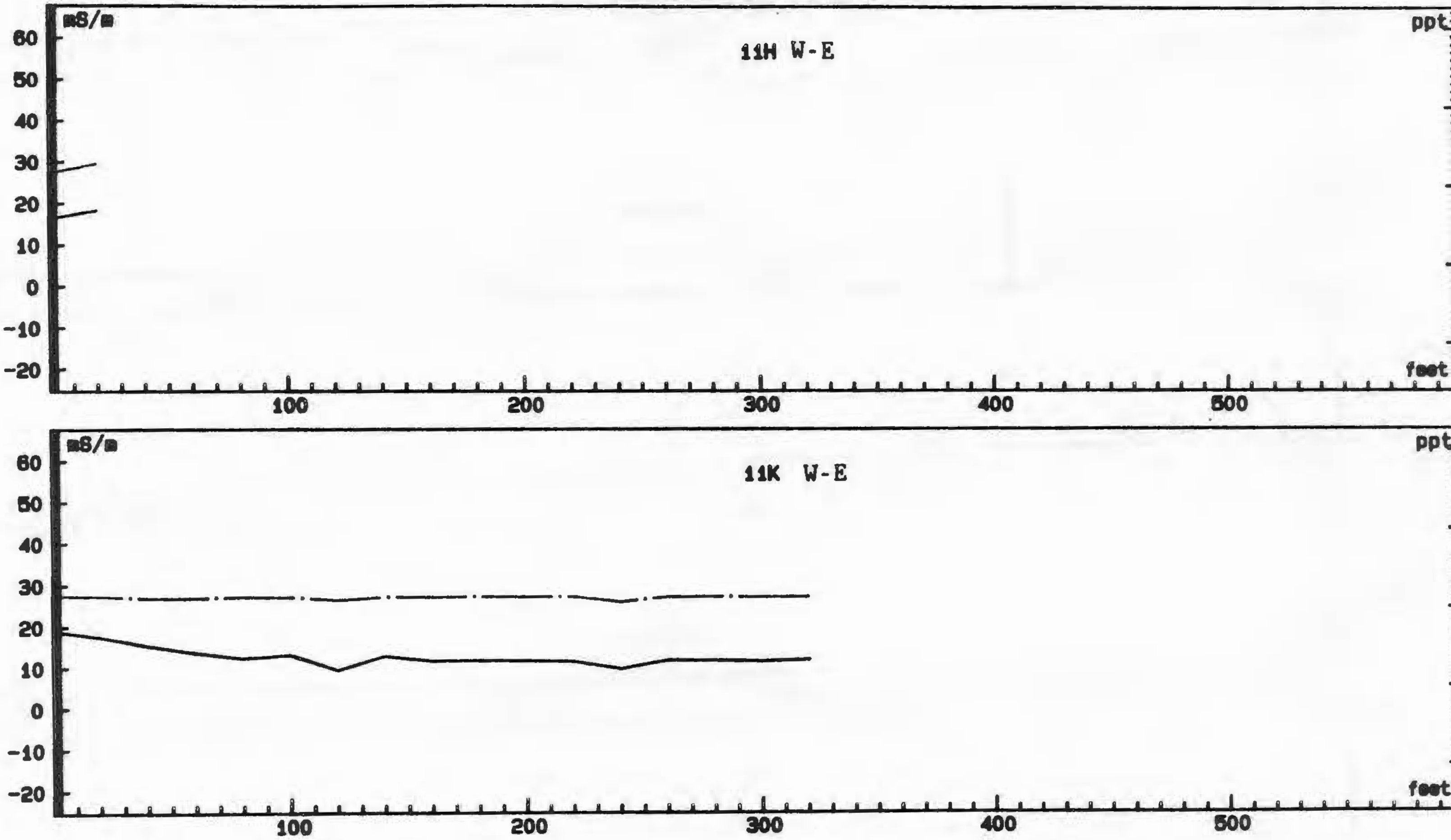
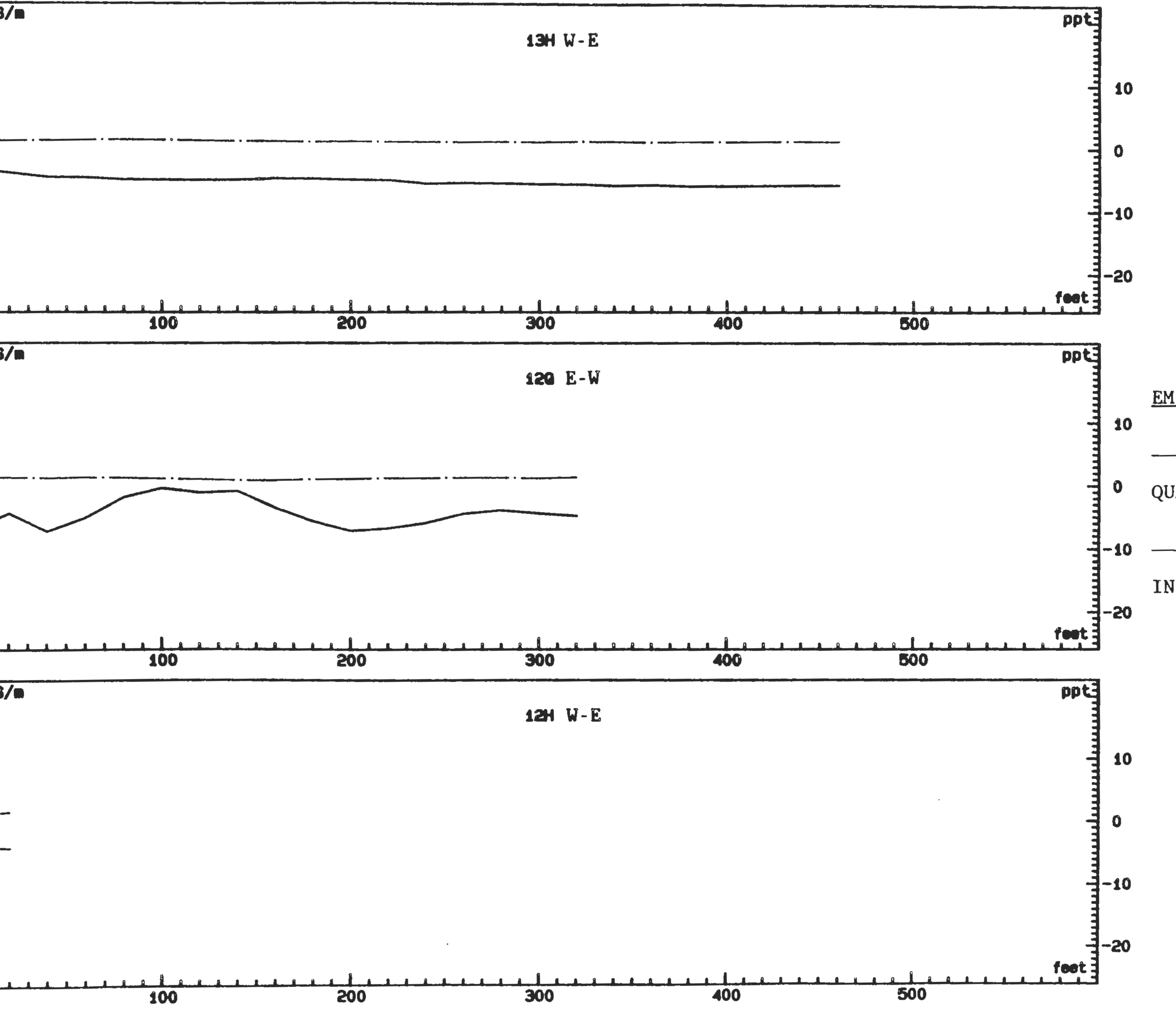


EM X-Y PLOTS

——— QUAD. PHASE

— · — IN-PHASE

SENECA ARMY DEPOT



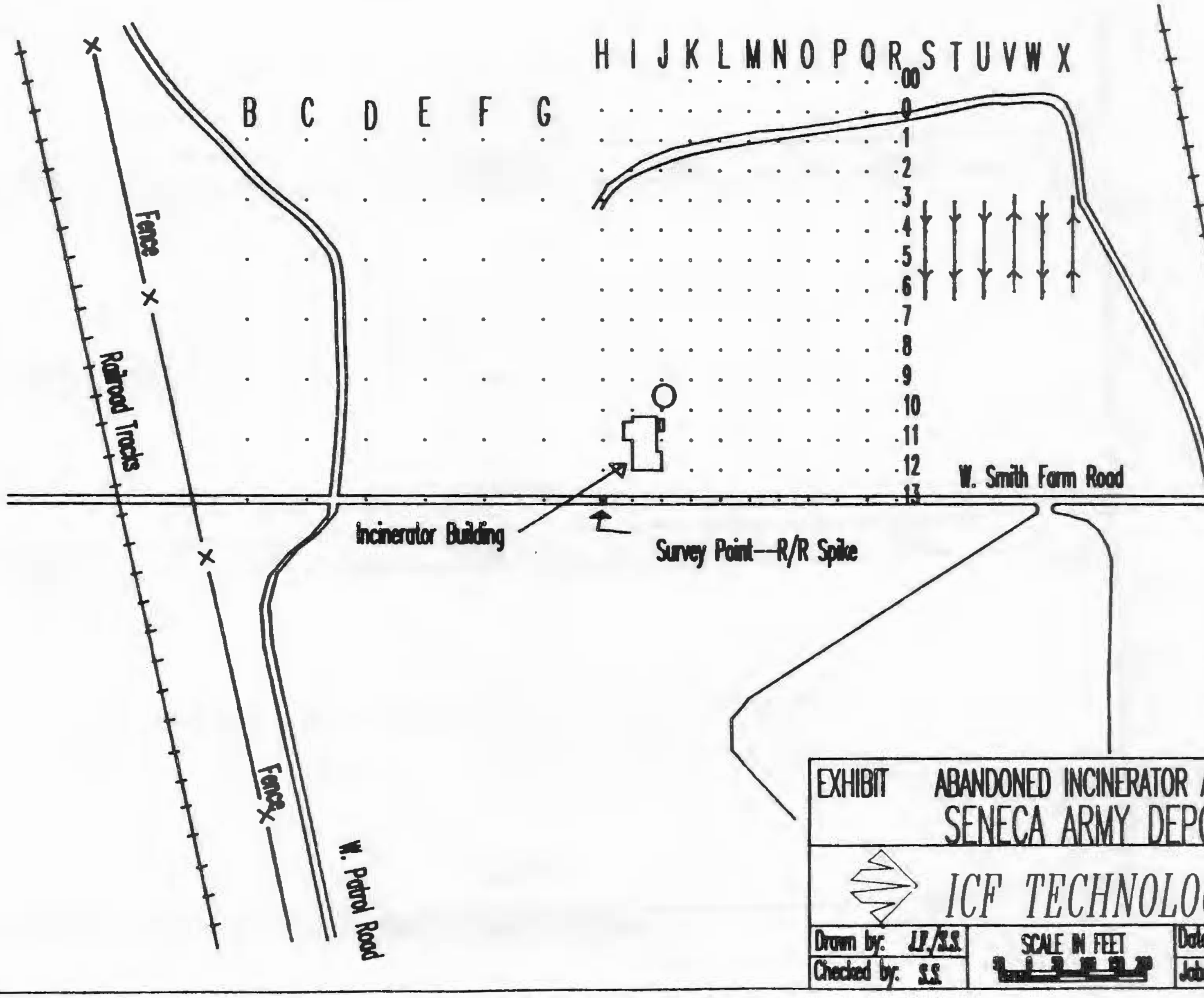


EXHIBIT ABANDONED INCINERATOR A

SENECA ARMY DEPO

ICF TECHNOLO

Drawn by: J.P./S.S.

Checked by: S.S.

SCALE IN FEET

Dat

Job

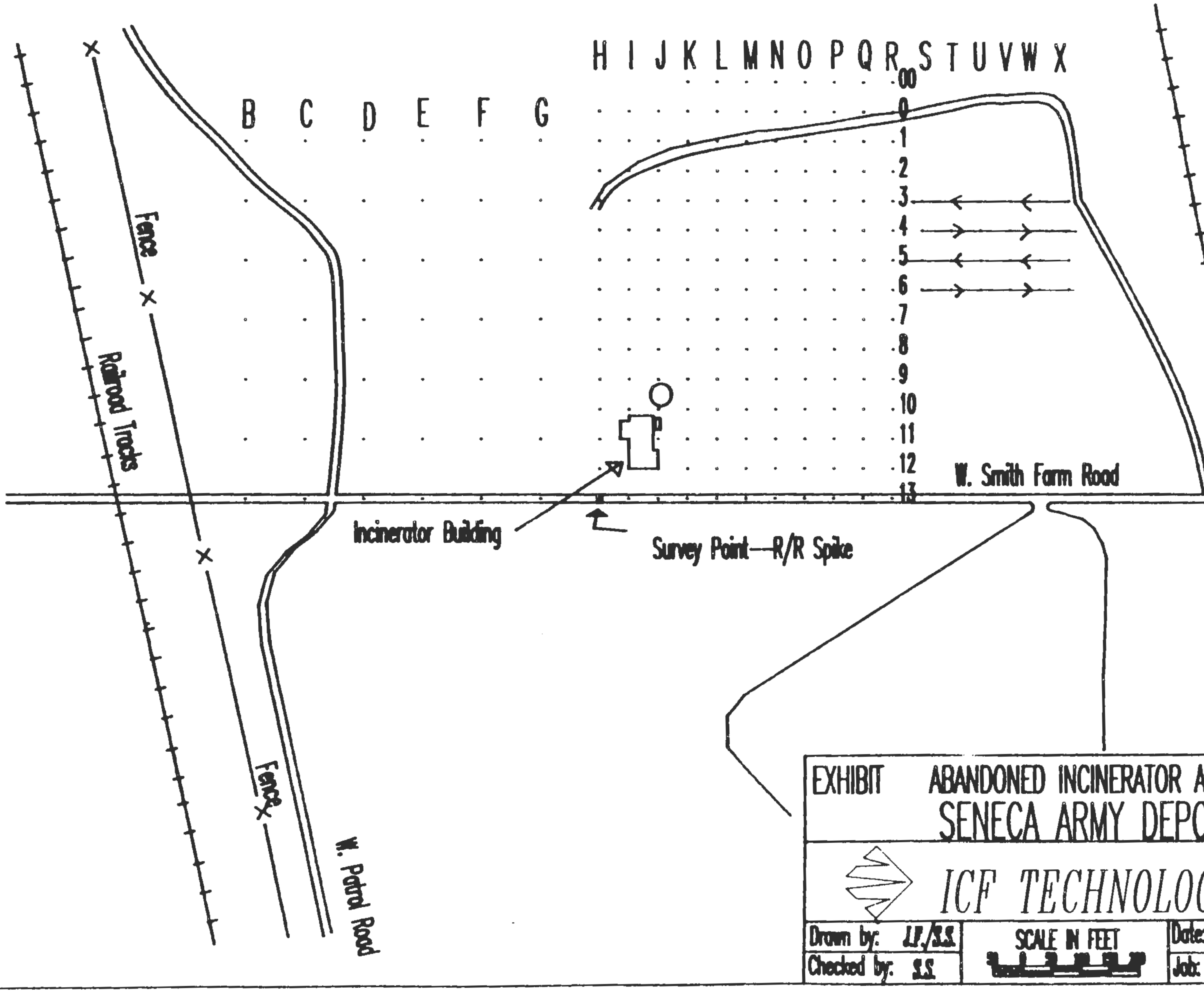
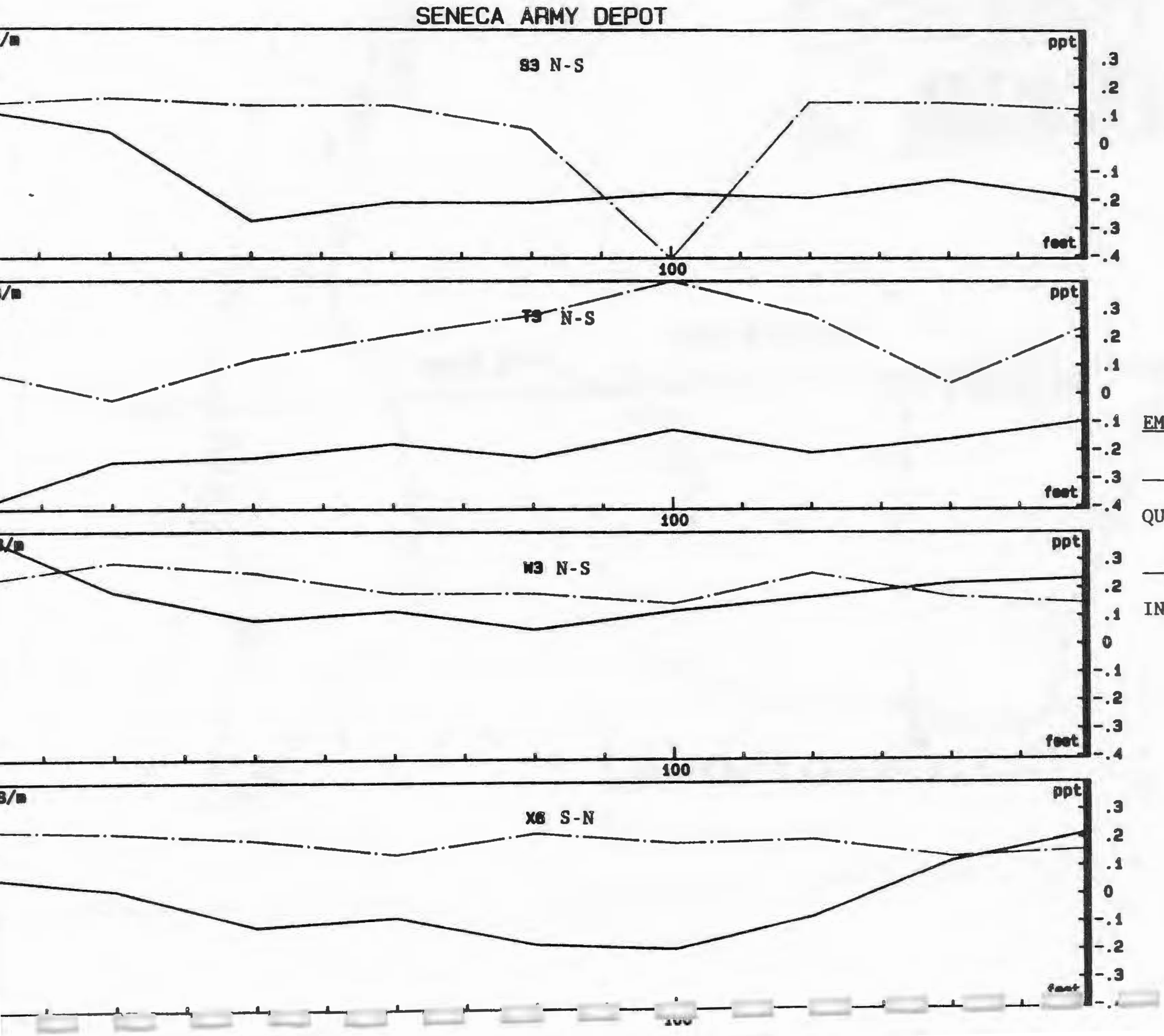
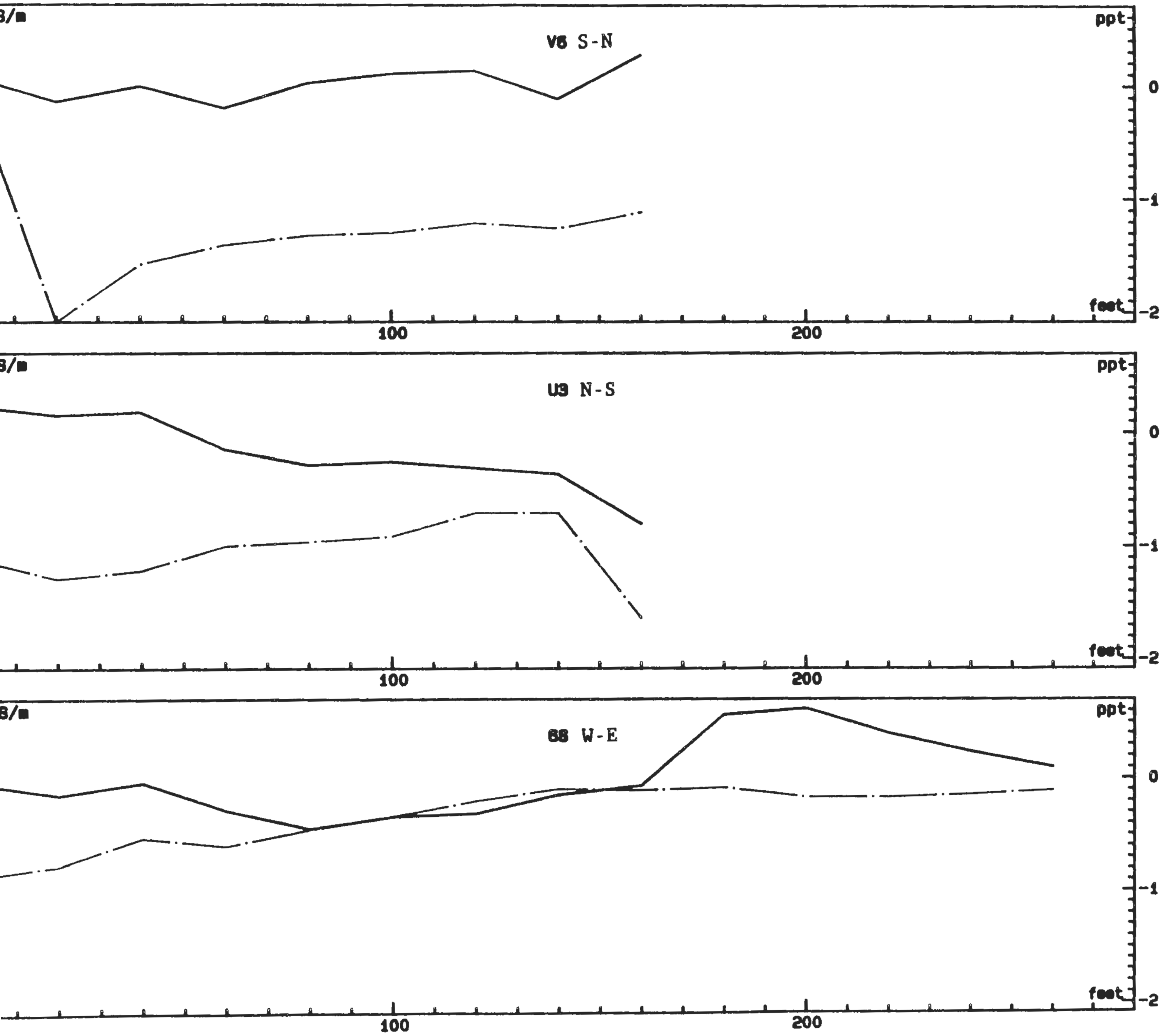


EXHIBIT ABANDONED INCINERATOR A
SENECA ARMY DEPO
ICF TECHNOLO

Drawn by: J.F./S.S.	SCALE IN FEET	Date:
Checked by: S.S.		Job:


SENECA ARMY DEPOT
/m
S3 N-S
ppt
.3
.2
.1
0
-.1
-.2
-.3
-.4
feet
100
/m
T3 N-S
ppt
.3
.2
.1
0
-.1
-.2
-.3
-.4
feet
100
/m
W3 N-S
ppt
.3
.2
.1
0
-.1
-.2
-.3
-.4
feet
100
S/m
X6 S-N
ppt
.3
.2
.1
0
-.1
-.2
-.3
feet
100
EM
QU
IN

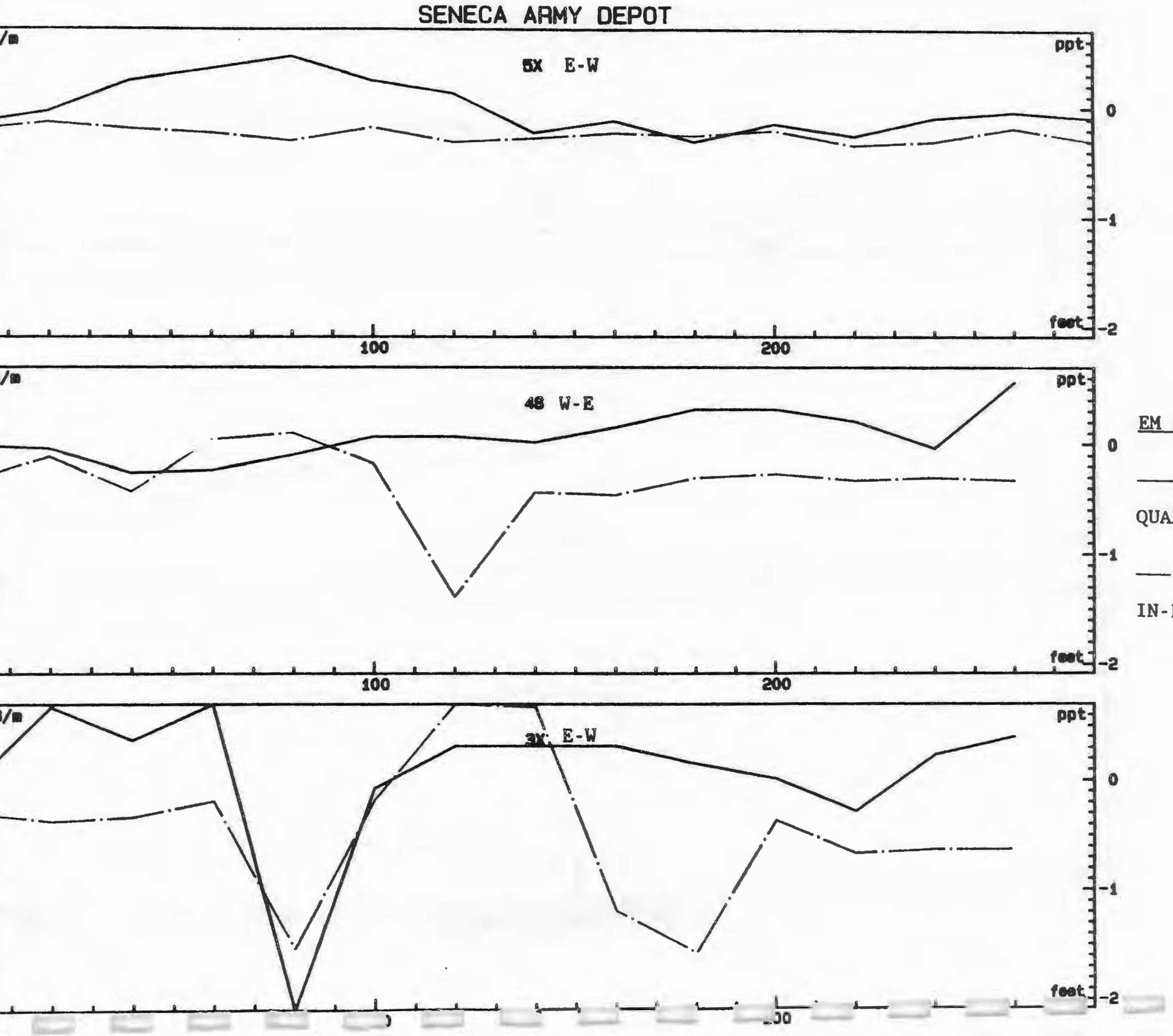
SENECA ARMY DEPOT



EM

QUA

IN-


SENECA ARMY DEPOT
/m
5X E-W
ppt
0
-1
feet
-2
100
200
/m
48 W-E
ppt
0
-1
feet
-2
100
200
/m
3X E-W
ppt
0
-1
feet
-2
200
EM
QUA
IN-

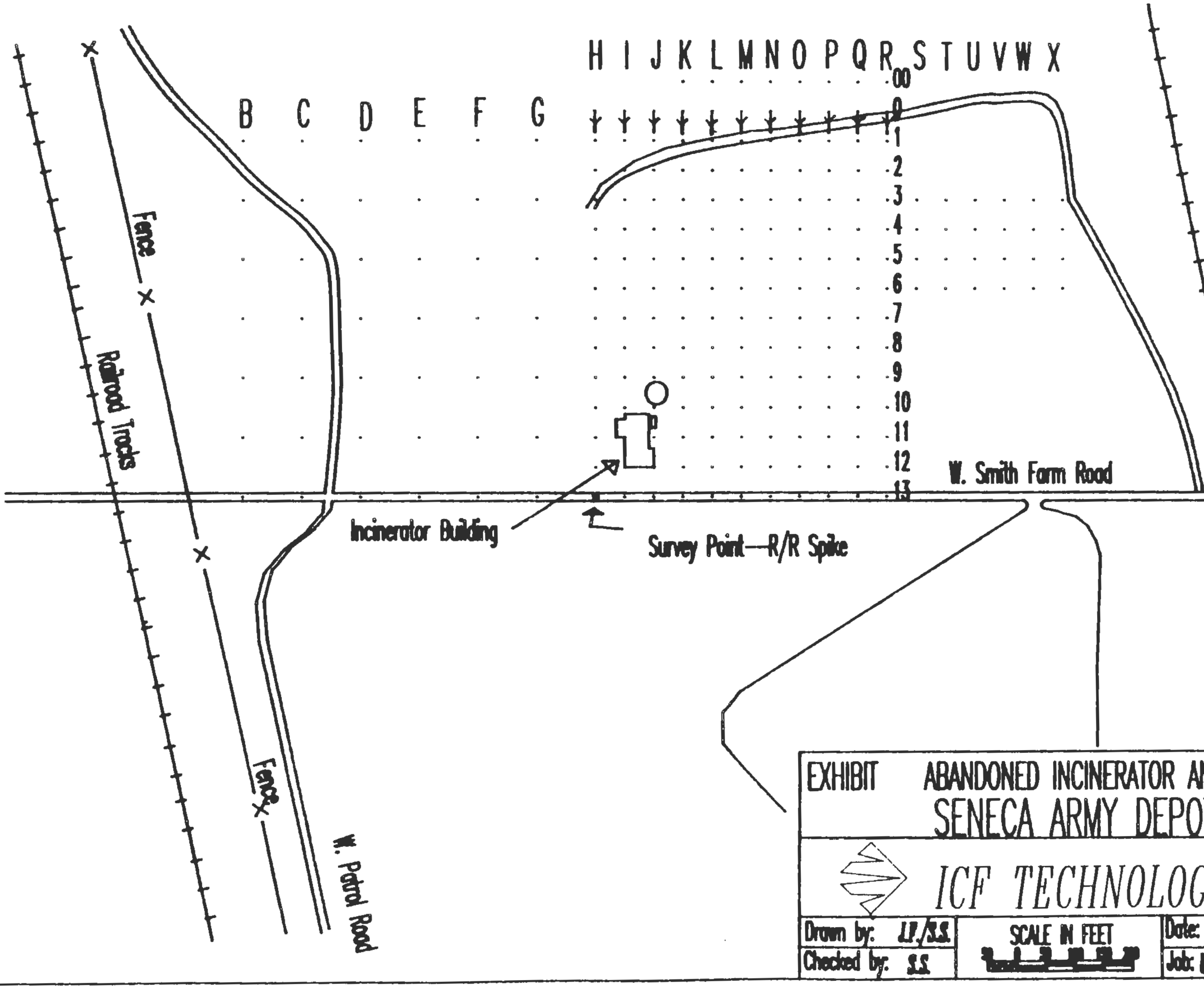


EXHIBIT ABANDONED INCINERATOR A

SENECA ARMY DEPO

ICF TECHNOLOG

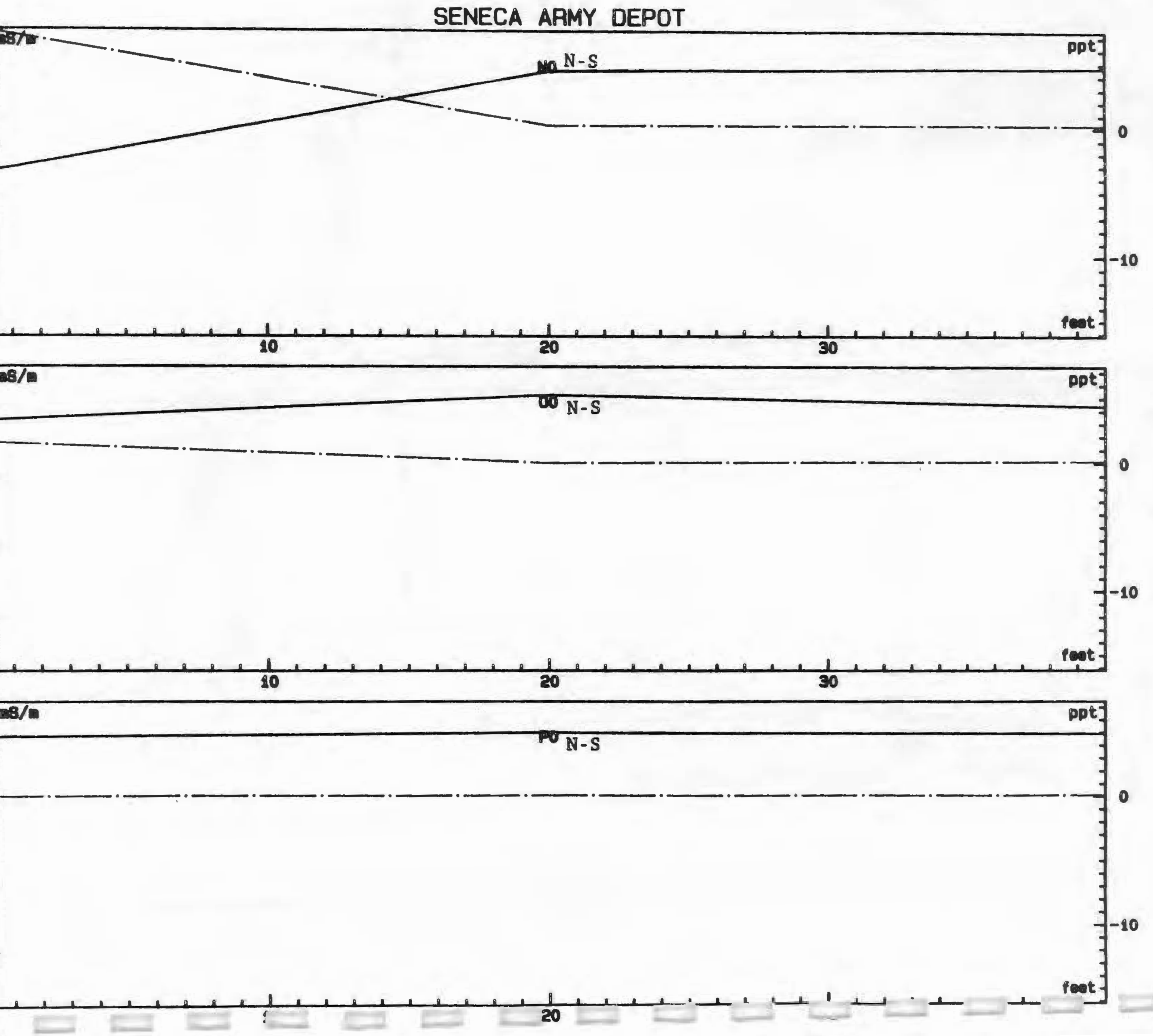
Drawn by: J.F./S.S.

Checked by: S.S.

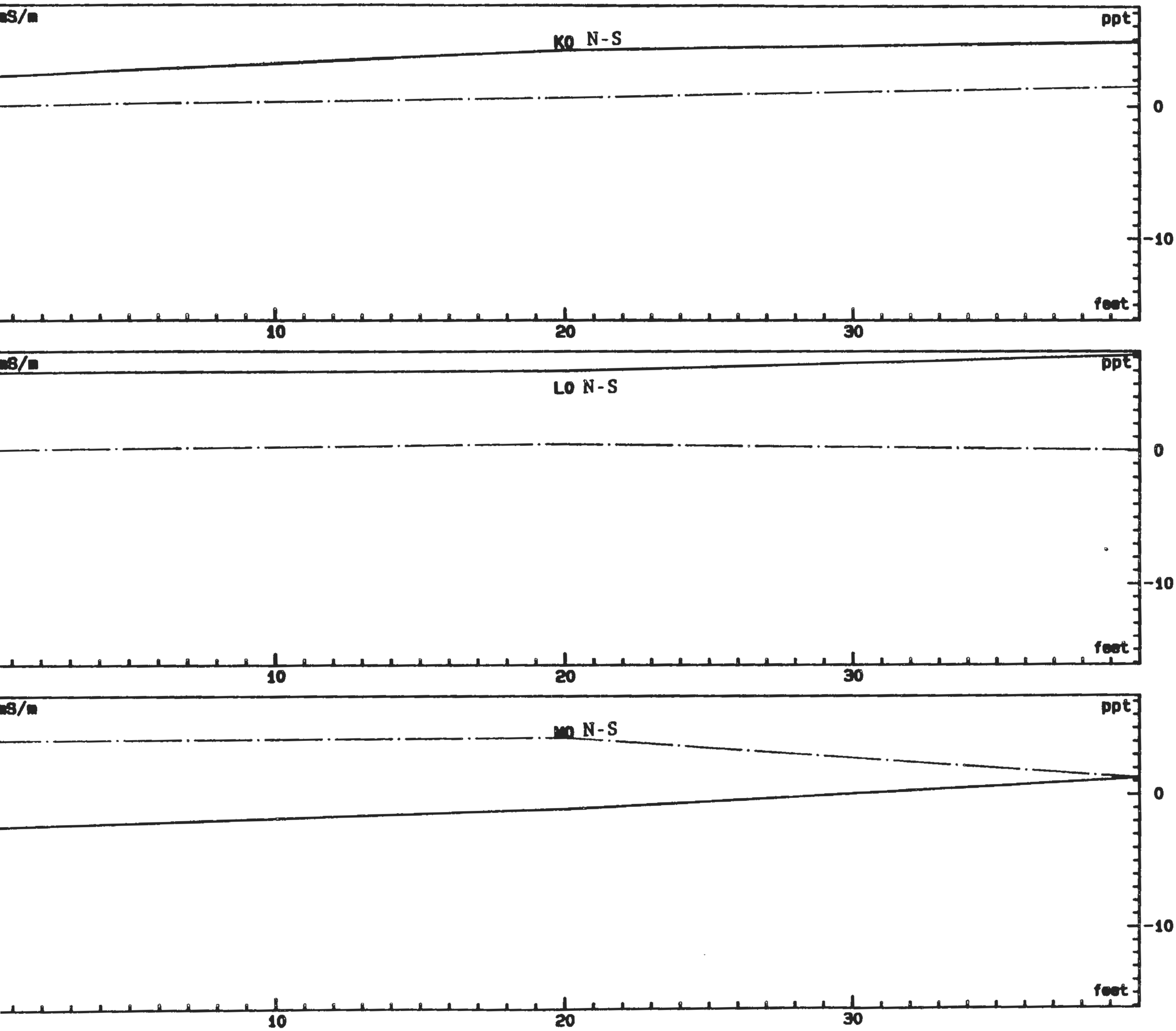
SCALE IN FEET

Date:

Job:


SENECA ARMY DEPOT
mS/m
ppt
NO N-S
0
-10
feet
10
20
30
mS/m
ppt
OO N-S
0
-10
feet
10
20
30
mS/m
ppt
PO N-S
0
-10
feet
20

SENECA ARMY DEPOT

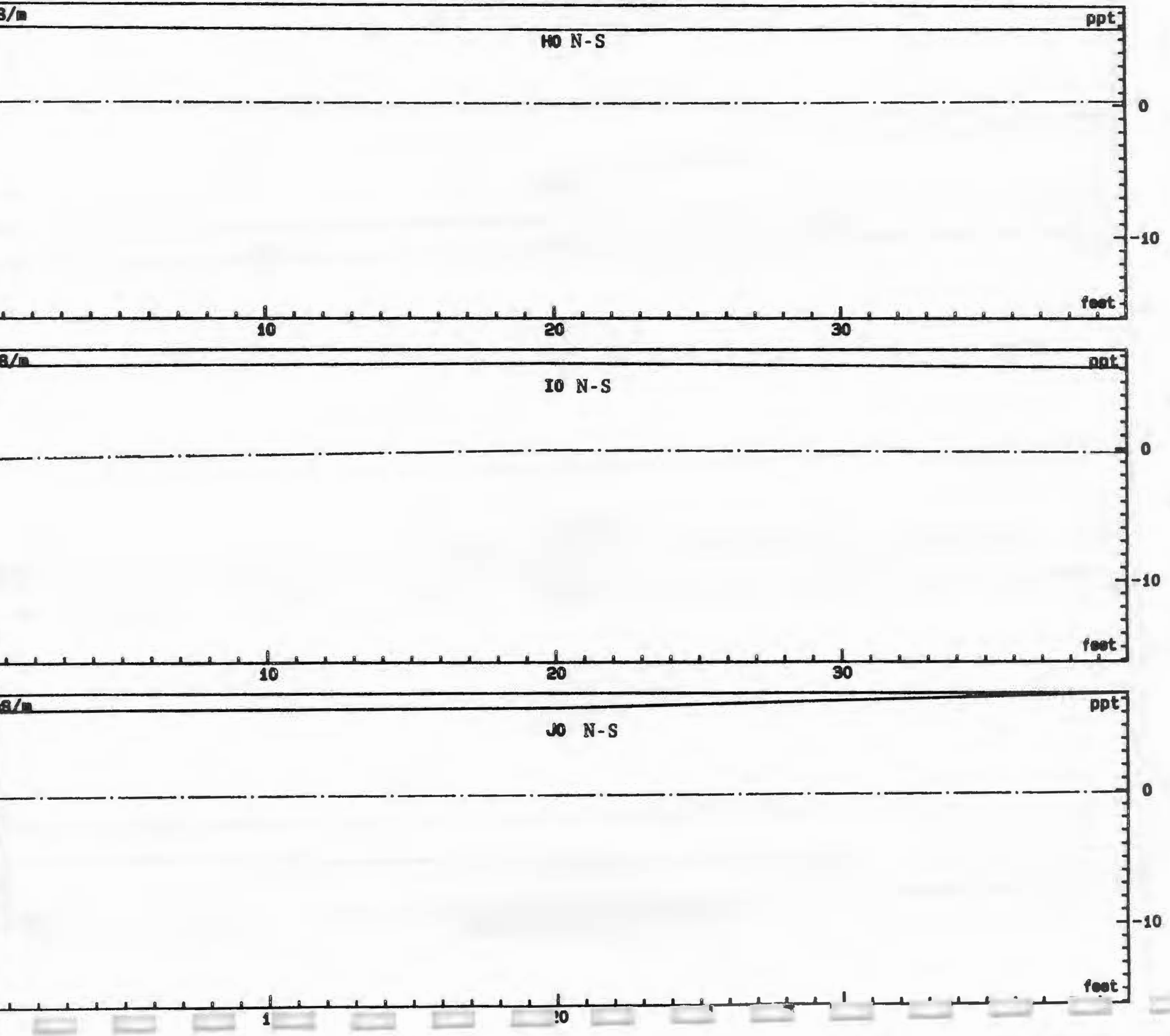


E

Q

II

SENECA ARMY DEPOT

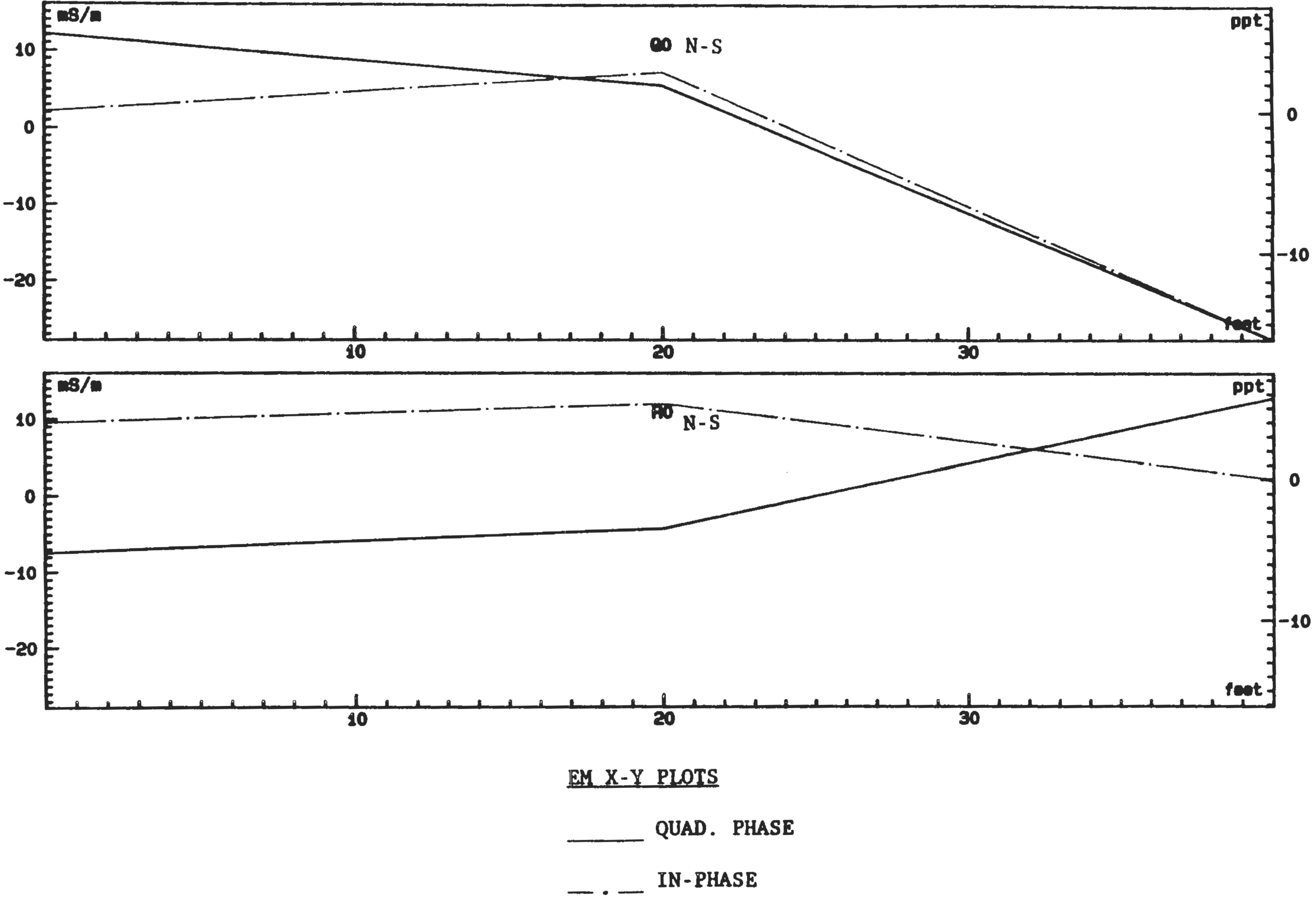


EM

QU

IN

SENECA ARMY DEPOT



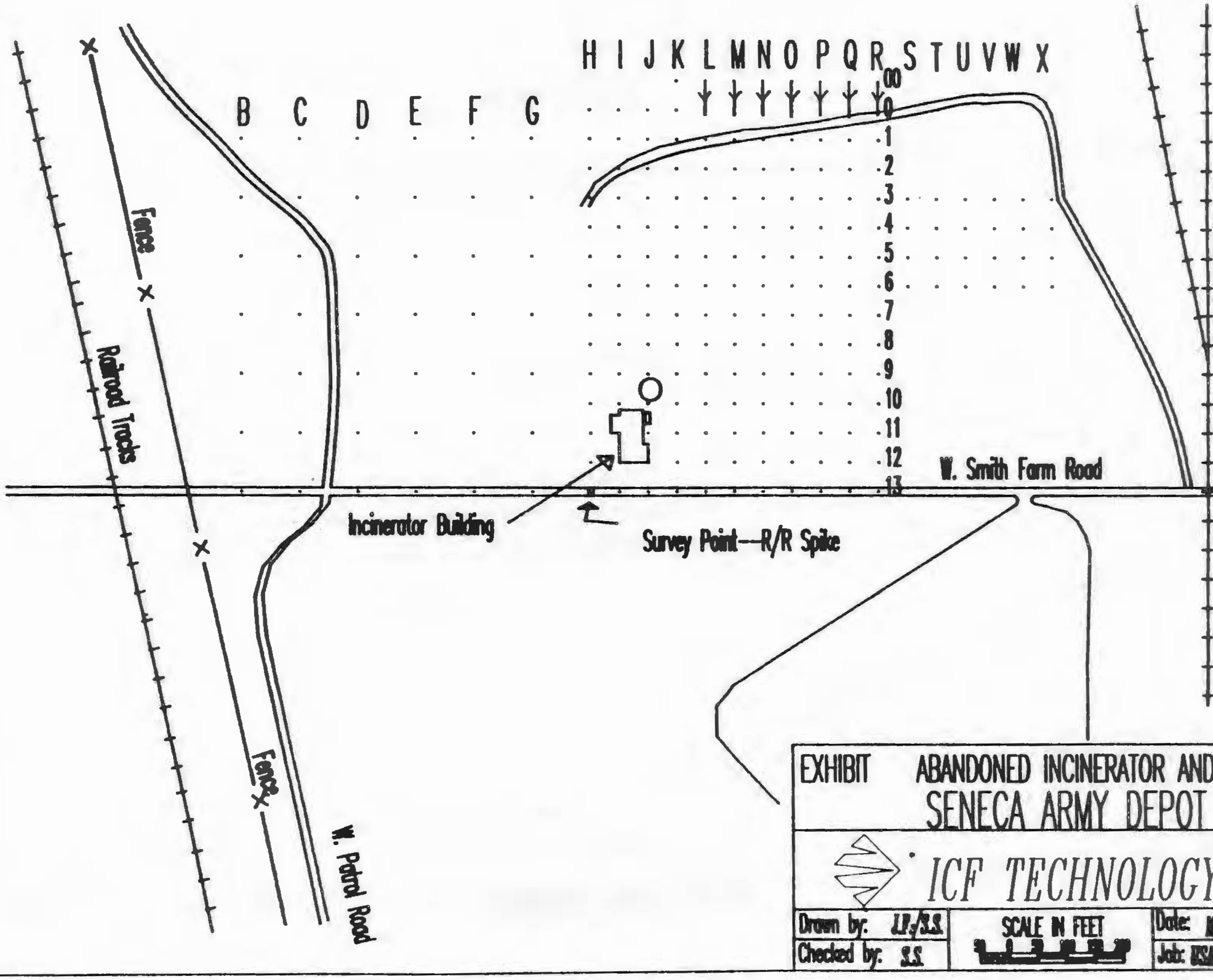


EXHIBIT ABANDONED INCINERATOR AND
SENECA ARMY DEPOT

ICF TECHNOLOGY

Drawn by: J.P./S.S.
Checked by: S.S.
SCALE IN FEET
Date:
Job:

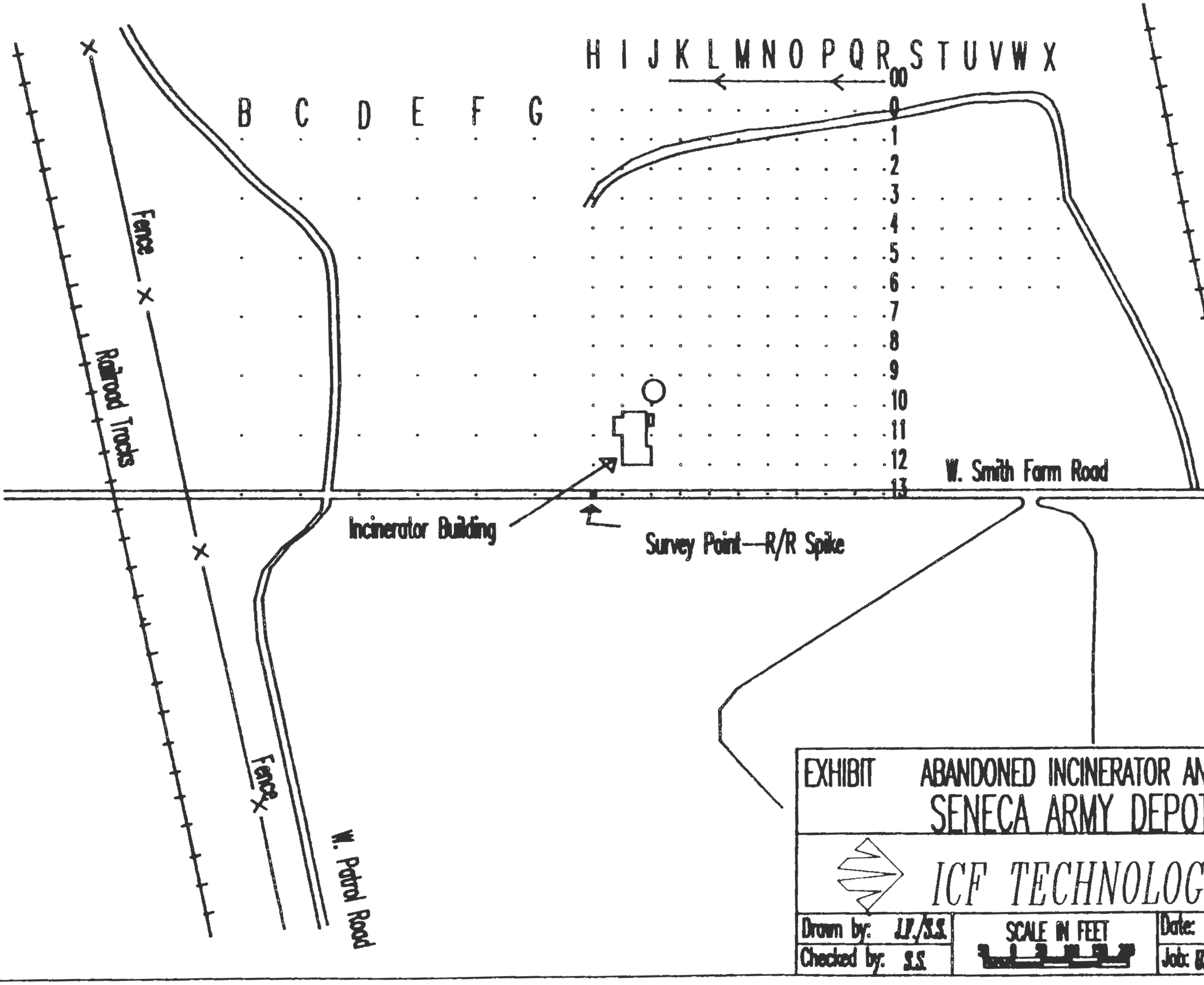


EXHIBIT ABANDONED INCINERATOR AN

SENECA ARMY DEPOT

ICF TECHNOLOG

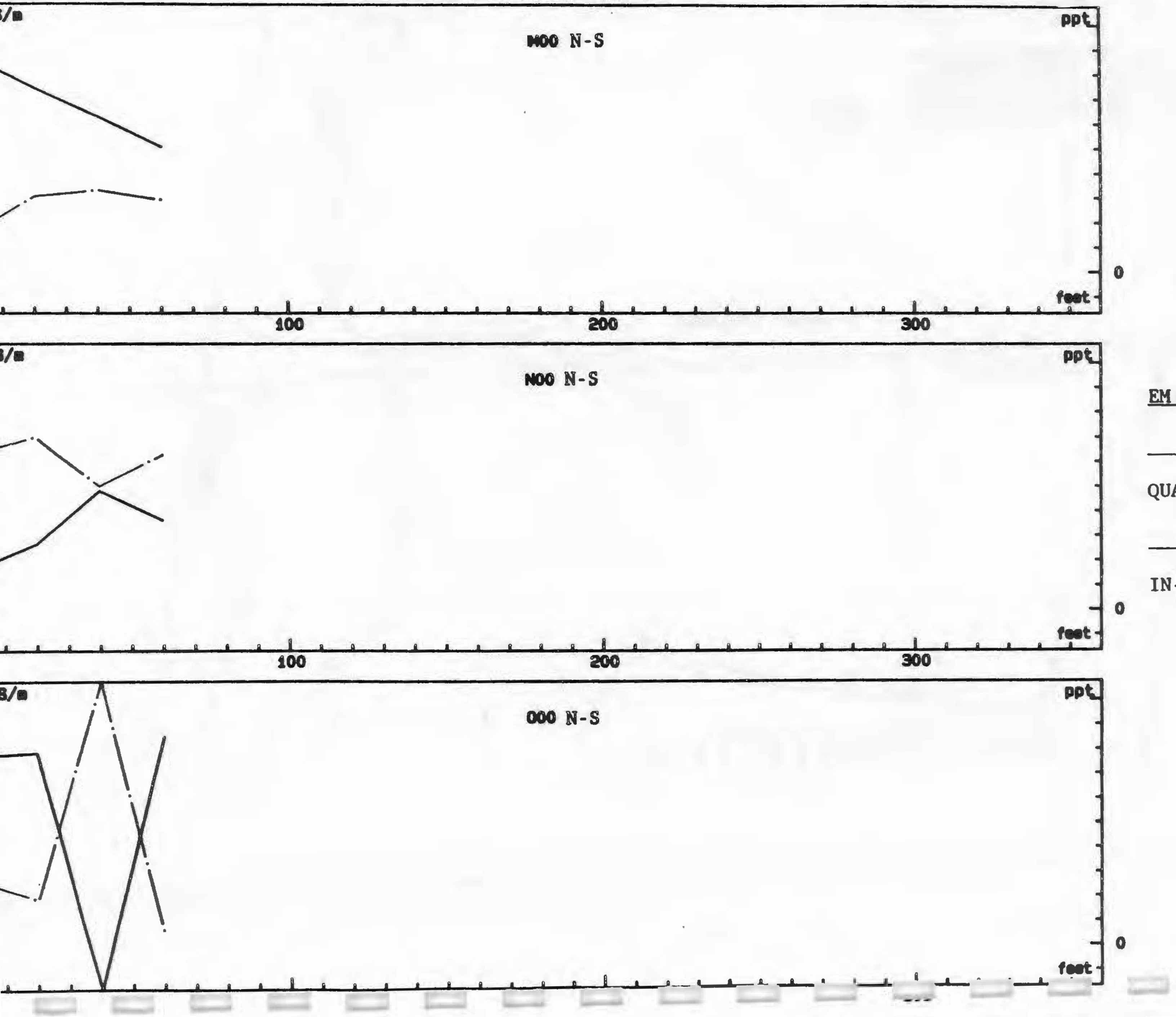
Drawn by: J.J./S.S.

Checked by: S.S.

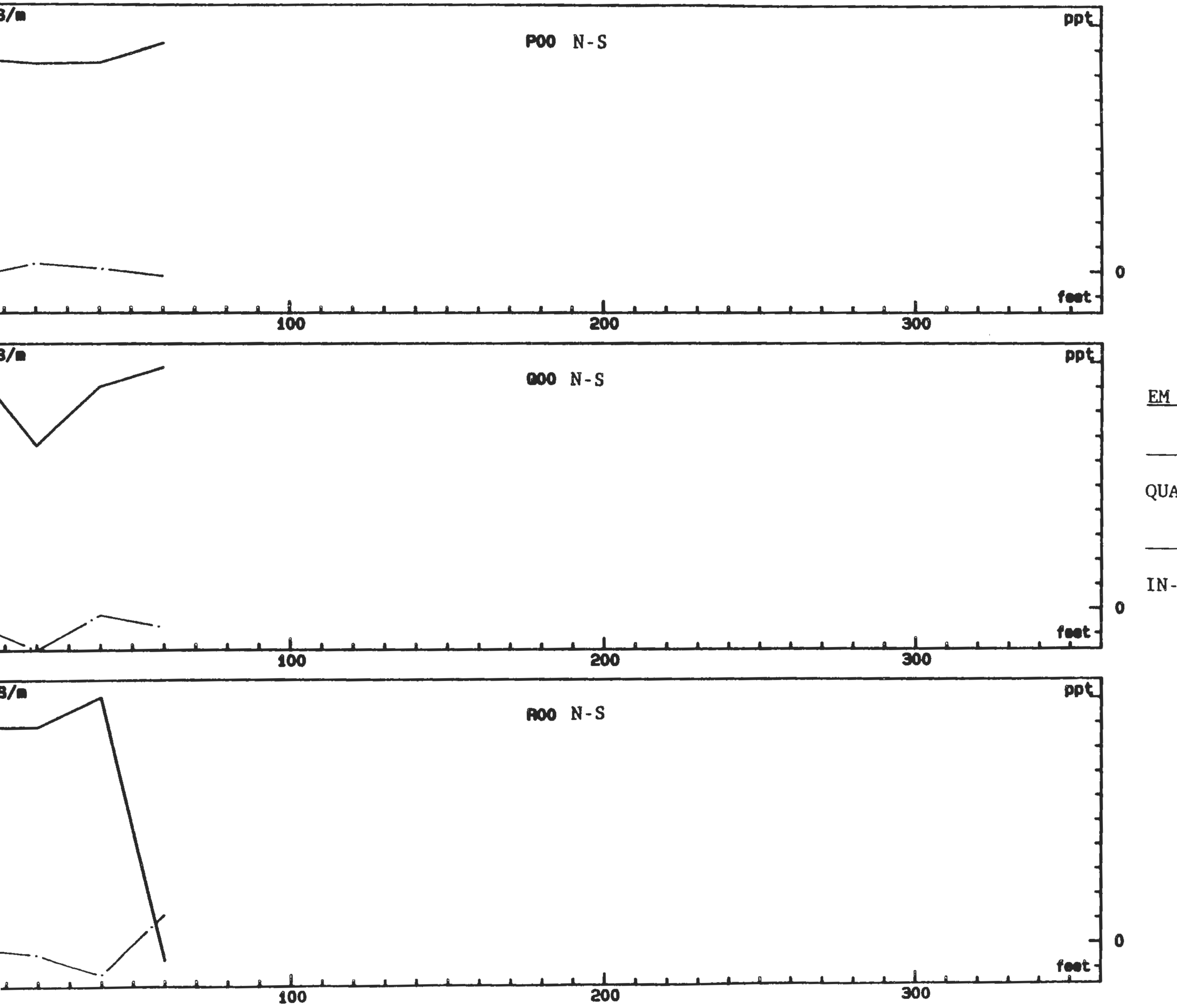
Date:

Job:

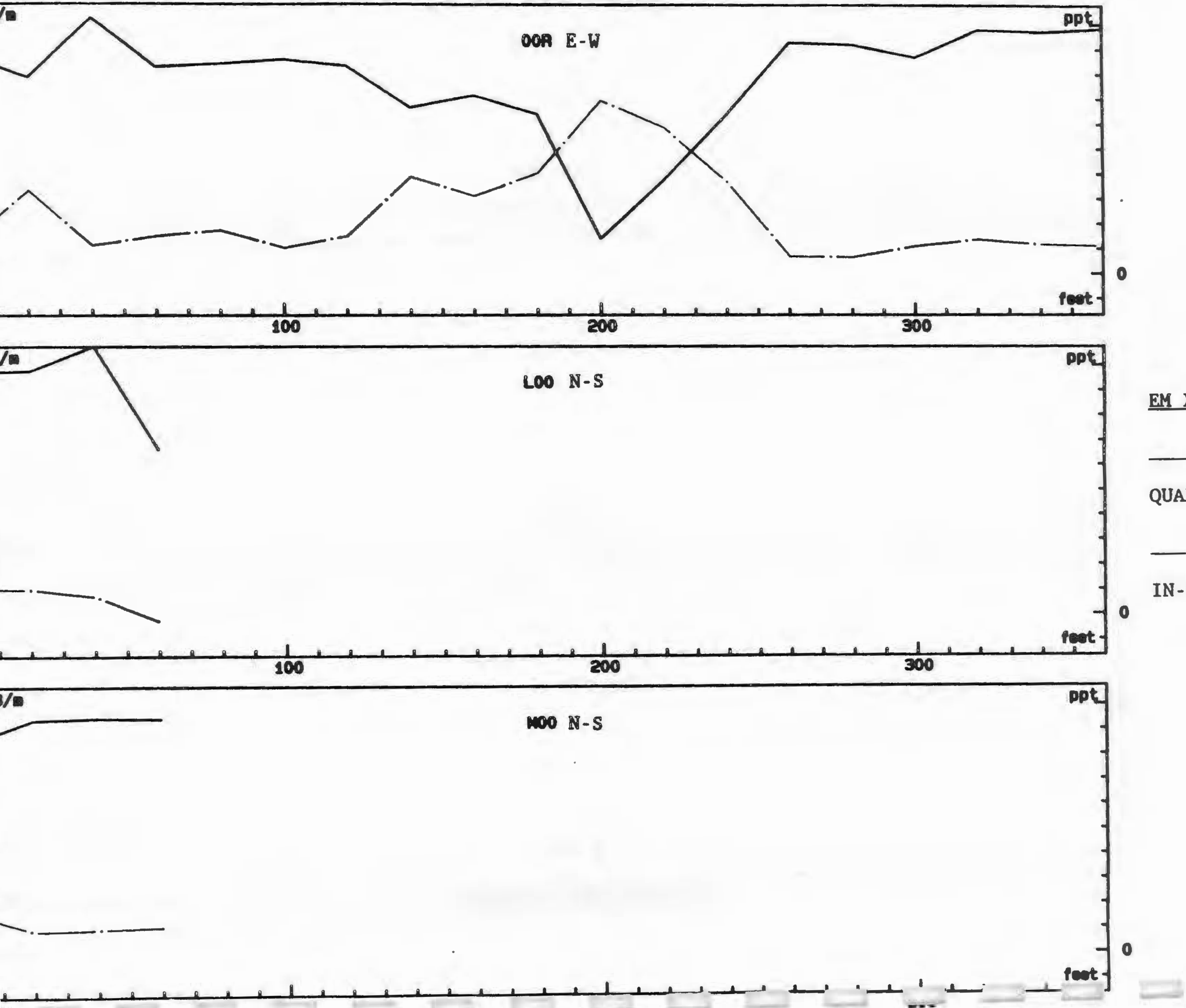
SENECA ARMY DEPOT



SENECA ARMY DEPOT



SENECA ARMY DEPOT



GPR SURVEY RECORDS

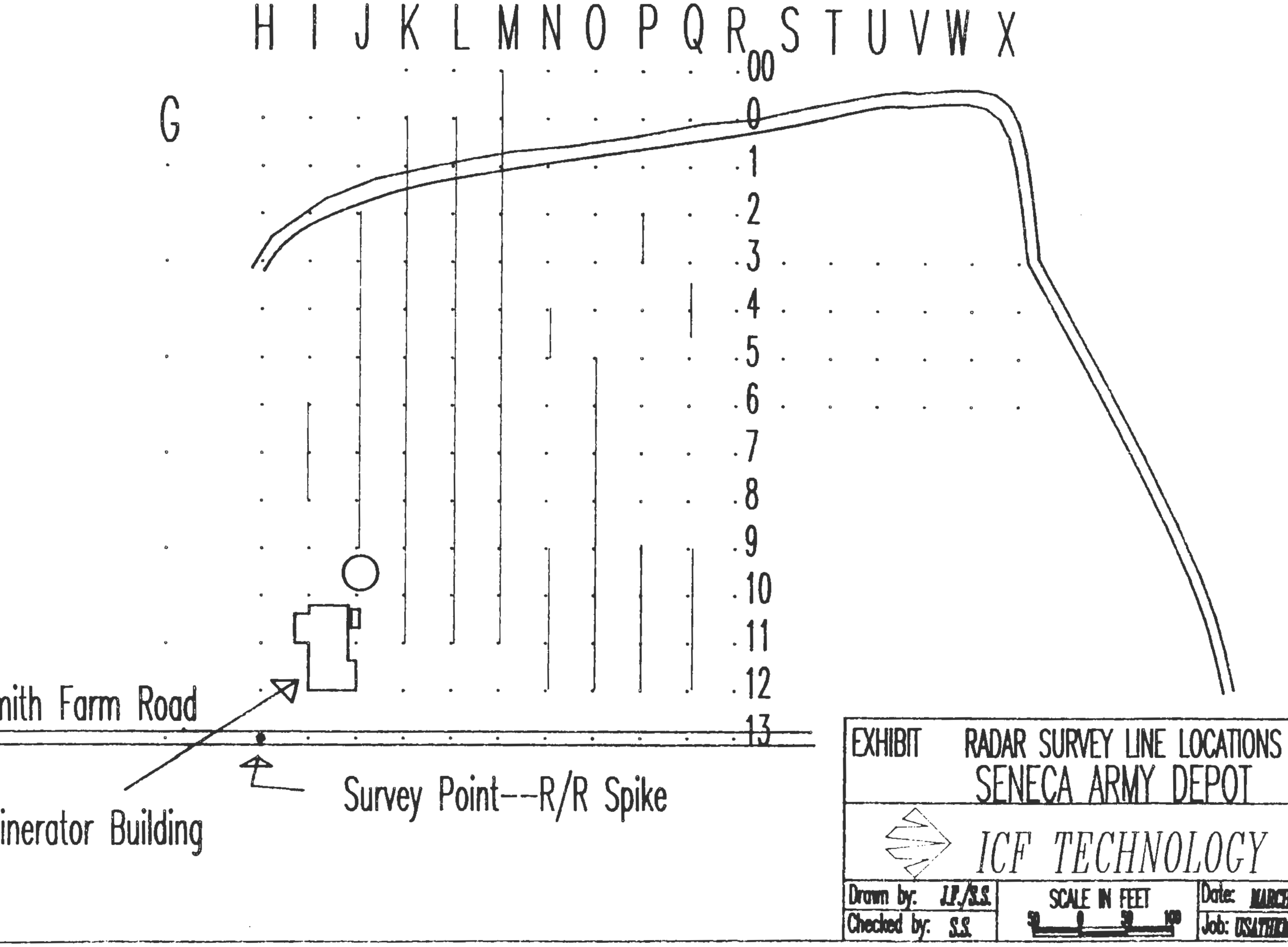


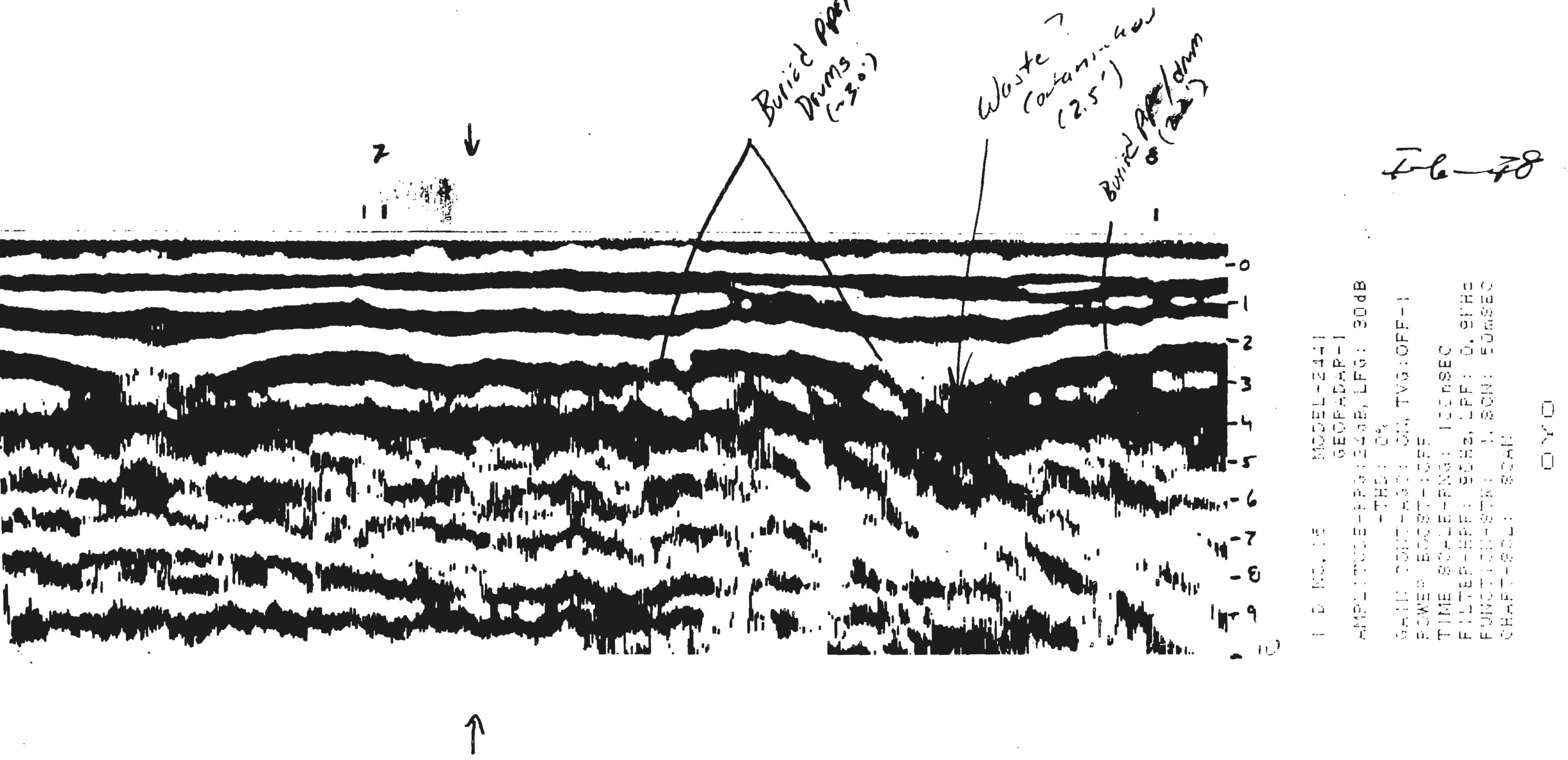
EXHIBIT RADAR SURVEY LINE LOCATIONS
SENECA ARMY DEPOT

ICF TECHNOLOGY

Drawn by: J.P./S.S.
Checked by: S.S.

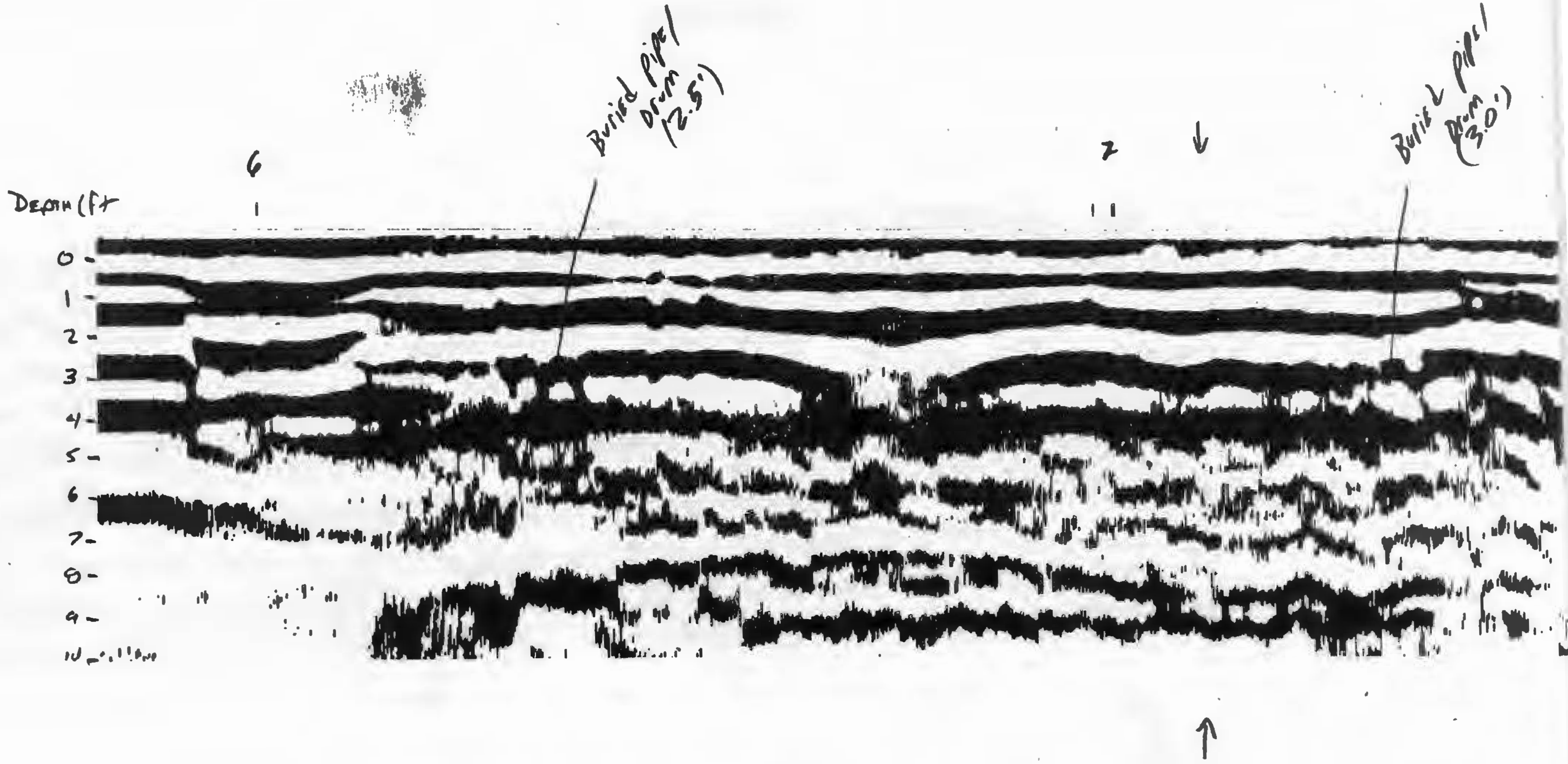
SCALE IN FEET

Date: MARC
Job: USATH

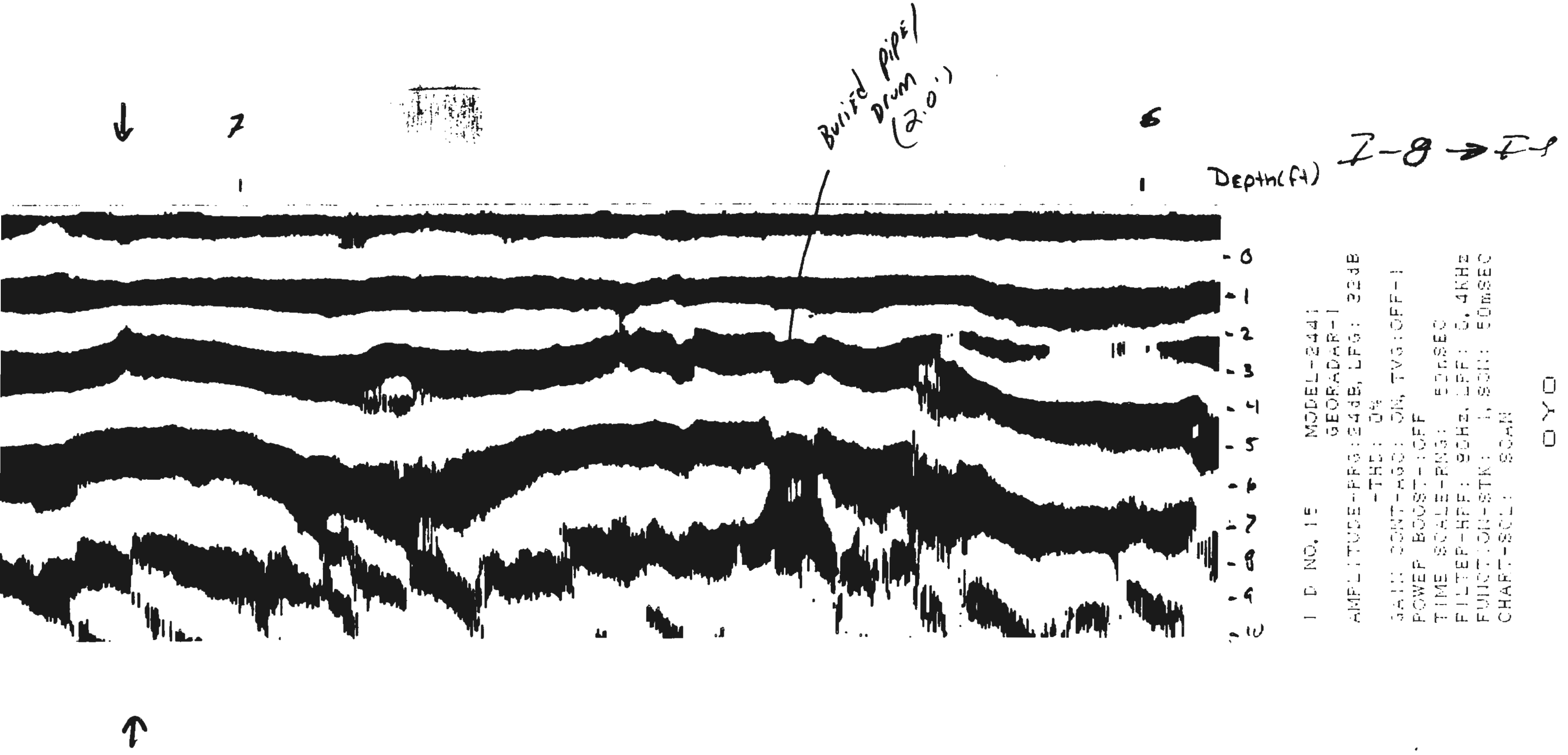


I-6—I-8

RADAR TRACK I-6 - I-8



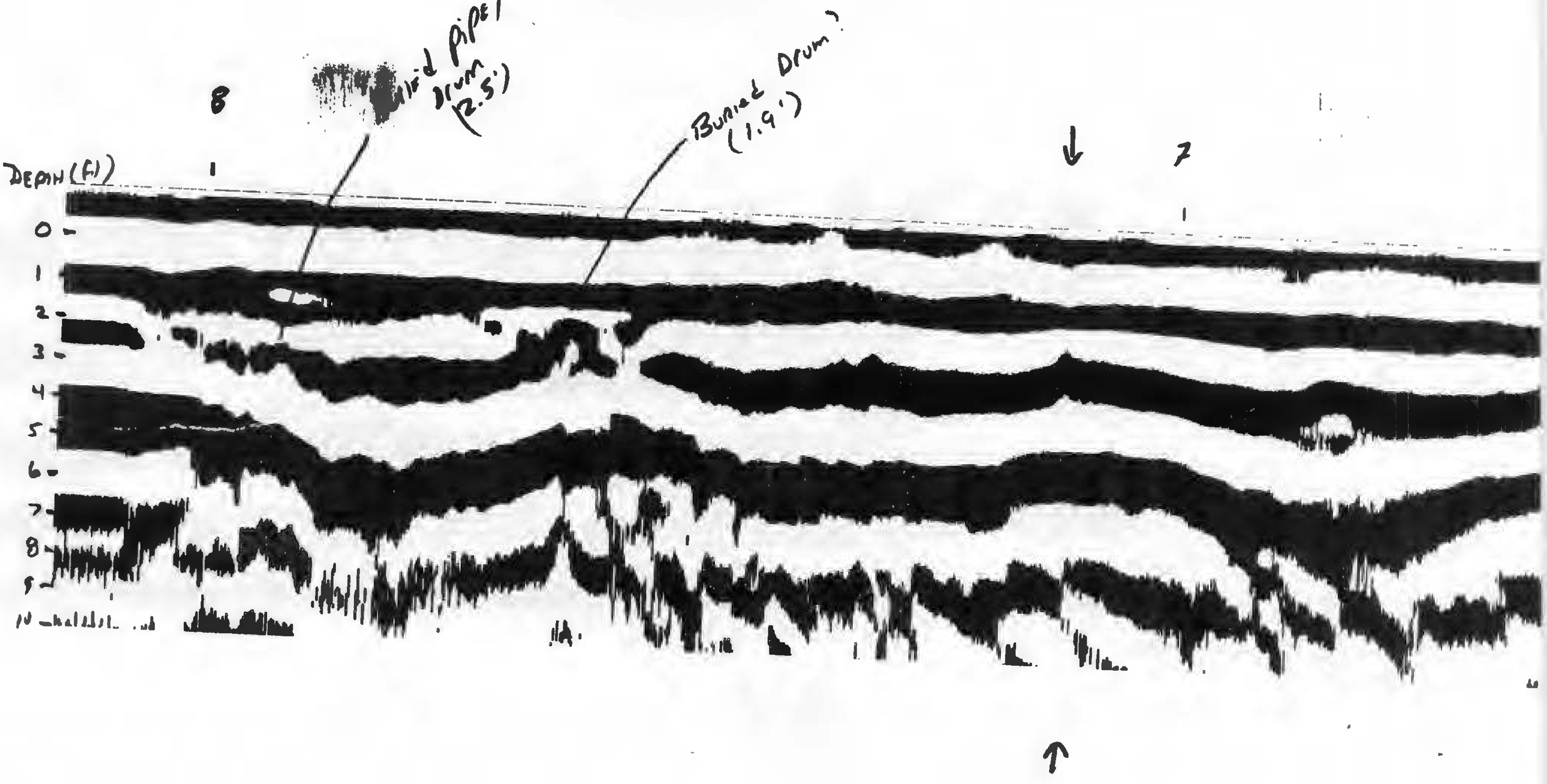
Buried pipe/drum (2.5')
Buried pipe/drum (3.0')
6
7
Depth (ft
0
1
2
3
4
5
6
7
8
9
10

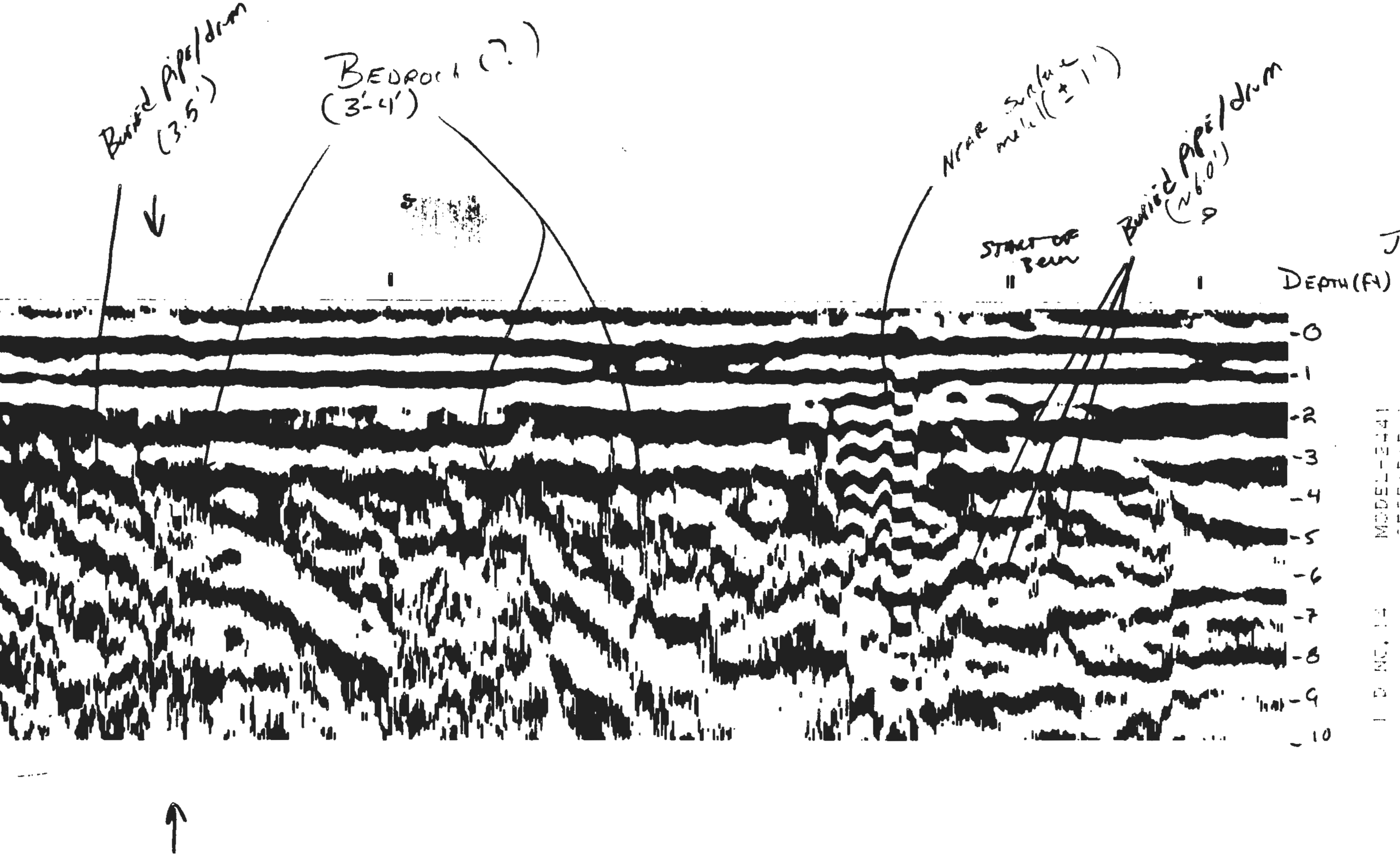


I D NO, 15 MODEL-2441
GEORADAR-I
AMPLITUDE-PRG:24dB, LPG: 32dB
-THE: 0%
GAIN CONT-AGC: ON, TVG:OFF-1
POWER BOOST-:OFF
TIME SCALE-RNG: 50nSEC
FILTER-HPF: 90Hz, LPF: 0,4KHz
FUNCTION-STK: 1, SCN: 50mSEC
CHART-SCL: SCAN

OYO

RADAR TRACK I-8 - I-6

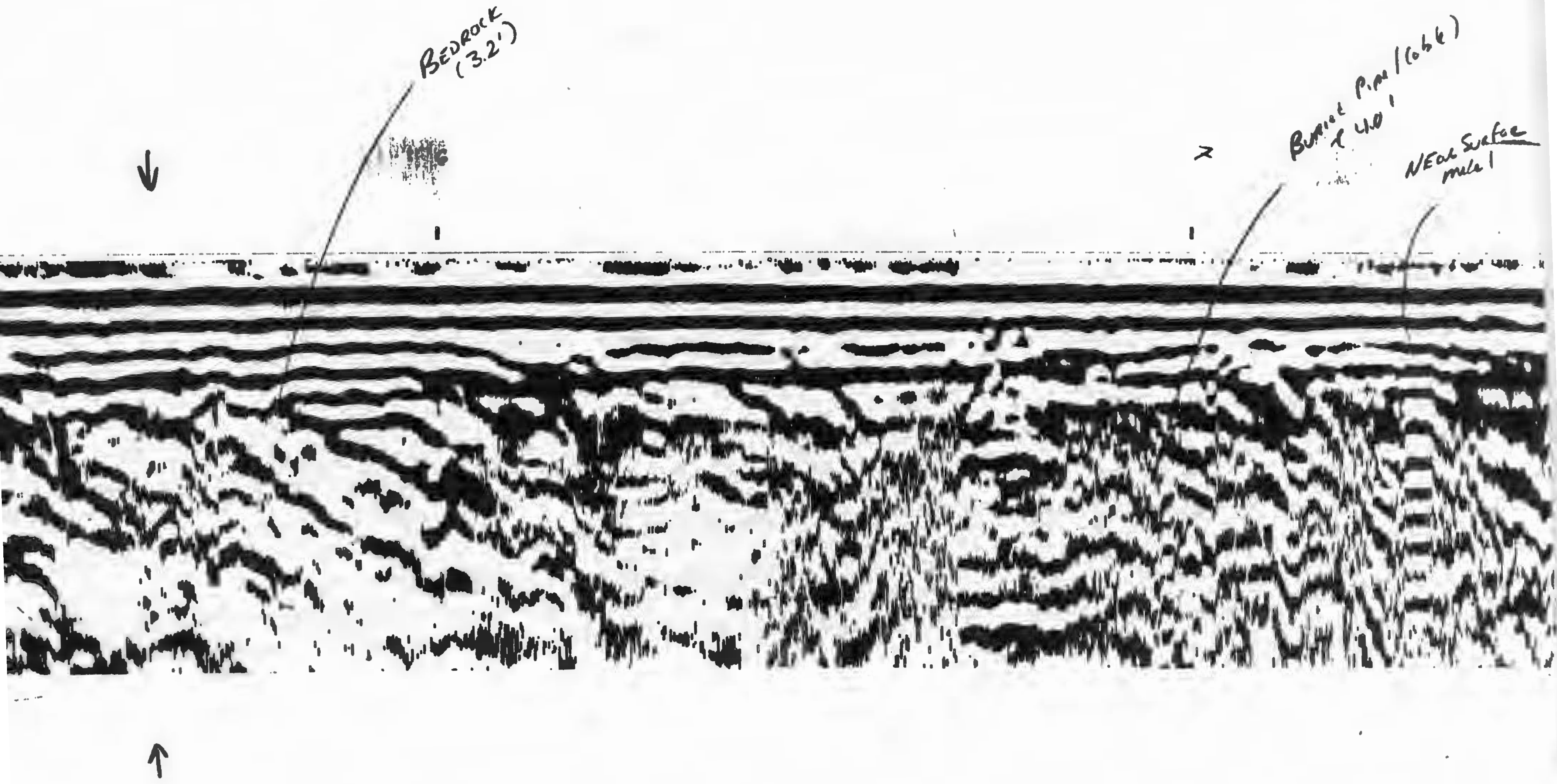

8
Buried pipe/ Drum (2.5')
Buried Drum? (1.9')
7
DEPTH (ft)
0
1
2
3
4
5
6
7
8
9
10

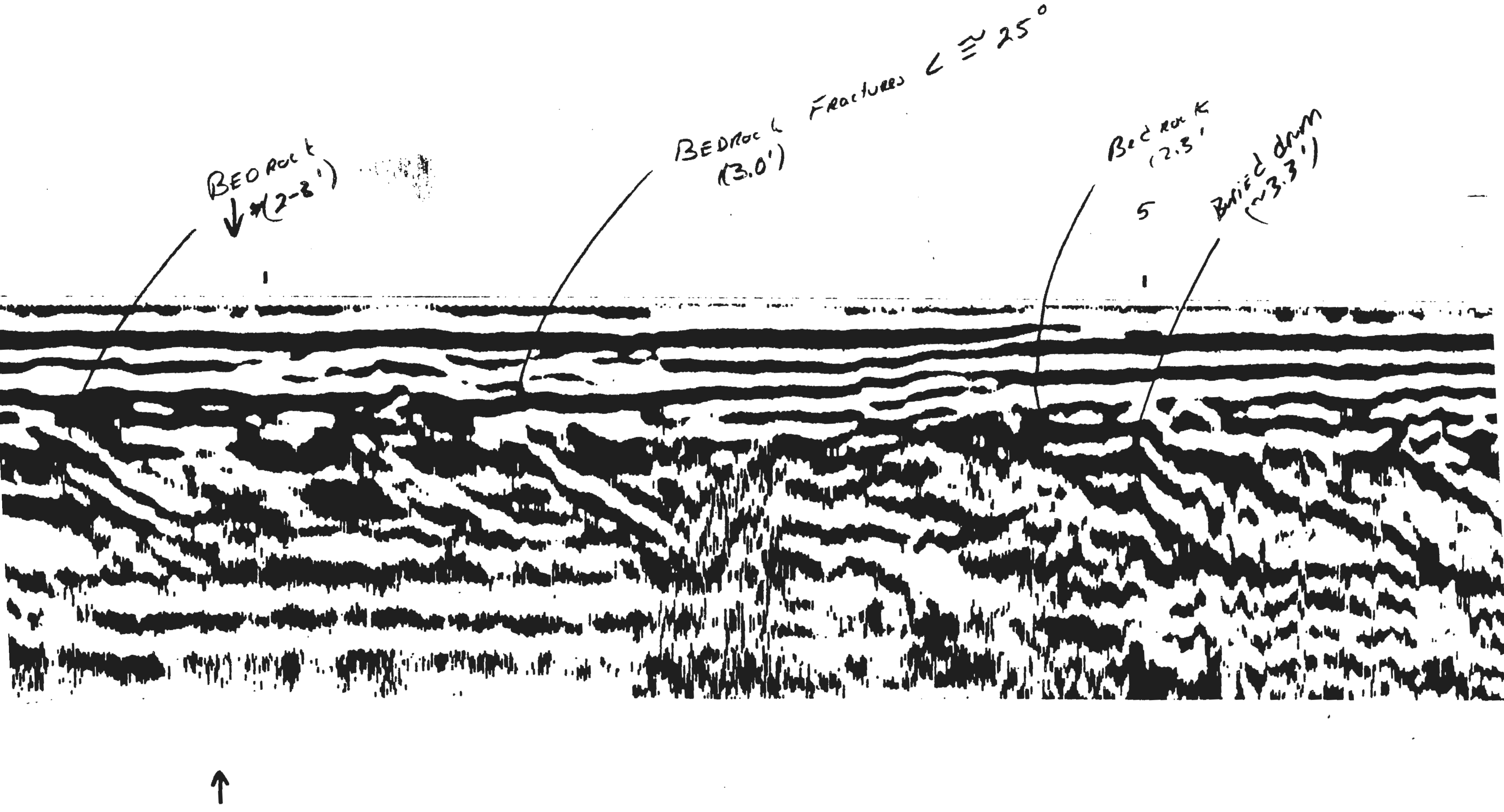


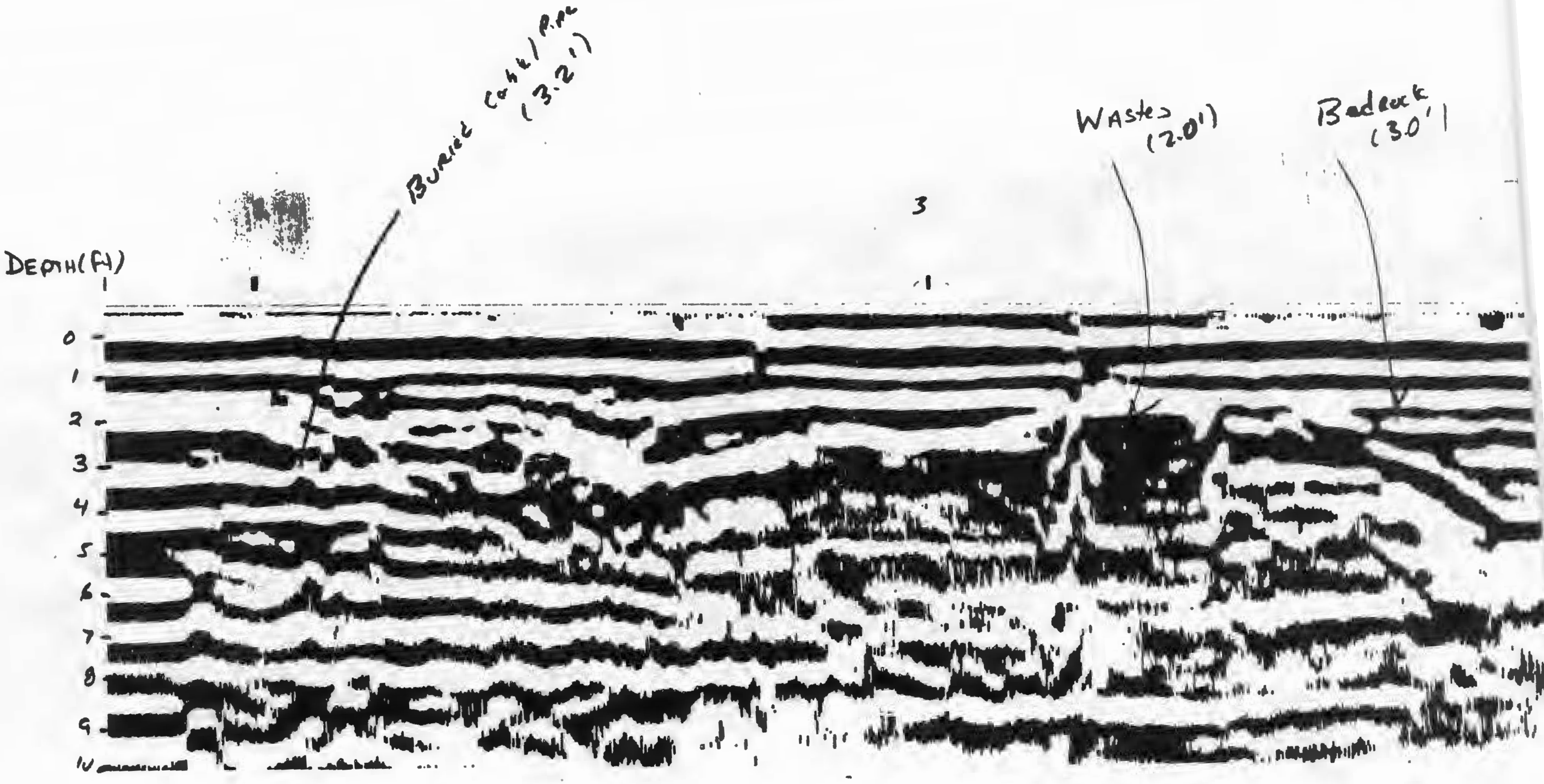
I D NO. 14   MODEL-2441
GEORADAR-1
AMPLITUDE-RPG: 21dB, LPG: 28dB
-THD: 0%
GAIN CONT-AGC: ON, TVG: OFF-1
POWER BOOST-: OFF
TIME SCALE-RNG: 120nSEC
FILTER-HPF: 8Hz, LPF: 0.4Hz
FUNCTION-STT: 1.8ON: 50nSEC
CHART-SCL: SCAN

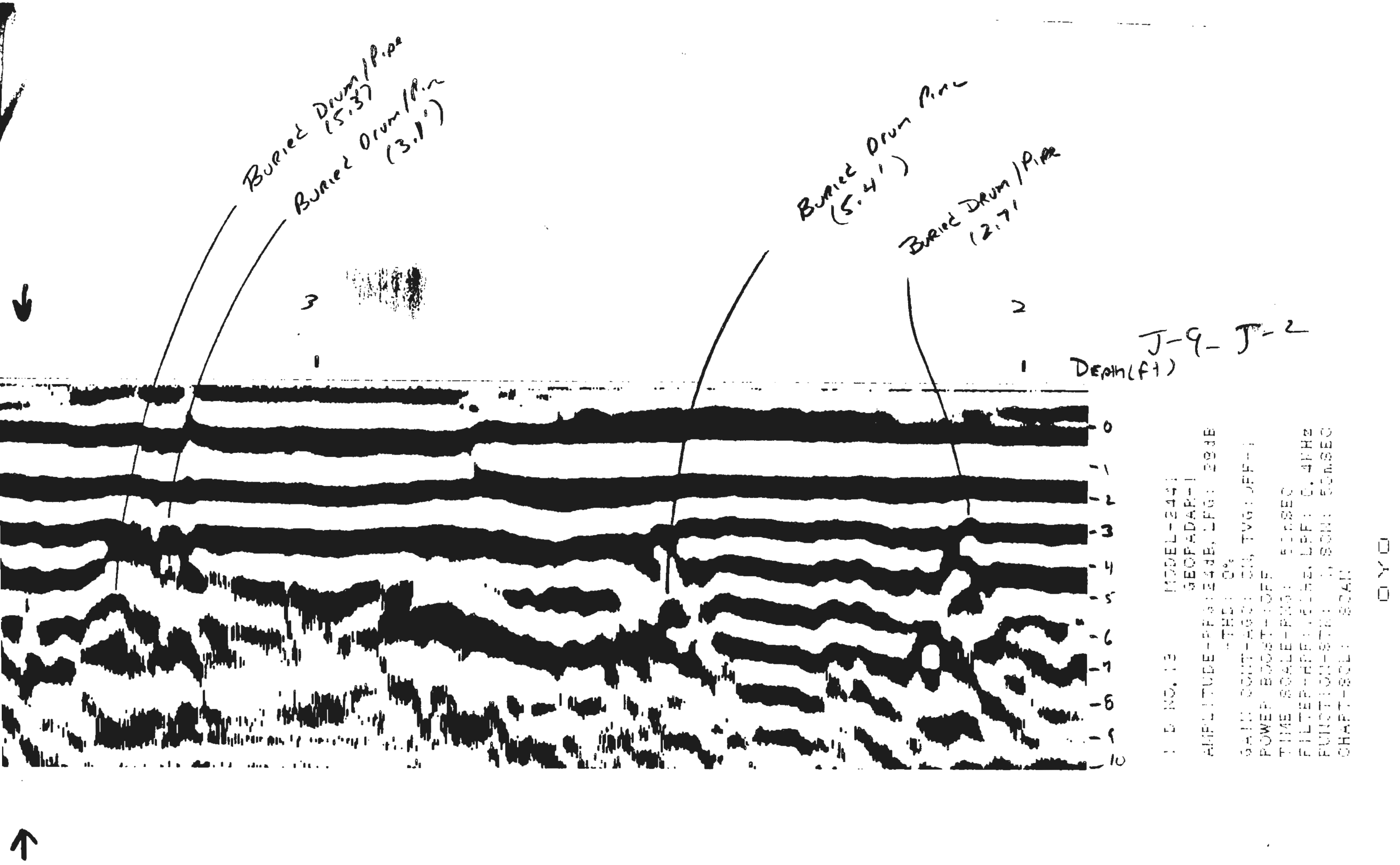
OYO

RADAR TRACK J-2 - J-9

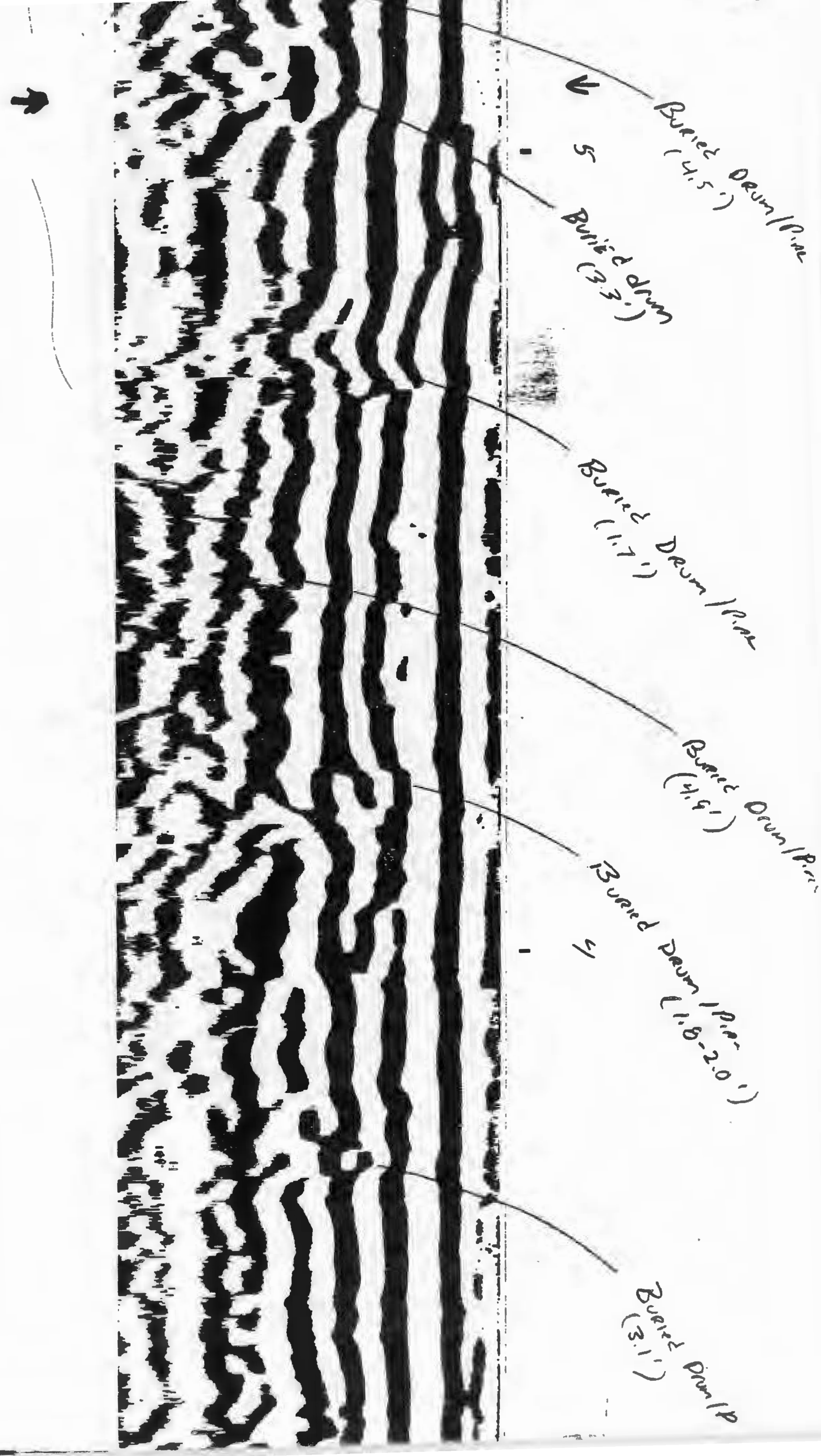

BEDROCK (3.2')
z
Buried Pipe/(cable) (4.0'
NEar Surface metal

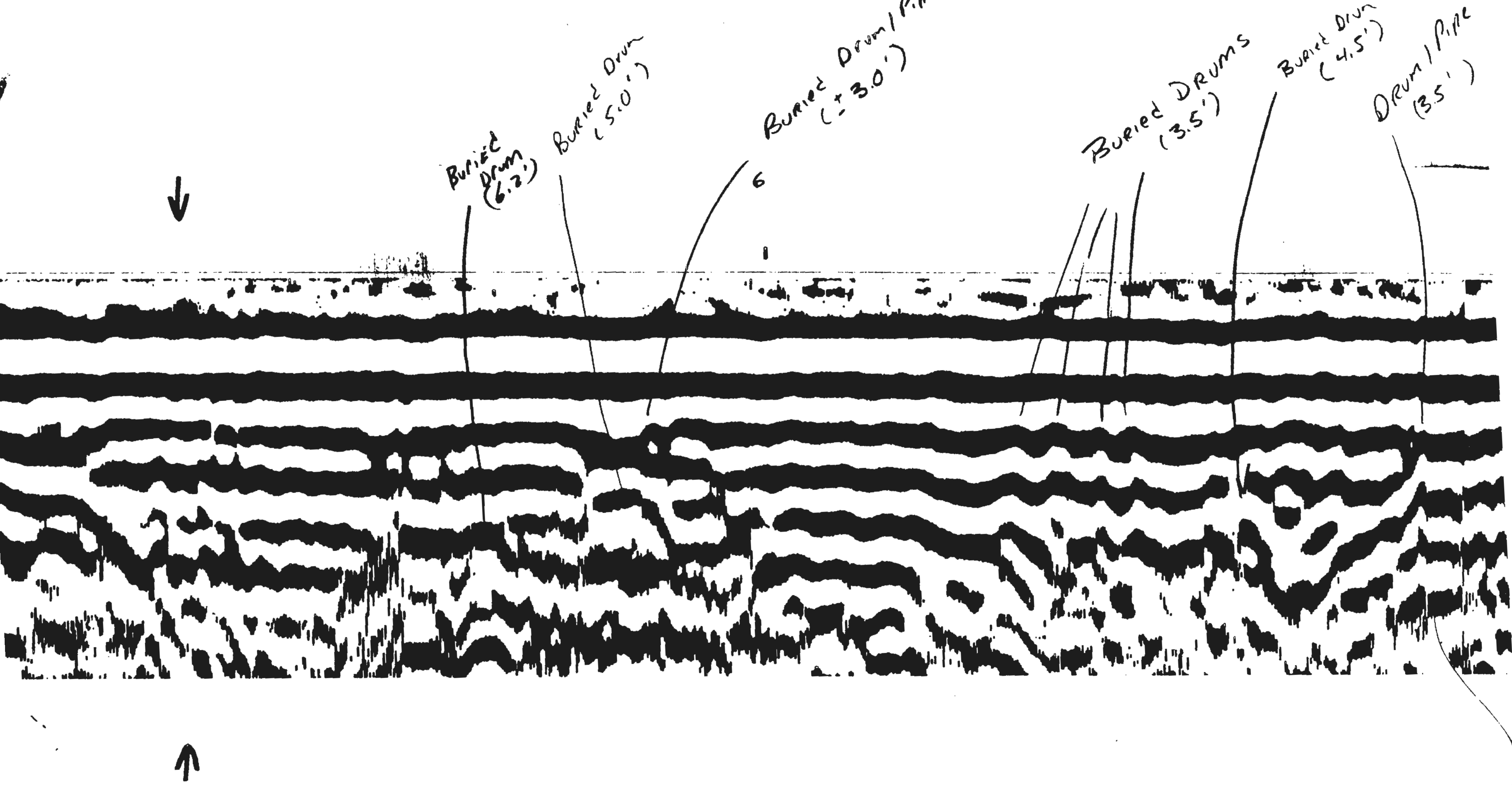

BEDROCK ↓ (2-8')
BEDROCK (3.0')
FRACTURES ∠ ≅ 25°
BEDROCK (2.3'
5
Buried drum (~3.3')
↑

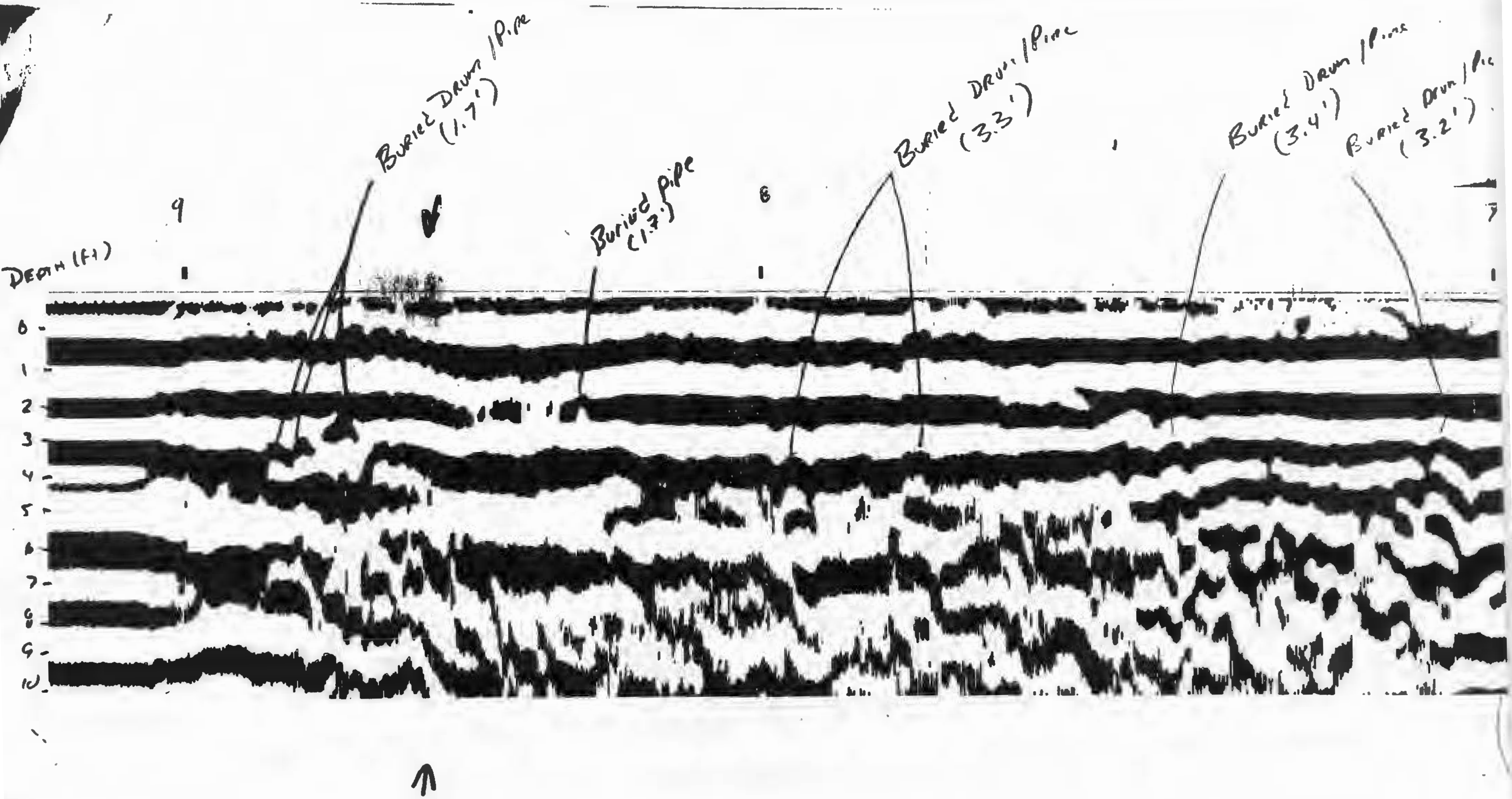

Buried cable/pipe (3.2')
Wastes (2.0')
Bedrock (3.0')
3
DEPTH(ft)
0
1
2
3
4
5
6
7
8
9
10

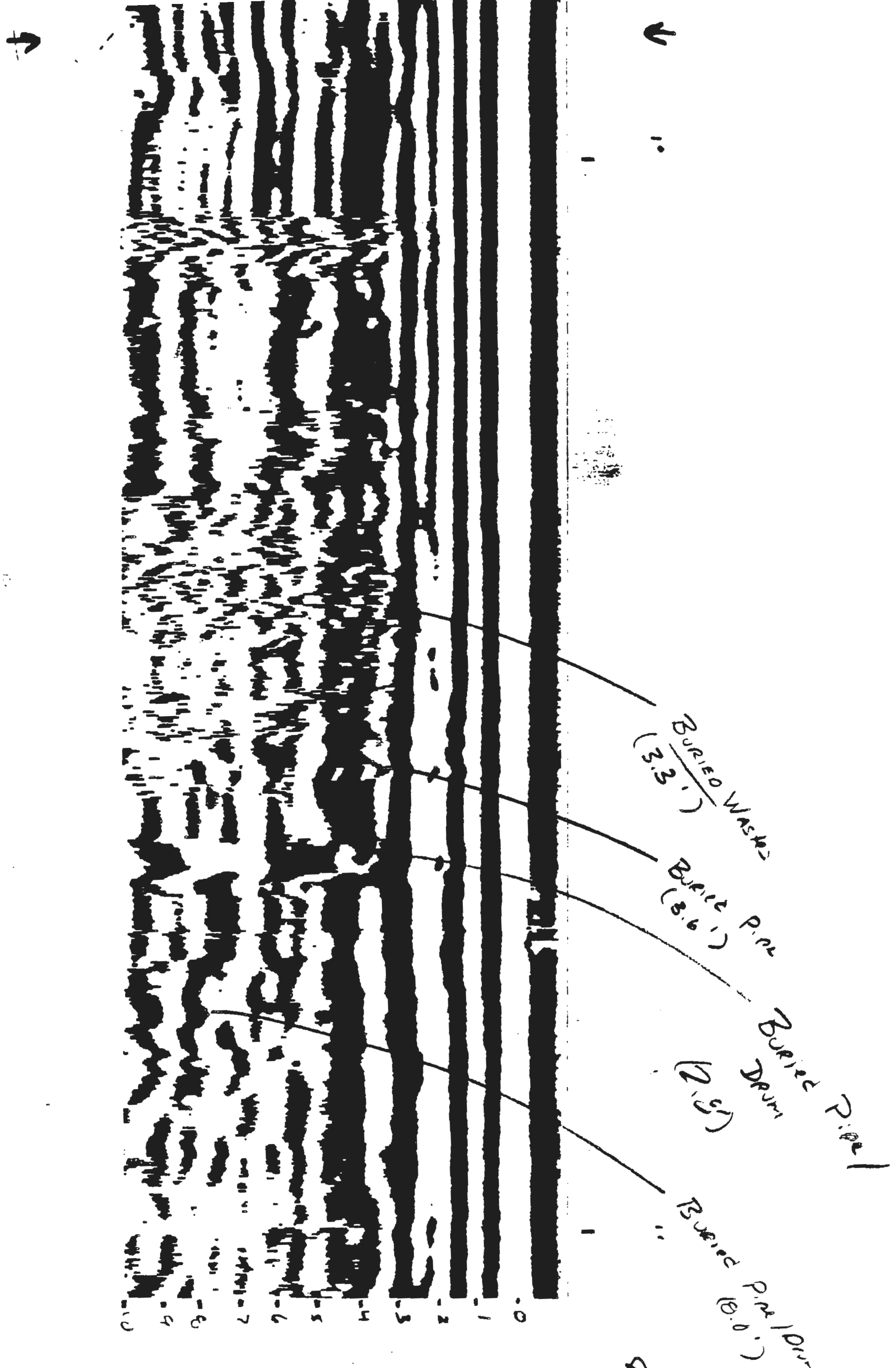


RADAR TRACK J-9 - J-2


Buried Drum/Pipe (4.5')
5
Buried drum (3.3')
Buried Drum/Pipe (1.7')
Buried Drum/Pipe (1.8')
Buried Drum/Pipe (1.8-2.0')
4
Buried Drum/P (3.1')


Buried Drum (6.2')
Buried Drum (5.0')
6
Buried Drum/Pipe (±3.0')
Buried DRUMS (3.5')
Buried Drum (4.5')
DRUM/Pipe (3.5')


Buried Drum/Pipe (1.7')
Buried pipe (1.7')
Buried Drum/Pipe (3.3')
Buried Drum/Pipe (3.4')
Buried Drum/Pipe (3.2')
9
8
7
Depth (ft)
0
1
2
3
4
5
6
7
8
9
10

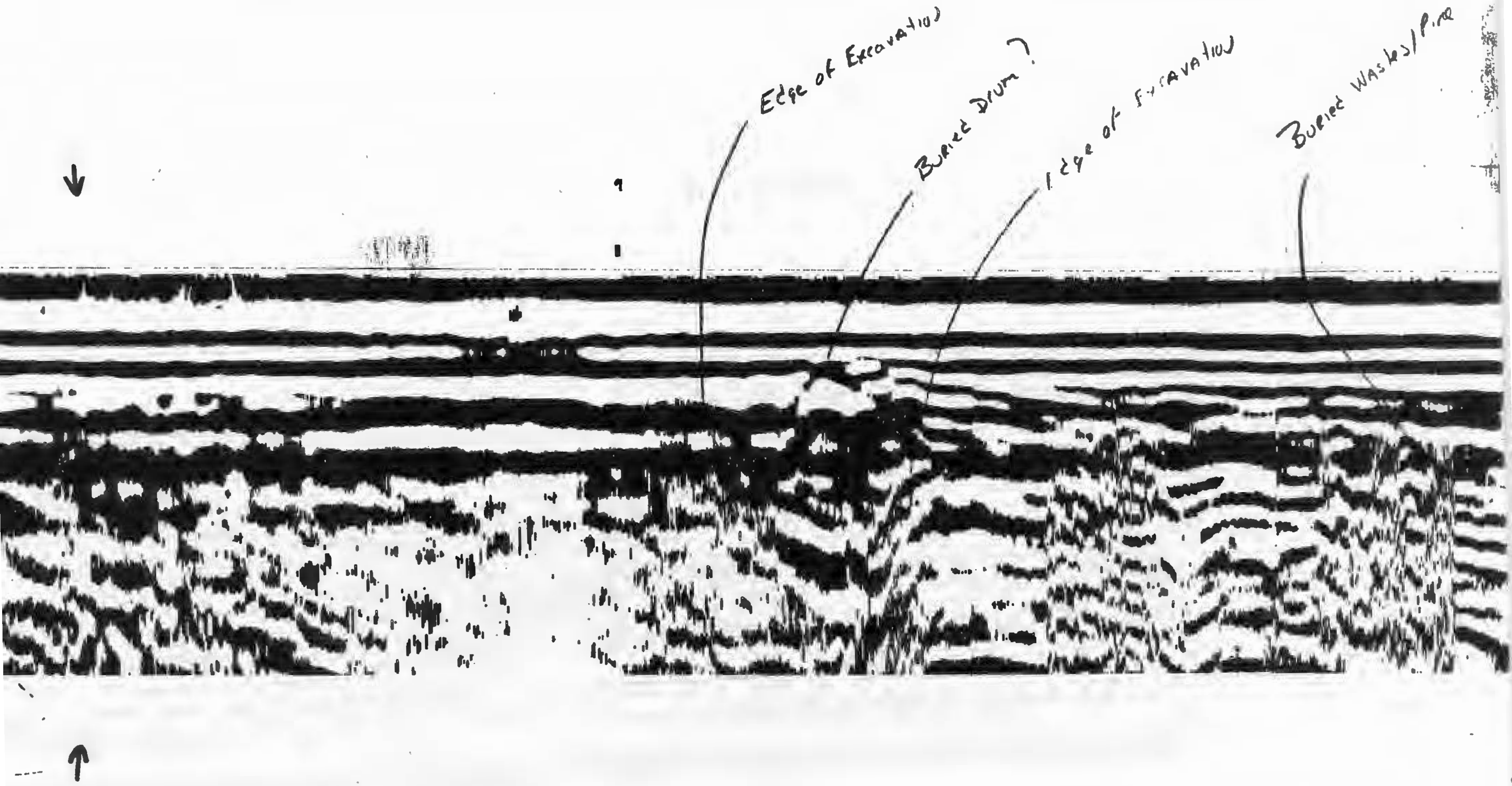


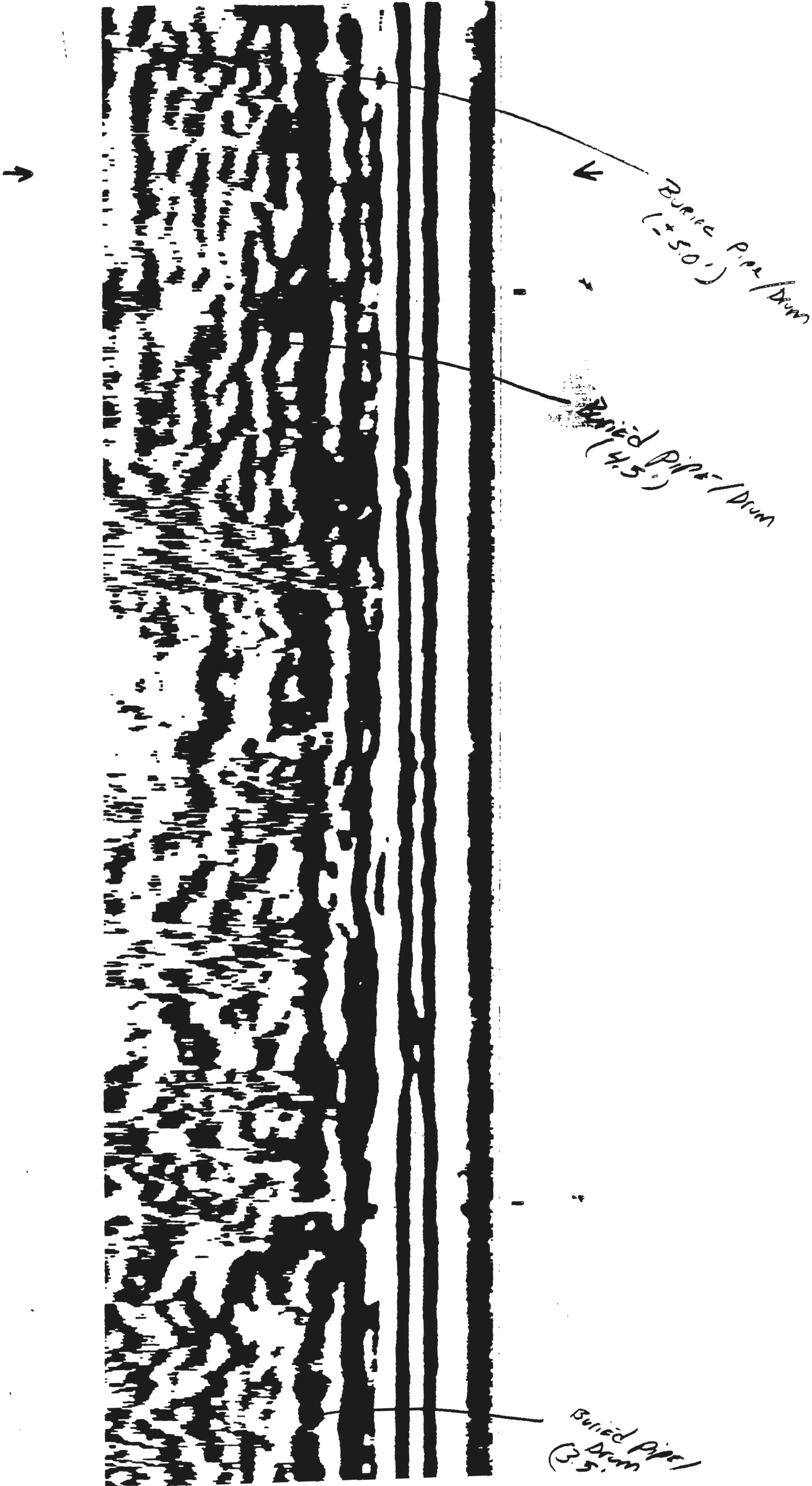
```
I D NO. 13        MODEL-2441
                  GEORADAR-1
AMPLITUDE-PRG:24dB, LFG: 28dB
         -THD: 0%
GAIN CONT-AGC: ON, TVG:OFF-1
POWER BOOST-:OFF
TIME SCALE-RNG: 100nSEC
FILTER-HPF: 80Hz, LPF: 0.4KHz
FUNCTION-STF:  1, SCN: 50mSEC
CHART-SCL:  SCAN
```

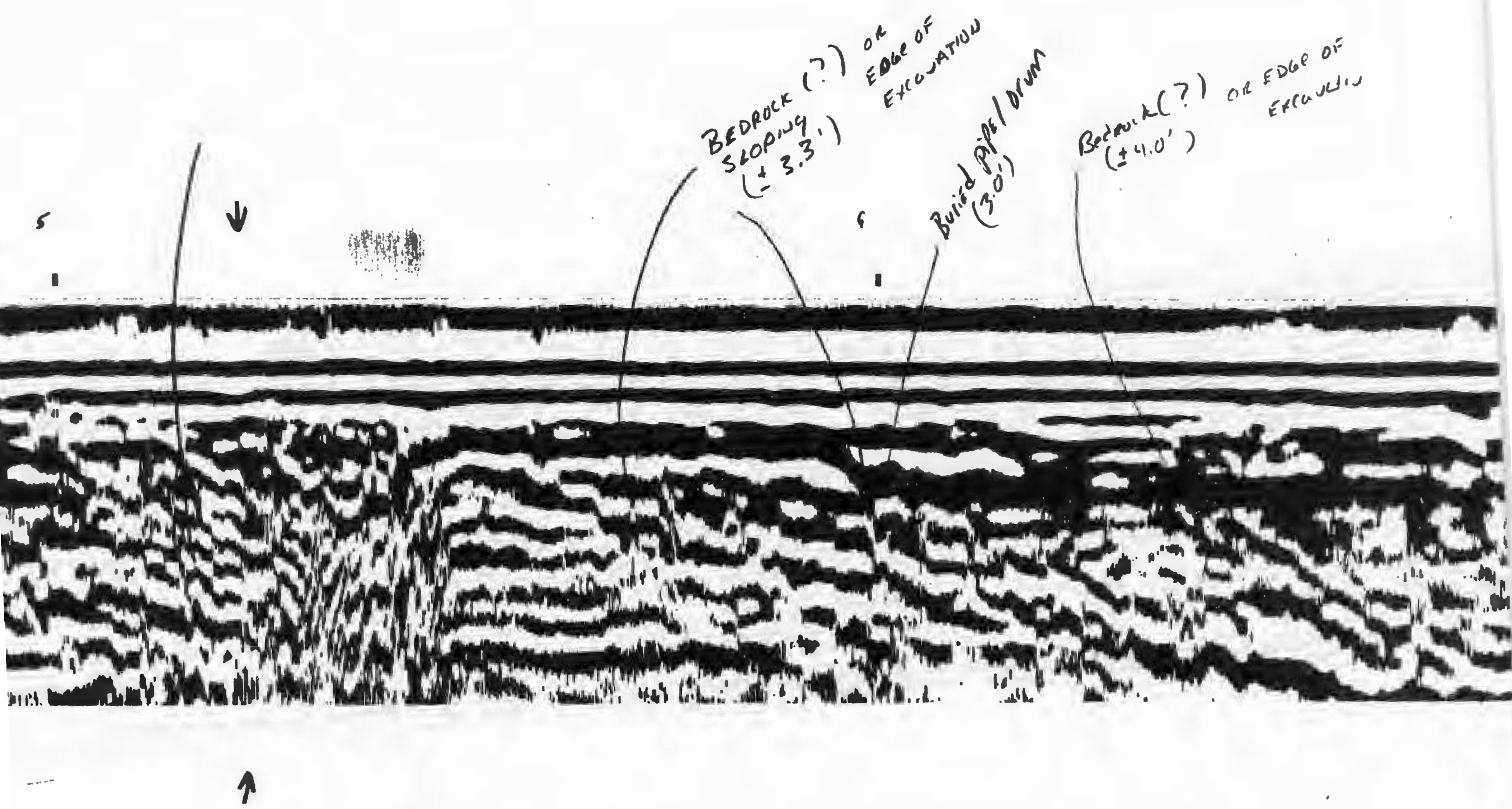
OYO

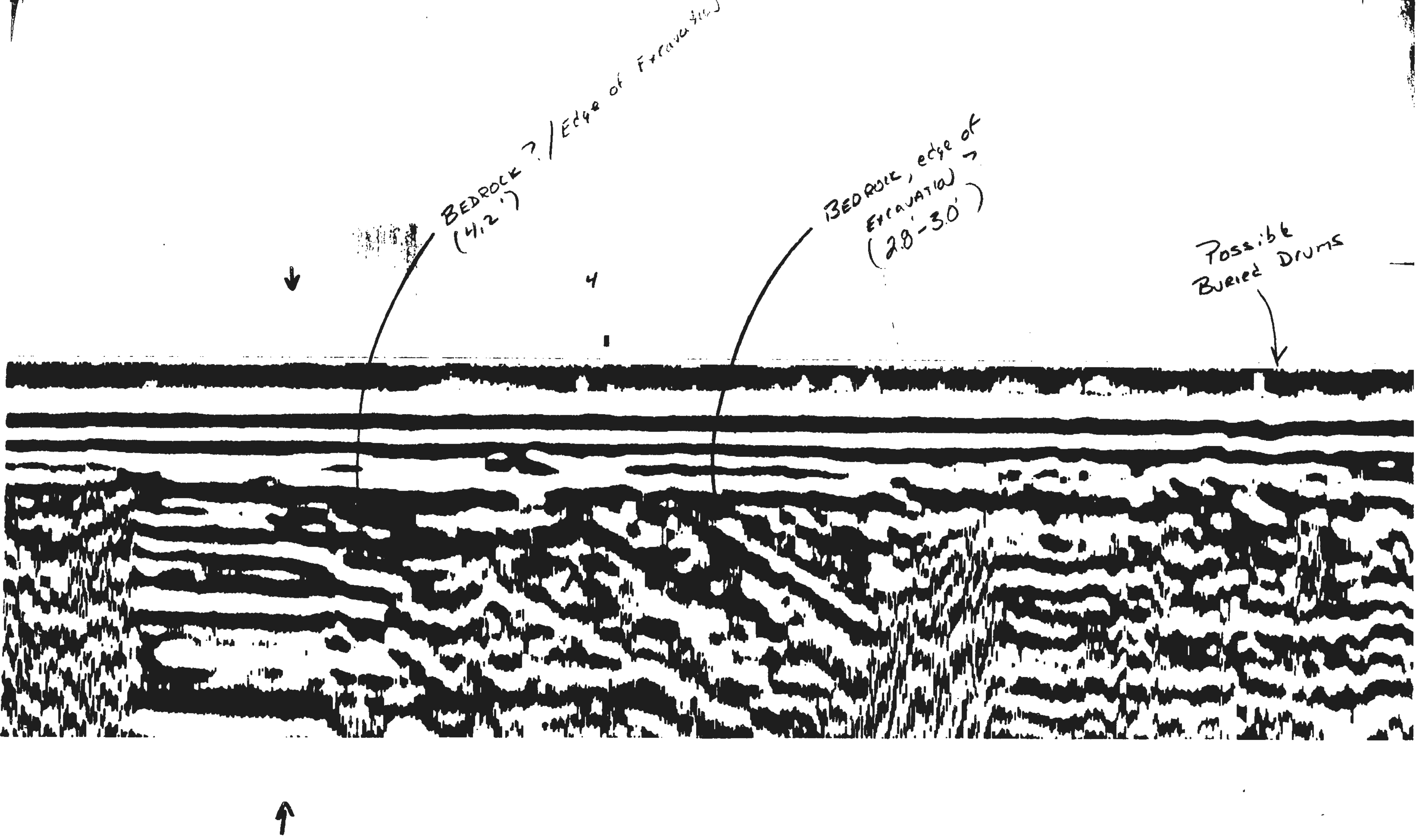
K-1 → K-11

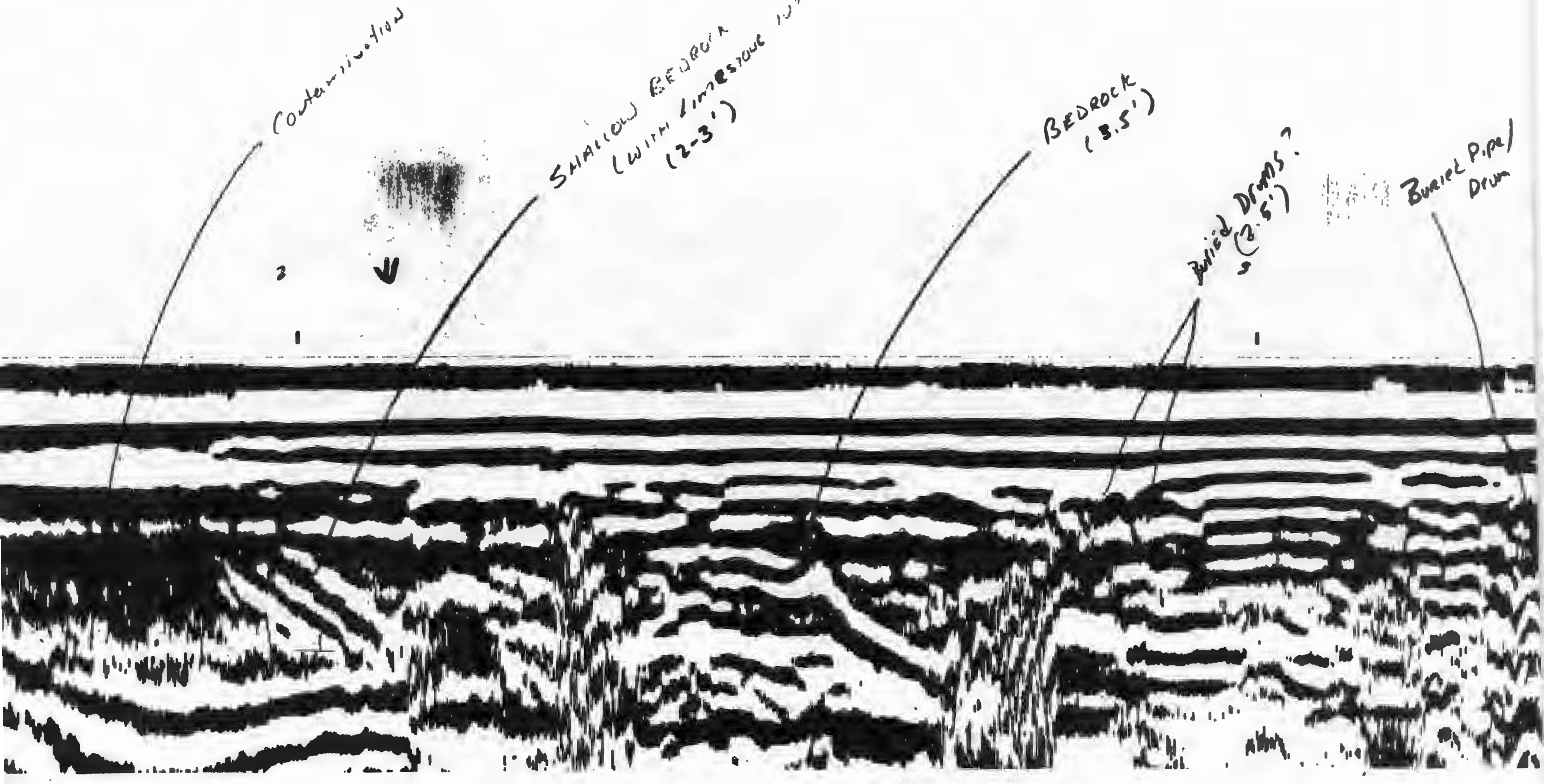
RADAR TRACK K-1 - K-11


Edge of Excavation
Buried Drum ?
Edge of Excavation
Buried Wastes/Pipe

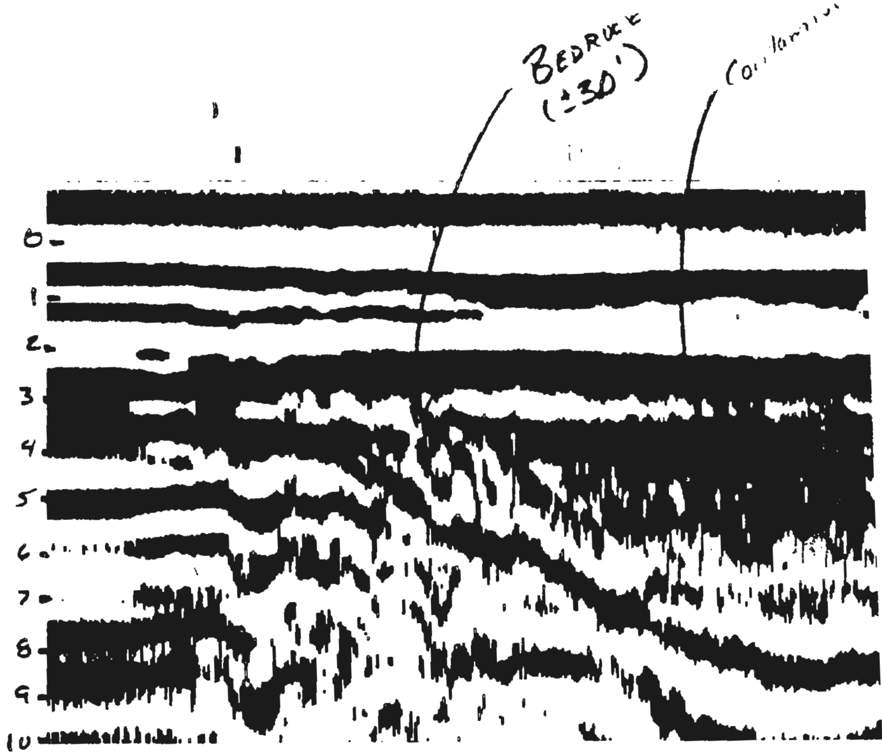

Buried Pipe/Drum (±5.0')
Buried Pipe/Drum (4.5')
Buried Pipe/Drum (3.5'


BEDROCK (?) OR EDGE OF EXCAVATION SLOPING (± 3.3')
Buried pipe/drum (3.0')
Bedrock (?) OR EDGE OF EXCAVATION (±4.0')
5
6

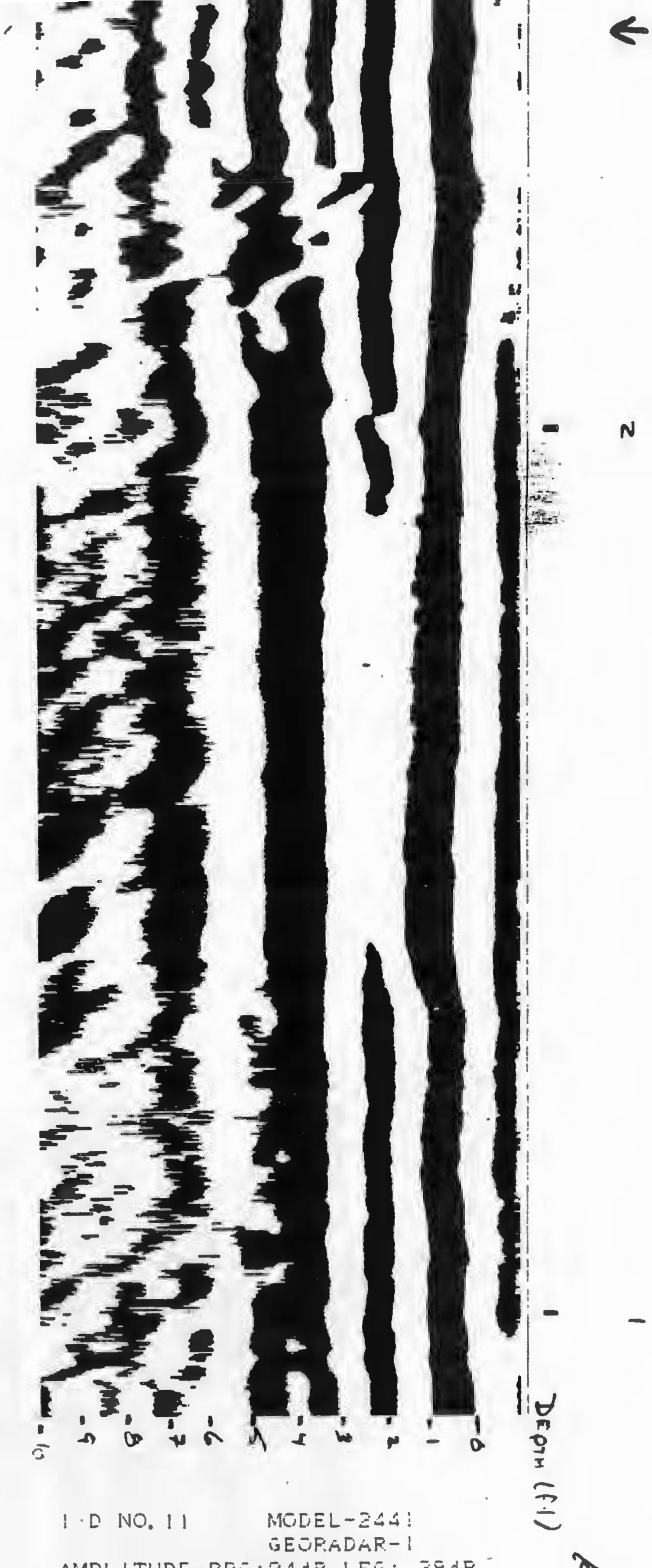

BEDROCK ? / Edge of Excavation)
(4.2')
4
BEDROCK, edge of Excavation ?
(2.8'-3.0')
Possible Buried Drums


Contamination
SHALLOW BEDROCK (WITH LIMESTONE INTRUSION) (2-3')
BEDROCK (3.5')
Buried Drums? (3.5')
Buried Pipe/ Drum

> 23.25



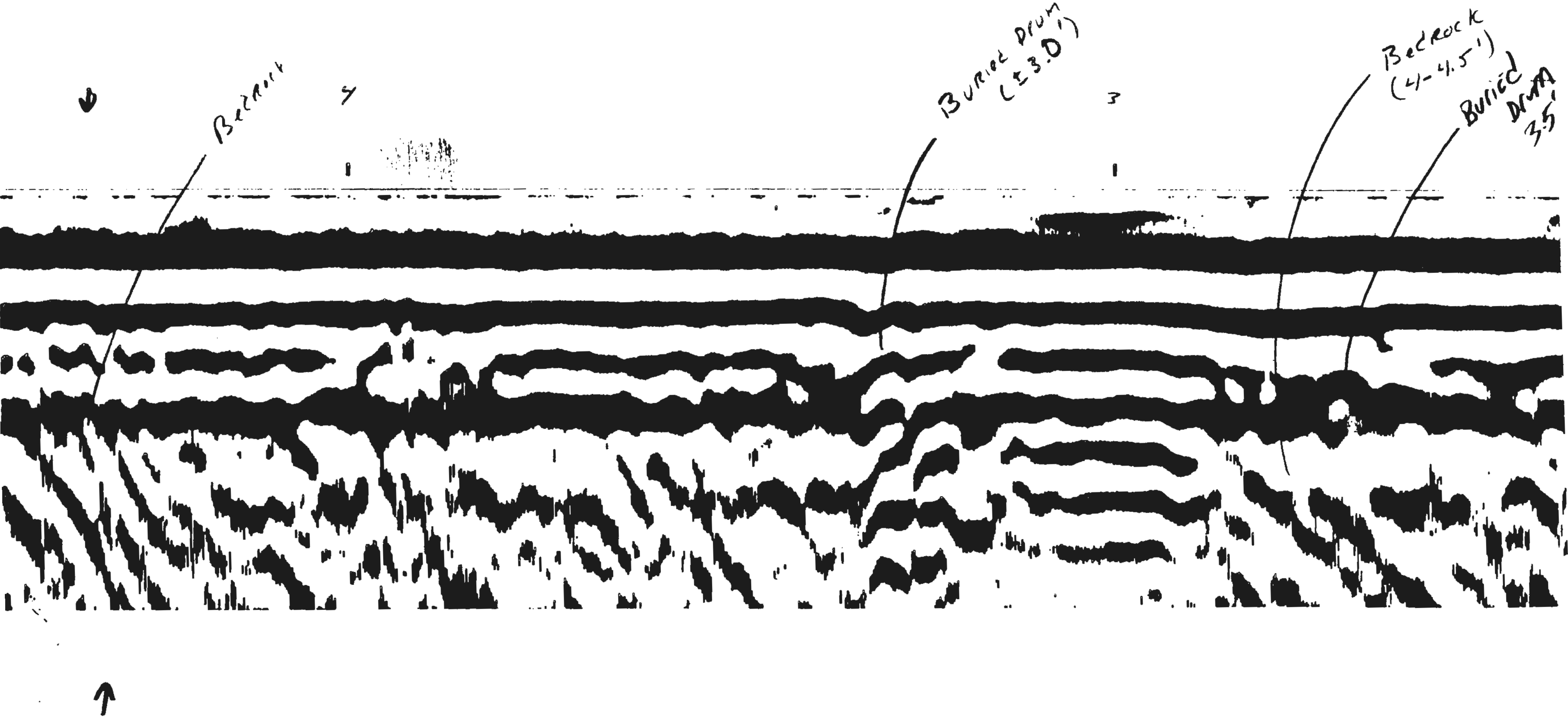
RADAR TRACK K-11 - K-1

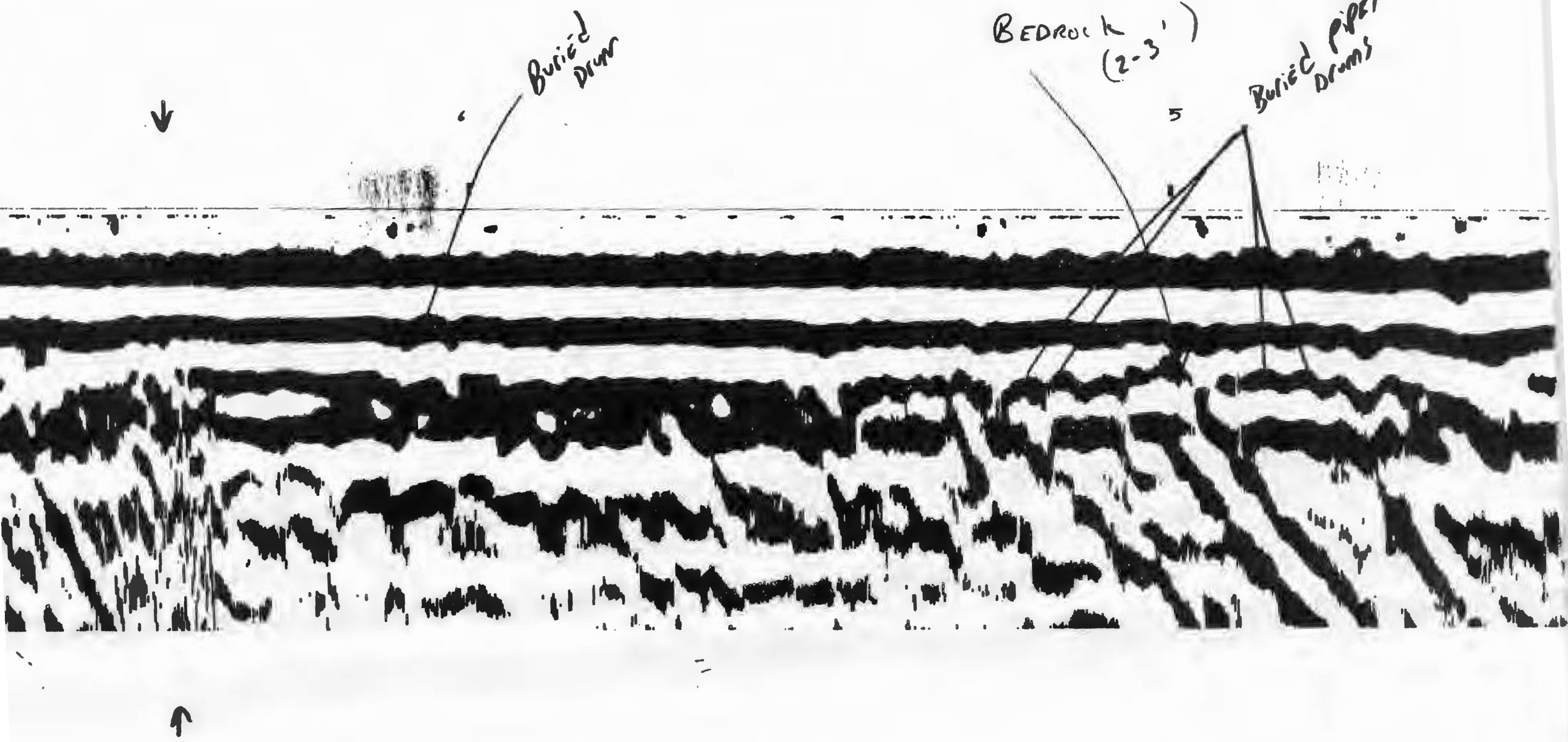


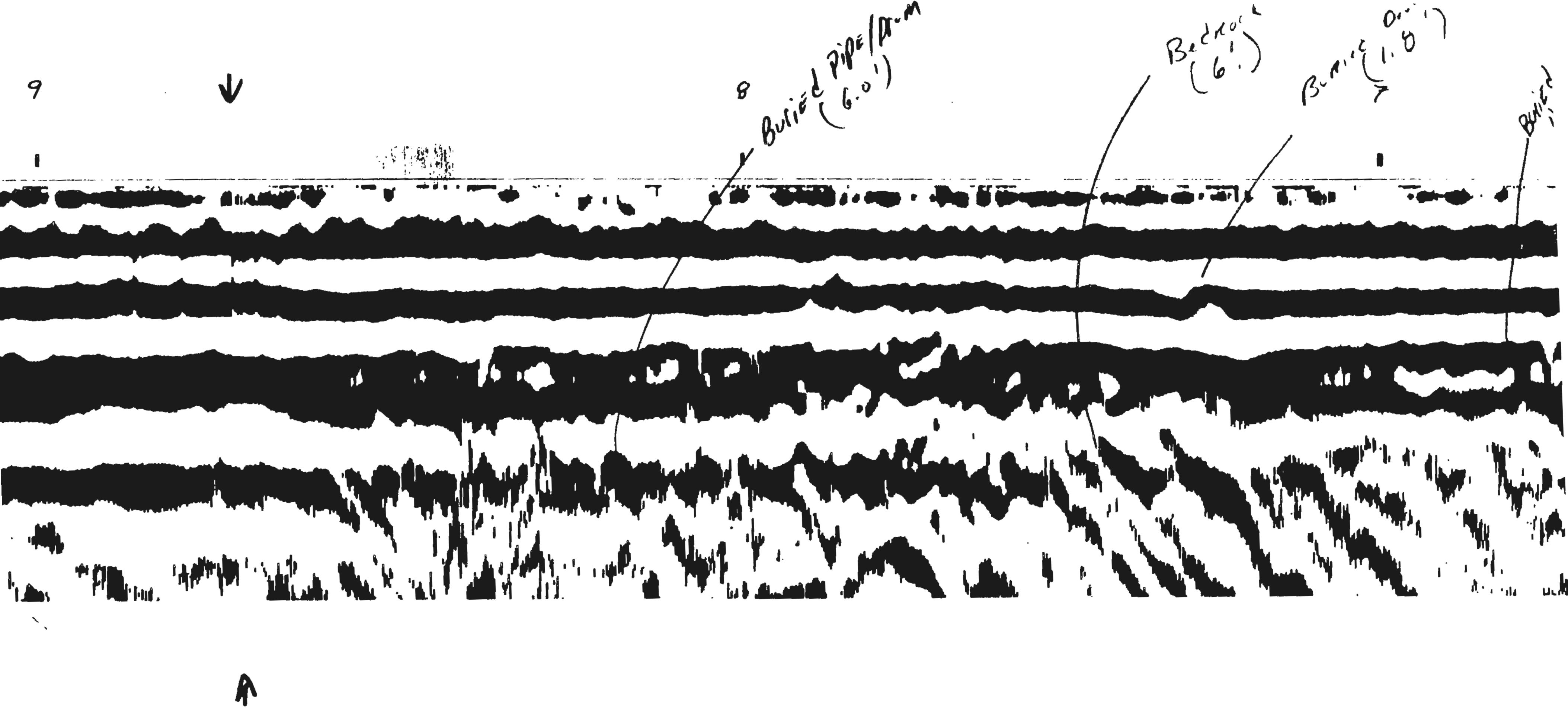
```
I D NO. 11        MODEL-2441
                  GEORADAR-I
AMPLITUDE-PRG:24dB, LFG: 29dB
         -THD: 0%
GAIN CONT-AGC: ON, TVG:OFF-1
POWER BOOST-: ON
TIME SCALE-RNG:   50nSEC
FILTEF-HPF: 80Hz, LPF: 0.4KHz
FUNCTION-STK: .1, SCN: 50mSEC
CHAPT-SCL:   SCAN
```

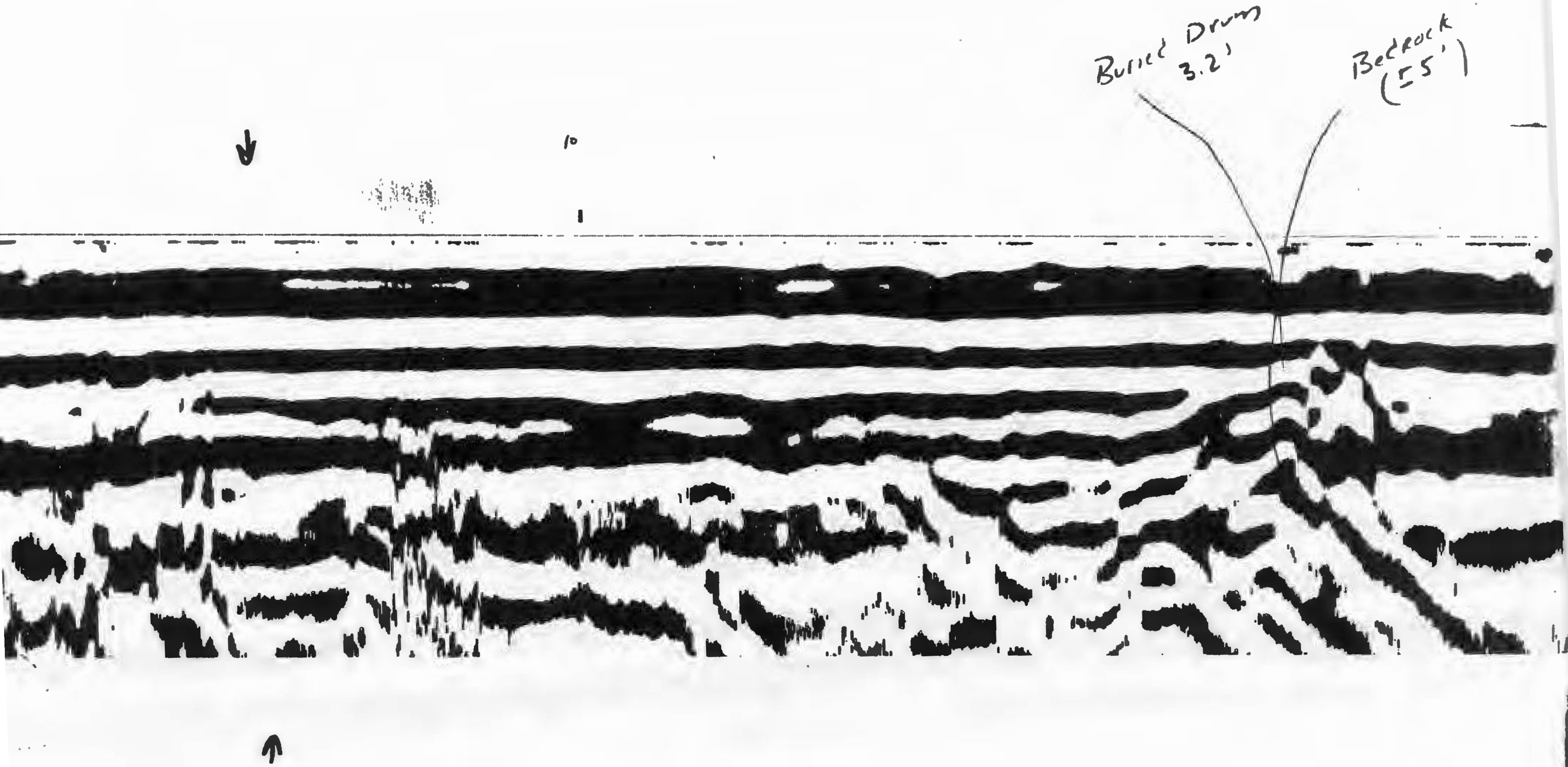
K-11 → K-1

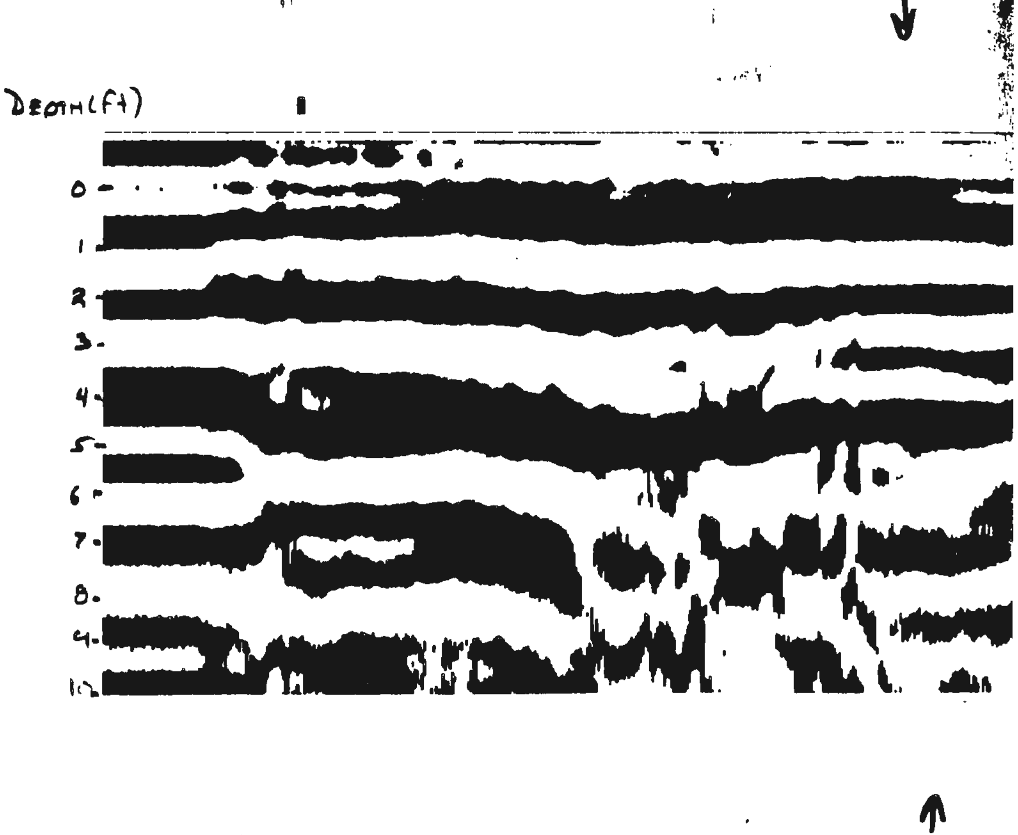
OYO

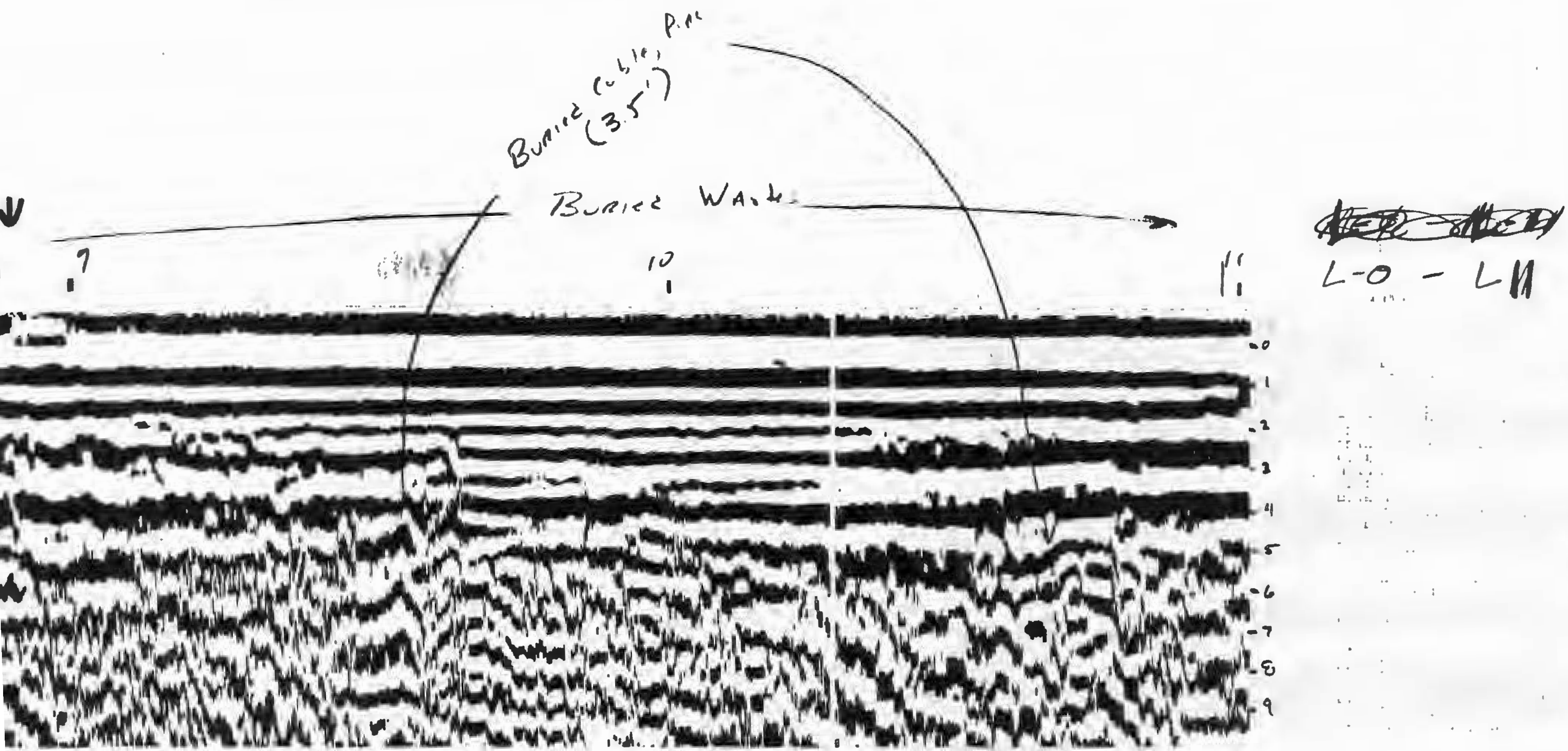

Bedrock
4
Buried Drum
(±3.0')
3
Bedrock
(4-4.5')
Buried
Drum
3.5'


Buried Drum
BEDROCK (2-3')
5
Buried pipe/Drums

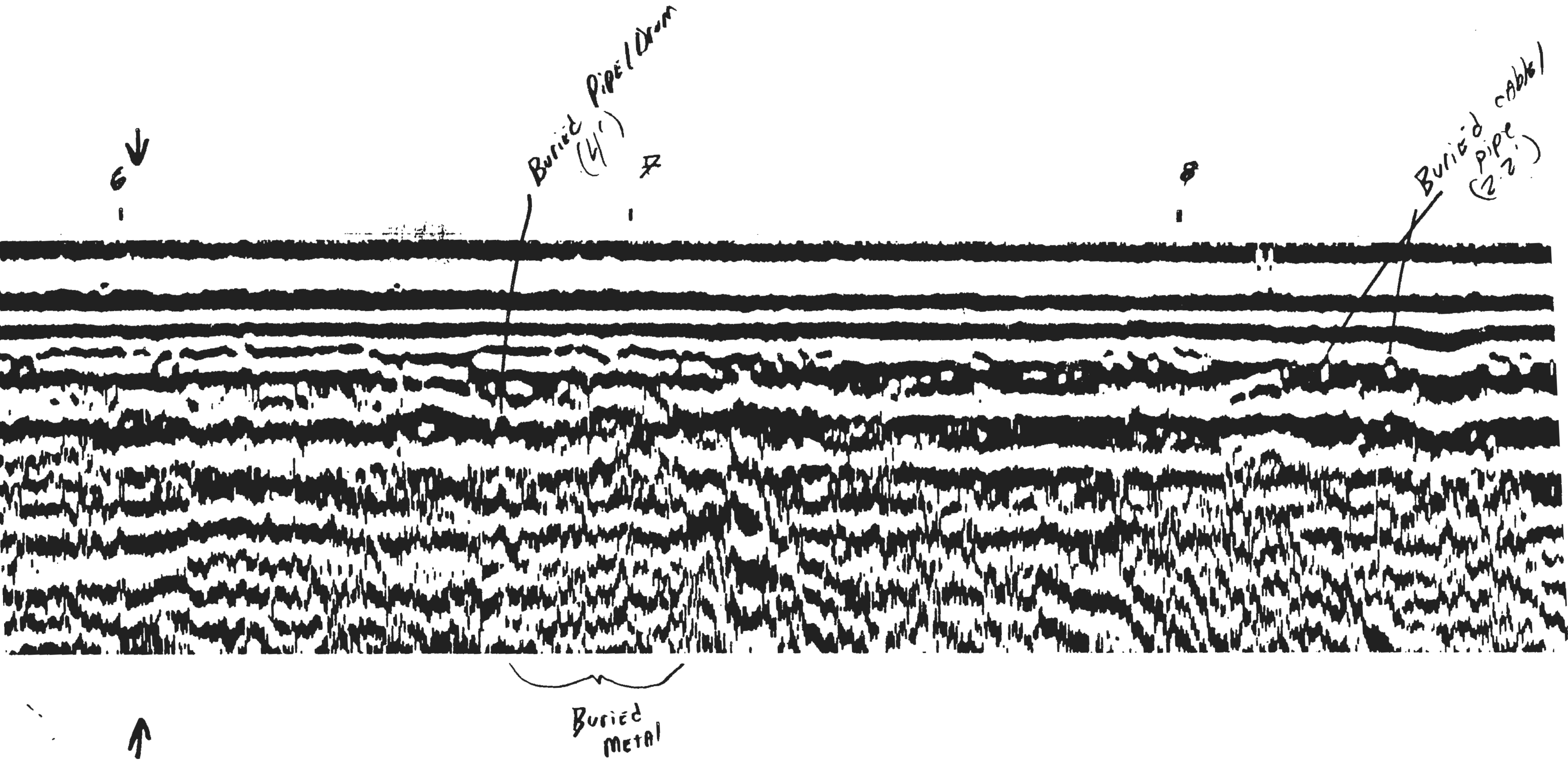

9
↓
8
Buried Pipe/Drum (6.0')
Bedrock (6')
Buried Dr (1.8')
7
Buried
↑

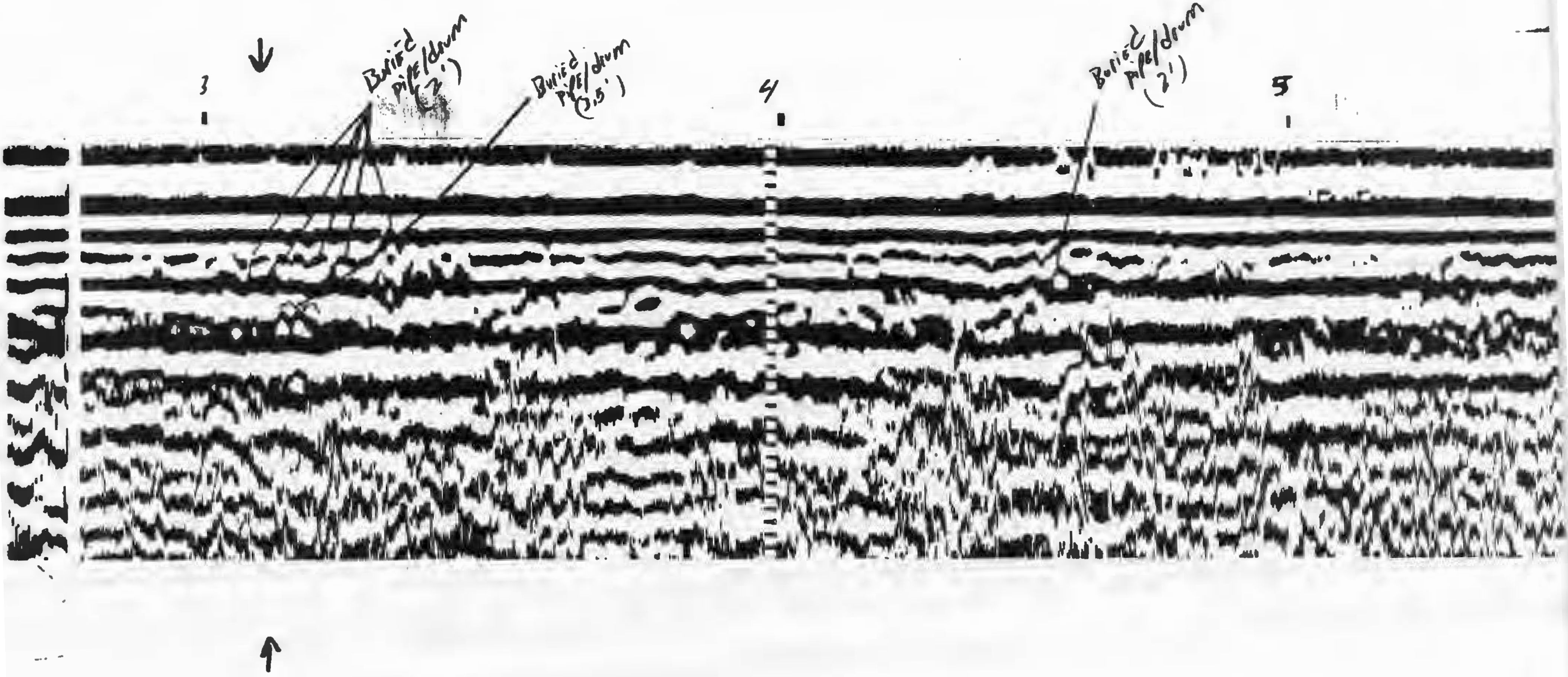

Buried Drum 3.2'
Bedrock (~5')
10

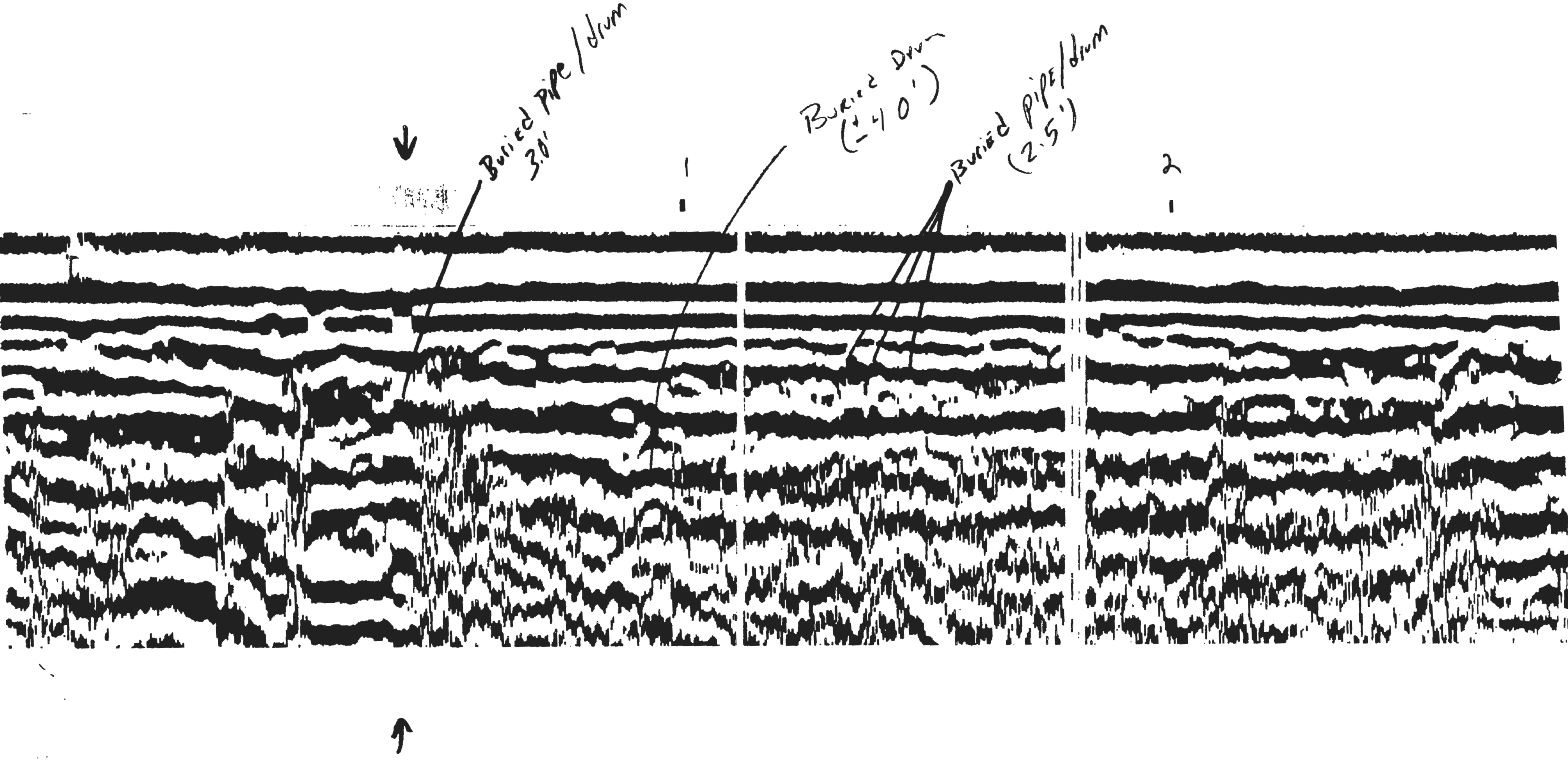

Depth(ft)
0
1
2
3
4
5
6
7
8
9
10

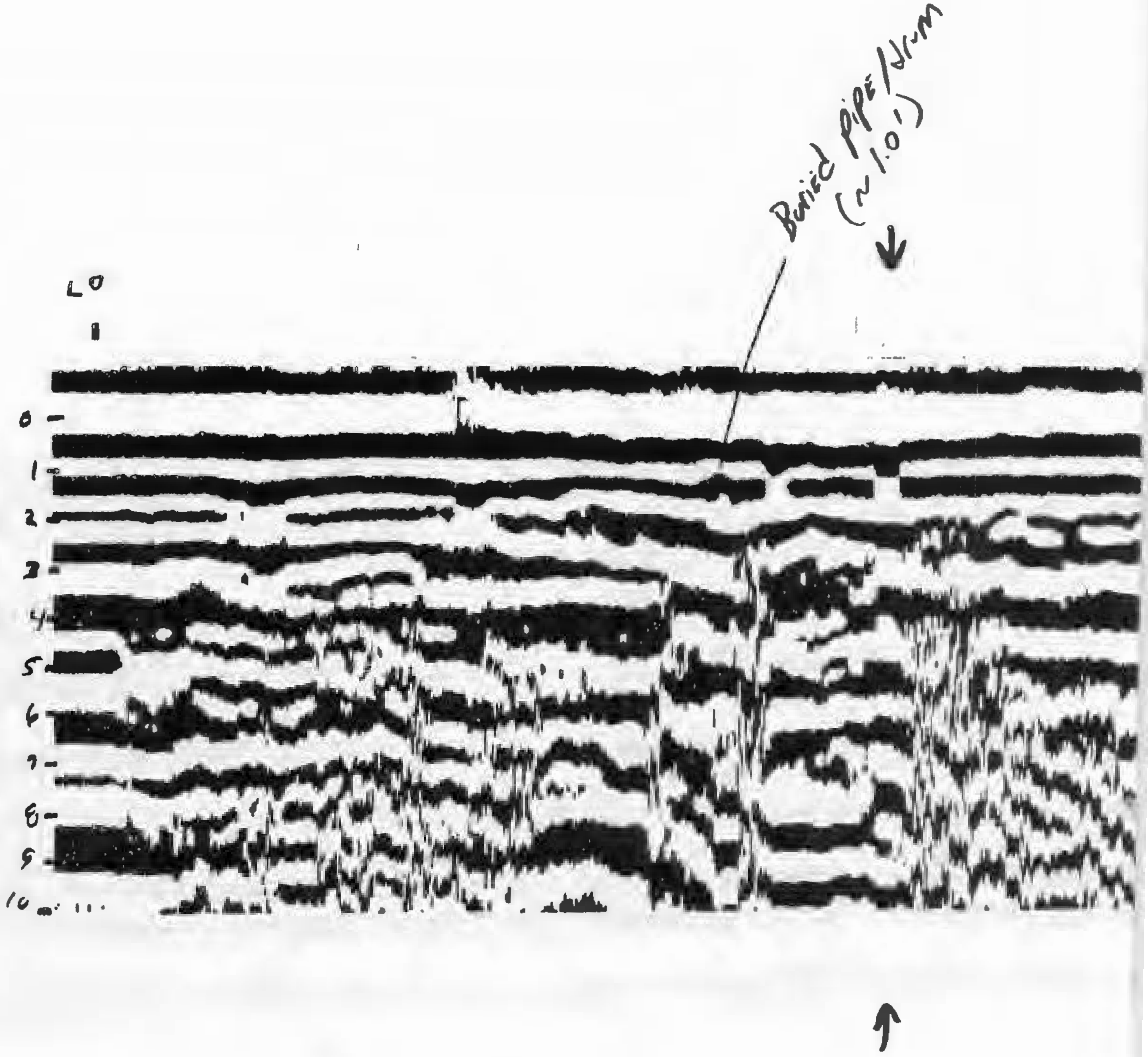


RADAR TRACK L-0 - L-11

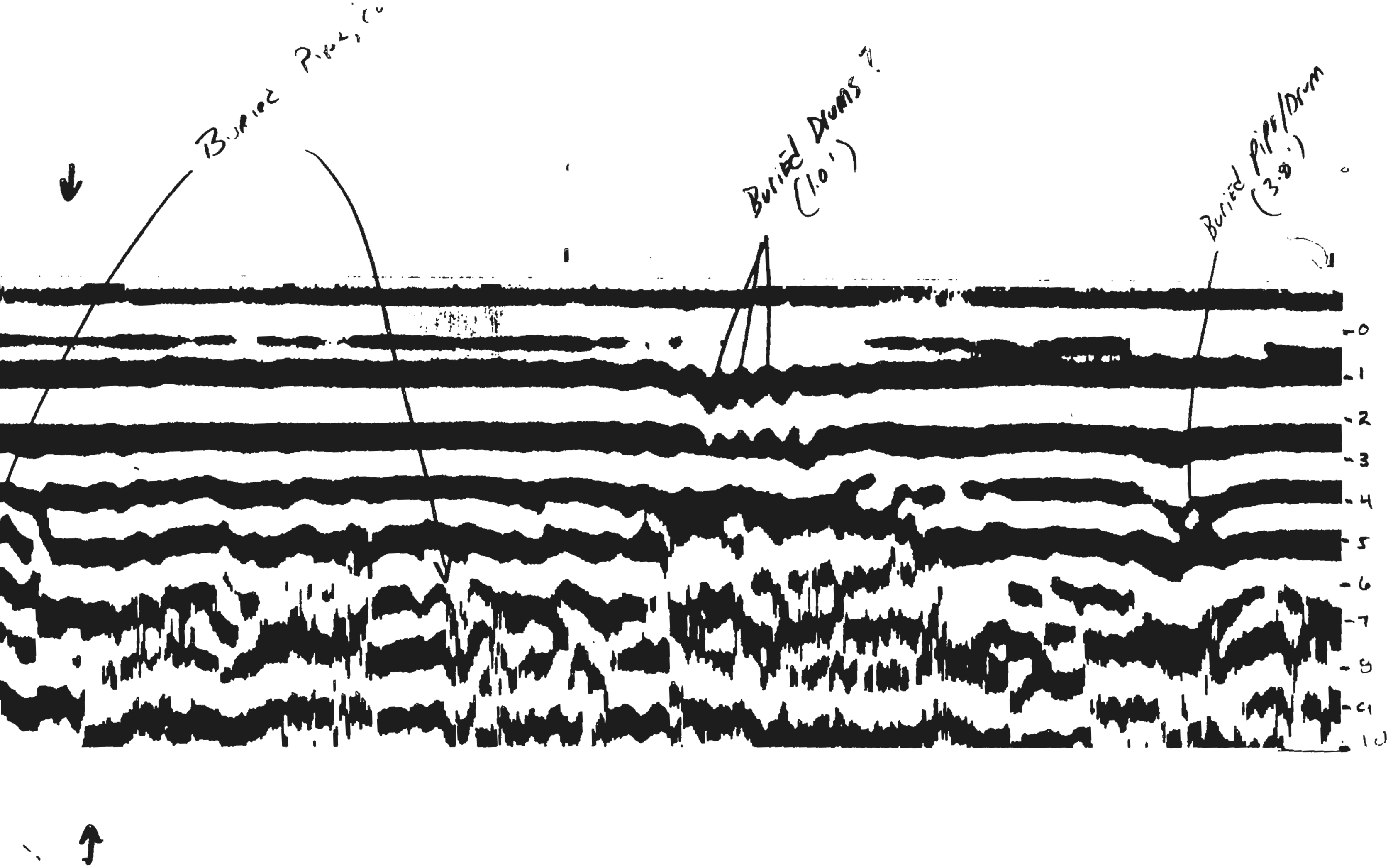

6
Buried Pipe/Drum
(4')
7
8
Buried cable/
pipe
(2.2')
Buried
metal


3
Buried pipe/drum (2')
Buried pipe/drum (3.5')
4
Buried pipe/drum (2')
5

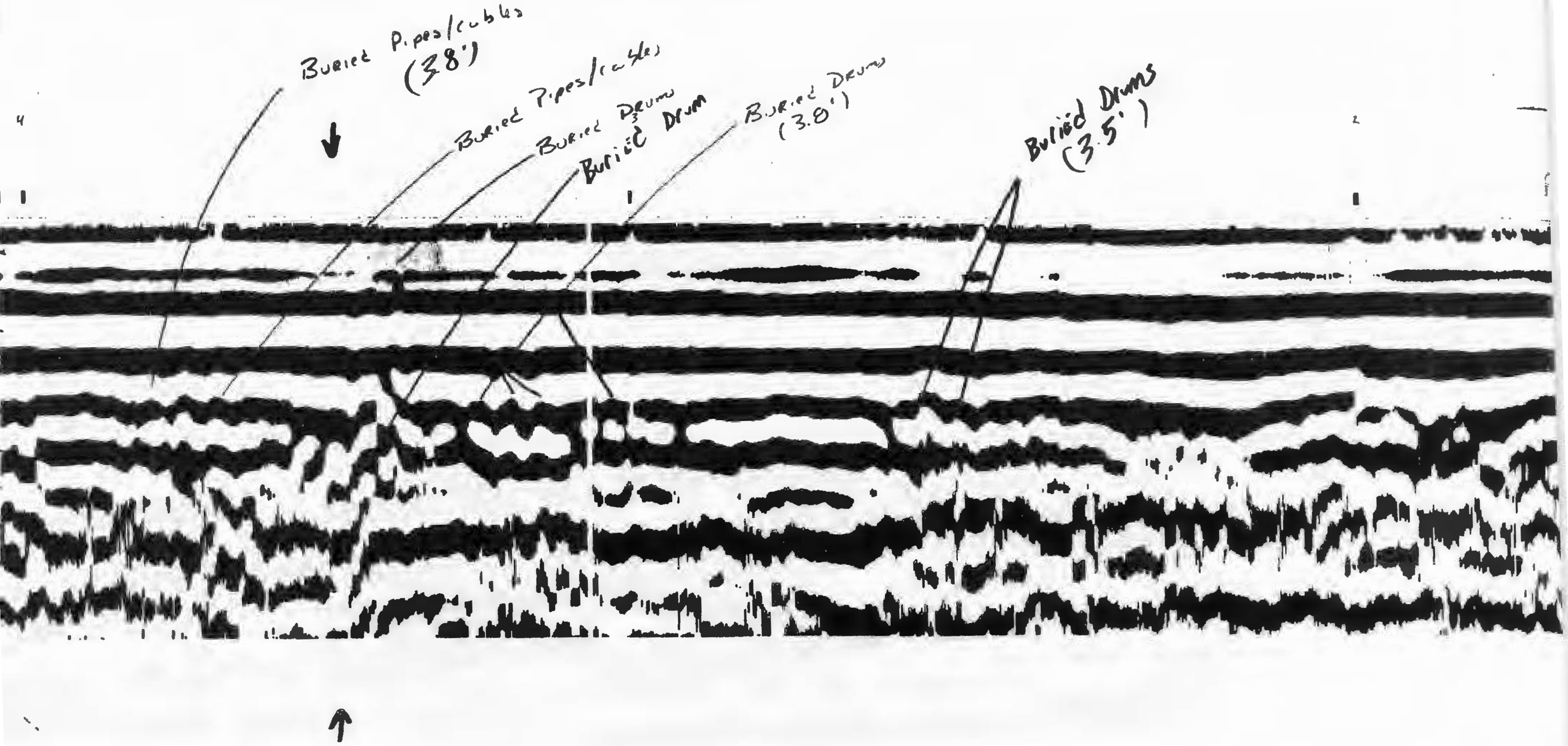

Buried pipe/drum 3.0'
Buried Drum (±4.0')
Buried pipe/drum (2.5')
1
2

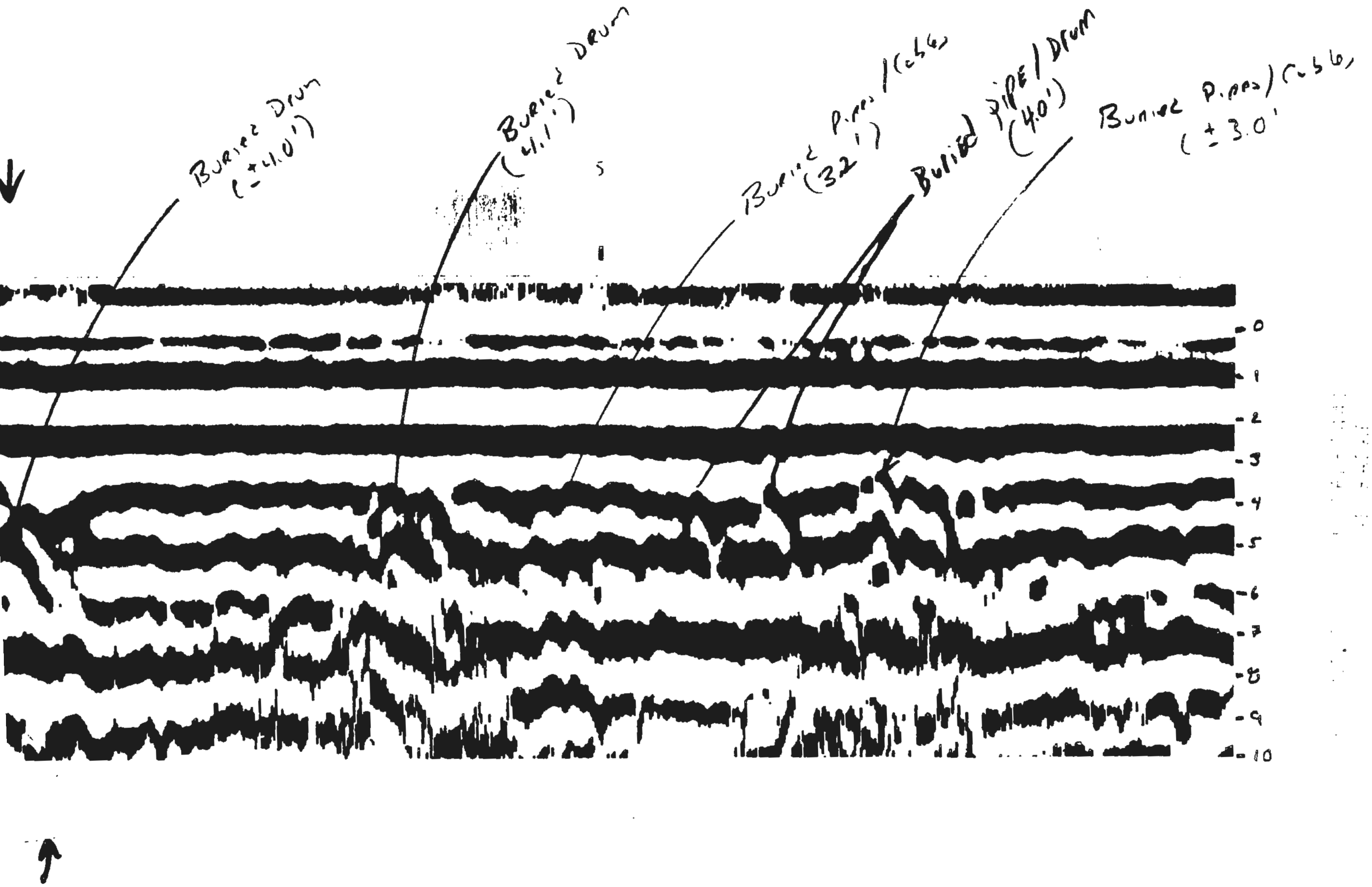

Buried pipe/drum
(~1.0')
LO
0
1
2
3
4
5
6
7
8
9
10

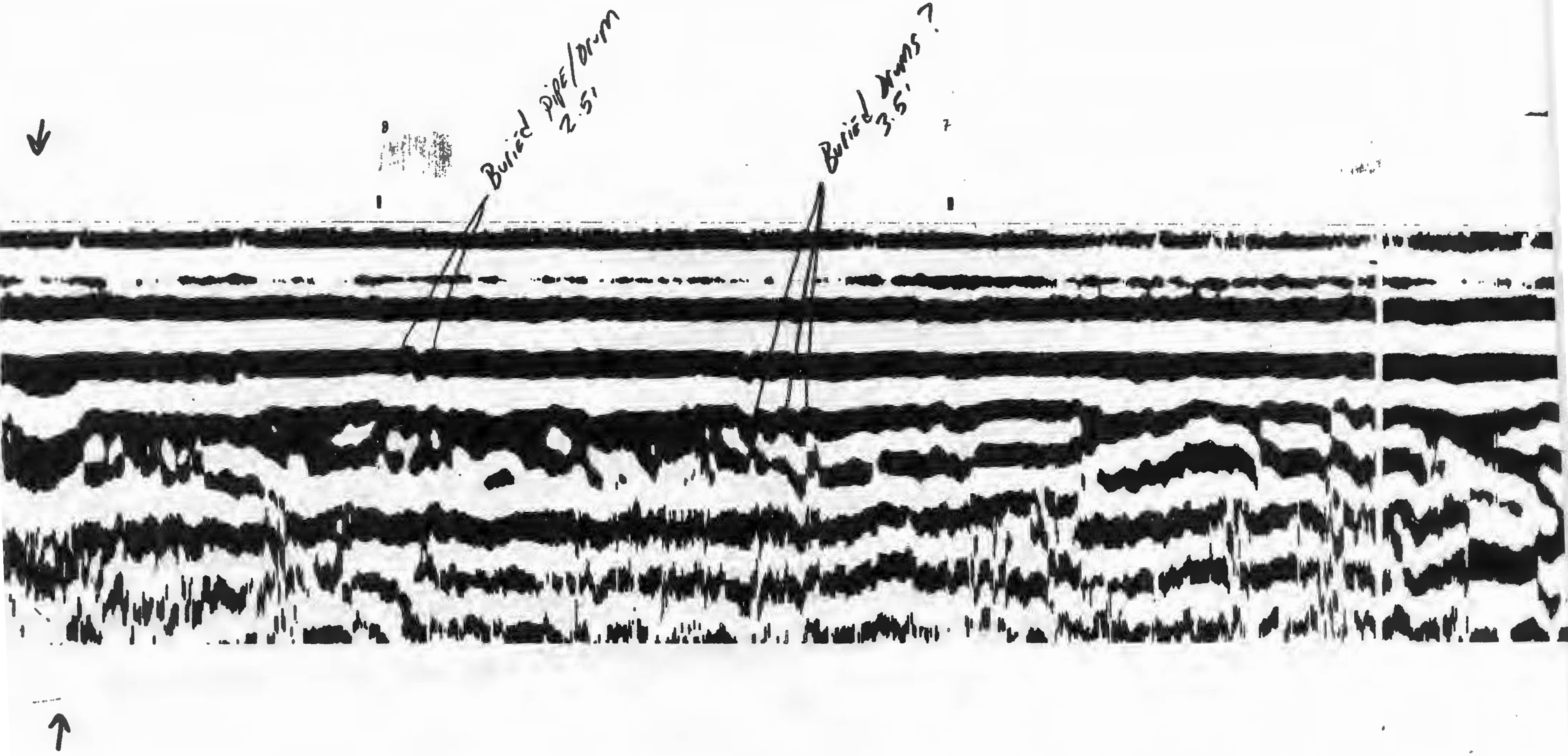
L-11 → L-0

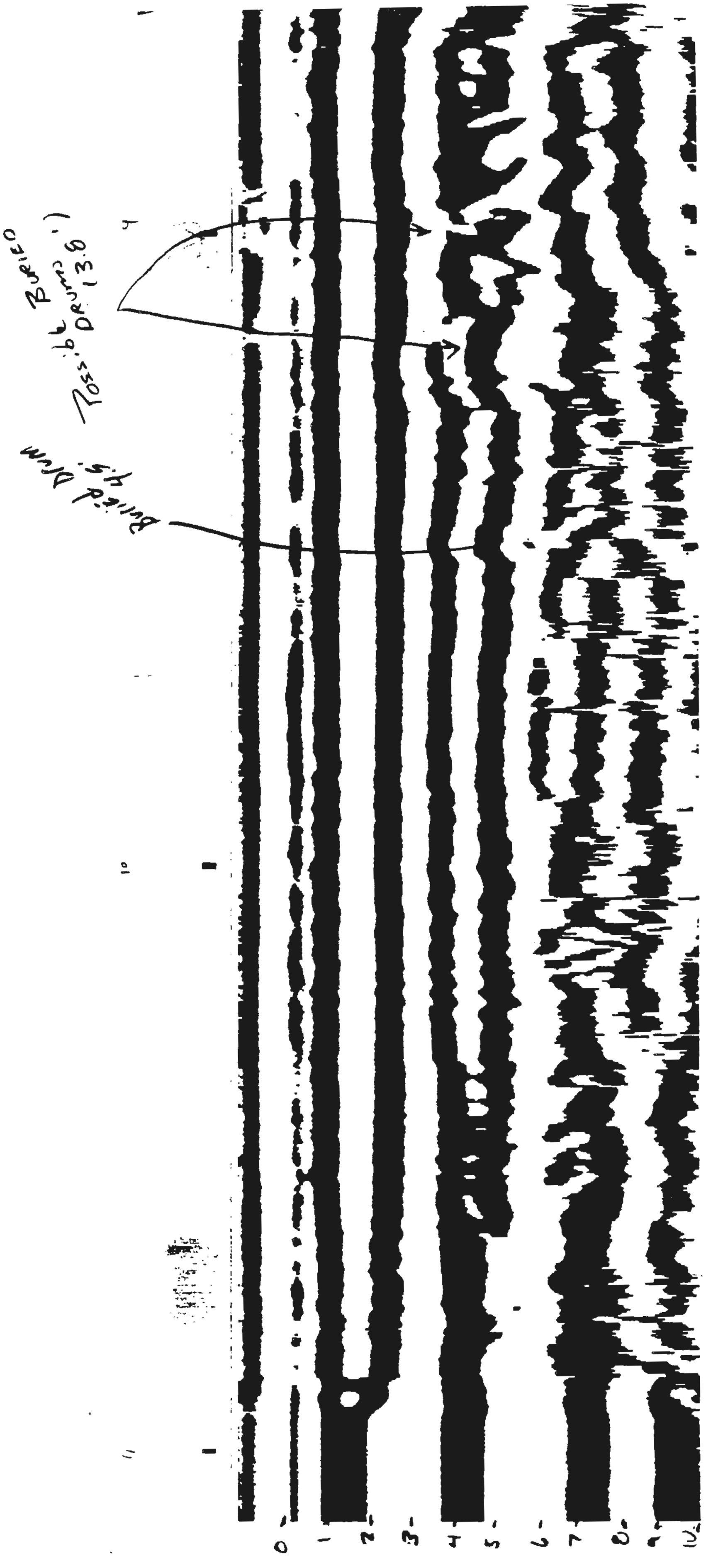


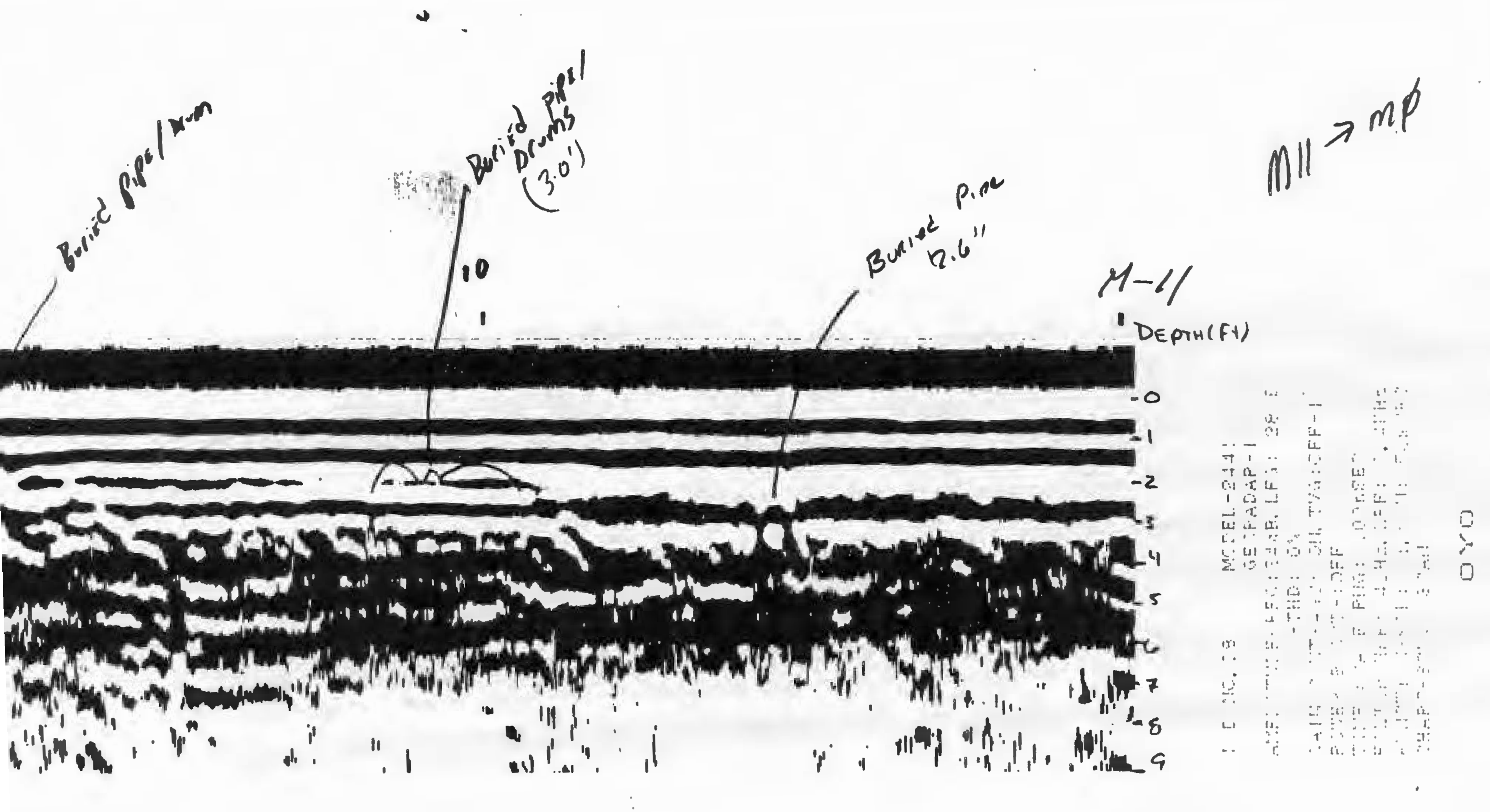
RADAR TRACK L-11 - L-0


4
Buried Pipes/cables (3.8')
Buried Pipes/cables
Buried Drum
Buried Drum
Buried Drum (3.8')
Buried Drums (3.5')
2

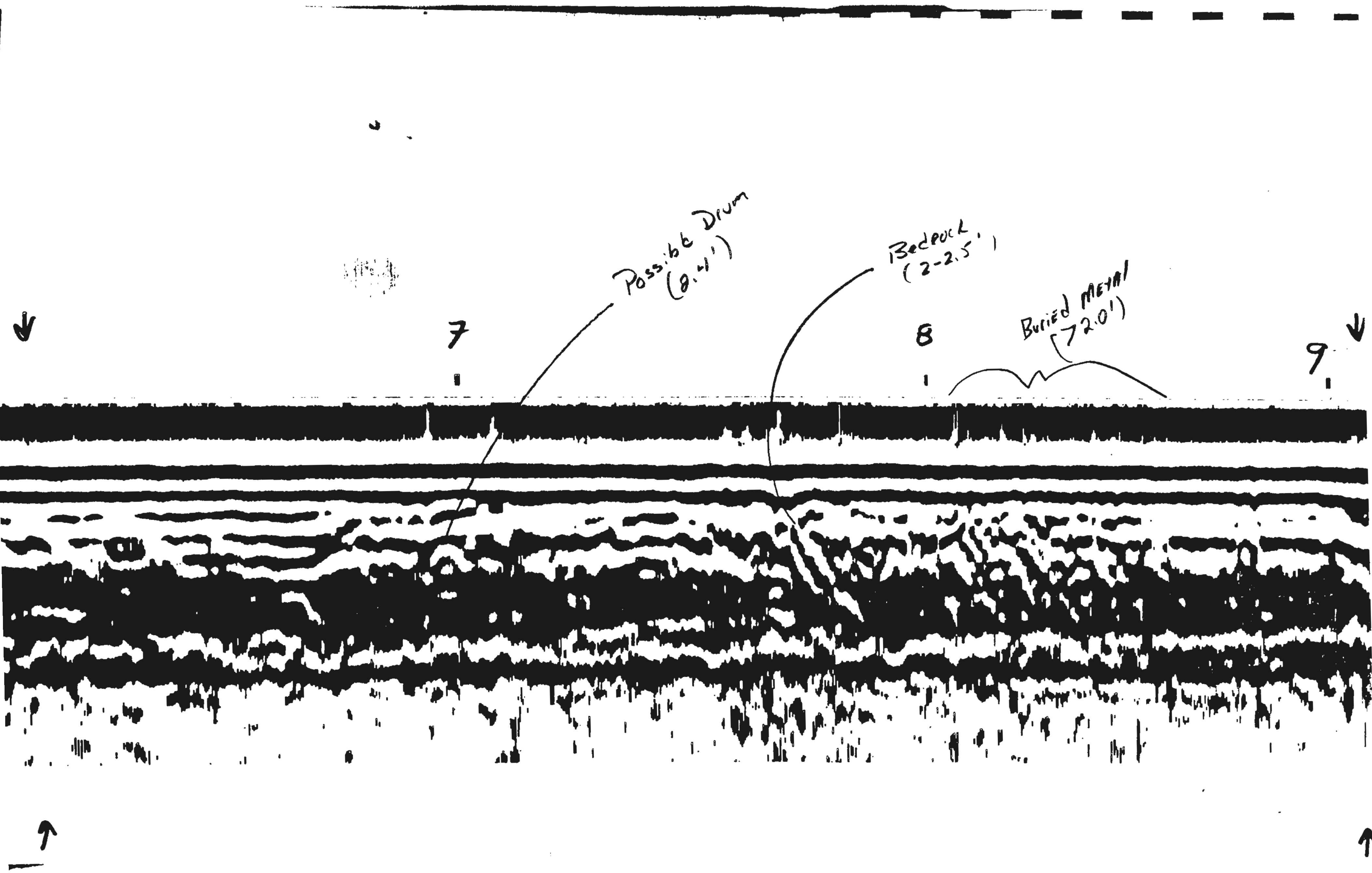

Buried Drum (±4.0')
Buried Drum (4.1')
5
Buried Pipes/Cable (3.2')
Buried Pipe/Drum (4.0')
Buried Pipes/Cable (±3.0')
0
1
2
3
4
5
6
7
8
9
10

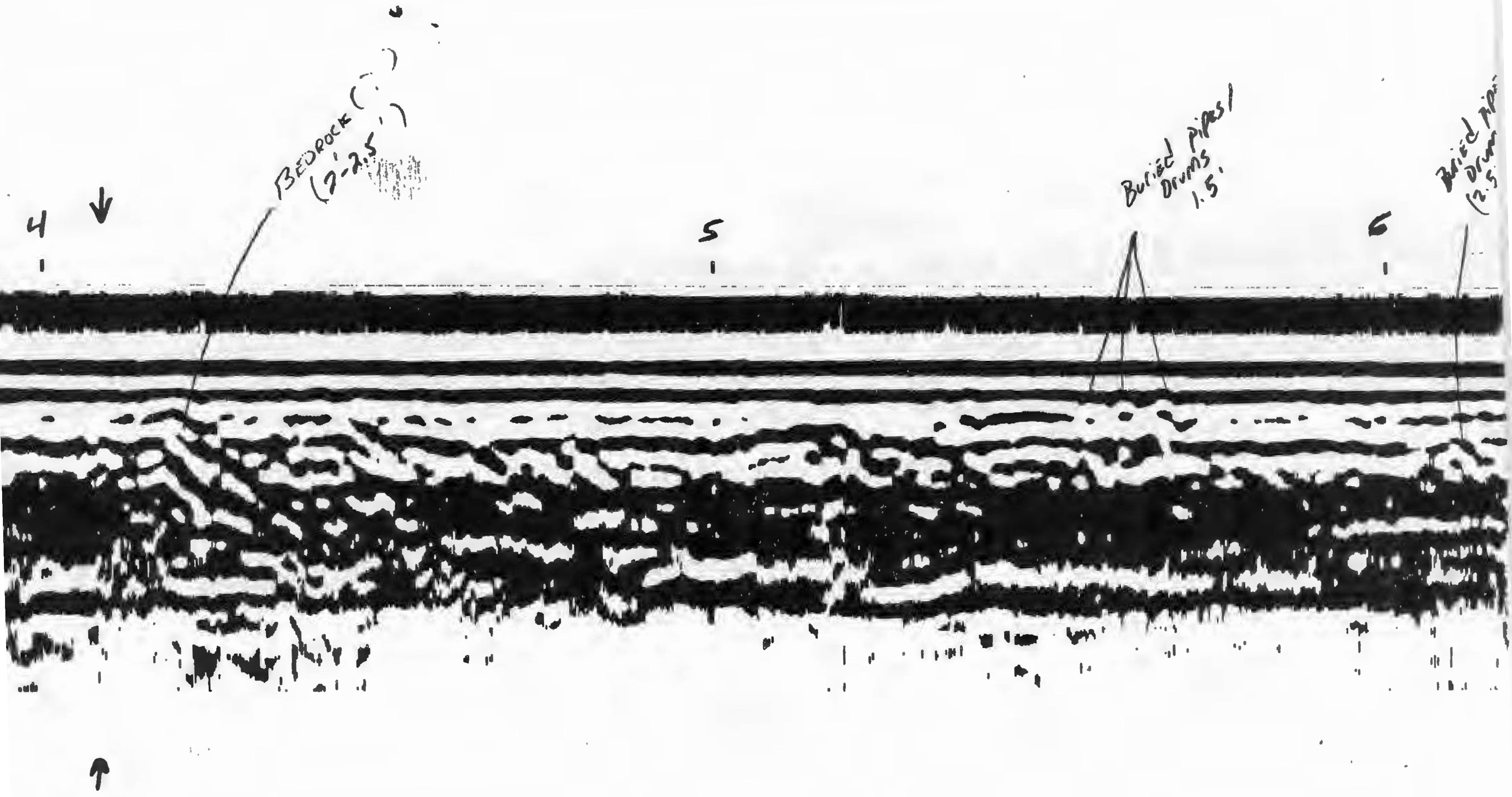

8
Buried pipe/drum
2.5'
Buried drums?
3.5'
7

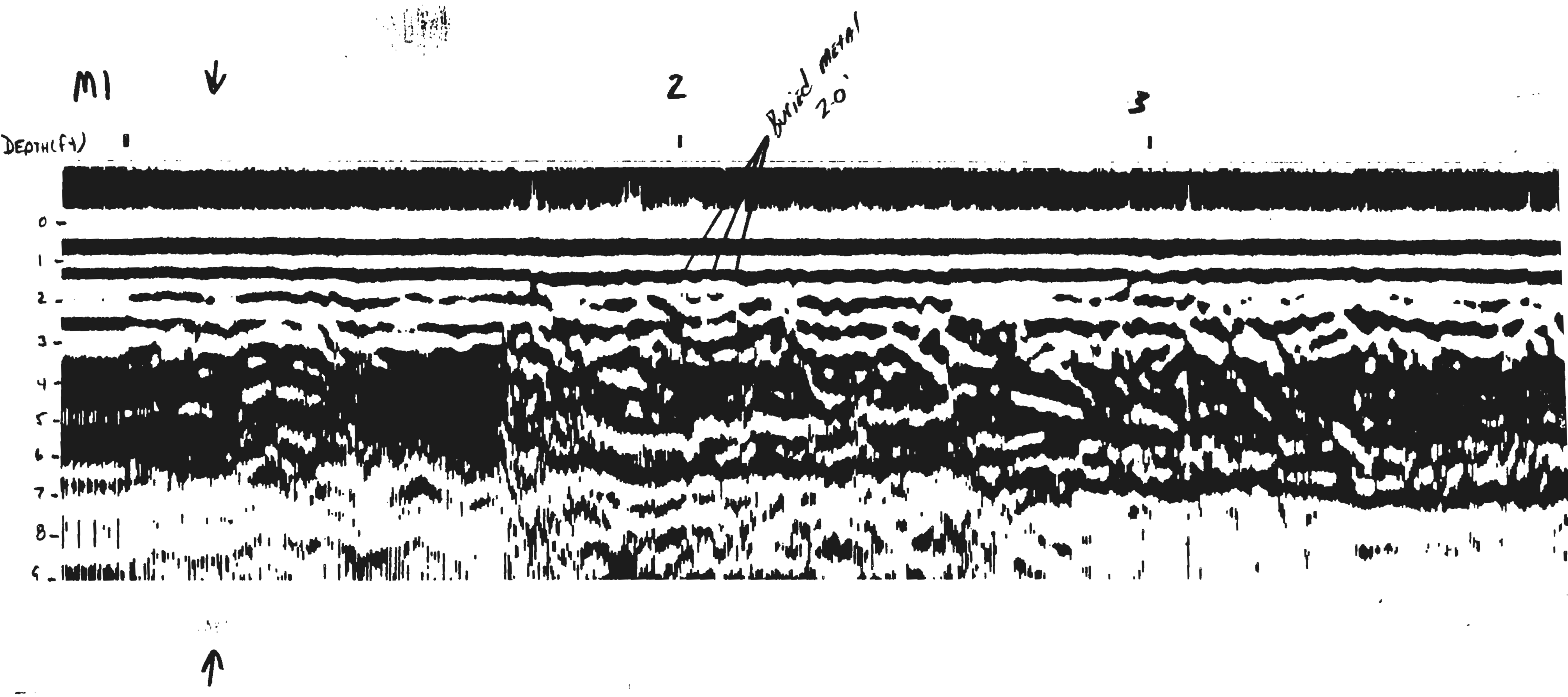

Possible Buried Drums (3.8')
Buried Drum 4.5'
9
10
11
0
1
2
3
4
5
6
7
8
9
10

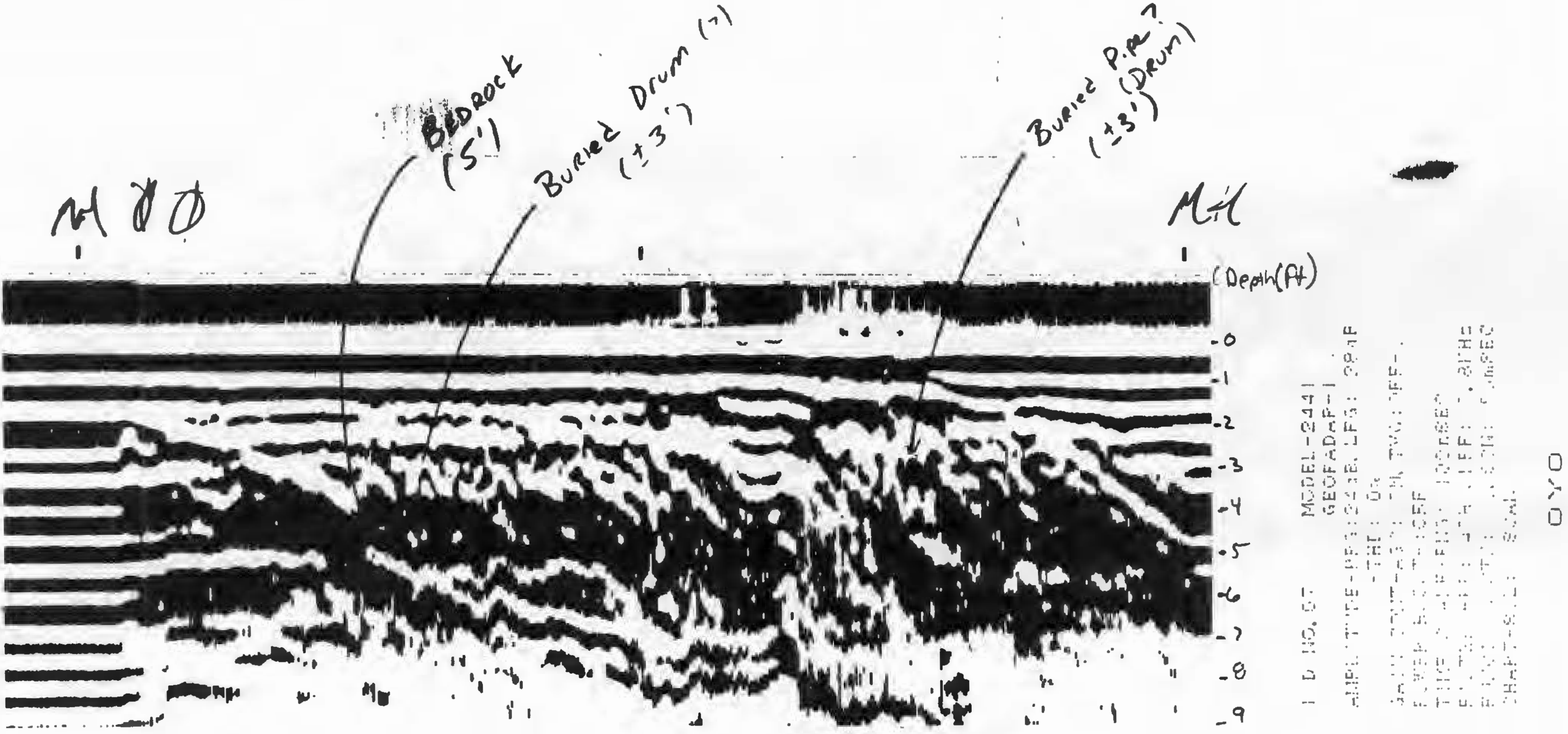


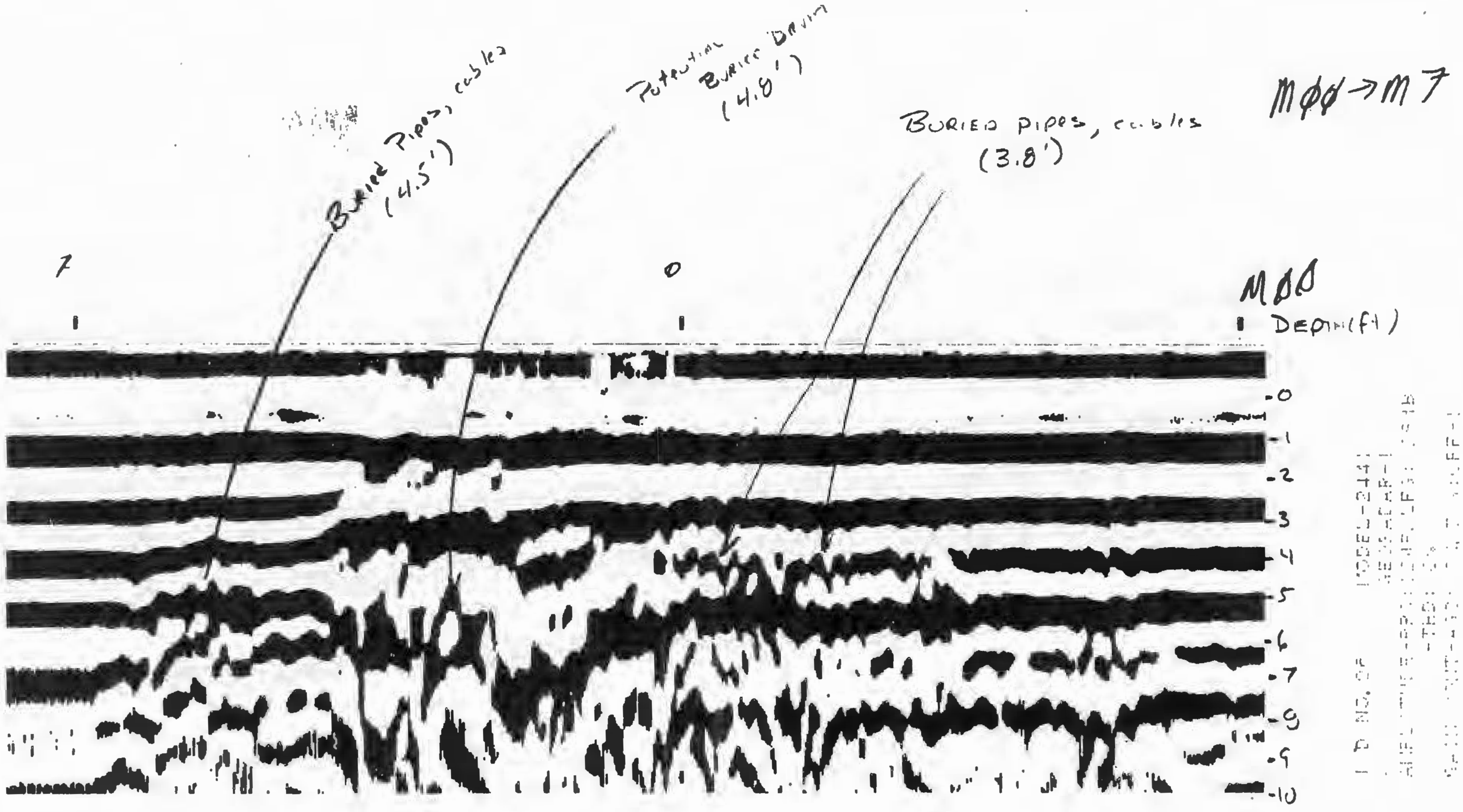
RADAR TRACK M-11 - M-0


Possible Drum
(8.4')
Bedrock
(2-2.5')
Buried Metal
(>2.0')
7
8
9

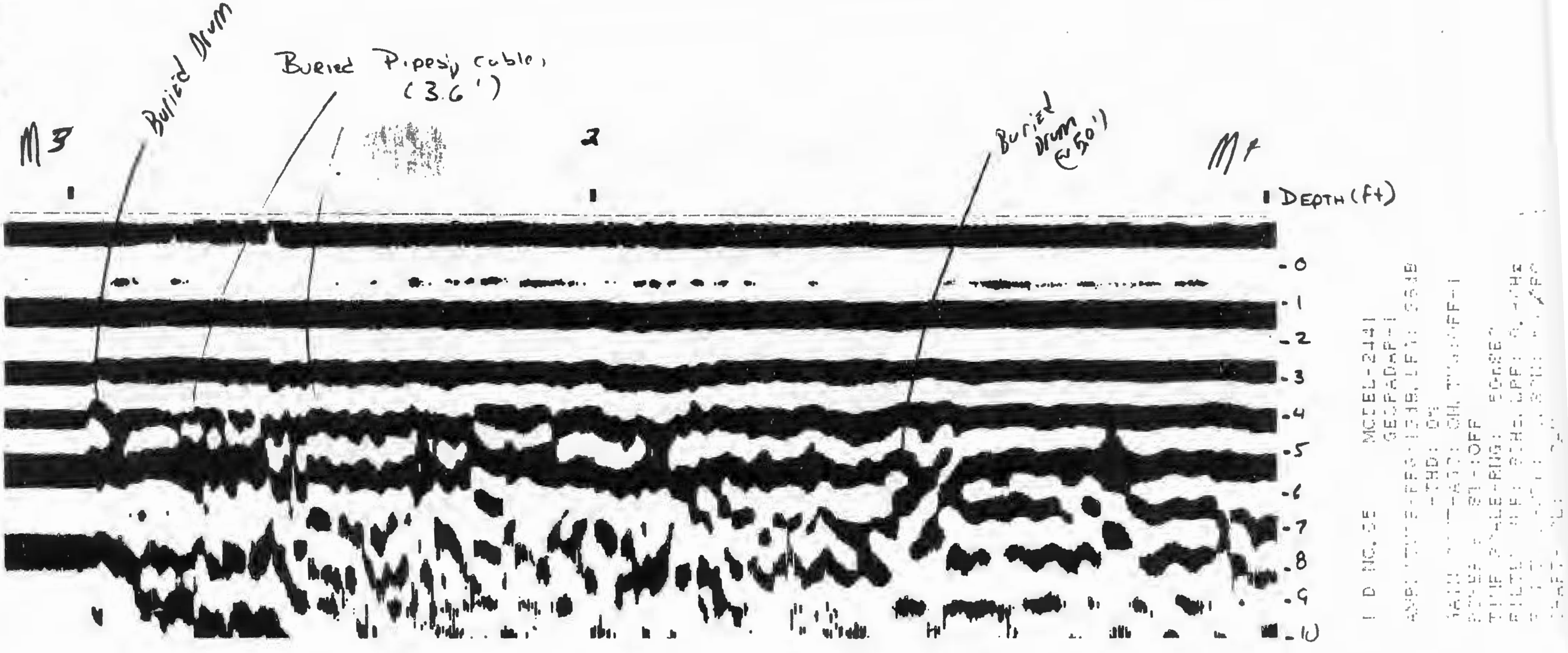

4
BEDROCK (2'-2.5')
5
Buried pipes/
Drums
1.5'
6
Buried pip
Drum
(2.5'

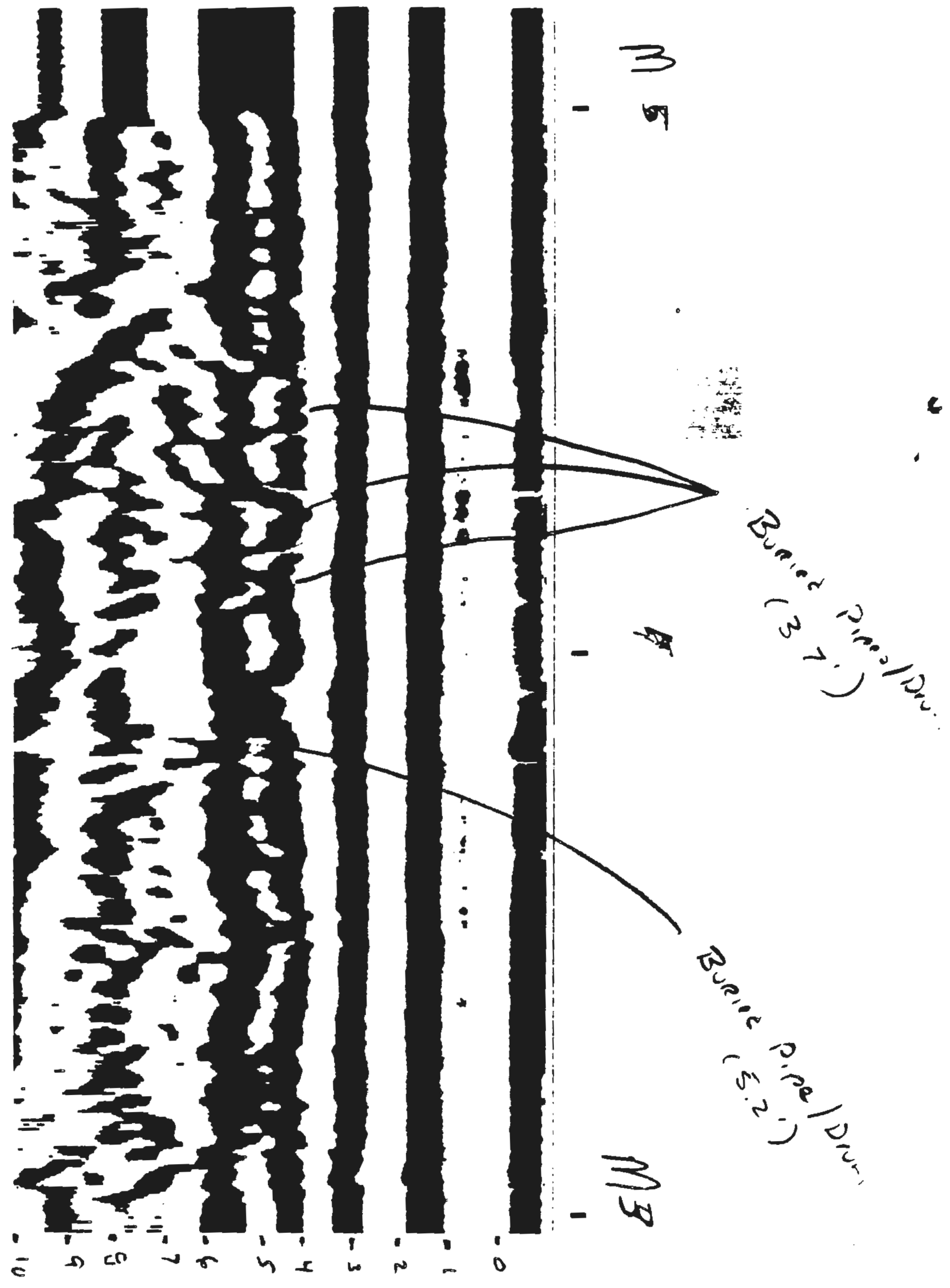

M1
2
3
Buried metal
2.0'
DEPTH(ft)
0
1
2
3
4
5
6
7
8
9


Bedrock (5')
Buried Drum (?) (±3')
Buried Pipe? (Drum) (±3')
M00
M1
(Depth(ft)
0
1
2
3
4
5
6
7
8
9
I D NO. 07
MODEL-2441
GEORADAR-1
OYO



RADAR TRACK M-00 - M-7


M3
Buried Drum
Buried Pipes/ cable, (3.6')
2
Buried drum (~5.0')
M4
DEPTH (ft)
0
1
2
3
4
5
6
7
8
9
10
I D NO. 05
MODEL-2441
GEORADAR-I
-THD: 0%
SCALE-RNG: 50nSEC

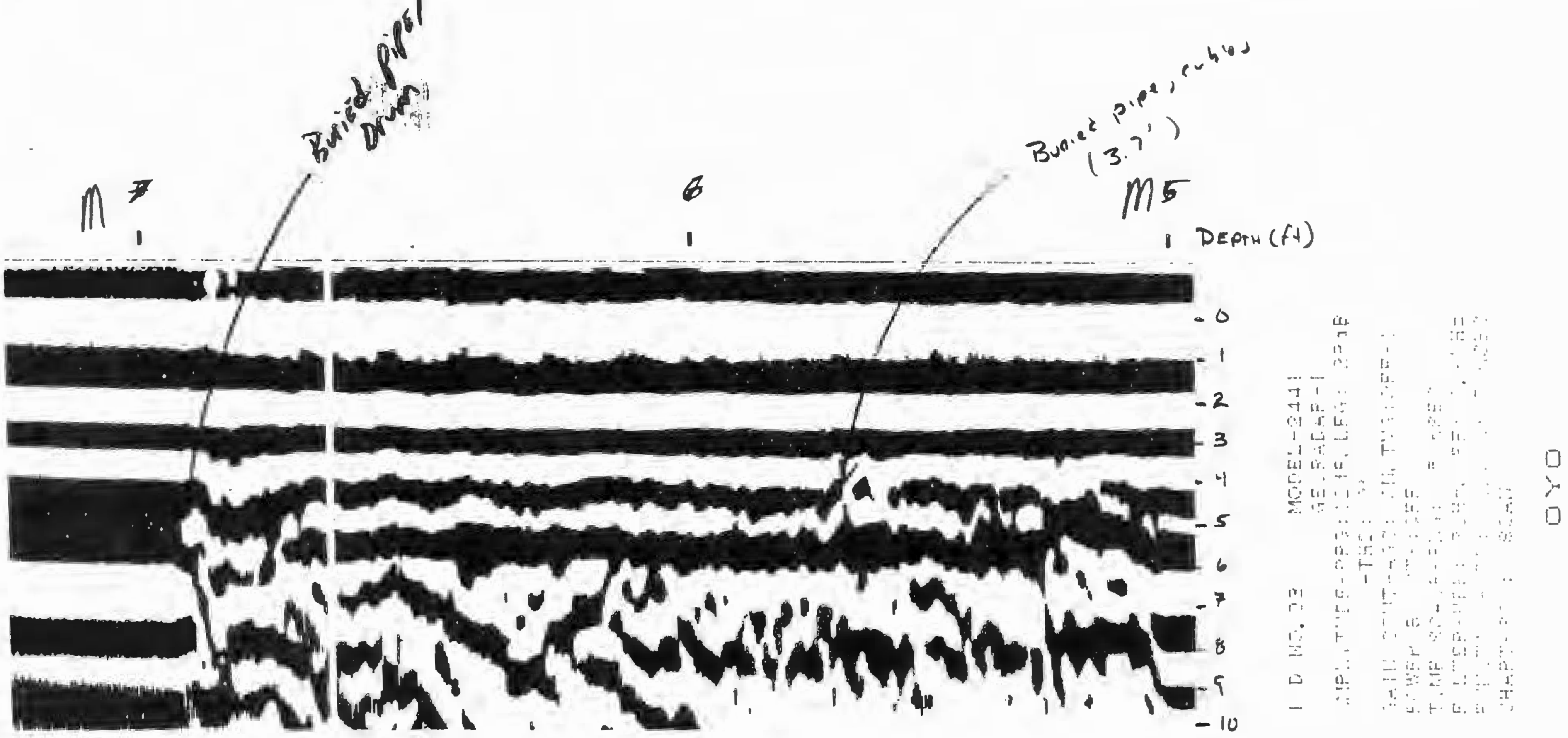


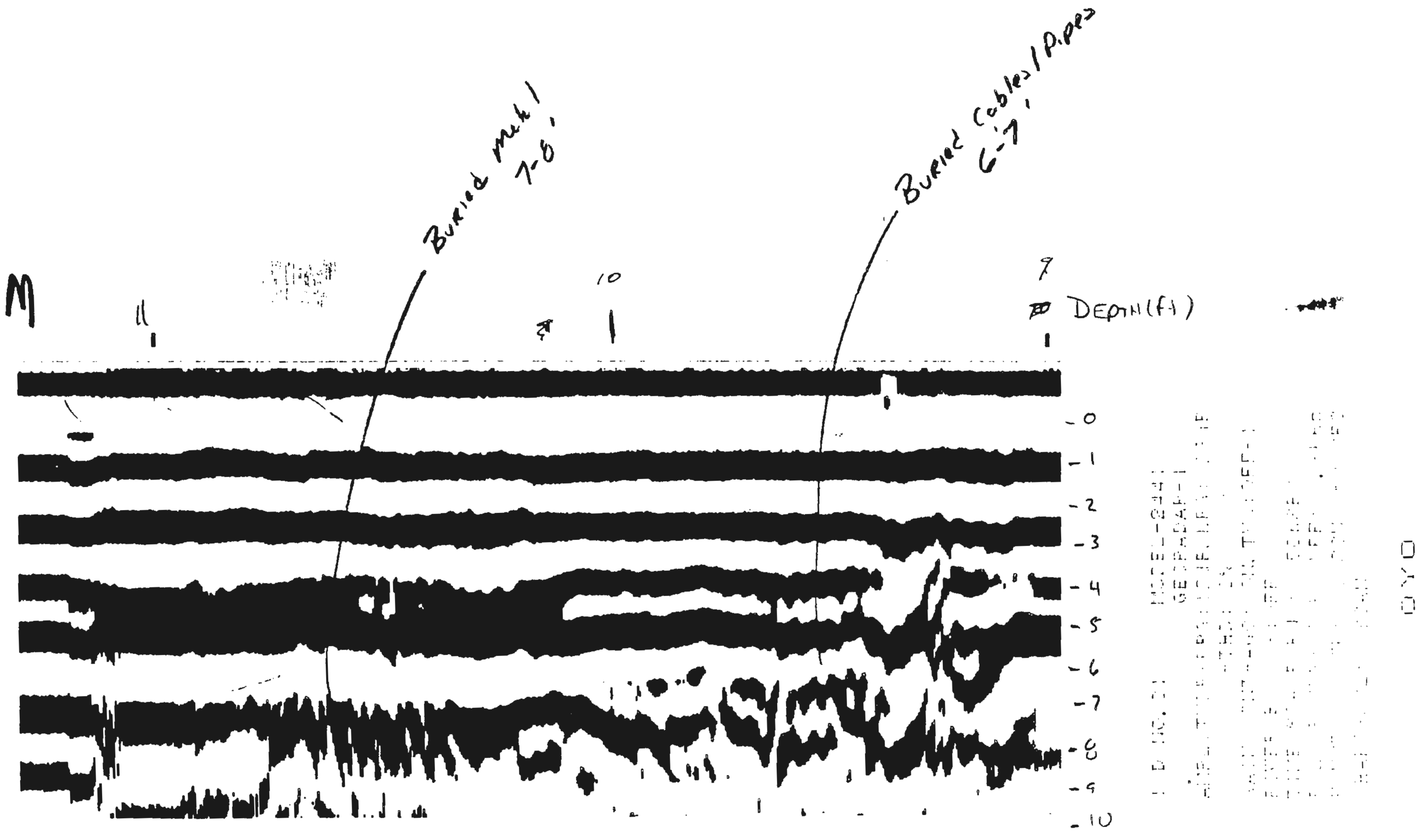
Buried Pipe/Dru (3.7')

Buried Pipe/Dru (5.2')

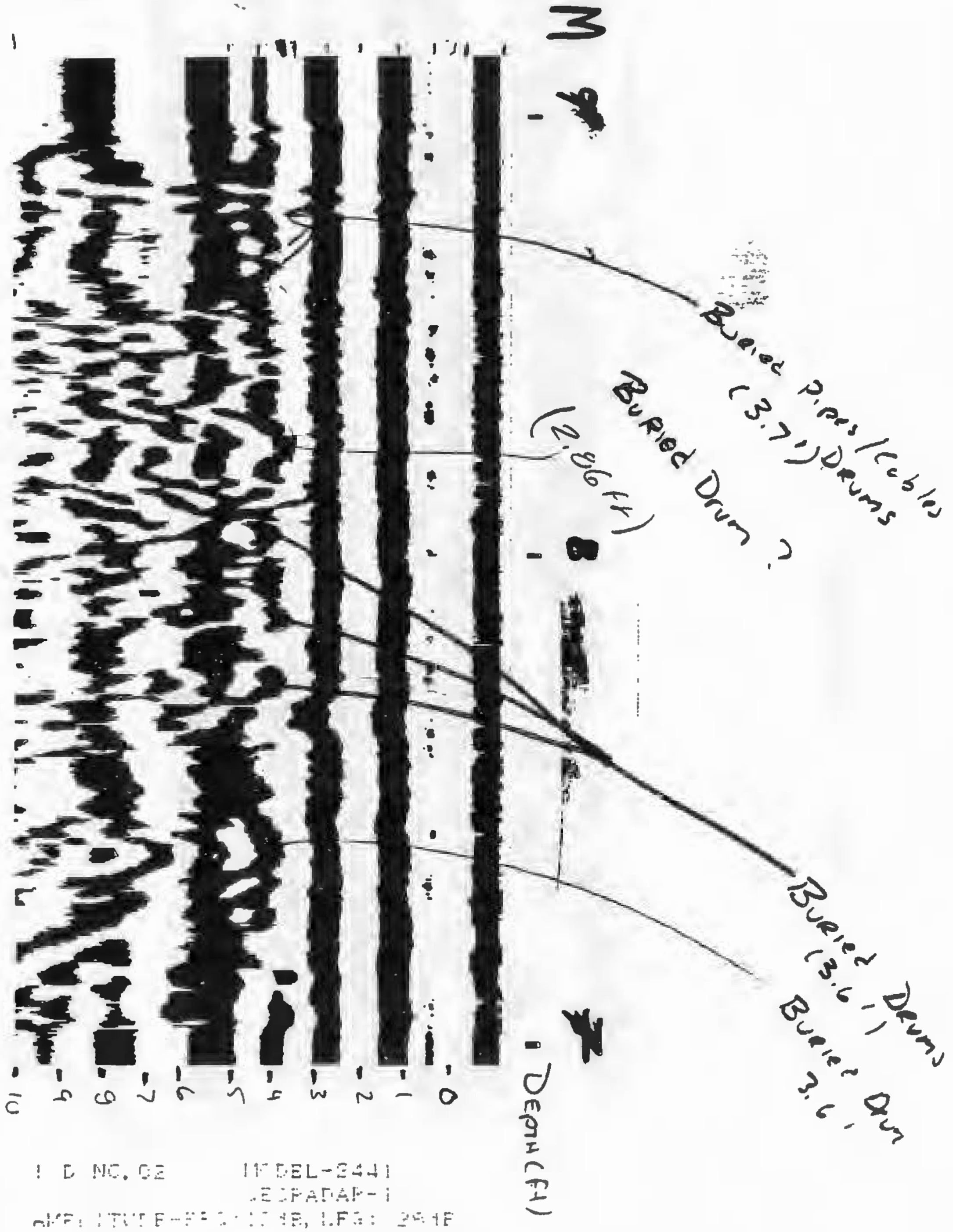
I D NO. 04 MODEL-2441
GEORADAR-I
AMPLITUDE-PRE: 12dB, LOG: 27dB
-THD: 0%
GAIN CONT-AGC: ON, TVG:OFF-1
POWER BOOST-:OFF
TIME SCALE-RNG: 50nSEC
FILTER-HPF: 40Hz, LPF: 0.1 kHz
[illegible]
CHART-SPEED: [illegible]

OYO


M 7
6
M5
Buried pipe/
Drum
Buried pipe, rubber
(3.7')
Depth (ft)
0
1
2
3
4
5
6
7
8
9
10
I D NO. 03
MODEL-3441
GE.RADAR-1
-THS
OYO

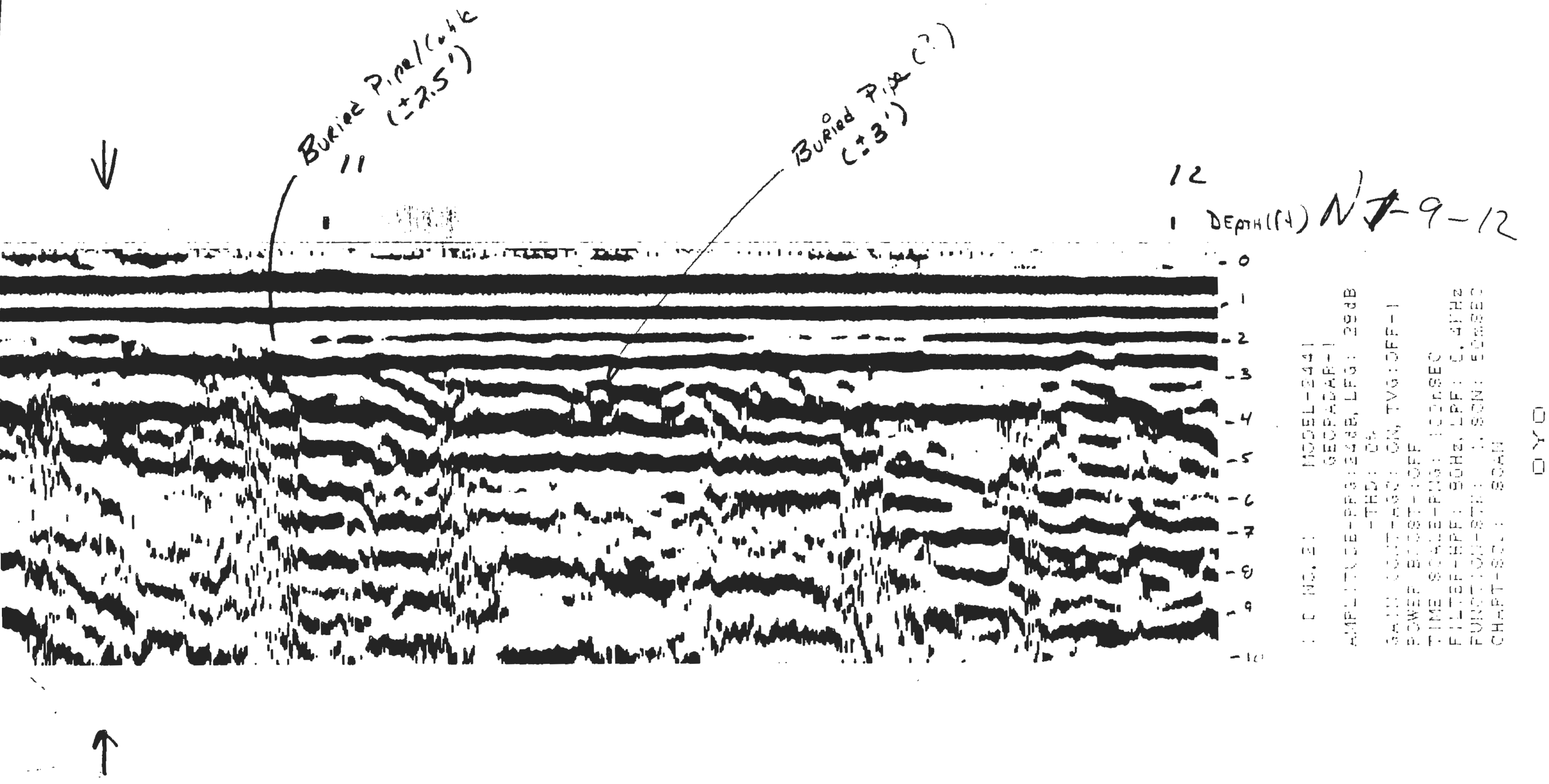


RADAR TRACK M-11 - M-7

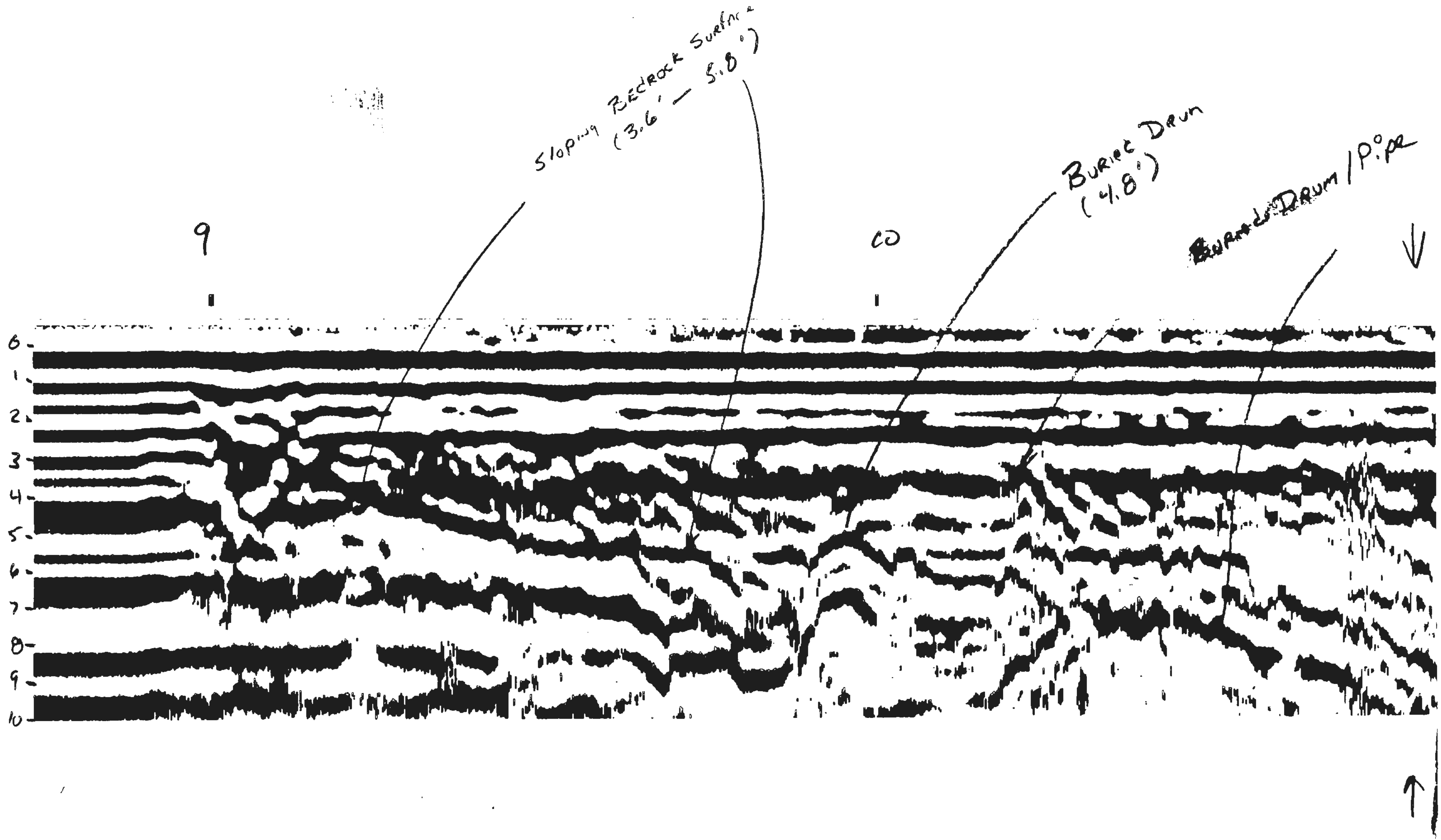


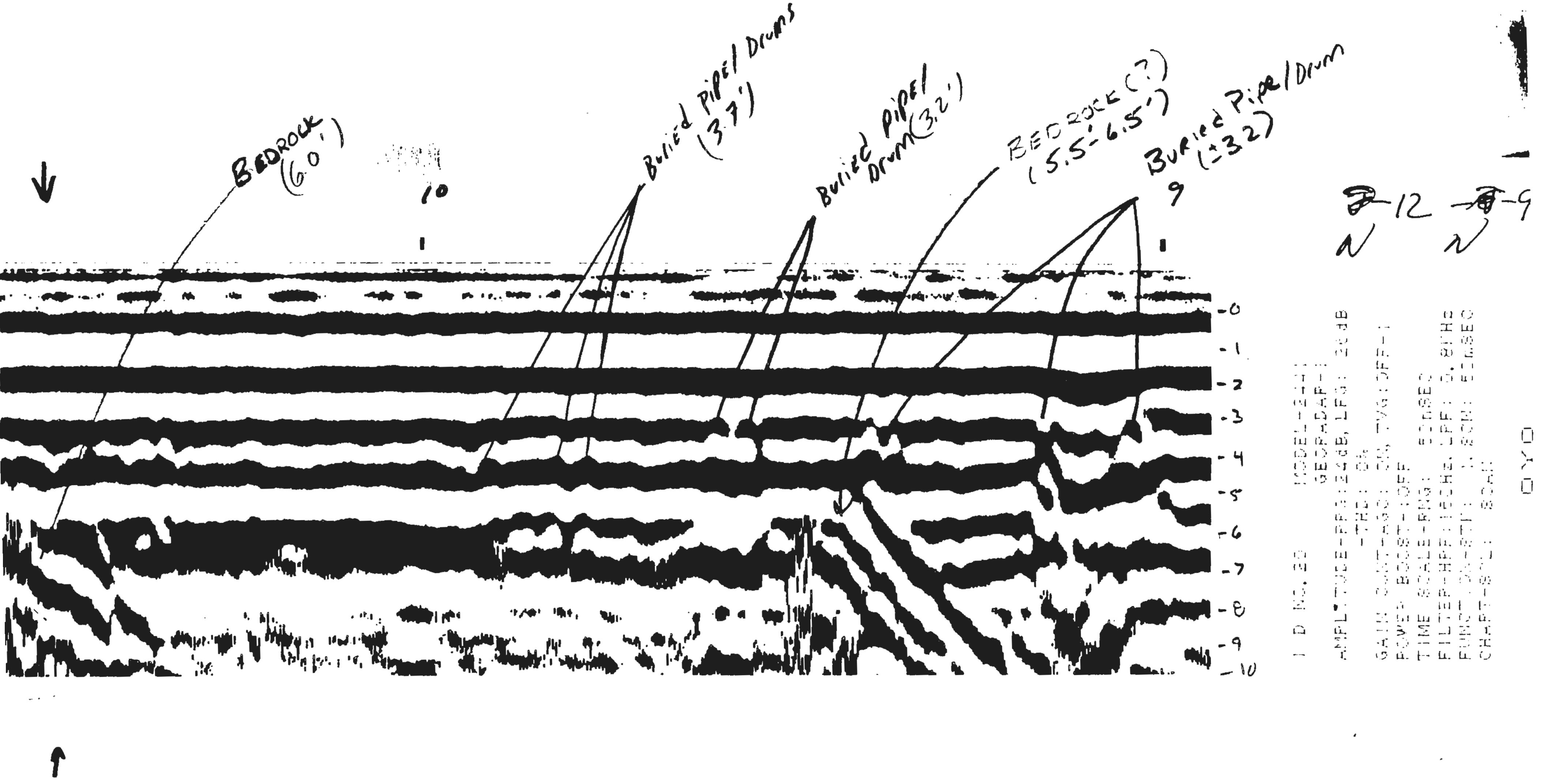
I D NO.02 MODEL-3441
GEORADAR-I
AMPLITUDE-PRE: [illegible] dB, LPG: 29dB
-THI: 3%
GAIN CONT-AGC: ON, TVG: OFF-I
POWER BOOST-: OFF
TIME SCALE-F [illegible] FILTER [illegible]
[illegible]
[illegible]
CHART-SCL: [illegible]

OYO

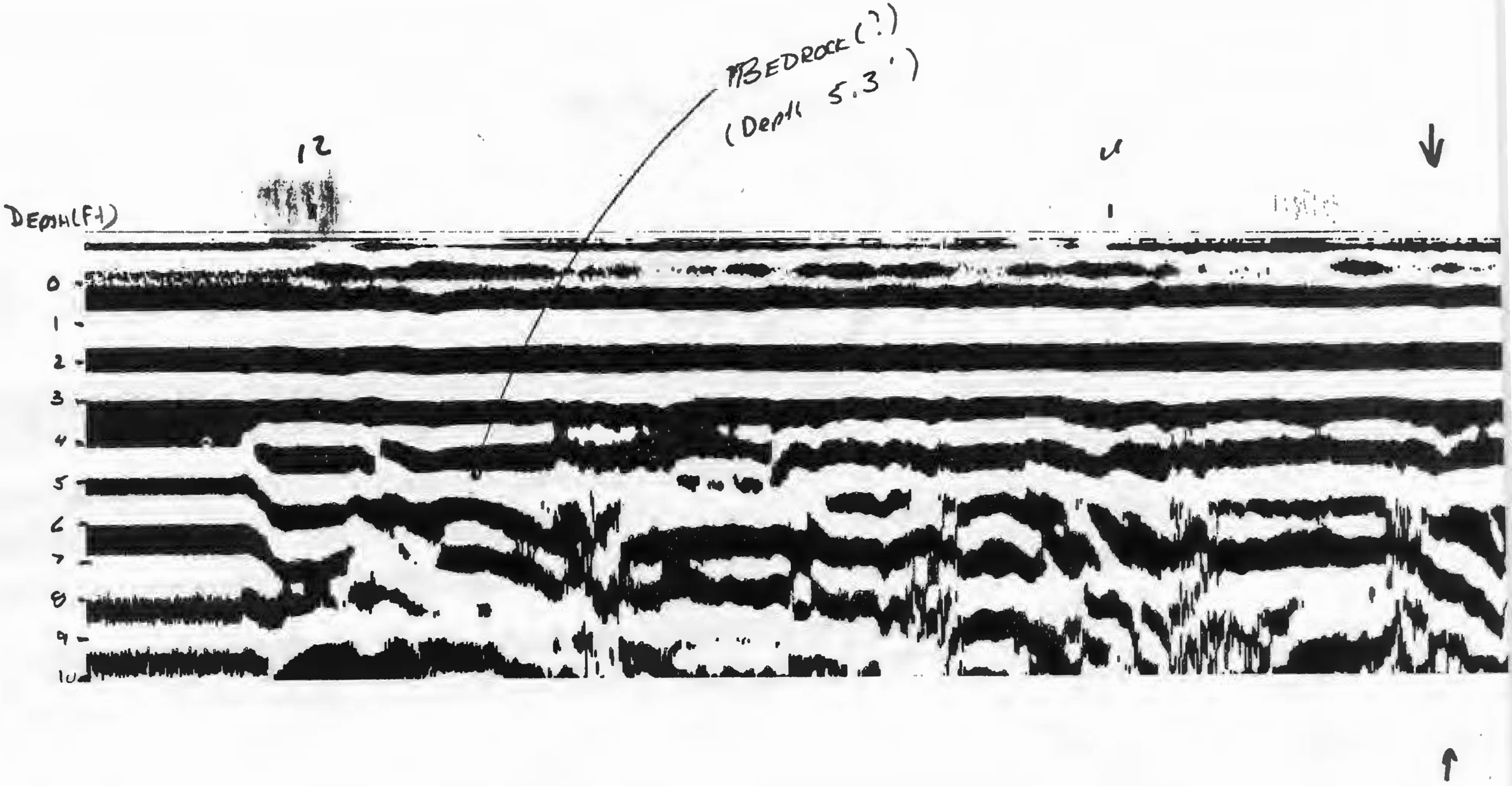


RADAR TRACK N-9 - N-12

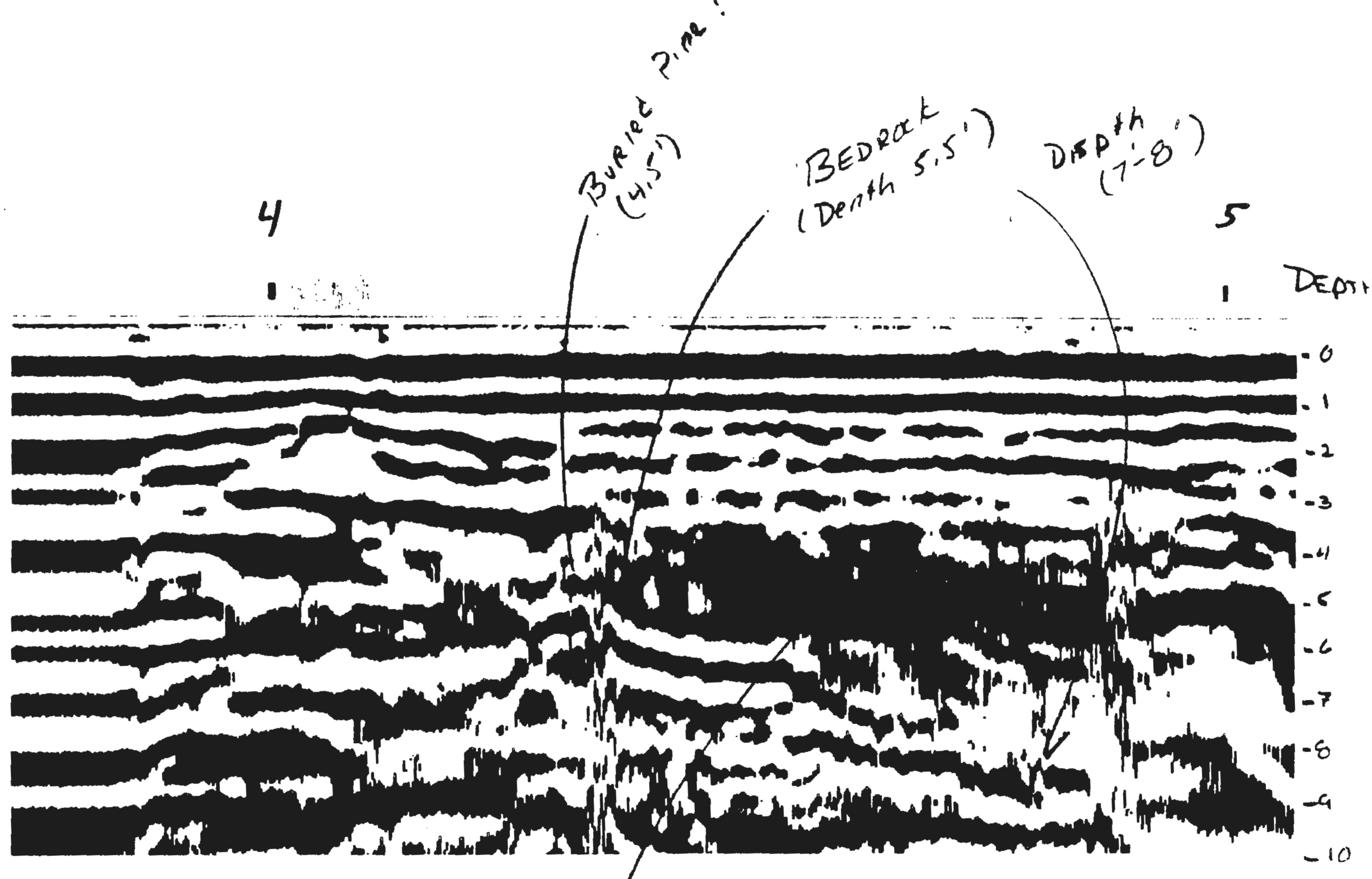

9
10
Sloping Bedrock Surface (3.6' — 5.8')
Buried Drum (4.8')
Buried Drum / Pipe
0
1
2
3
4
5
6
7
8
9
10



RADAR TRACK N-12 - N-9


BEDROCK (?)
(Depth 5.3')
12
11
DEPTH(FT)
0
1
2
3
4
5
6
7
8
9
10

N-4-5



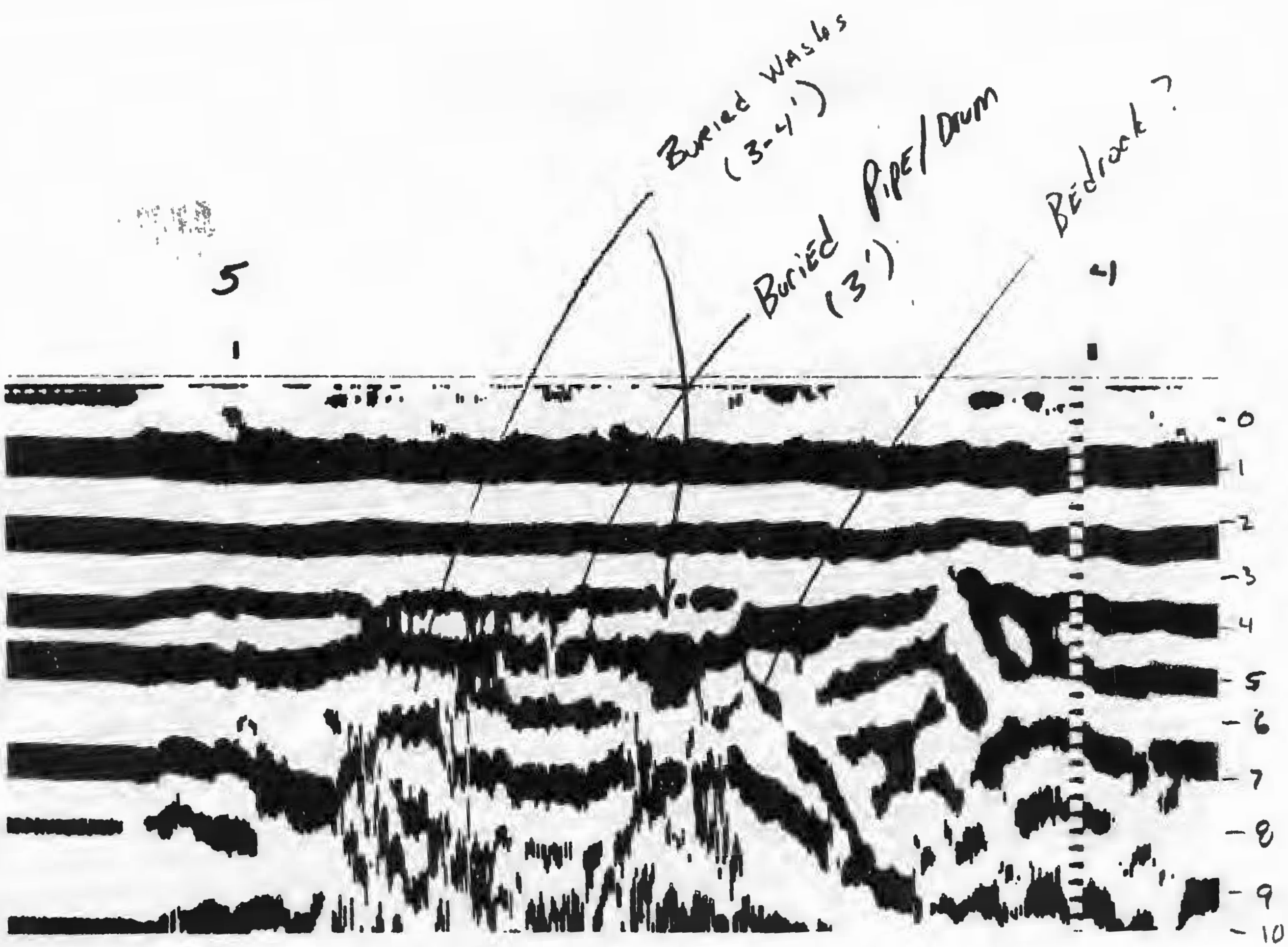
I D NO. 23   MODEL-2441
GEORADAR-I
AMPLITUDE-PRG:34dB, LFG: 34dB
-THD: 0%
GAIN CONT-AGC: ON, TVG:OFF-1
POWER BOOST-:OFF
TIME SCALE-RNG: 100nSEC
FILTER-HPF: 40Hz, LFF: 0.4KHz
FUNCTION-STK: 1, SCN: 50mSEC
CHART-SCL: SCAN

OYO

RADAR TRACK N-4 - -N-5

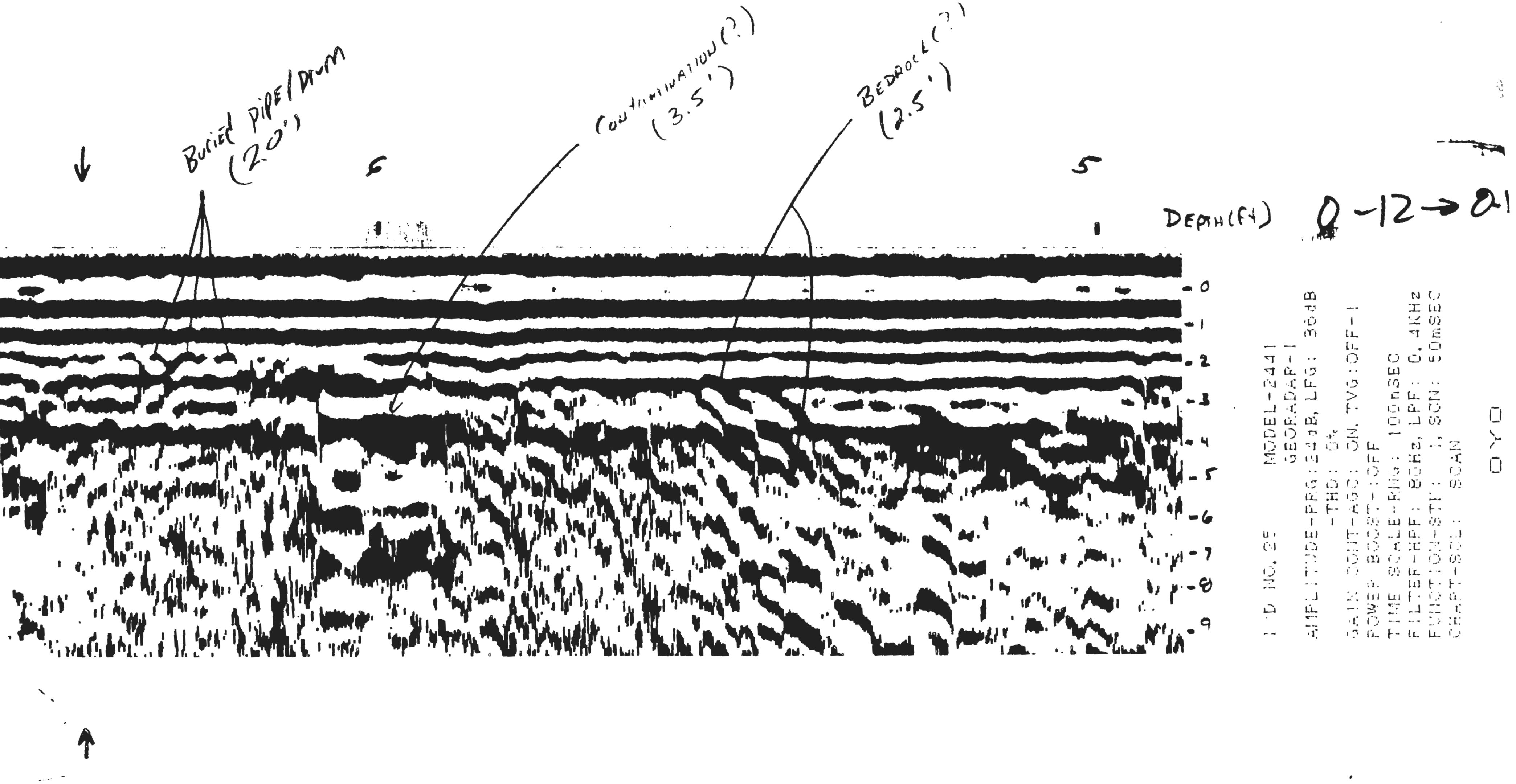
Darkened reflection
may indicate some
change in conductivity,
possibly caused by a contaminant(s).

N5—4



I D NO. 22   MODEL-2441
GEORADAR-I
AMPLITUDE-PFG:24dB, LFG: 28dB
-THD: 0%
GAIN CONT-AGC: ON, TVG:OFF-1
POWER BOOST-:OFF
TIME SCALE-RNG: 50nSEC
FILTER-HFF: 80Hz, LPF: 0.4KHz
FUNCTION-STK: 1, SCN: 50mSEC
CHART-SCL: SCAN
OYO

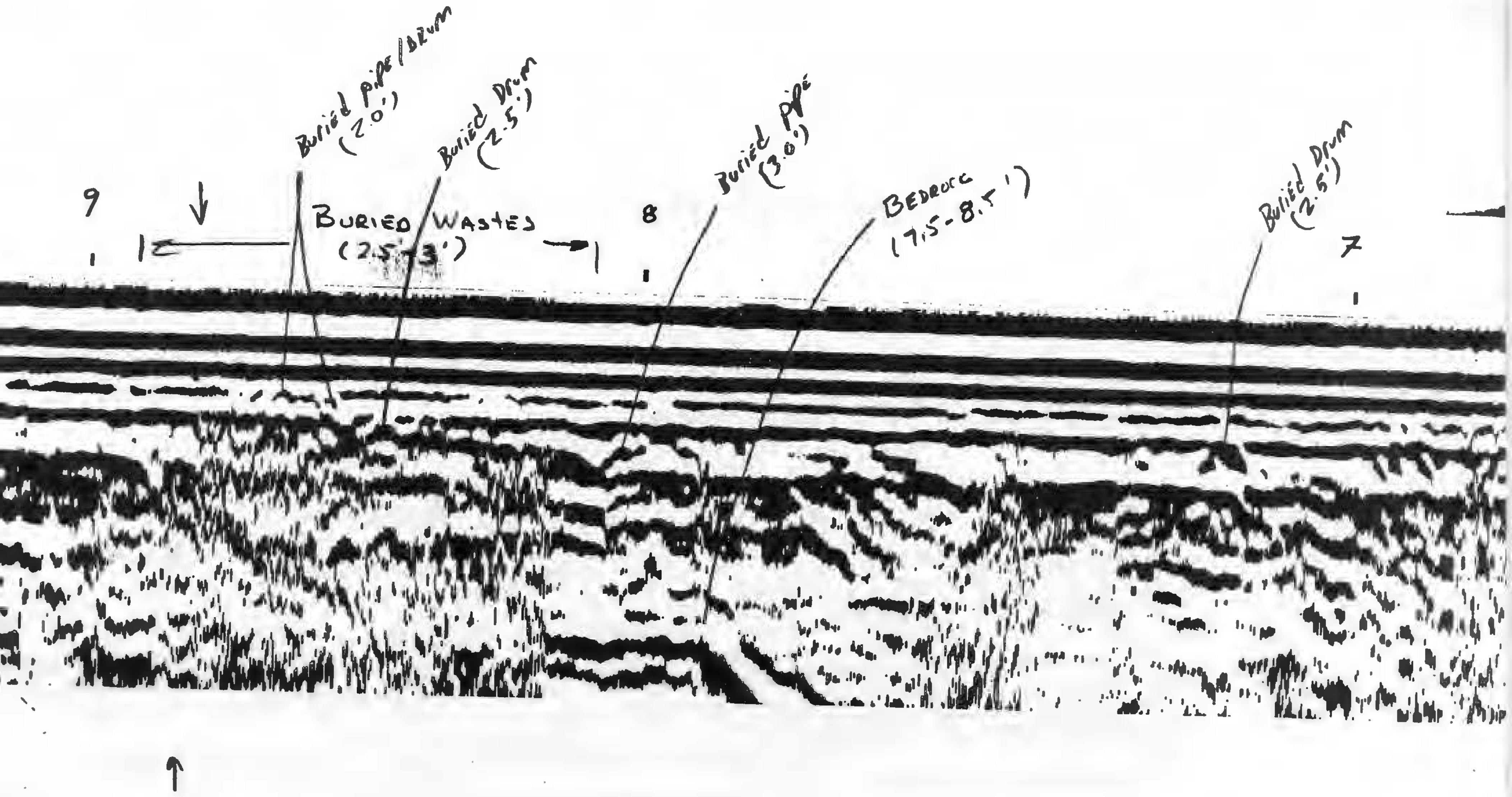
RADAR TRACK N-5 - N-4

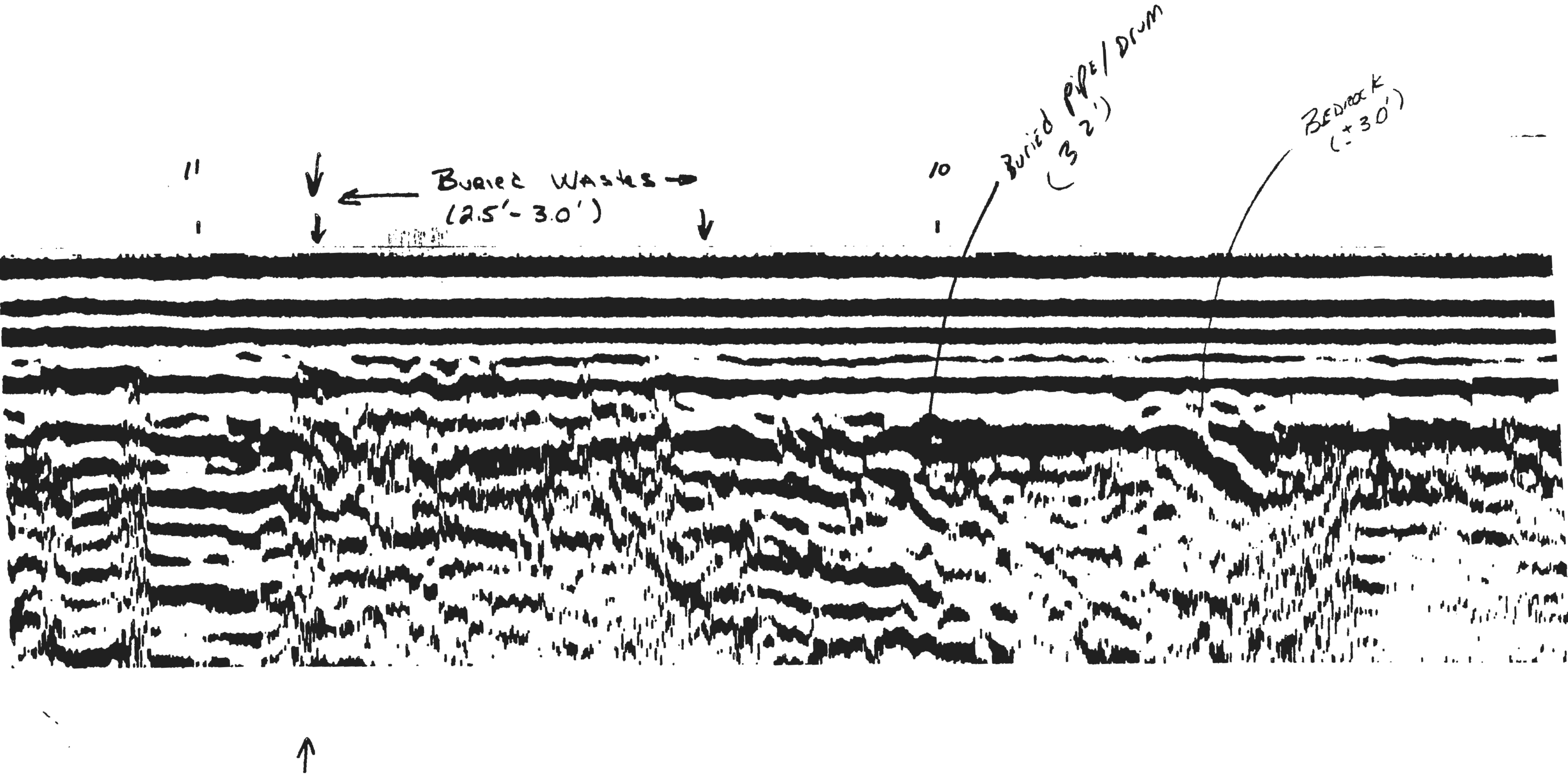


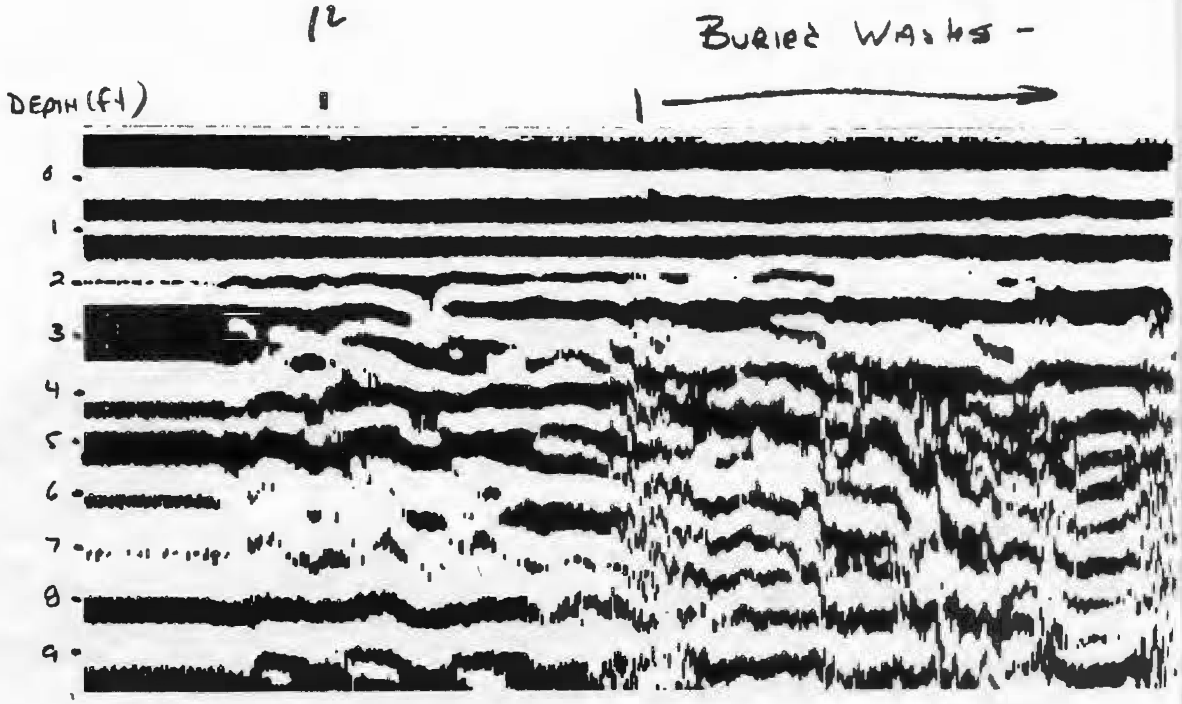
```
I D NO, 25      MODEL-2441
          GEORADAR-1
AMPLITUDE-PRG: 24dB, LFG: 36dB
      -THD: 0%
GAIN CONT-AGC: ON, TVG:OFF-1
POWER BOOST-:OFF
TIME SCALE-RNG: 100nSEC
FILTER-HPF: 80Hz, LPF: 0.4KHz
FUNCTION-STT: 1, SCN: 50mSEC
CHART-SCL: SCAN
```

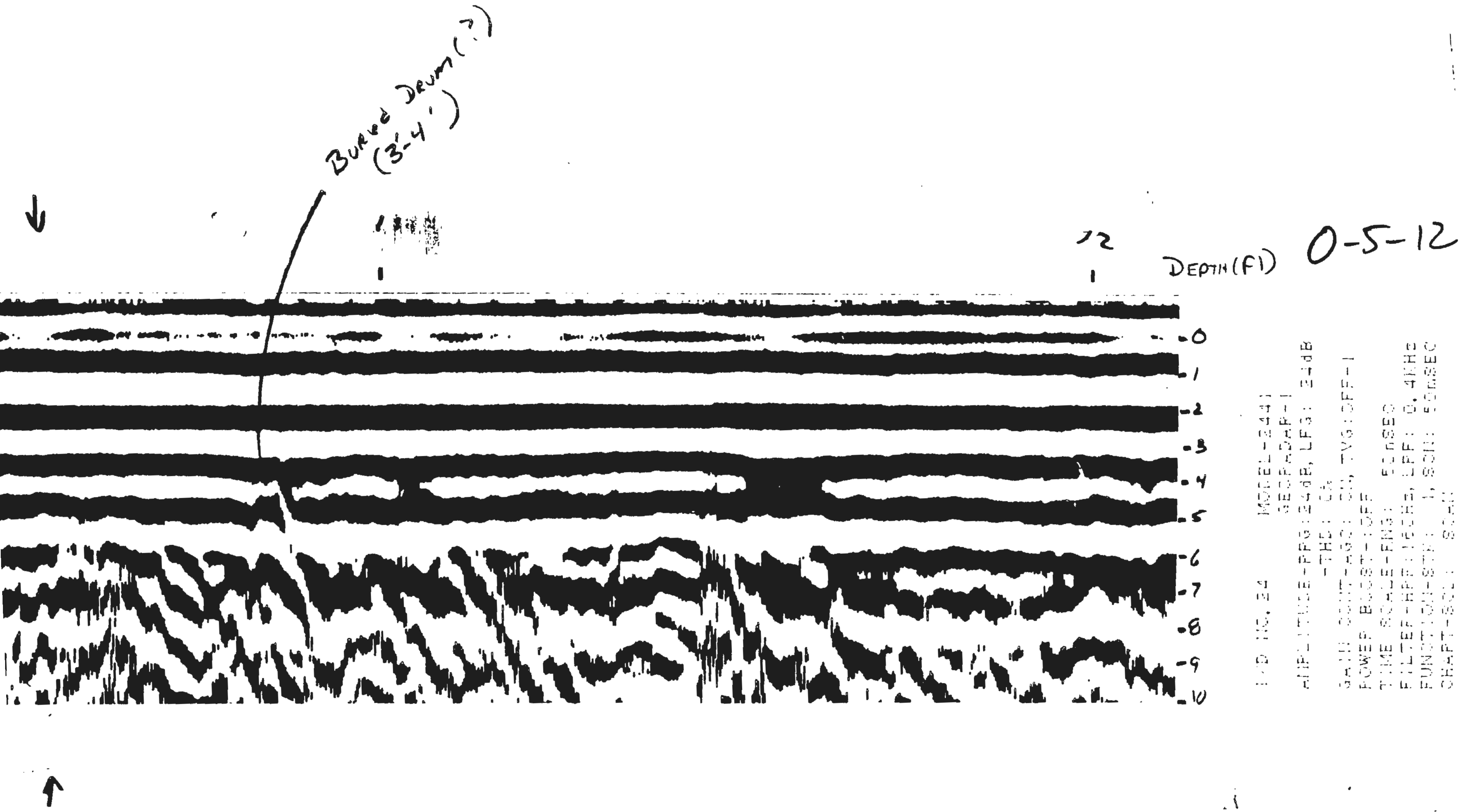
OYO

RADAR TRACK 0-12 - 0-5

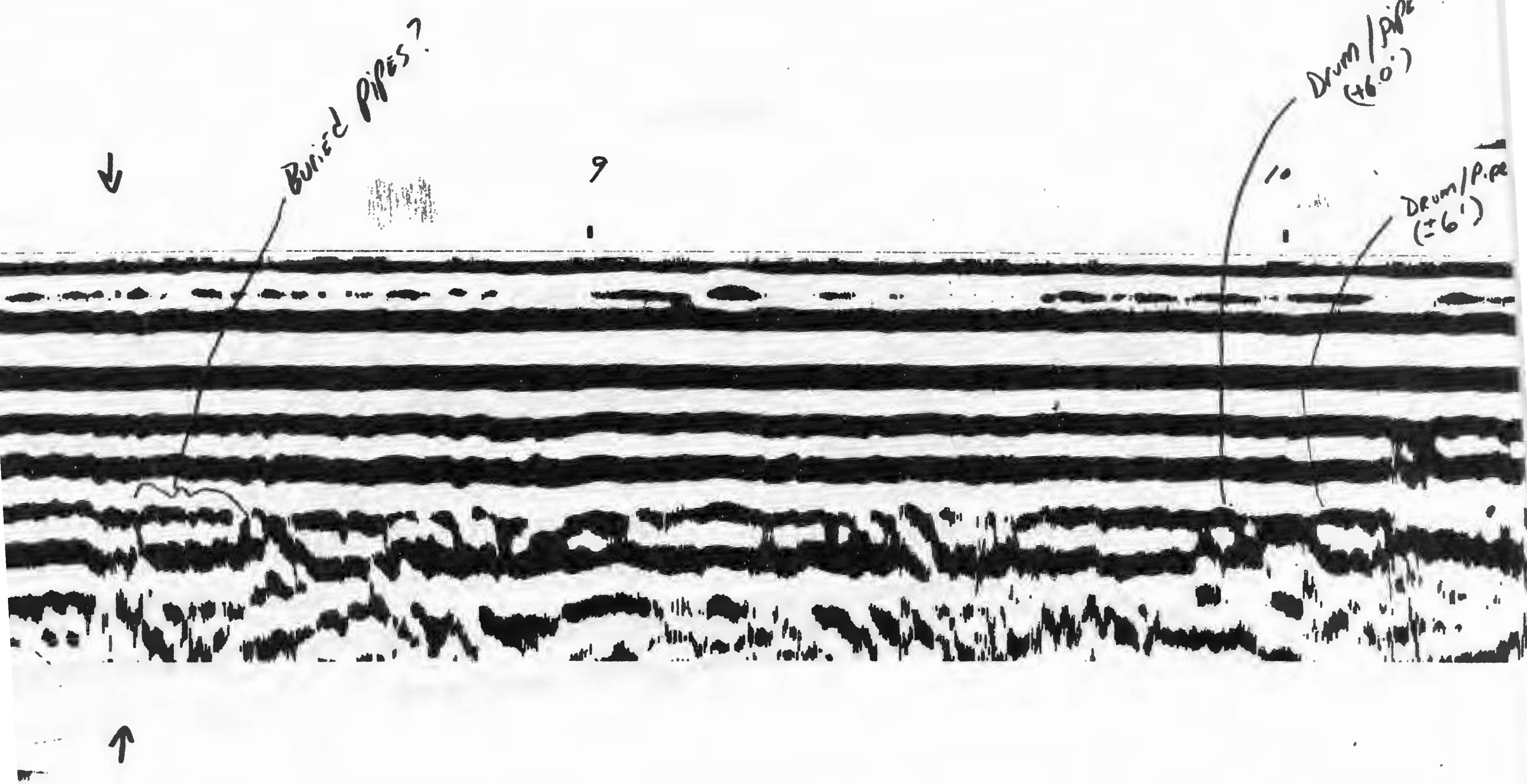

9
8
7
Buried pipe/Drum (2.0')
Buried Drum (2.5')
Buried Wastes (2.5'-3')
Buried Pipe (3.0')
Bedrock (7.5-8.5')
Buried Drum (2.5')

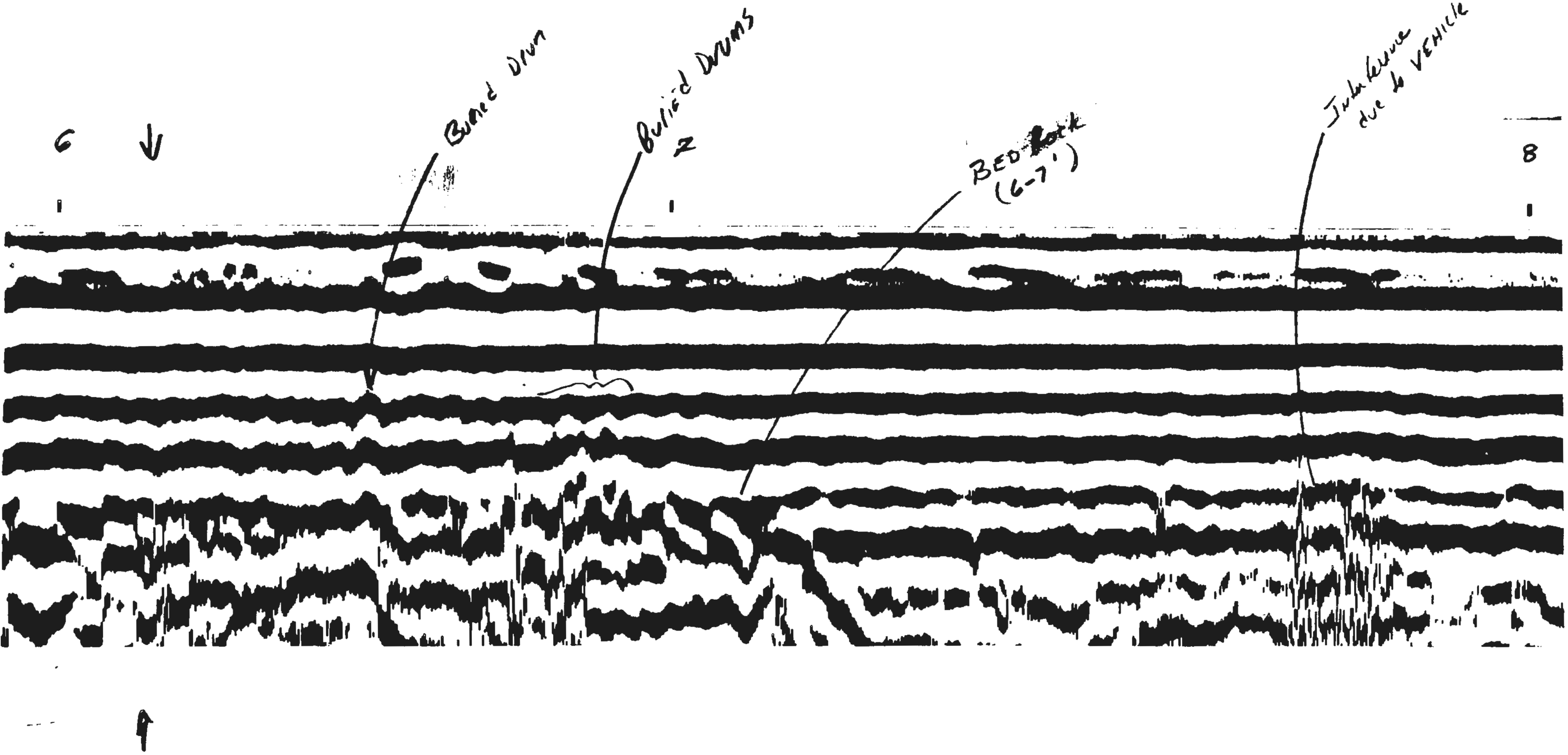

11
Buried Wastes
(2.5'-3.0')
10
Buried pipe/drum
(3.2')
Bedrock
(±3.0')

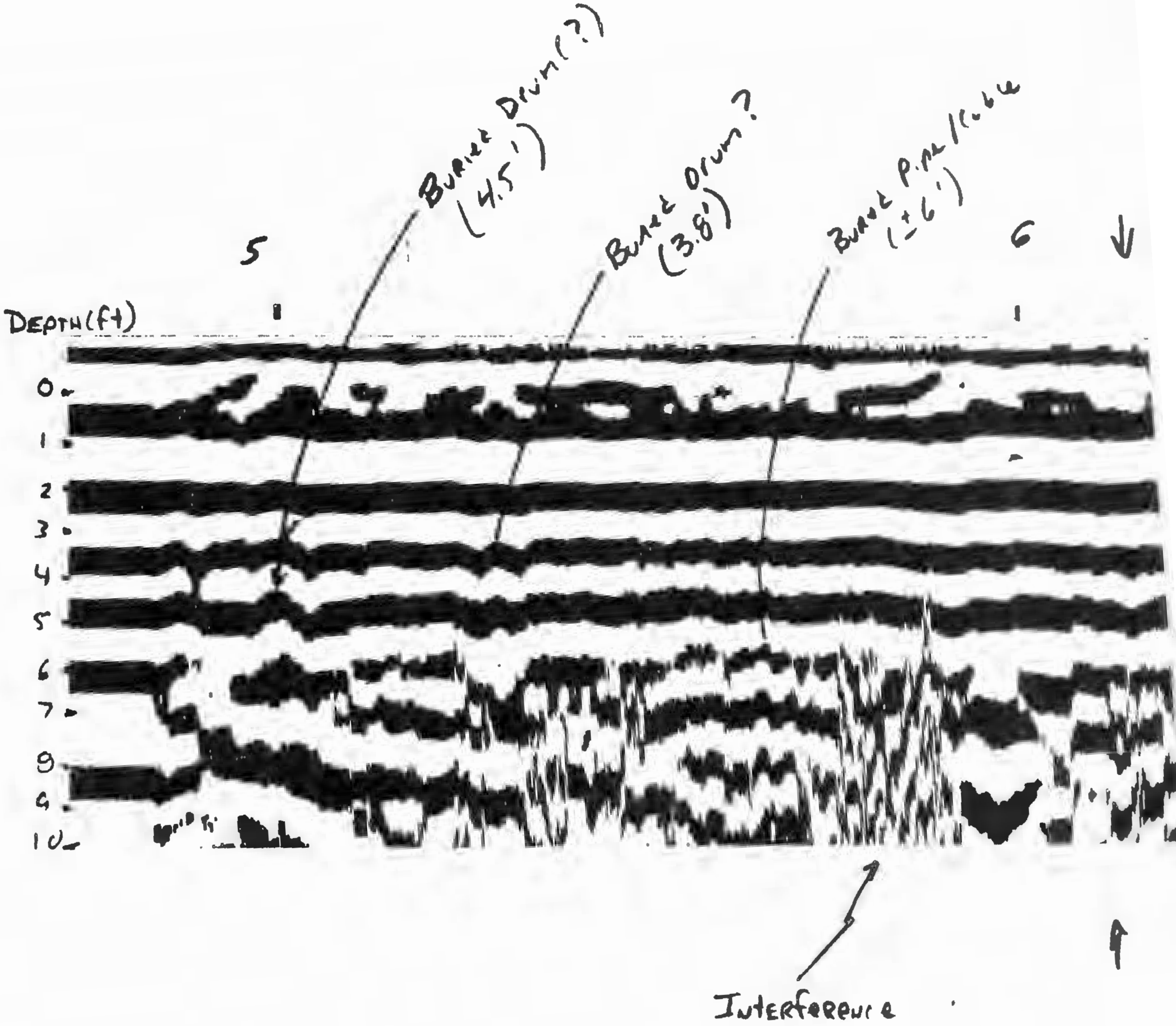

12
BURIED WASTE -
DEPTH (ft)
0
1
2
3
4
5
6
7
8
9

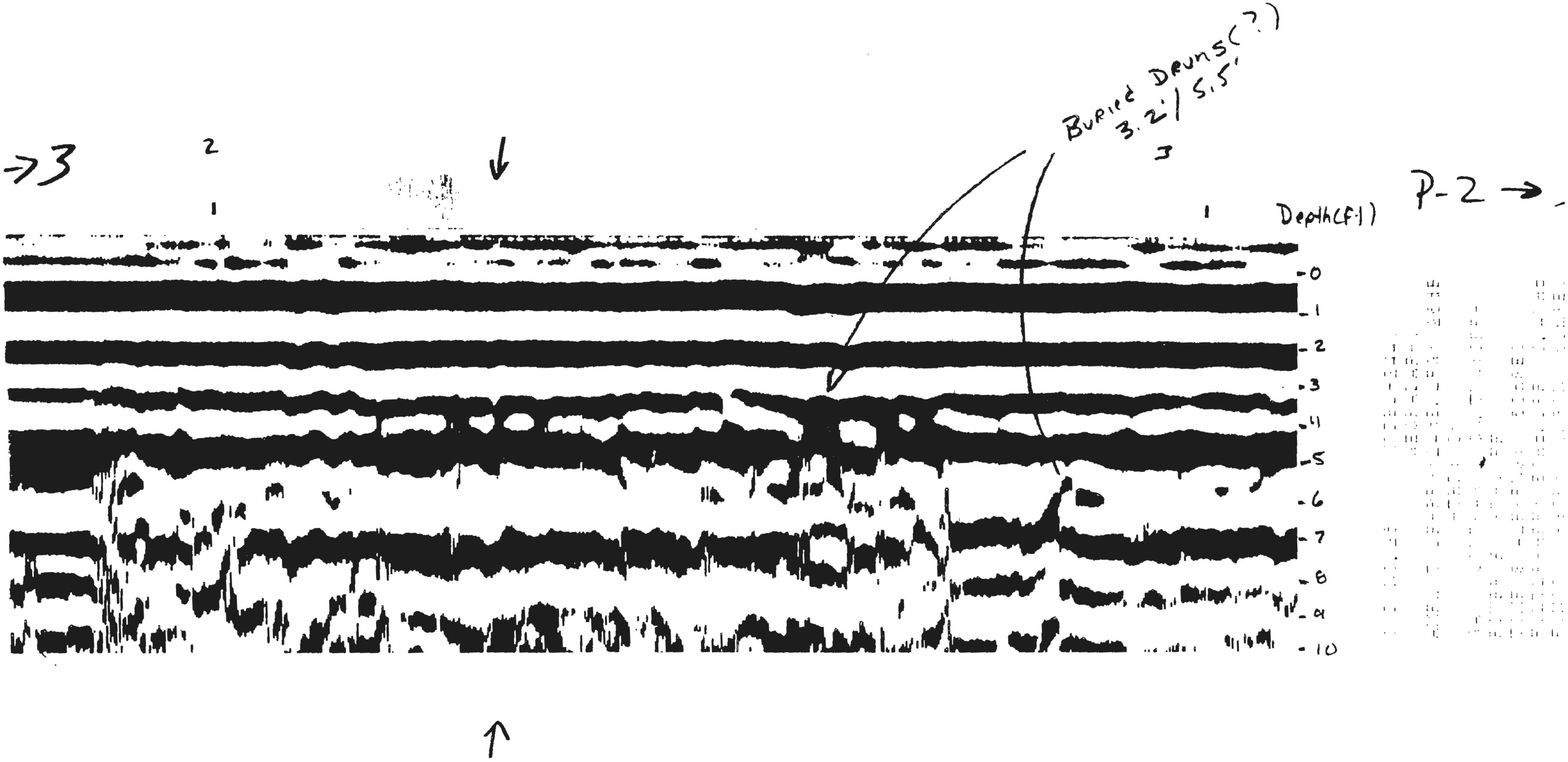


RADAR TRACK 0-5 - 0-12


Buried Pipes?
9
10
Drum/Pipe
(±6.0')
Drum/Pipe
(±6')


6
↓
Buried Drum
Buried Drums
7
BED-Rock
(6-7')
Interference due to VEHICLE
8


5
6
Buried Drum(?) (4.5')
Buried Drum? (3.8')
Buried Pipe/Cable (±6')
Depth(ft)
0
1
2
3
4
5
6
7
8
9
10
Interference



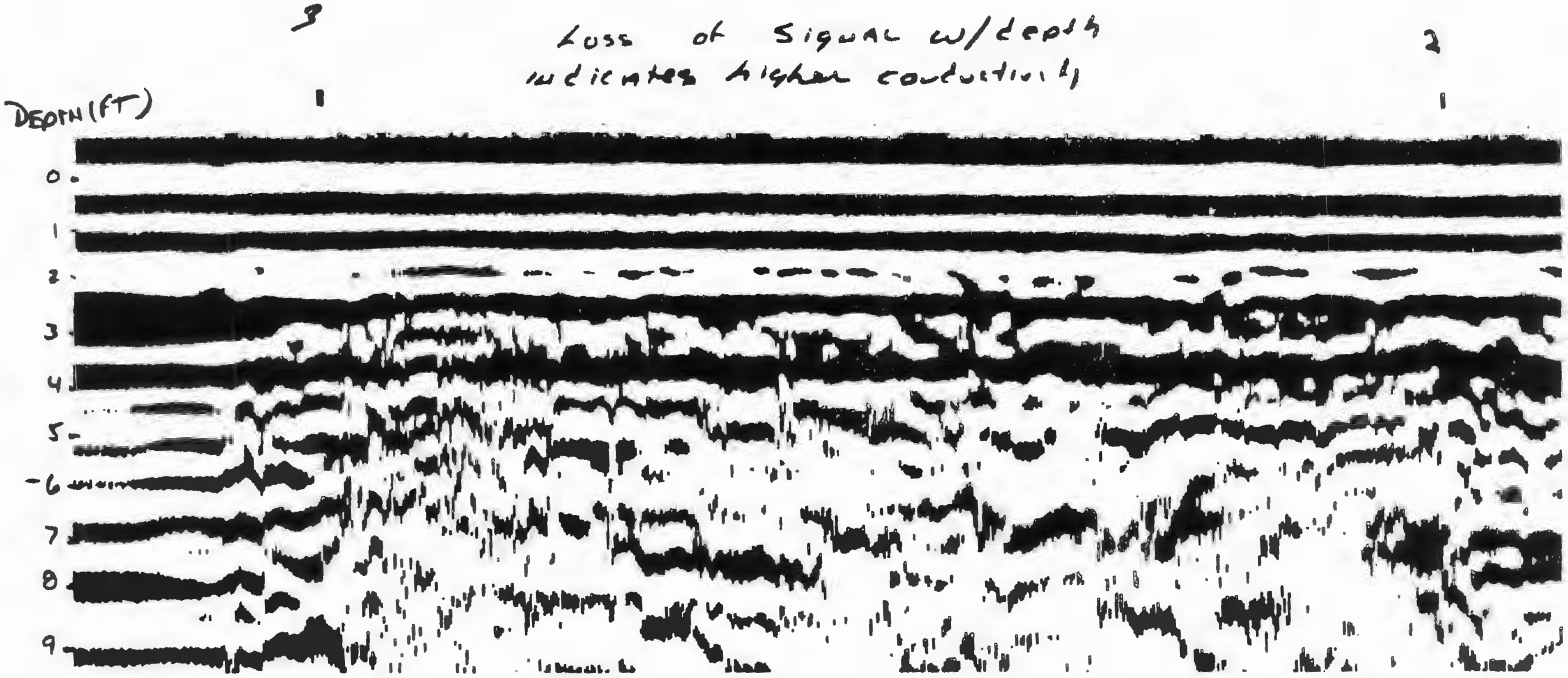
RADAR TRACK P-2 - P-3

P-3-2

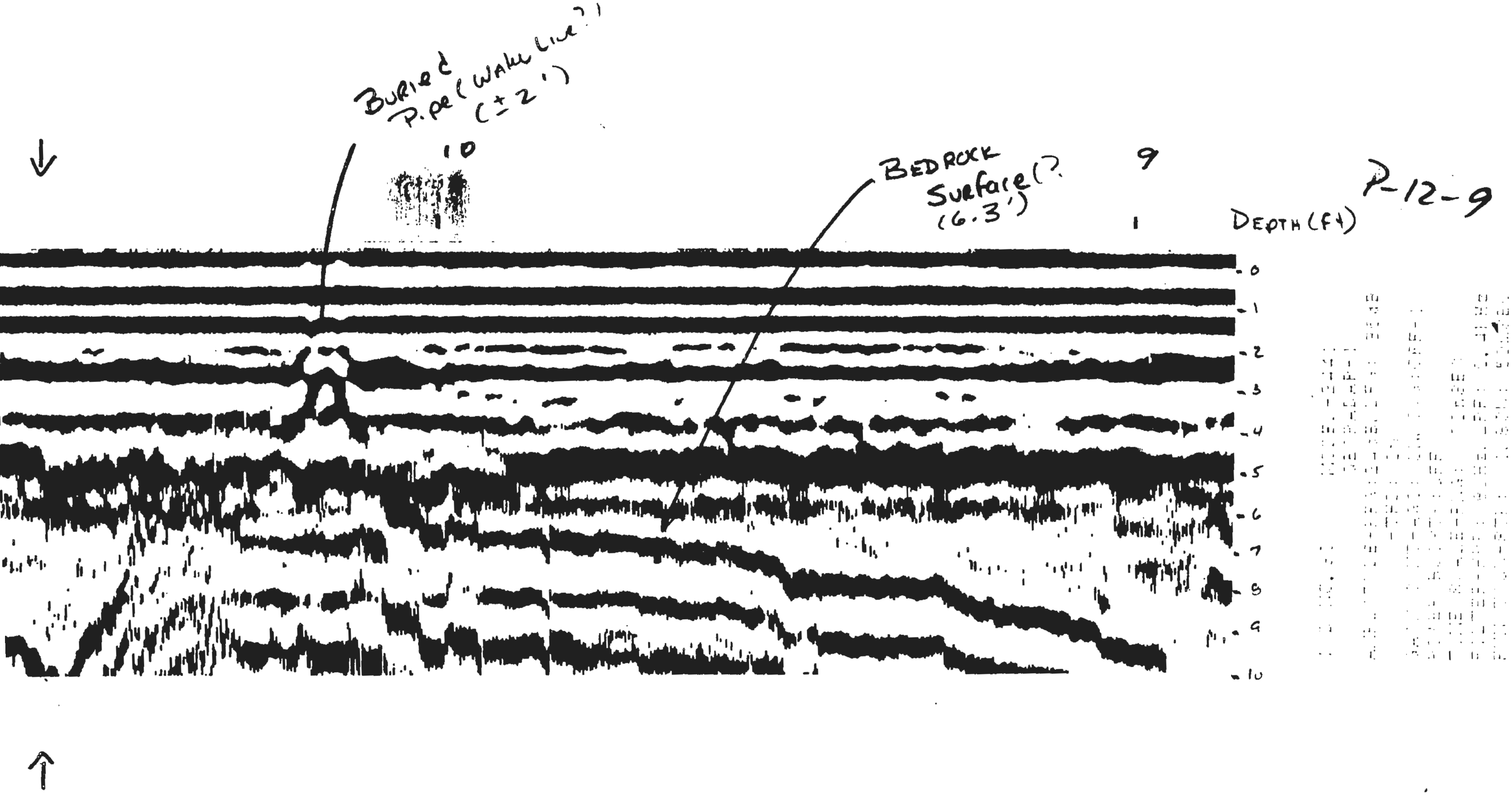
(Depth (2.3'-2.5'))

←—— Buried Wastes/Metal ——→

Loss of signal w/depth indicates higher conductivity



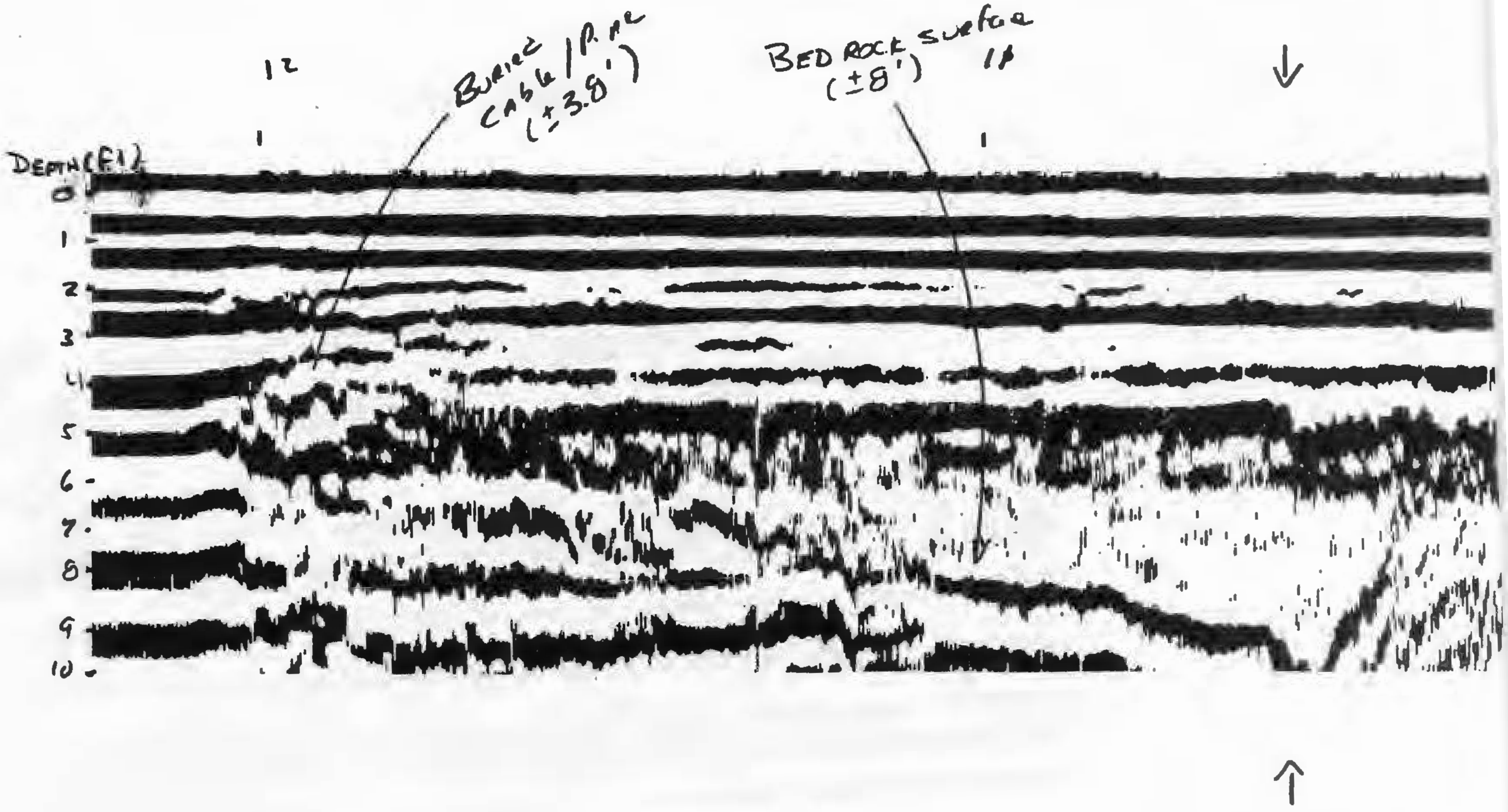
RADAR TRACK P-3 - P-2

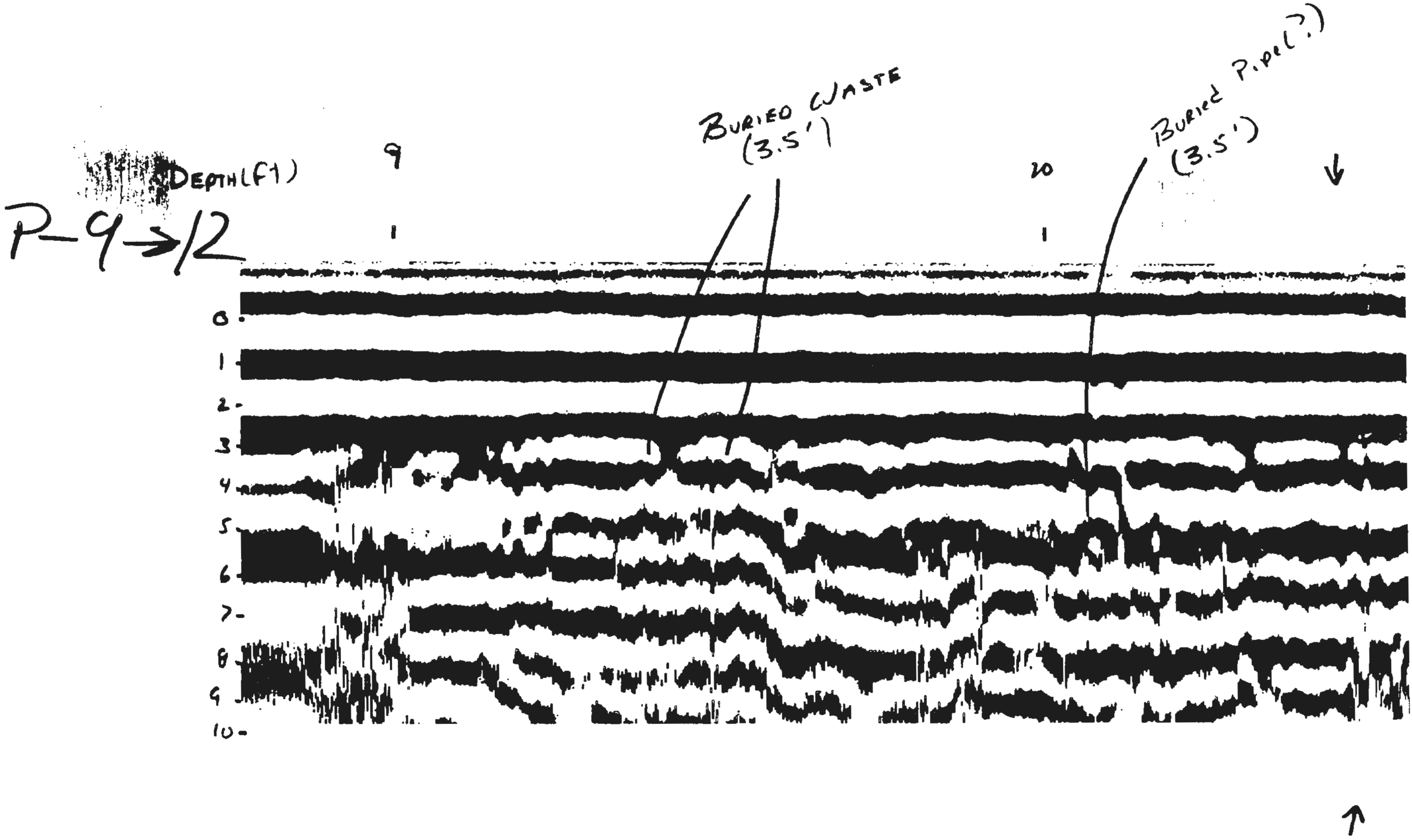


RADAR TRACK P-12 - P-9

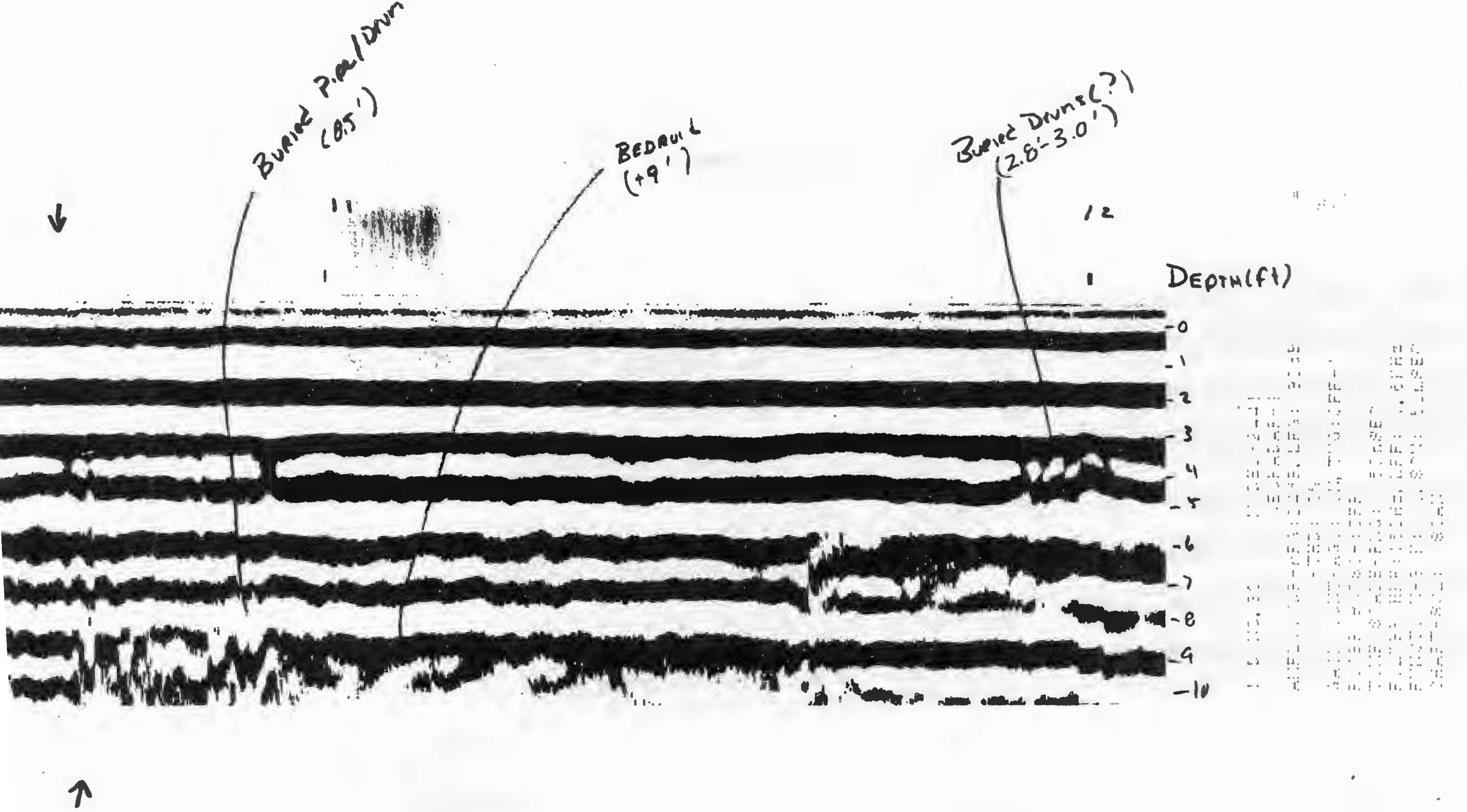
AMPLITUDE-PFA: [illegible]dB, LPG: 30dB
-THC: [illegible]
GAIN CONT-AGC: ON, TVG: OFF-[illegible]
POWER [illegible]: [illegible]
TIME SCALE-FULL: 80nSEC
FILTER-HPF: 150MHz, LPF: 1.6GHz
[illegible]: [illegible]: 50μSEC
CHART-FULL: SCAN

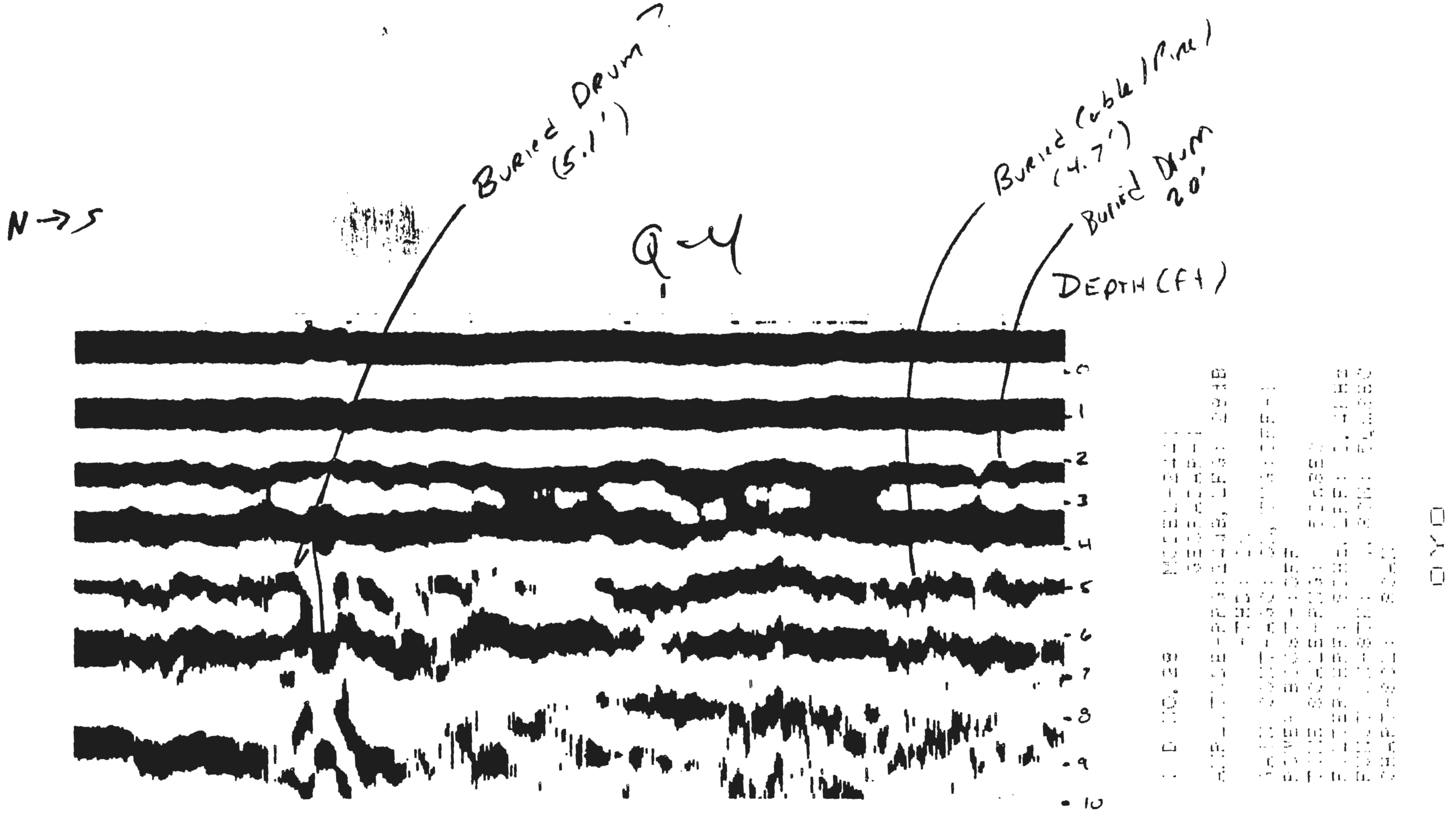
OYO



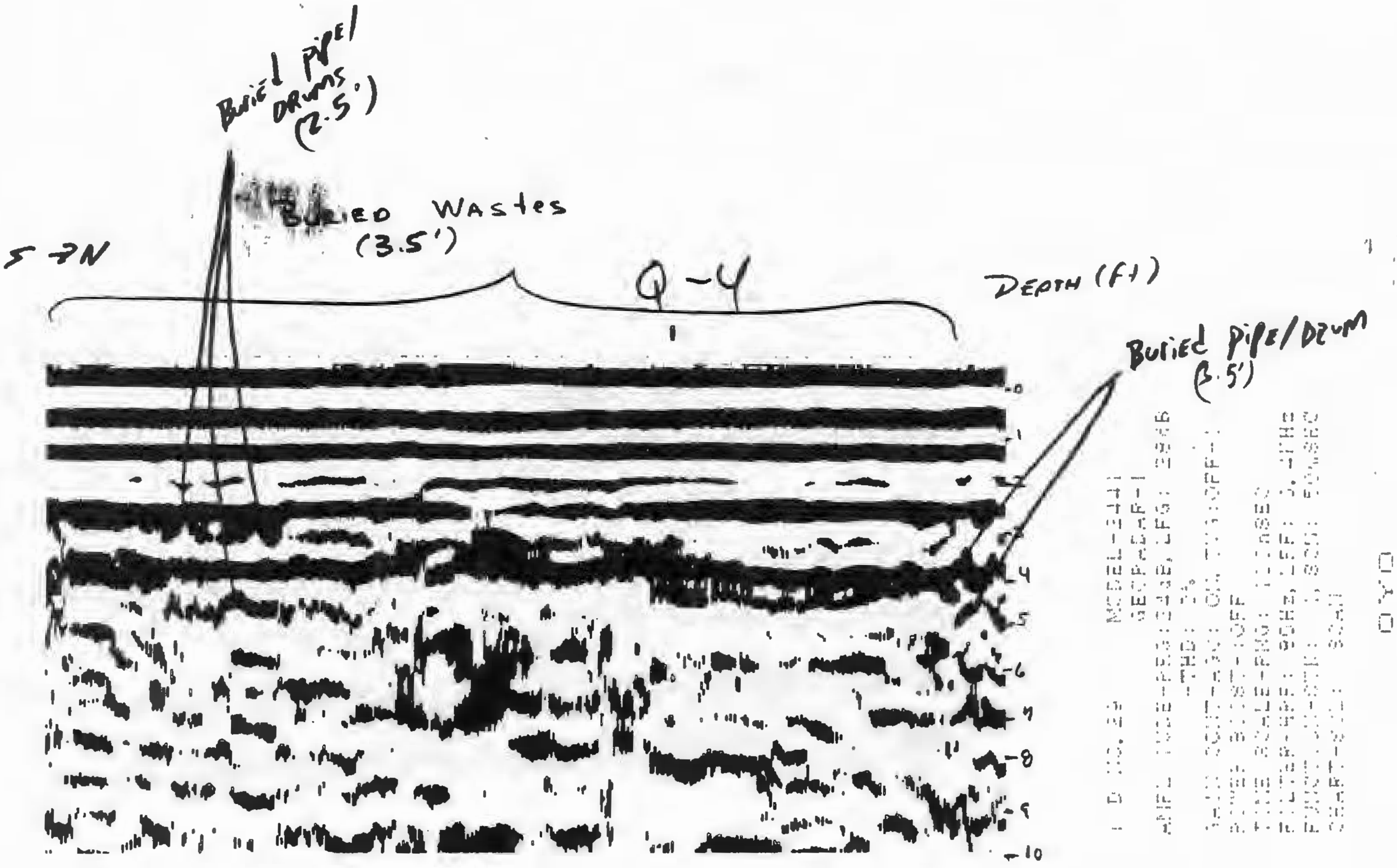


RADAR TRACK P-9 - P-12


Buried Pipe/Drum.
(8.5')
Bedrock
(+9')
Buried Drums(?)
(2.8'-3.0')
11
12
Depth(ft)
0
1
2
3
4
5
6
7
8
9
10
OYO



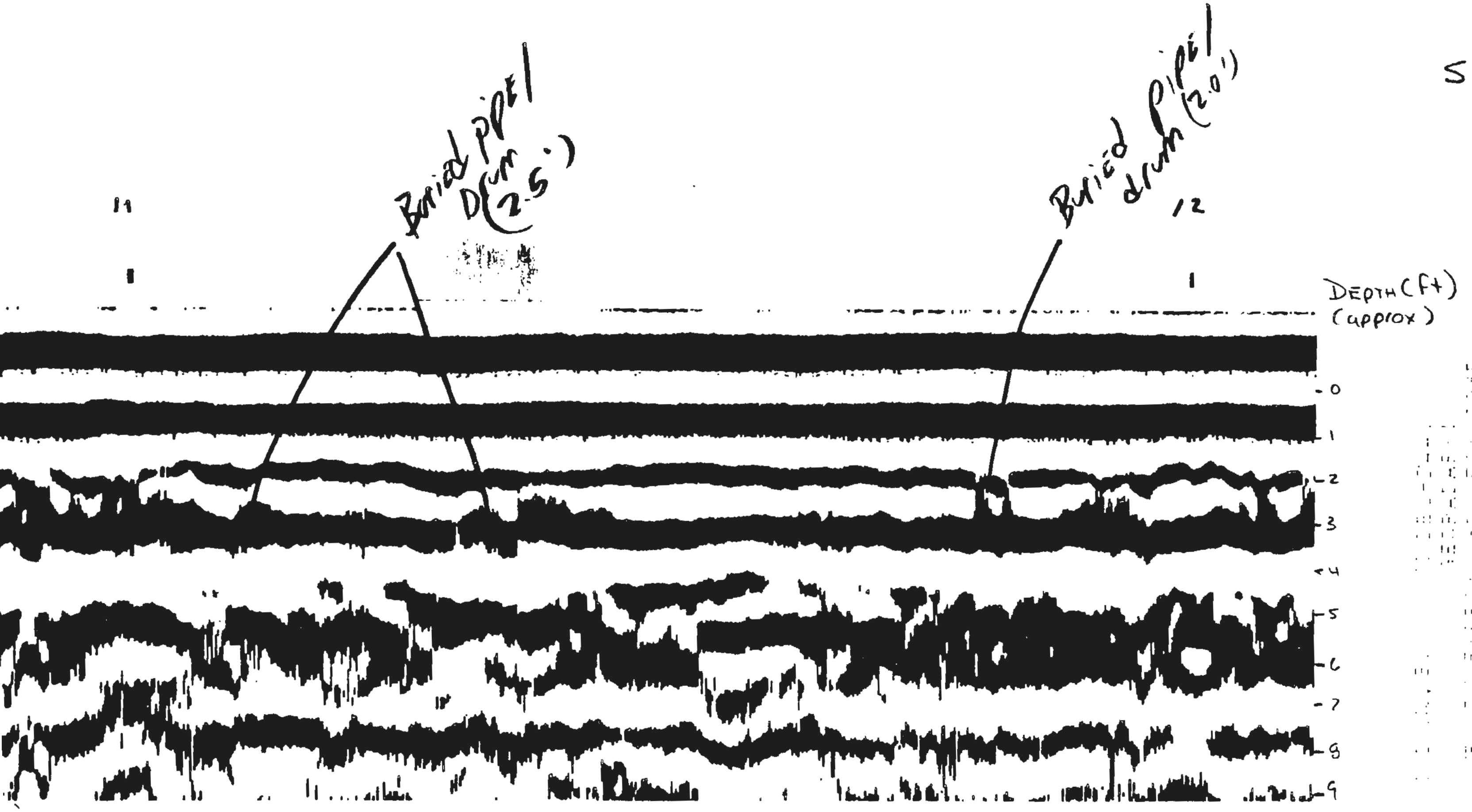
RADAR TRACK Q-4 (N-S)



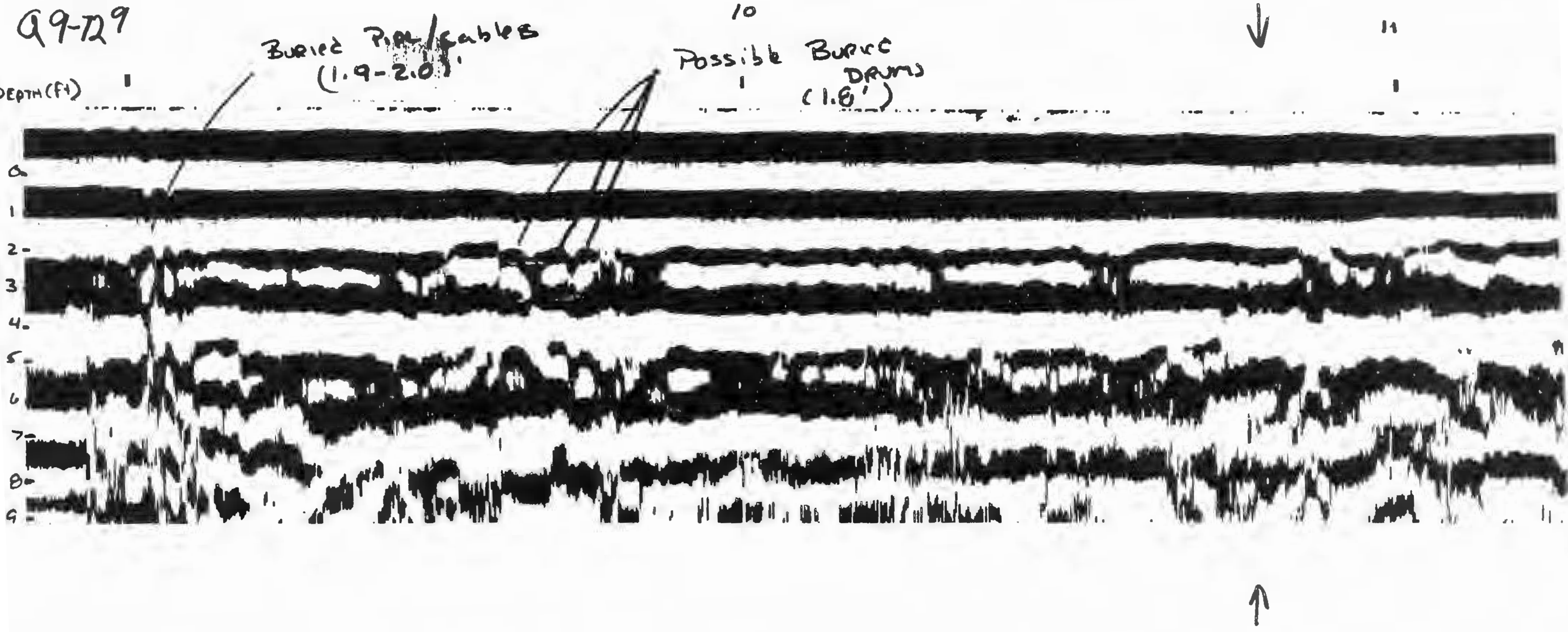
RADAR TRACK Q-4 (S-N)

SHALLOW - DEFINITION

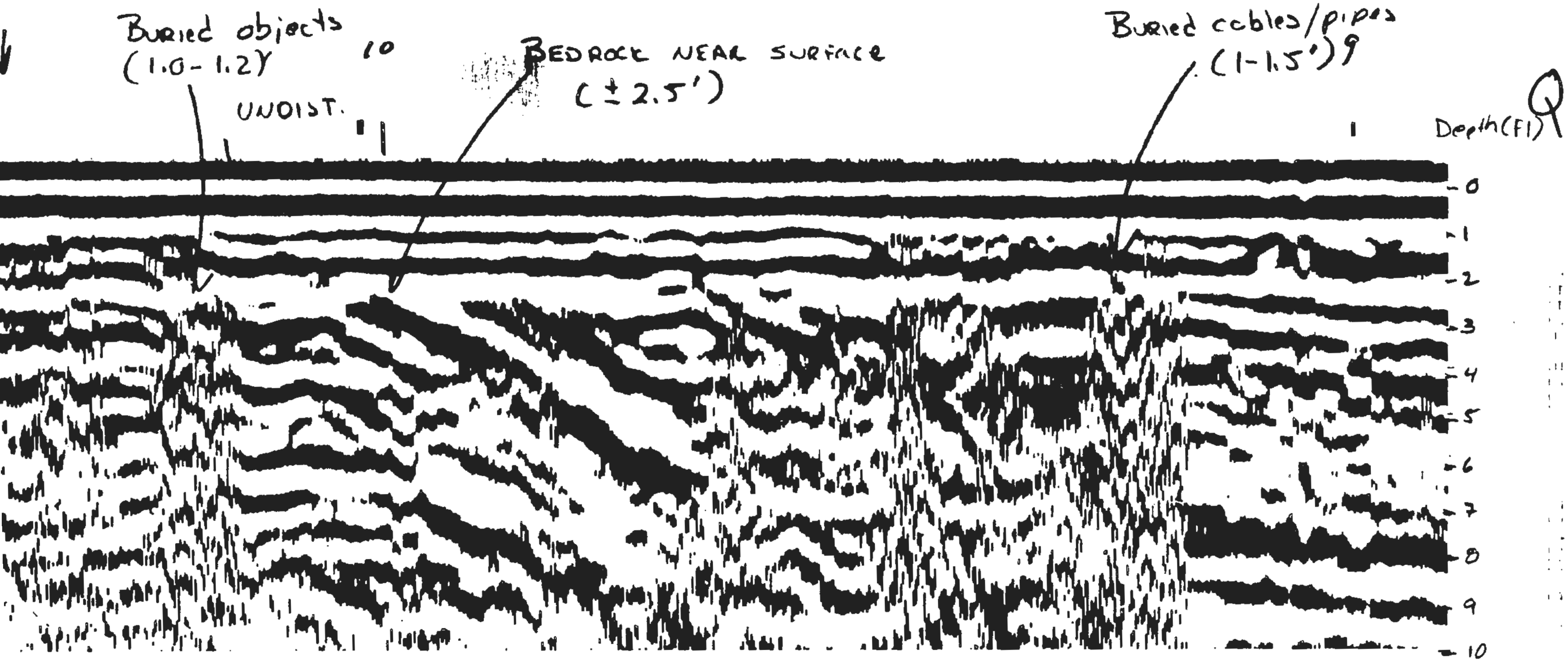
Q-9 → 12



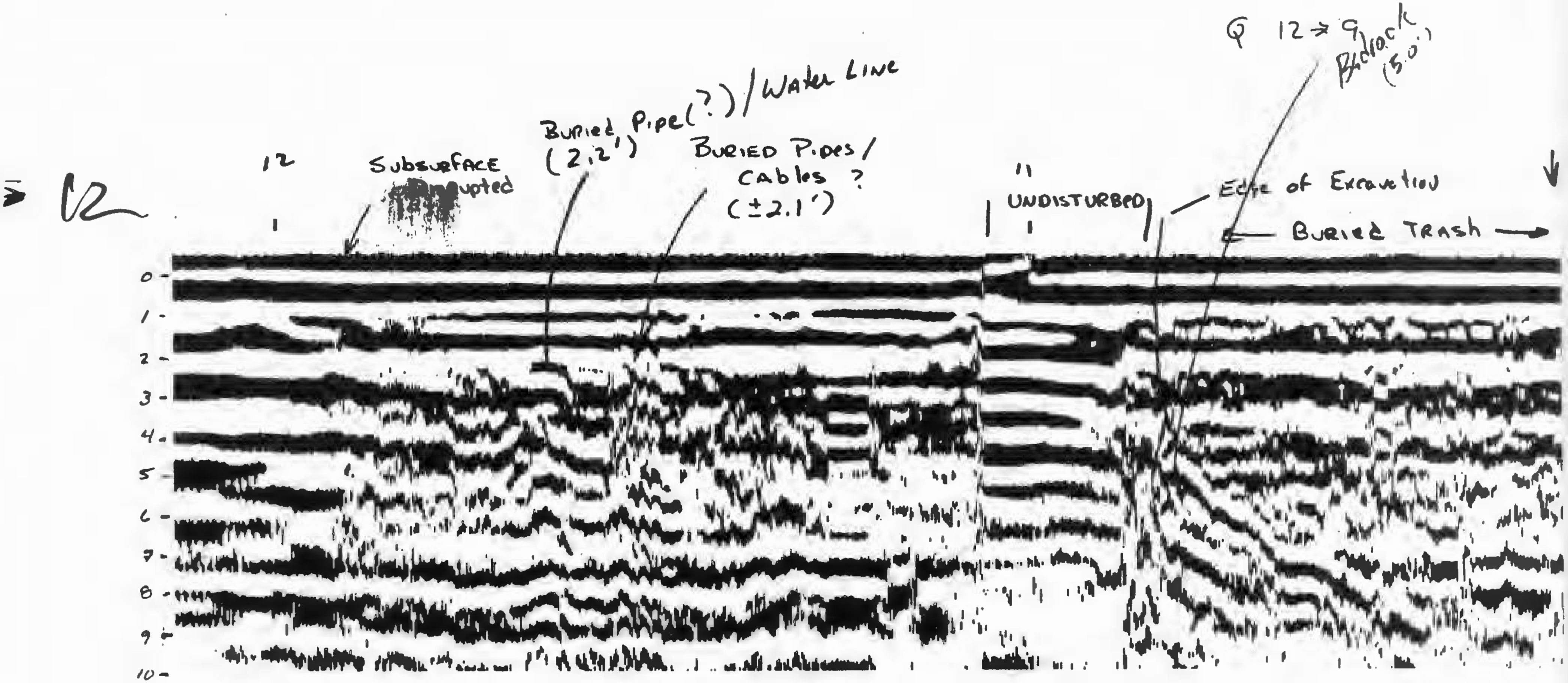
RADAR TRACK Q-9 - Q-12


Q9-T29
Buried Pipe/cables
(1.9-2.0')
Possible Buried Drums
(1.8')
10
11
DEPTH (Ft)
0
1
2
3
4
5
6
7
8
9

Q 12—9



RADAR TRACK Q-12 - Q-9

12
12
Subsurface Disrupted
Buried Pipe(?)/Water Line
(2.2')
Buried Pipes/
Cables ?
(±2.1')
11
UNDISTURBED
Edge of Excavation
Buried Trash
12 → 9
Bedrock
(5.0')
0
1
2
3
4
5
6
7
8
9
10

APPENDIX C

SOIL GAS SURVEY REPORT

SOIL GAS SURVEY
SENECA ARMY DEPOT
ROMULUS, NEW YORK

PREPARED FOR

ICF INCORPORATED
9300 LEE HIGHWAY
FAIRFAX, VIRGINIA 22031-3153

PREPARED BY

TARGET ENVIRONMENTAL SERVICES, INC.
OAKLAND CENTER
8940-A ROUTE 108
COLUMBIA, MARYLAND 21045
(301) 992-6622

DECEMBER 1988

EXECUTIVE SUMMARY

On October 24 through November 1, 1988,**TARGET** Environmental Services, Inc. (**TARGET**) conducted a soil gas survey at the Seneca Army Depot in Romulus, New York. Analysis of the samples on a portable gas chromatograph (PID) revealed elevated hydrocarbon concentrations primarily on the central portion of the survey area. The highest Total Volatiles levels were detected north of the incinerator building, at Station K6. A compound with an elution time near that of toluene accounts for essentially all of the remaining volatiles measured on the site, outside of the K6 area. The local anomaly at K6 reflects the occurrence of a non-standardized light (volatile) hydrocarbon. Low concentrations of TCE and t-1,2-DCE were measured on the western half of the site, coinciding with the points of highest Total Volatiles concentrations.

Introduction

Trichloroethylene and dichloroethylene were detected in ground water samples collected from monitoring wells at the Seneca Army Depot in Romulus, New York. **ICF Incorporated** contracted **TARGET** Environmental Services, Inc. (**TARGET**) to perform a soil gas survey (using a portable gas chromatograph for sample analysis) to assess the site for subsurface hydrocarbon contamination. The field phase of this survey was conducted October 24 through November 1, 1988.

Terminology

In order to prevent misunderstanding of certain terms used in this report, the following clarifications are offered:

The term "feature" is used in reference to a discernable pattern in the contoured data. It denotes a contour form rather than a definite or separate chemical occurrence.

The term "occurrence" is used to indicate an area where chemical compounds are present in sufficient concentrations to be detected by the analysis of soil vapors. The term is not indicative of any specific mode of occurrence (vapor, dissolved, etc), and does not necessarily indicate or suggest the presence of "free product" or "phase-separated hydrocarbons".

The term "trace level" represents a concentration that is detectable but is less than the formal detection limit of the analytical equipment. A statistically valid quantification of trace levels is not possible.

The term "analyte" refers to any of the hydrocarbons standardized for quantification in the chromatographic analysis.

The term "vadose zone" represents the unsaturated zone between the ground water table and the ground surface.

Field Procedures

Soil gas samples were collected at a total of 167 locations at the site, as shown in Figure 1. An addition headspace sample was collected at the central portion of the site (north of the tank area). To collect the samples a 1/2 inch hole was produced to a depth of two to four feet (depending upon subsurface conditions) by using a slide hammer. The entire sampling system was purged with ambient air drawn through a dust and organic vapor filter cartridge, and a stainless steel probe was inserted to the full depth of the hole and sealed off from the atmosphere. A sample of in-situ soil gas was then withdrawn through the probe and used to purge atmospheric air from the sampling system. A second sample of soil gas was withdrawn through the probe and encapsulated in a pre-evacuated glass vial at two atmospheres of pressure (15 psig). The samples were analyzed using a Photovac Model 10-S-50 portable gas chromatograph.

Prior to the day's field activities all sampling equipment, slide hammer rods, and probes were decontaminated by washing with soapy distilled water and rinsing with distilled water. Internal surfaces were flushed dry using pre-purified nitrogen, and external surfaces were wiped clean using clean paper towels.

Field control samples were collected at the beginning of each day's field activities, after every twentieth soil gas sample, and at the end of each day's field activities. These QA/QC samples were obtained by inserting the probe tip into a tube flushed by a 20 psi flow of pre-purified nitrogen and collecting in the same manner as described above.

Analytical Procedures

100 ml glass containers were prepared for use in standardization by heating in an oven while subjected to a 10 mm Hg positive pressure of ultra-zero air. The containers were then sealed using butyl rubber and teflon septa. Sealing operations were conducted under an atmosphere of ultra-zero air at one atmosphere pressure.

Standards were produced by injecting known quantities of liquid DCE, TCE, and toluene into a sealed 100 ml glass container. Injection was performed using a gas-tight syringe. Triplicate chromatograph runs of the DCE, TCE, and toluene standards were performed and the resulting readings were averaged to provide a standard response factor.

Discussion and Interpretation of Results

In order to provide graphic presentation of the results, individual data sets in Table 1 have been mapped and contoured to produce Figures 2 through 5. Dashed contours are used where patterns are extrapolated into areas of less complete data.

The Total Volatiles map (Figure 2) reveals the highest levels of subsurface hydrocarbon contamination north of the incinerator building (Station K6). Narrow patterns extend southwestward to Station G11 (west of the incinerator building) and southward to Station K8. This feature also extends northward, where data form a somewhat sinuous pattern with a localized high at Station K-2a. Relatively low concentrations are present on the western half of the site, where a narrow feature trends westward to Station B5. The largest peak on the Sample K6 chromatogram was not identified as one of the standardized analytes, however, its retention time indicates that the contaminant in this samples is a light, or volatile, hydrocarbon. The rapid drop in hydrocarbon concentrations outward from the very high level at K6 suggests that Sample K6 lies within a very limited pocket or containment of contaminant material.

Due to the variations in the run conditions which occur in the field, the retention times of compounds are likely to vary. The "toluene" concentrations in Table 1 are calculated based on the area of a peak eluting with a retention time close to that of toluene, and using the response factor for toluene (determined in the standardization procedures). However, as discussed above, this compound may not be toluene. The map patterns (Figure 3) are similar to those of the Total Volatiles, except for the conspicuous absence of this analyte around K6. The highest "toluene" concentration (165 ug/l) is at Station F5, centrally located on the western half of the site. The "toluene" levels indicate that this analyte comprises most, if not all, of the volatile organics observed on the site, outside of the K6 area.

Low-level anomalies of TCE (Figure 4) and trans-1,2-DCE (Figure 5) were also observed in scattered samples at the site. These anomalies coincide with the areas of elevated hydrocarbon concentrations shown on the Total Volatiles map. These halogenated hydrocarbons do not appear to comprise a significant amount of the contamination in the survey area.

TABLE 2

LABORATORY RESULTS
PORTABLE GAS CHROMATOGRAPH
CONCENTRATIONS IN MICROGRAMS-PER-LITER

SAMPLE	t12DCE	"TOLUENE"[1]	TCE	CALCULATED TOTAL VOLATILE[2]
B1	<1.0	<1.0	2.2	2.2
B3	<1.0	<1.0	<1.0	<1.0
B5	<1.0	6.7	<1.0	6.7
B7	<1.0	<1.0	<1.0	<1.0
B9	<1.0	<1.0	2.2	2.9
B11	<1.0	10	<1.0	10
B13	<1.0	<1.0	<1.0	<1.0
C1	<1.0	<1.0	<1.0	<1.0
C3	<1.0	<1.0	<1.0	<1.0
C5	<1.0	32	<1.0	33
C7	<1.0	<1.0	<1.0	<1.0
C9	<1.0	<1.0	2.6	5.4
C11	<1.0	<1.0	<1.0	<1.0
C13	<1.0	<1.0	<1.0	<1.0
D1	<1.0	<1.0	<1.0	<1.0
D3	<1.0	<1.0	<1.0	<1.0
D5	<1.0	2.8	<1.0	2.8
D7	<1.0	<1.0	<1.0	<1.0
D9	<1.0	<1.0	<1.0	<1.0
D11	<1.0	<1.0	2.0	2.5
D13	<1.0	<1.0	<1.0	<1.0
E1	<1.0	<1.0	2.0	2.0
E3	<1.0	1.0	1.9	3.7
E5	<1.0	3.6	<1.0	3.6
E7	<1.0	1.2	1.4	2.6
E9	<1.0	1.6	1.6	1.6
E11	<1.0	2.0	1.8	3.8
E13	<1.0	<1.0	<1.0	<1.0
F1	<1.0	<1.0	<1.0	2.5
F3	<1.0	2.8	<1.0	3.0
F5	1.1	165	<1.0	166
F7	<1.0	10	<1.0	10

t12DCE = trans-1,2-dichloroethene **TCE = 1,1,2-trichloroethene**

[1] **COMPOUND MAY NOT BE TOLUENE, CONCENTRATIONS BASED ON RETENTION TIME O TOLUENE**

[2] **CALCULATED USING THE SUM OF THE AREAS OF ALL INTEGRATED CHROMATOGRAM PEAK AND AN AVERAGE INSTRUMENT RESPONSE FACTOR OF THE STANDARDIZED ANALYTES**

TABLE 2 (cont)

LABORATORY RESULTS
PORTABLE GAS CHROMATOGRAPH
CONCENTRATIONS IN MICROGRAMS-PER-LITER

SAMPLE	t12DCE	TOLUENE[1]	TCE	CALCULATED TOTAL VOLATILES[2]
F9	<1.0	<1.0	<1.0	<1.0
F11	<1.0	<1.0	<1.0	<1.0
F13	<1.0	<1.0	<1.0	<1.0
G1	<1.0	2.8	3.9	7.2
G3	<1.0	<1.0	<1.0	<1.0
G5	<1.0	14	<1.0	15
G7	<1.0	<1.0	<1.0	<1.0
G9	<1.0	1.5	<1.0	1.5
G11	49	41	<1.0	405
G13	<1.0	<1.0	2.7	2.7
H4	<1.0	4.0	<1.0	4.7
H5	<1.0	<1.0	<1.0	<1.0
H6	<1.0	4.0	<1.0	5.8
H7	<1.0	<1.0	<1.0	<1.0
H8	<1.0	<1.0	<1.0	7.0
H9	<1.0	36	<1.0	36
H10	<1.0	5.6	<1.0	8.8
H11	<1.0	<1.0	4.2	4.2
H12	<1.0	2.0	<1.0	2.0
H13	<1.0	<1.0	<1.0	<1.0
I0	<1.0	<1.0	<1.0	3.8
I1	<1.0	<1.0	<1.0	1.8
I2	<1.0	19	<1.0	20
I3	<1.0	<1.0	<1.0	41
I4	<1.0	<1.0	<1.0	2.0
I5	<1.0	1.7	<1.0	1.7
I6	<1.0	155	<1.0	155
I7	<1.0	59	<1.0	59
I8	<1.0	7.7	<1.0	15
I9	<1.0	<1.0	<1.0	<1.0
I13	<1.0	<1.0	<1.0	<1.0

t12DCE = trans-1,2-dichloroethene **TCE = 1,1,2-trichloroethene**

[1] COMPOUND MAY NOT BE TOLUENE, CONCENTRATIONS BASED ON RETENTION TIME OF TOLUENE

[2] CALCULATED USING THE SUM OF THE AREAS OF ALL INTEGRATED CHROMATOGRAM PEAKS, AND AN AVERAGE INSTRUMENT RESPONSE FACTOR OF THE STANDARDIZED ANALYTES

TABLE 2 (cont)

LABORATORY RESULTS
PORTABLE GAS CHROMATOGRAPH
CONCENTRATIONS IN MICROGRAMS-PER-LITER

SAMPLE	t12DCE	TOLUENE[1]	TCE	CALCULATED TOTAL VOLATILES[2]
J0	<1.0	<1.0	<1.0	<1.0
J1	5.9	3.6	1.4	78
J2	2.0	101	<1.0	103
J3	<1.0	<1.0	<1.0	23
J4	<1.0	<1.0	3.1	29
J5	<1.0	<1.0	<1.0	5.9
J7	<1.0	<1.0	<1.0	<1.0
J8	<1.0	<1.0	<1.0	<1.0
J9	<1.0	<1.0	<1.0	<1.0
K00	<1.0	<1.0	<1.0	<1.0
K0	<1.0	<1.0	<1.0	2.2
K1	<1.0	<1.0	<1.0	391
K2	2.0	<1.0	<1.0	462
K-2a	2.0	614	<1.0	655
K3	<1.0	<1.0	<1.0	1.6
K6	<1.0	<1.0	<1.0	11,000
$K\text{-}6_1$	<1.0	<1.0	<1.0	40
K7	<1.0	<1.0	<1.0	15
$K\text{-}7_1$	<1.0	<1.0	<1.0	4.0
K8	5.7	11	<1.0	82
K9	<1.0	<1.0	<1.0	<1.0
K10	<1.0	<1.0	<1.0	<1.0
K11	<1.0	<1.0	<1.0	<1.0
K12	<1.0	<1.0	<1.0	5.0
K13	<1.0	<1.0	<1.0	3.2
L00	<1.0	<1.0	<1.0	<1.0
L1	<1.0	16	<1.0	16
L3	<1.0	<1.0	<1.0	<1.0
L4	<1.0	1.9	<1.0	1.9
L5	<1.0	31	<1.0	32
L6	<1.0	<1.0	<1.0	<1.0

t12DCE = trans-1,2-dichloroethene TCE = 1,1,2-trichloroethene

[1] COMPOUND MAY NOT BE TOLUENE, CONCENTRATIONS BASED ON RETENTION TIME O TOLUENE

[2] CALCULATED USING THE SUM OF THE AREAS OF ALL INTEGRATED CHROMATOGRAM PEAK , AND AN AVERAGE INSTRUMENT RESPONSE FACTOR OF THE STANDARDIZED ANALYTES

TABLE 2 (cont)

LABORATORY RESULTS
PORTABLE GAS CHROMATOGRAPH
CONCENTRATIONS IN MICROGRAMS-PER-LITER

SAMPLE	t12DCE	TOLUENE[1]	TCE	CALCULATED TOTAL VOLATILES[2]
L7	<1.0	<1.0	<1.0	<1.0
L8	<1.0	<1.0	<1.0	<1.0
L10	<1.0	<1.0	<1.0	<1.0
L11	<1.0	<1.0	<1.0	8.9
L13	<1.0	<1.0	<1.0	<1.0
M1	<1.0	<1.0	<1.0	<1.0
M2	<1.0	<1.0	<1.0	<1.0
M3	<1.0	<1.0	<1.0	<1.0
M5	<1.0	<1.0	<1.0	<1.0
M6	<1.0	<1.0	<1.0	<1.0
M7	<1.0	<1.0	<1.0	12
M9	<1.0	<1.0	<1.0	<1.0
M10	<1.0	<1.0	<1.0	<1.0
M11	<1.0	<1.0	<1.0	<1.0
M13	<1.0	<1.0	<1.0	<1.0
N2	<1.0	<1.0	<1.0	<1.0
N3	<1.0	<1.0	<1.0	<1.0
N4	<1.0	<1.0	<1.0	1.6
N5	<1.0	<1.0	<1.0	<1.0
N6	<1.0	<1.0	<1.0	<1.0
N7	<1.0	<1.0	<1.0	<1.0
N8	<1.0	<1.0	<1.0	<1.0
N9	<1.0	<1.0	<1.0	<1.0
N10	<1.0	<1.0	<1.0	<1.0
N11	<1.0	<1.0	<1.0	<1.0
N12	<1.0	<1.0	<1.0	<1.0
N13	<1.0	<1.0	<1.0	<1.0
O1	<1.0	<1.0	<1.0	<1.0
O6	<1.0	<1.0	<1.0	<1.0
O8	<1.0	<1.0	<1.0	<1.0
O9	<1.0	<1.0	<1.0	<1.0

t12DCE = trans-1,2-dichloroethene **TCE = 1,1,2-trichloroethene**

[1] **COMPOUND MAY NOT BE TOLUENE, CONCENTRATIONS BASED ON RETENTION TIME OF TOLUENE**

[2] **CALCULATED USING THE SUM OF THE AREAS OF ALL INTEGRATED CHROMATOGRAM PEAKS, AND AN AVERAGE INSTRUMENT RESPONSE FACTOR OF THE STANDARDIZED ANALYTES**

TABLE 2 (cont)

LABORATORY RESULTS
PORTABLE GAS CHROMATOGRAPH
CONCENTRATIONS IN MICROGRAMS-PER-LITER

SAMPLE	t12DCE	TOLUENE[1]	TCE	CALCULATED TOTAL VOLATILES[2]
O10	<1.0	<1.0	<1.0	<1.0
O11	<1.0	<1.0	<1.0	<1.0
O12	<1.0	<1.0	<1.0	<1.0
O13	<1.0	<1.0	<1.0	<1.0
P2	<1.0	<1.0	<1.0	<1.0
P3	<1.0	<1.0	<1.0	<1.0
P5	<1.0	<1.0	<1.0	<1.0
P7	<1.0	<1.0	<1.0	<1.0
P9	<1.0	<1.0	<1.0	<1.0
P10	<1.0	<1.0	<1.0	<1.0
P12	<1.0	<1.0	<1.0	<1.0
P13	<1.0	<1.0	<1.0	<1.0
Q00	<1.0	<1.0	<1.0	<1.0
Q1	<1.0	<1.0	<1.0	<1.0
Q3	<1.0	<1.0	<1.0	<1.0
Q4	<1.0	<1.0	<1.0	<1.0
Q6	<1.0	<1.0	<1.0	<1.0
Q9	<1.0	<1.0	<1.0	<1.0
Q10	<1.0	<1.0	<1.0	<1.0
Q12	<1.0	<1.0	<1.0	<1.0
Q13	<1.0	<1.0	<1.0	<1.0
R6	<1.0	<1.0	<1.0	<1.0
R7	<1.0	<1.0	<1.0	<1.0
R8	<1.0	<1.0	<1.0	<1.0
R9	<1.0	<1.0	<1.0	<1.0
R10	<1.0	<1.0	<1.0	<1.0
R11	<1.0	<1.0	<1.0	<1.0
R12	<1.0	<1.0	<1.0	<1.0
R13	<1.0	<1.0	<1.0	<1.0
S4	<1.0	<1.0	<1.0	<1.0
S6	<1.0	<1.0	<1.0	<1.0

t12DCE = trans-1,2-dichloroethene TCE = 1,1,2-trichloroethene

[1] COMPOUND MAY NOT BE TOLUENE, CONCENTRATIONS BASED ON RETENTION TIME O TOLUENE

[2] CALCULATED USING THE SUM OF THE AREAS OF ALL INTEGRATED CHROMATOGRAM PEAK, AND AN AVERAGE INSTRUMENT RESPONSE FACTOR OF THE STANDARDIZED ANALYTES

TABLE 2 (cont)

LABORATORY RESULTS
PORTABLE GAS CHROMATOGRAPH
CONCENTRATIONS IN MICROGRAMS-PER-LITER

SAMPLE	t12DCE	TOLUENE[1]	TCE	CALCULATED TOTAL VOLATILES[2]
U4	<1.0	<1.0	<1.0	<1.0
U5	<1.0	<1.0	<1.0	<1.0
V4	<1.0	<1.0	<1.0	<1.0
V5	<1.0	<1.0	<1.0	<1.0
W4	<1.0	<1.0	<1.0	<1.0
X4	<1.0	<1.0	<1.0	<1.0

t12DCE = trans-1,2-dichloroethene

TCE = 1,1,2-trichloroethene

[1] COMPOUND MAY NOT BE TOLUENE, CONCENTRATIONS BASED ON RETENTION TIME OF TOLUENE

[2] CALCULATED USING THE SUM OF THE AREAS OF ALL INTEGRATED CHROMATOGRAM PEAKS, AND AN AVERAGE INSTRUMENT RESPONSE FACTOR OF THE STANDARDIZED ANALYTES

TABLE 2 (cont)

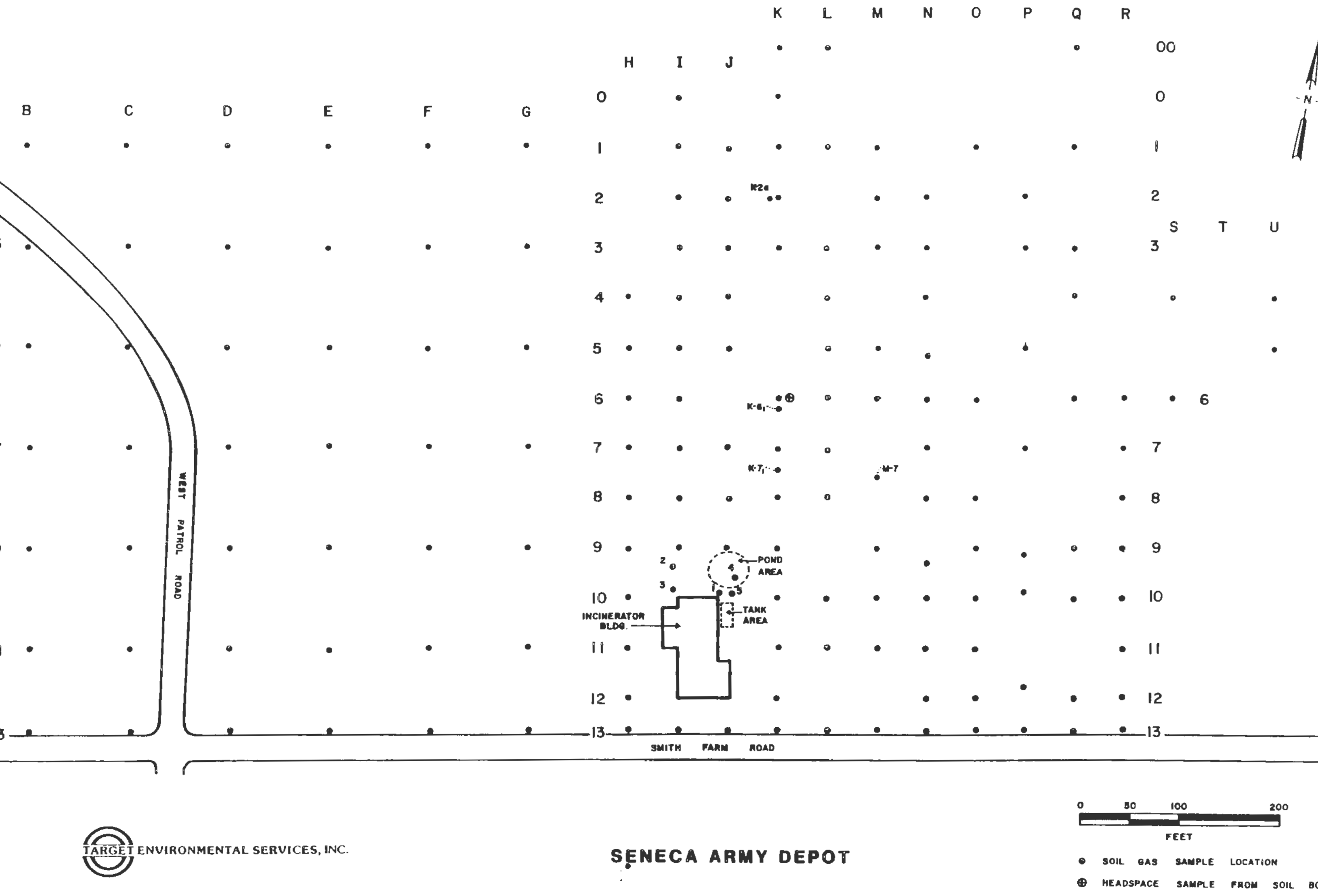
LABORATORY RESULTS
PORTABLE GAS CHROMATOGRAPH
CONCENTRATIONS IN MICROGRAMS-PER-LITER

SAMPLE	t12DCE	TOLUENE[1]	TCE	CALCULATED TOTAL VOLATILES[2]
TANK AREA				
TANK1	<1.0	<1.0	<1.0	<1.0
TANK2	<1.0	5.5	<1.0	5.5
TANK3	<1.0	<1.0	<1.0	<1.0
TANK4	<1.0	<1.0	<1.0	<1.0
TANK5	<1.0	<1.0	<1.0	<1.0
HEADSPACE				
K-6$_h$	<1.0	<1.0	<1.0	15
FIELD CONTROL SAMPLES				
200	<1.0	<1.0	<1.0	<1.0
201	<1.0	<1.0	<1.0	<1.0
202	<1.0	<1.0	<1.0	<1.0
203	<1.0	<1.0	<1.0	<1.0
204	<1.0	<1.0	<1.0	<1.0
205	<1.0	<1.0	<1.0	<1.0
206	<1.0	<1.0	<1.0	<1.0
207	<1.0	<1.0	<1.0	<1.0
208	<1.0	<1.0	<1.0	<1.0
209	<1.0	<1.0	<1.0	<1.0
210	<1.0	<1.0	<1.0	<1.0
211	<1.0	<1.0	<1.0	<1.0
212	<1.0	<1.0	<1.0	<1.0
213	<1.0	<1.0	<1.0	<1.0
214	<1.0	<1.0	<1.0	<1.0
215	<1.0	<1.0	<1.0	<1.0

t12DCE = trans-1,2-dichloroethene TCE = 1,1,2-trichloroethene

[1] COMPOUND MAY NOT BE TOLUENE, CONCENTRATIONS BASED ON RETENTION TIME O TOLUENE

[2] CALCULATED USING THE SUM OF THE AREAS OF ALL INTEGRATED CHROMATOGRAM PEAK , AND AN AVERAGE INSTRUMENT RESPONSE FACTOR OF THE STANDARDIZED ANALYTES



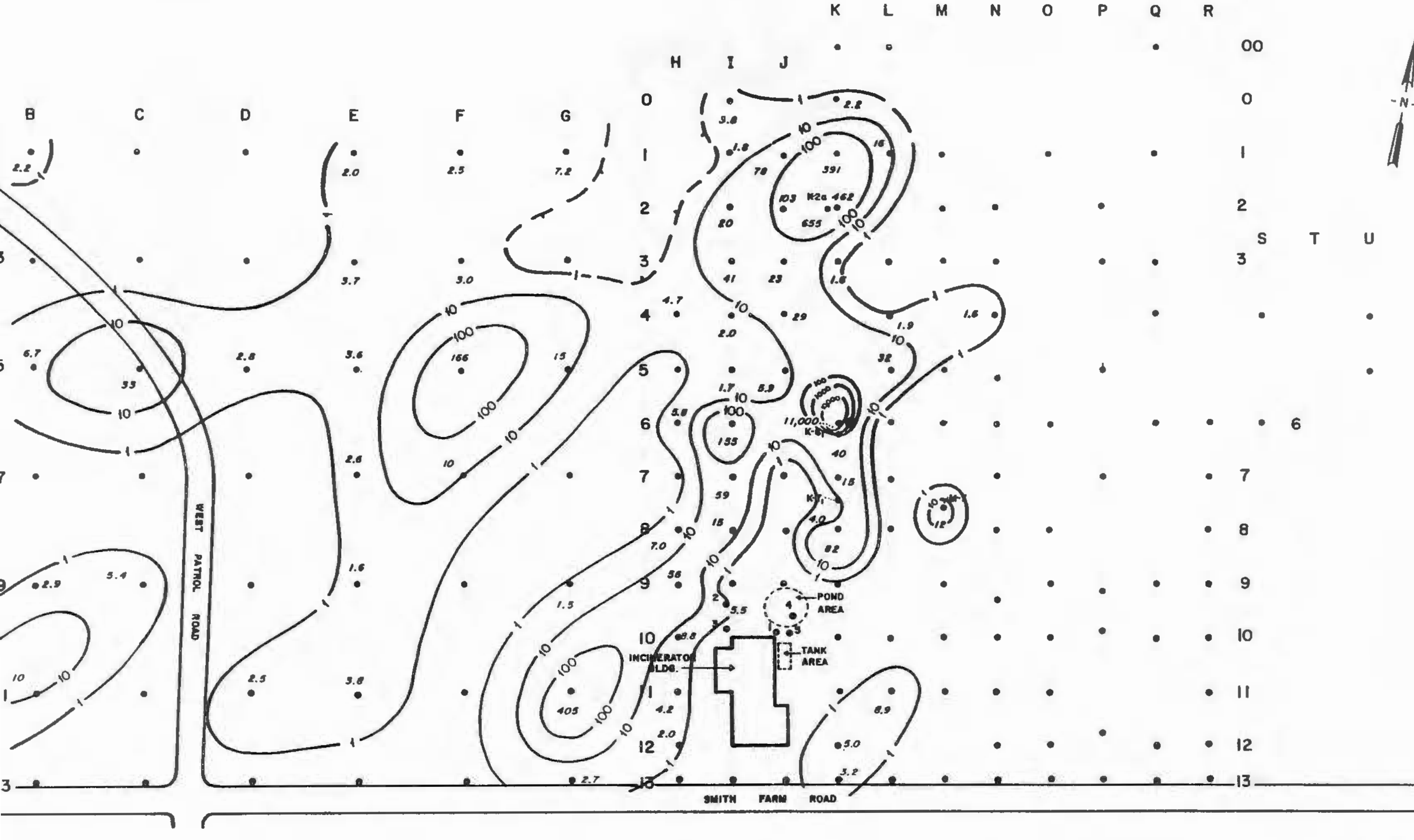
TARGET ENVIRONMENTAL SERVICES, INC.

SENECA ARMY DEPOT

ROMULUS, NY

This map is integral to a written report
and should be viewed in that context.

FIGURE 1. Sample Loca



0 50 100 200
FEET

● SOIL GAS SAMPLE LOCATION
⊕ HEADSPACE SAMPLE FROM SOIL

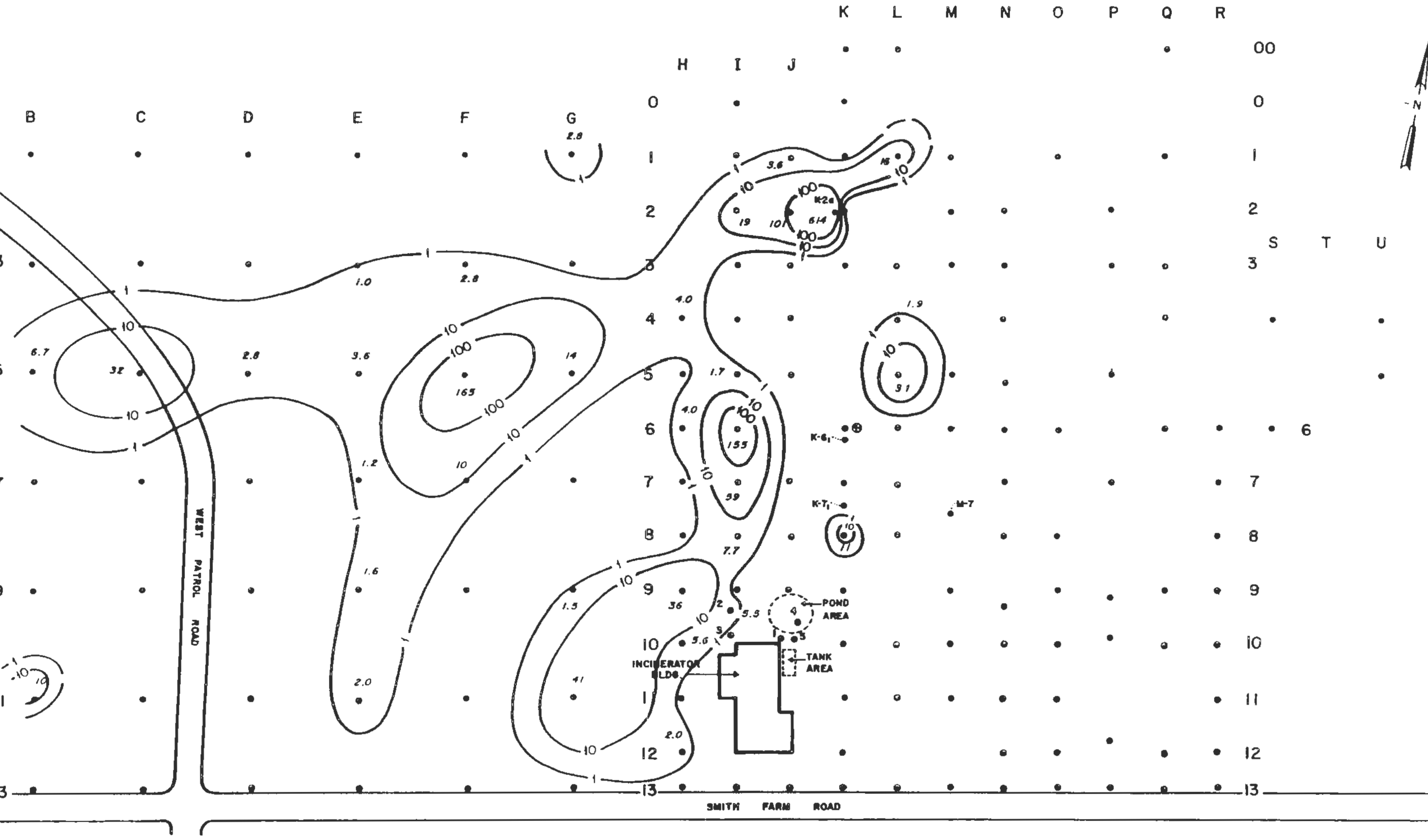
TARGET ENVIRONMENTAL SERVICES, INC.

SENECA ARMY DEPOT

ROMULUS, NY

This map is integral to a written report and [redacted] be vi[redacted] that [redacted]

[redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] URI[redacted] FID [redacted] Vol,[redacted]



0 50 100 200

FEET

● SOIL GAS SAMPLE LOCATION

⊕ HEADSPACE SAMPLE FROM SOIL BO

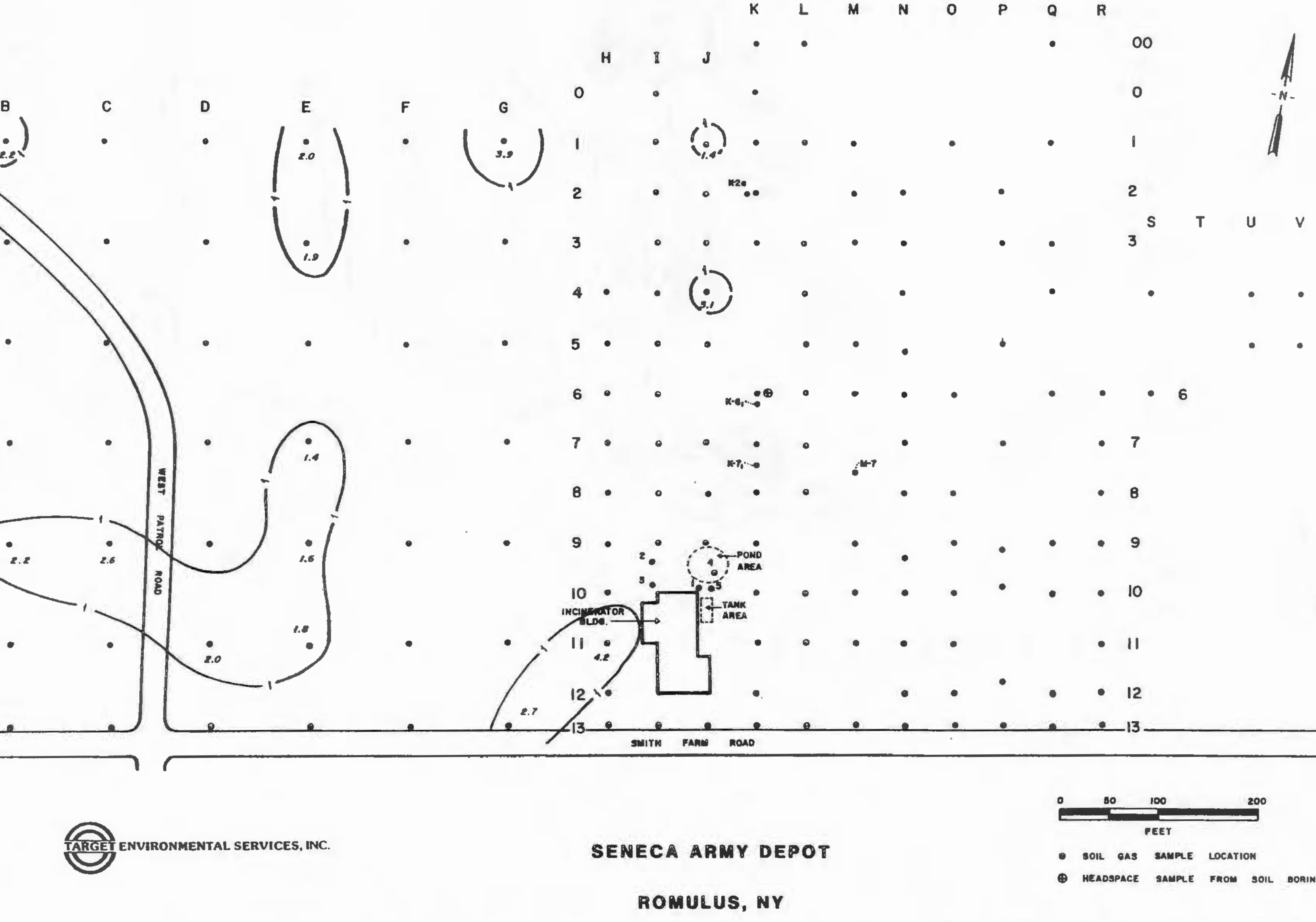
TARGET ENVIRONMENTAL SERVICES, INC.

SENECA ARMY DEPOT

ROMULUS, NY

This map is integral to a written report and should be viewed in that context.

FIGURE 3. Toluene (µg/



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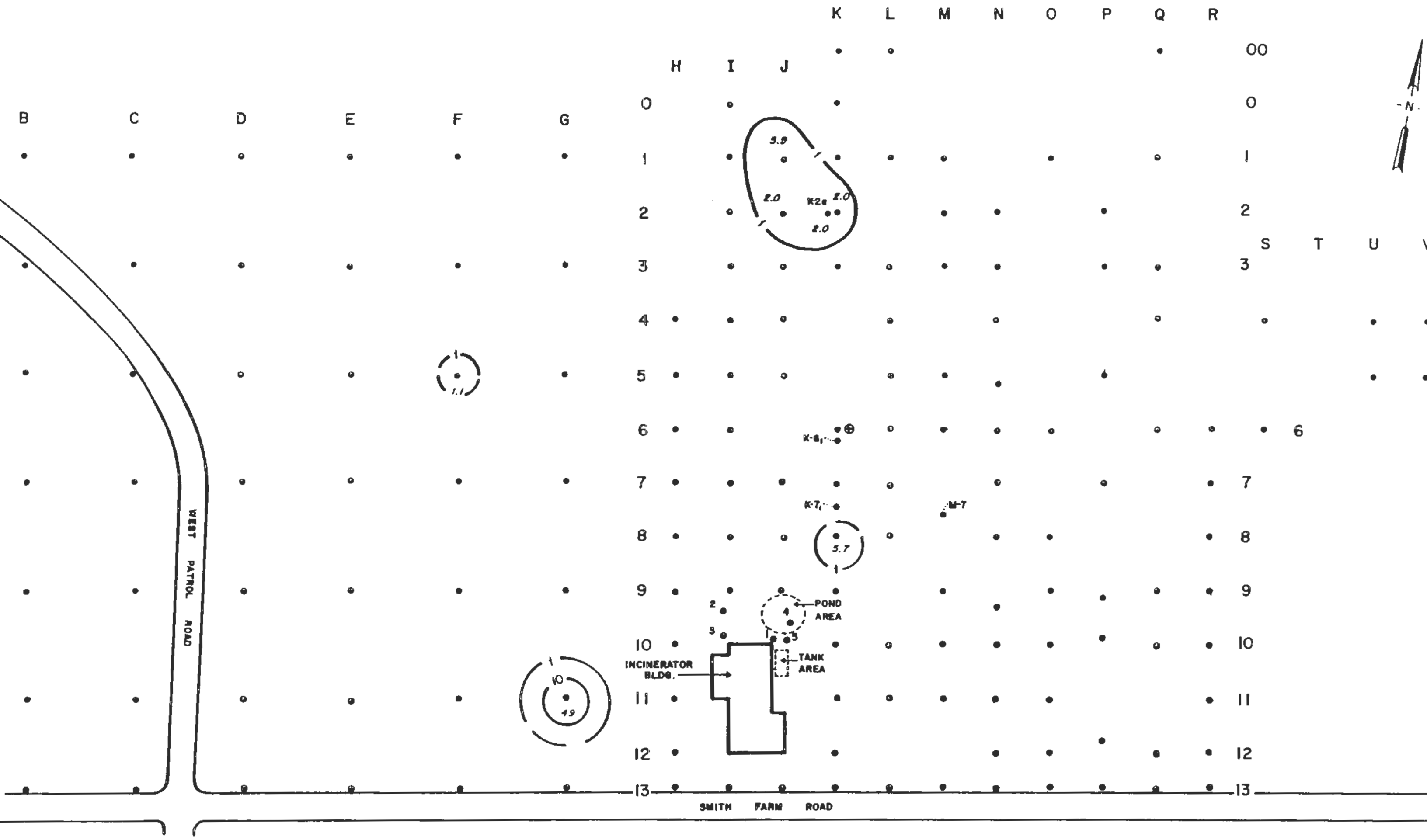
[redacted]nd should [redacted] viewed in that context.

FIGURE 4. TCE (µg/l)



0 50 100 200
FEET

● SOIL GAS SAMPLE LOCATION

⊕ HEADSPACE SAMPLE FROM SOIL BOR

TARGET ENVIRONMENTAL SERVICES, INC.

SENECA ARMY DEPOT

ROMULUS, NY

This map is integral to a written report
and should be viewed in that context.

FIGURE 5. t-1,2-DCE (

APPENDIX D

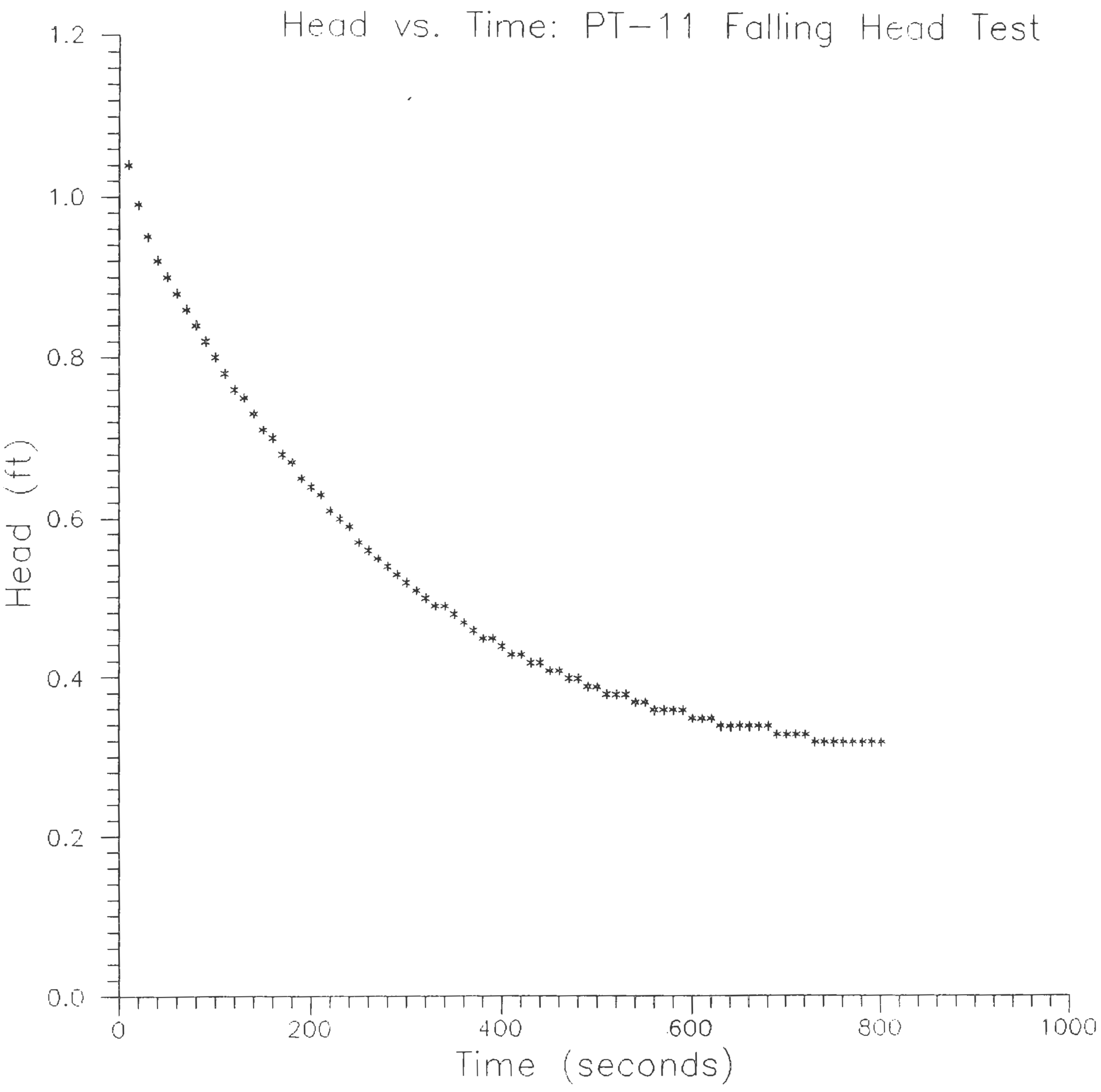
AQUIFER TEST AND FIELD MEASUREMENT DATA

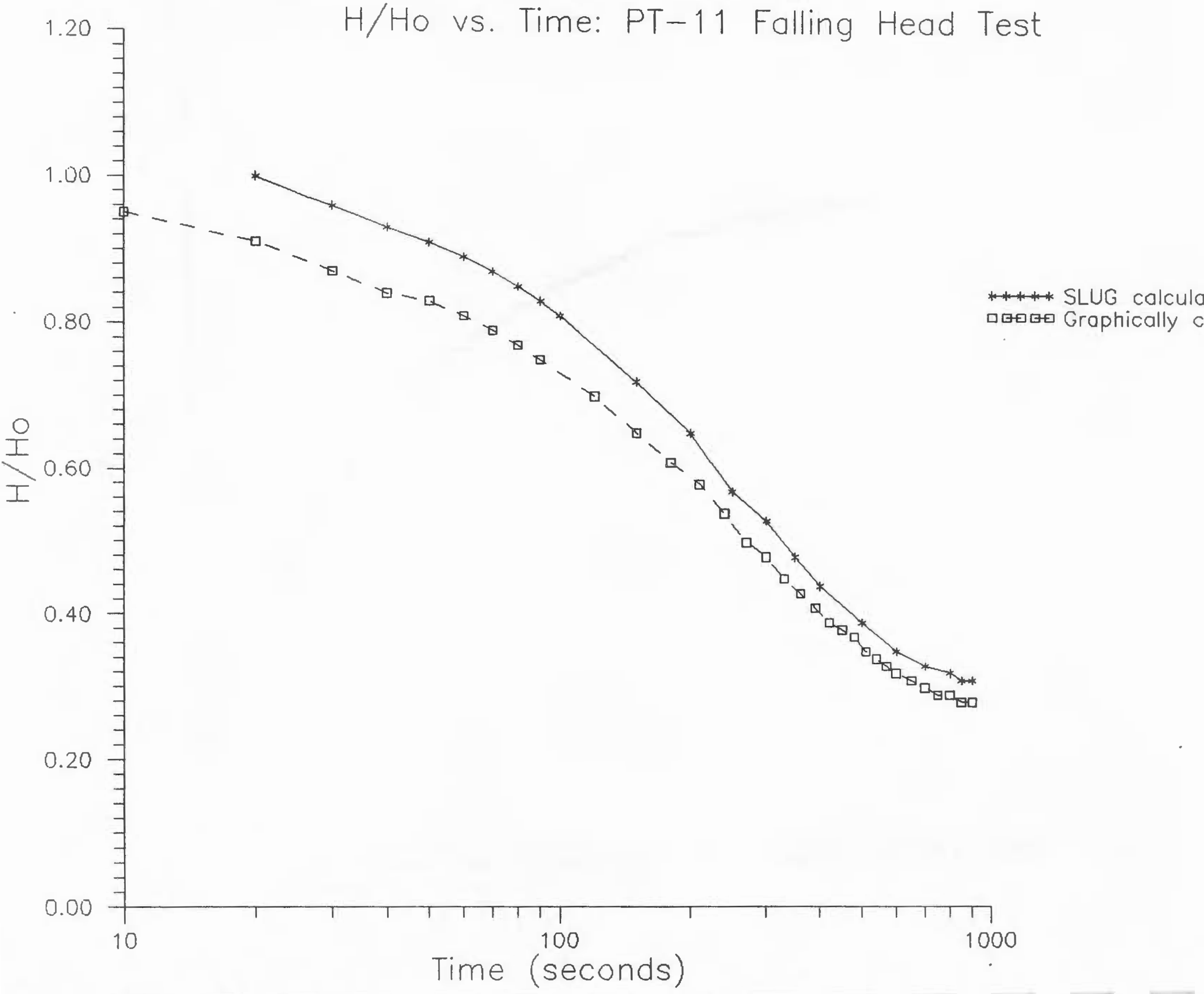
EXHIBIT D-1. FIELD MEASUREMENTS DURING WELL SAMPLING AT SEAD

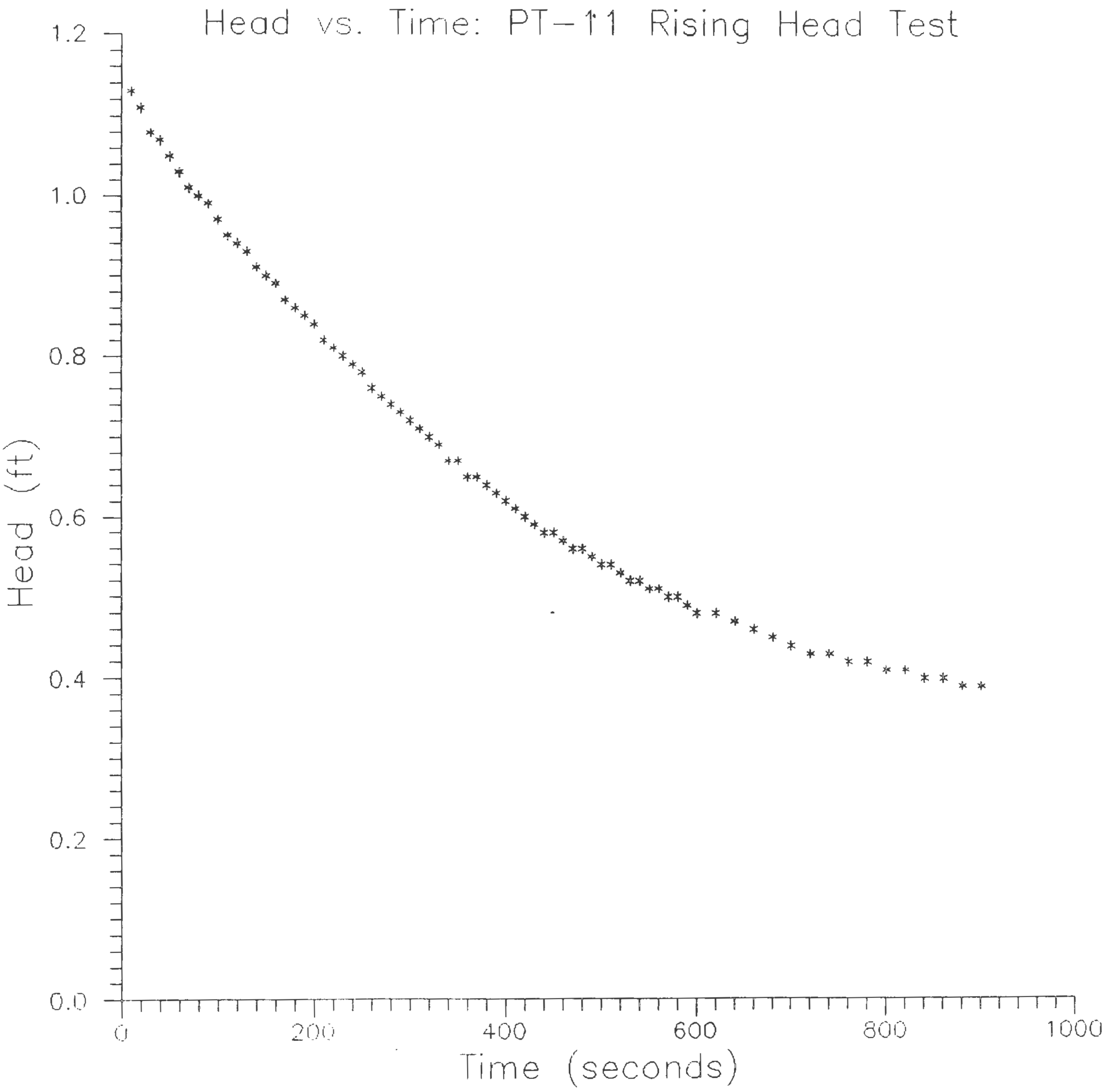
		WELL PT -10		WELL PT -18		WELL PT -12		WELL PT -20		WELL PT -21	
ASURE	DATE	BEFORE	AFTER	BEFORE	AFTER	BEFORE	AFTER	BEFORE	AFTER	BEFORE	AFTER
	10-27-88	7.48	7.18	6.53	ND	7.22	ND	6.72	6.69	7.95	ND
	11-08-88	7.06	7.61	6.9	6.8	6.95	7.06	7.02	7.15	7.35	8.45
	11-16-88	7.1	6.98	6.8	7	7.05	7.1	ND	6.8	ND	7.5
ND.	10-27-88	890	900	1760	ND	2860	ND	1190	1170	690	ND
	11-08-88	1030	880	1610	1850	2210	2030	1140	1160	1010	900
	11-16-88	840	760	1600	1570	1950	1800	ND	1040	ND	1070
MP.	10-27-88	13.4	11	14.3	ND	14.2	ND	13.2	13.3	13.1	ND
	11-08-88	11	9	11	12	12	11	11	12	11	ND
	11-16-88	13	11	11	12	11	10	ND	12	ND	11

		WELL PT -22		WELL PT -15		WELL PT -25		WELL PT -17		WELL PT -24	
ASURE	DATE	BEFORE	AFTER	BEFORE	AFTER	BEFORE	AFTER	BEFORE	AFTER	BEFORE	AFTER
	10-27-88	7.32	7.3	7.38	ND	6.81	ND	6.84	6.75	6.97	7.11
	11-08-88	7.08	7.09	7.6	7.6	7.05	7.1	6.5	7	6.94	6.8
	11-16-88	ND	7	ND	7.18	ND	6.8	ND	6.85	ND	6.76
ND.	10-27-88	1610	1610	590	ND	690	ND	820	860	790	790
	11-08-88	1330	1470	600	620	670	680	700	700	740	780
	11-16-88	ND	1380	ND	590	ND	600	ND	800	ND	750
MP.	10-27-88	13.6	13.8	13.1	ND	13.6	ND	13.7	14.1	14.1	13.9
	11-08-88	11	11	11	11	12	12	12	12	11	11
	11-16-88	ND	13	ND	12	ND	12	ND	12	ND	12

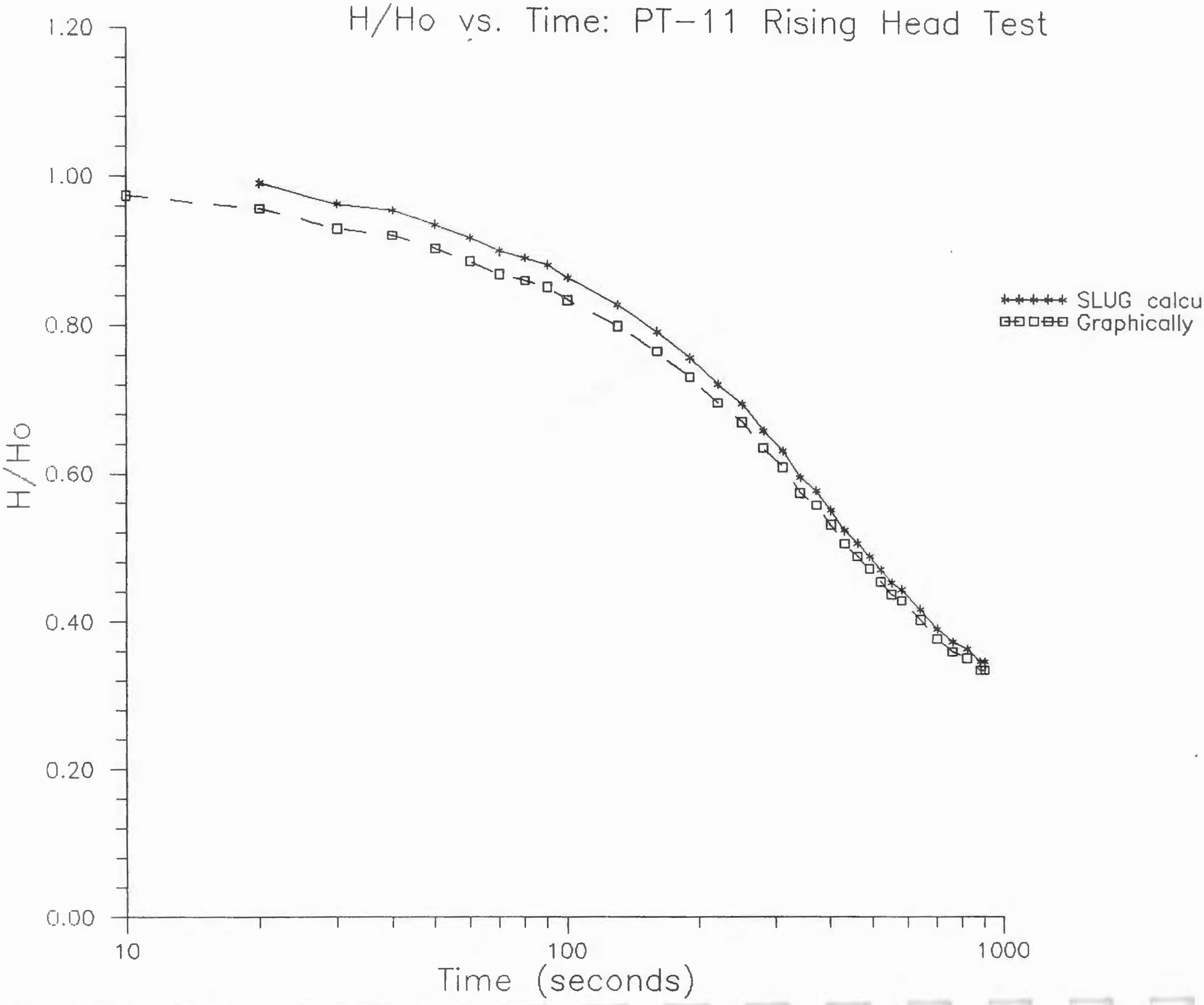
ND = NOT DETERMINED

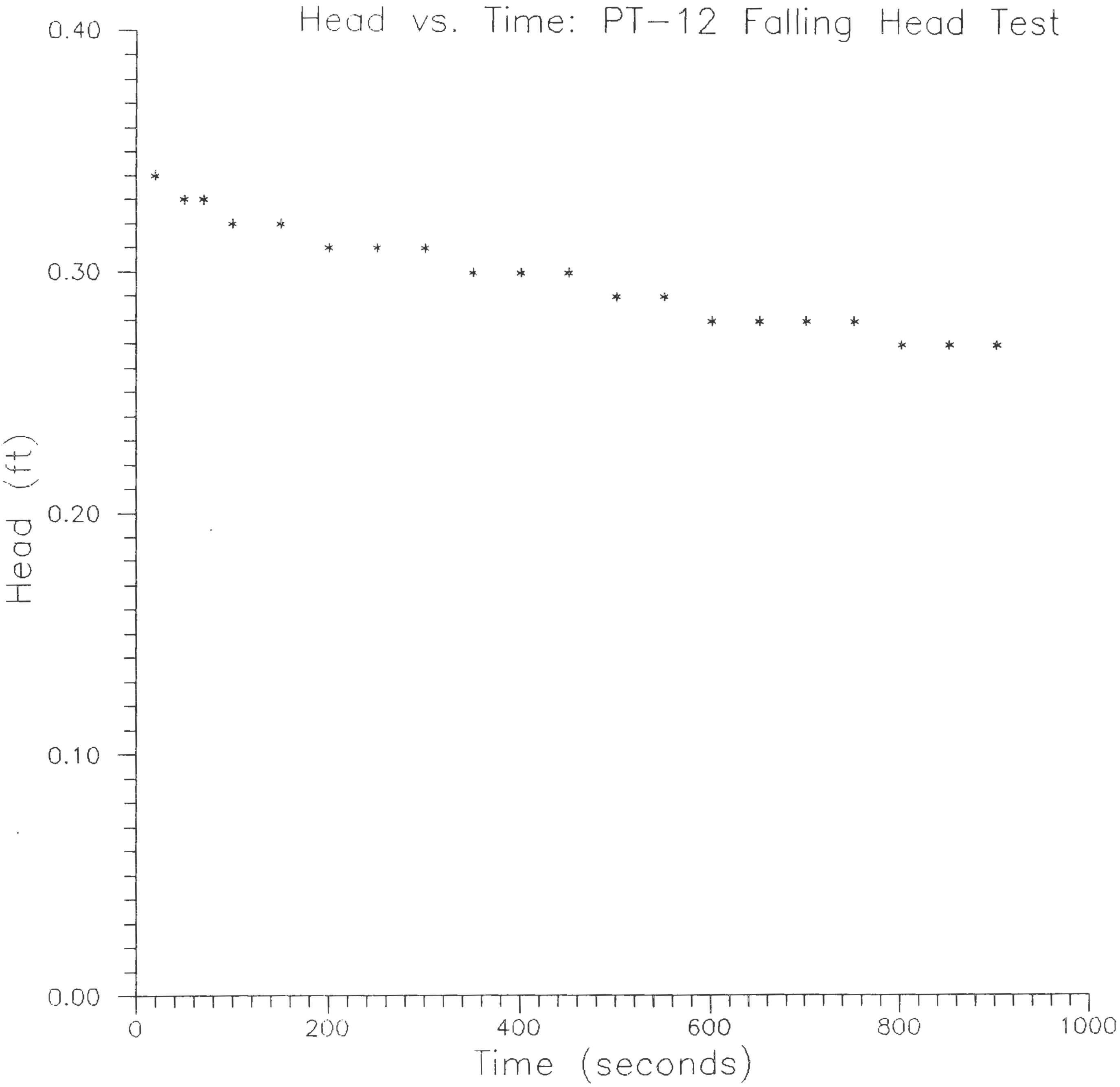

Head vs. Time: PT-11 Falling Head Test
Head (ft)
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
200
400
600
800
1000
Time (seconds)

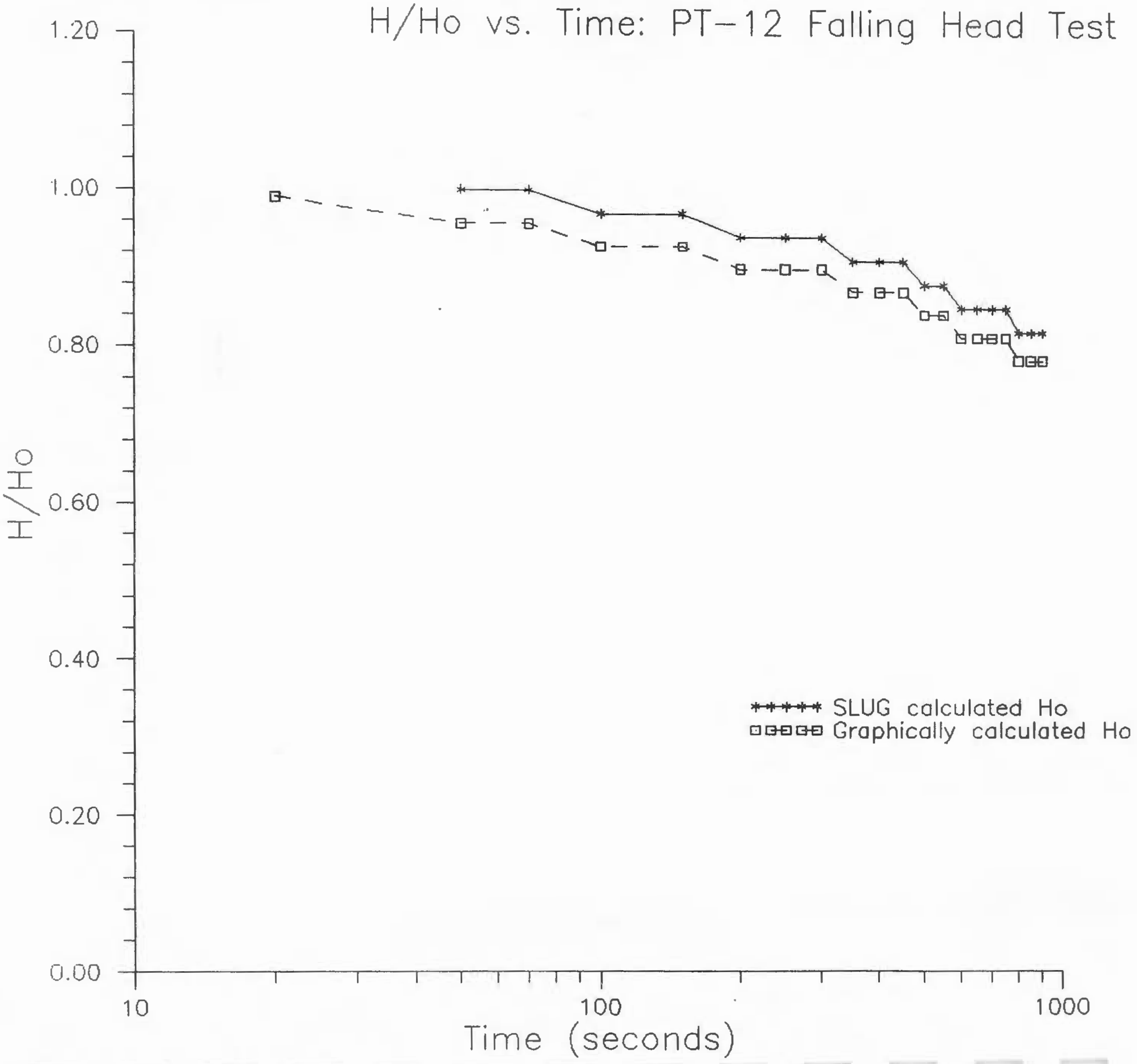

H/Ho vs. Time: PT-11 Falling Head Test
1.20
1.00
0.80
0.60
0.40
0.20
0.00
H/Ho
10
100
1000
Time (seconds)
SLUG calcula
Graphically c

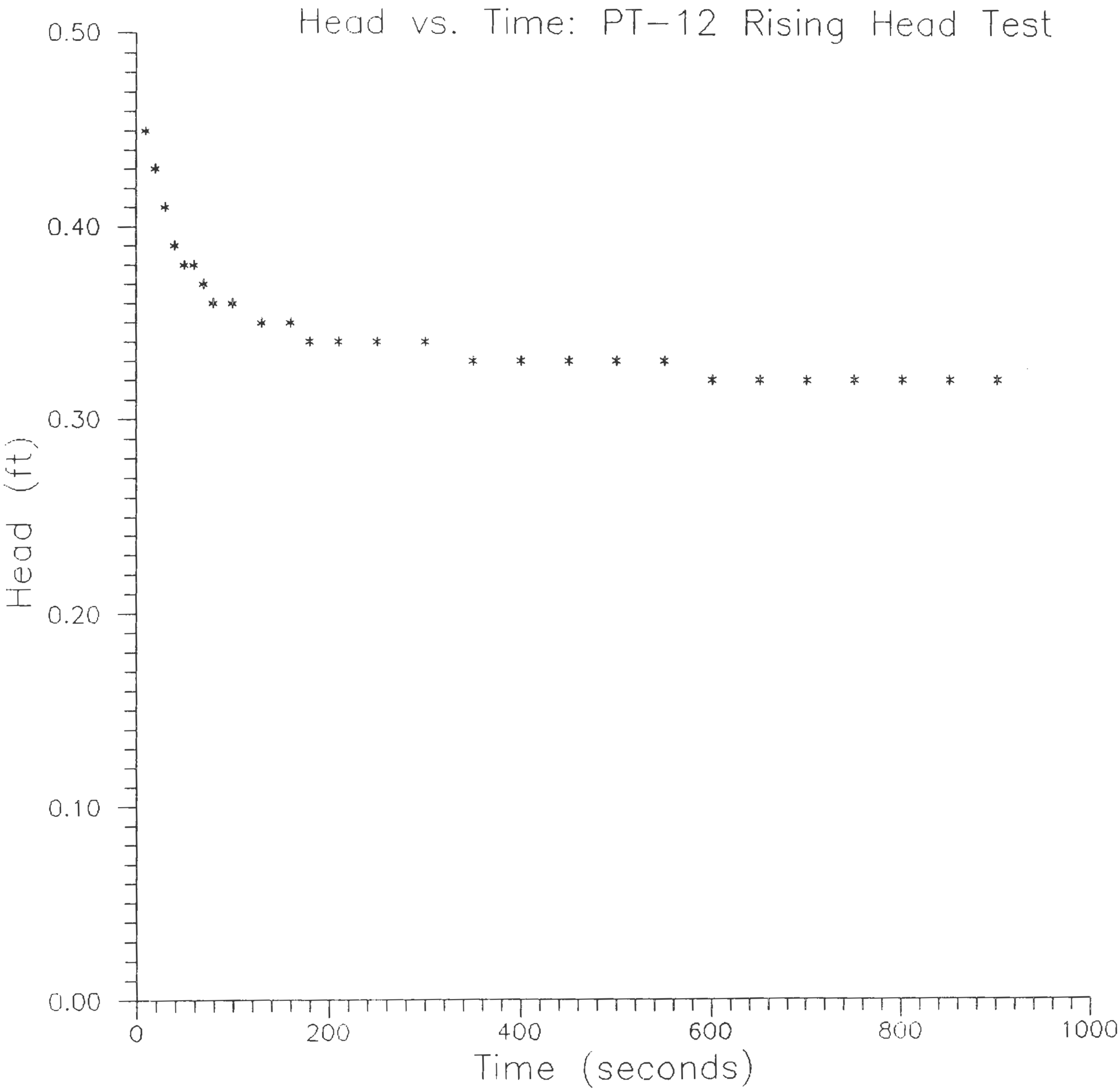


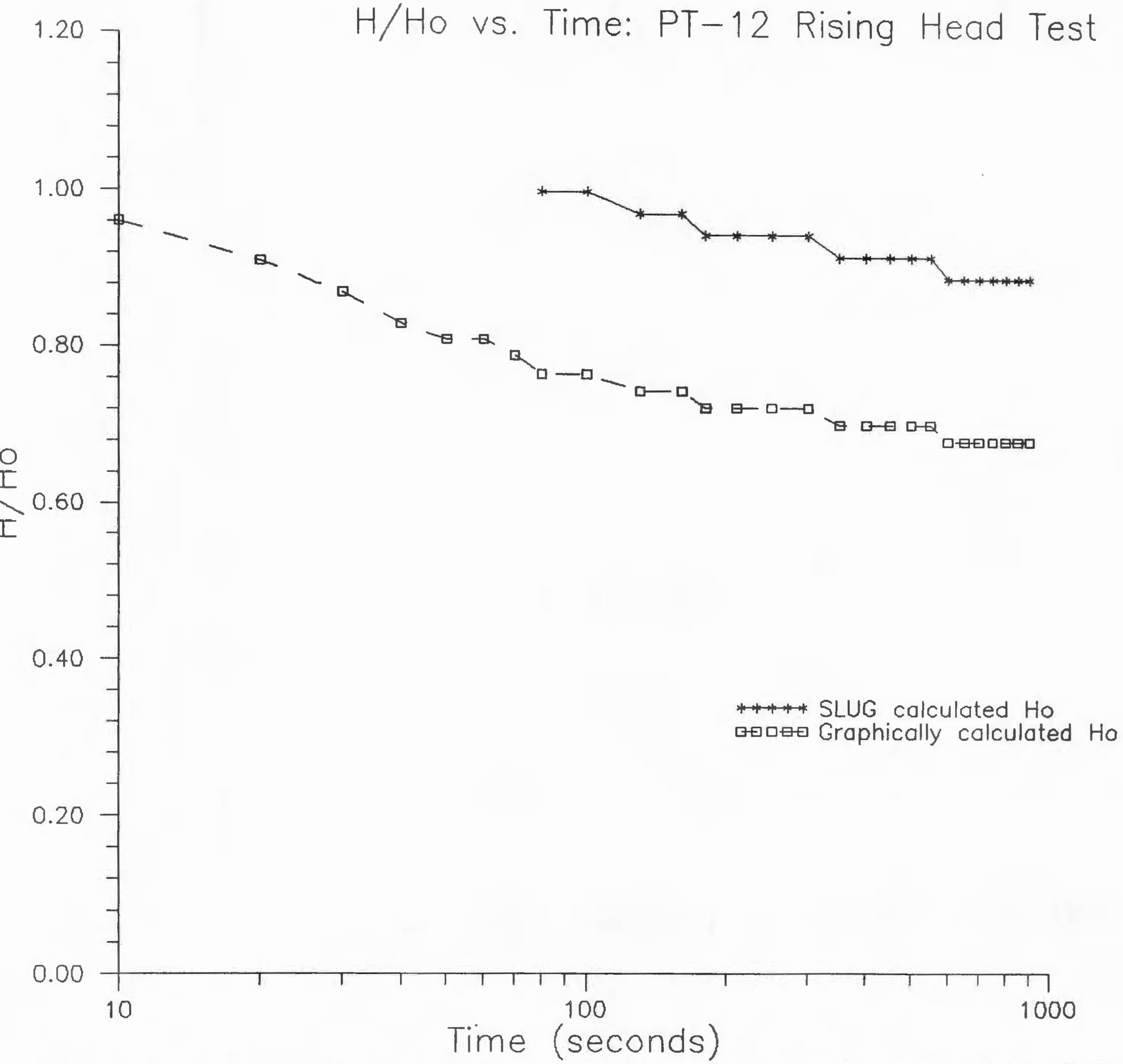
Head vs. Time: PT-11 Rising Head Test


H/Ho vs. Time: PT-11 Rising Head Test
1.20
1.00
0.80
0.60
0.40
0.20
0.00
H/Ho
10
100
1000
Time (seconds)
SLUG calcu
Graphically

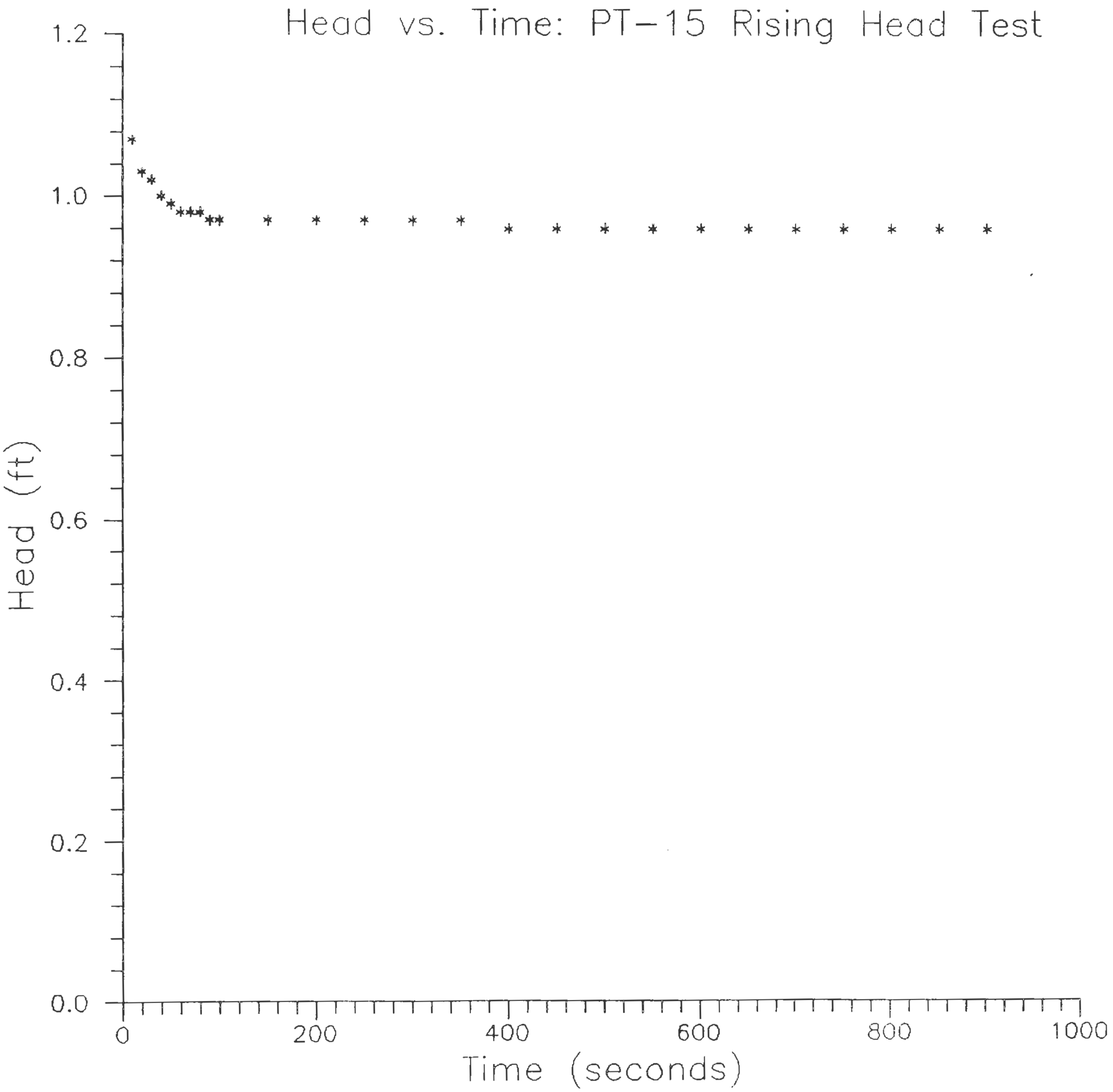

Head vs. Time: PT-12 Falling Head Test
0.40
0.30
0.20
0.10
0.00
Head (ft)
0
200
400
600
800
1000
Time (seconds)

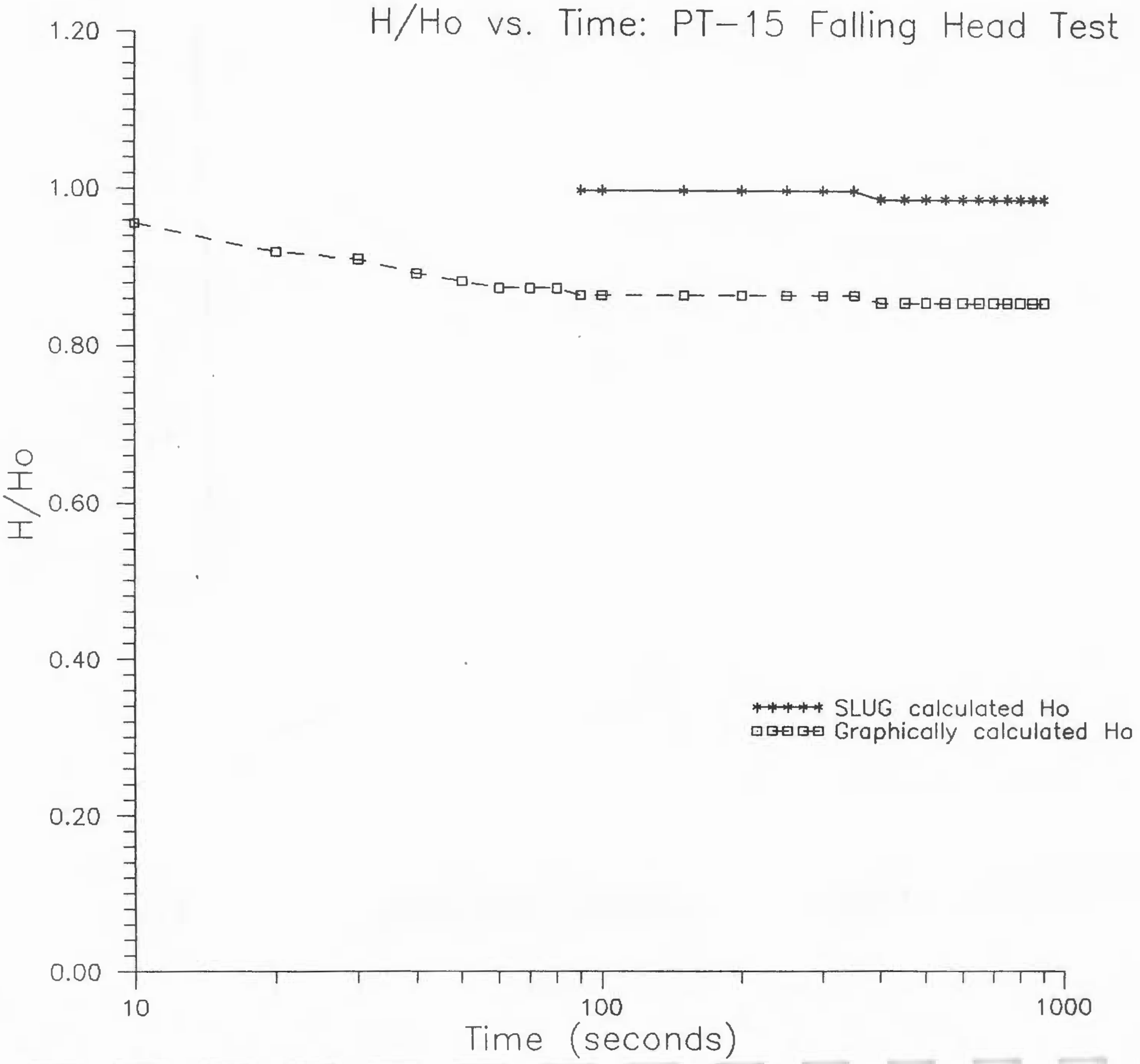

H/Ho vs. Time: PT–12 Falling Head Test
H/Ho
1.20
1.00
0.80
0.60
0.40
0.20
0.00
10
100
1000
Time (seconds)
SLUG calculated Ho
Graphically calculated Ho


Head vs. Time: PT-12 Rising Head Test
0.50
0.40
0.30
0.20
0.10
0.00
Head (ft)
0
200
400
600
800
1000
Time (seconds)

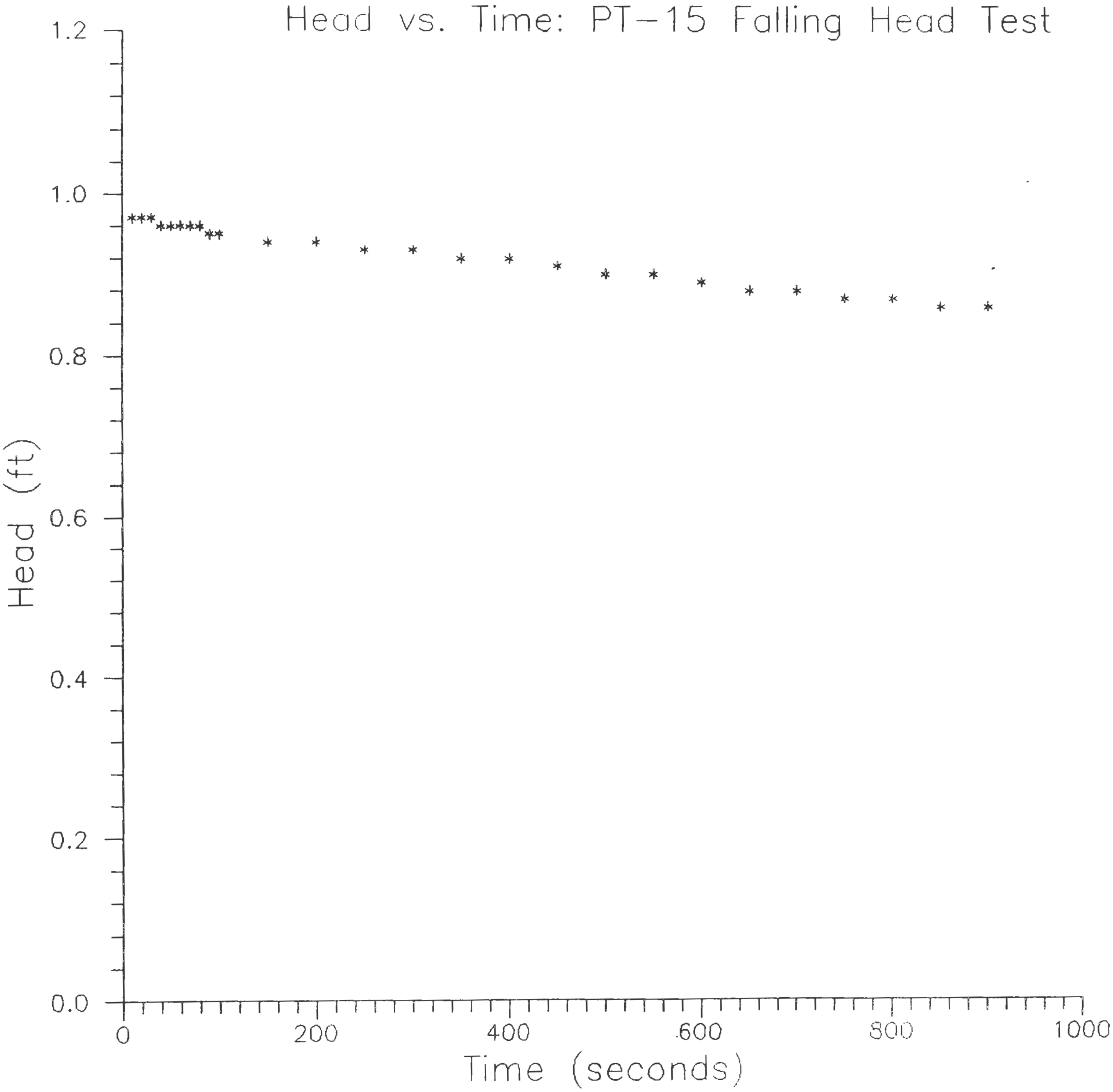


H/Ho vs. Time: PT-12 Rising Head Test


Head vs. Time: PT-15 Rising Head Test
Head (ft)
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
200
400
600
800
1000
Time (seconds)

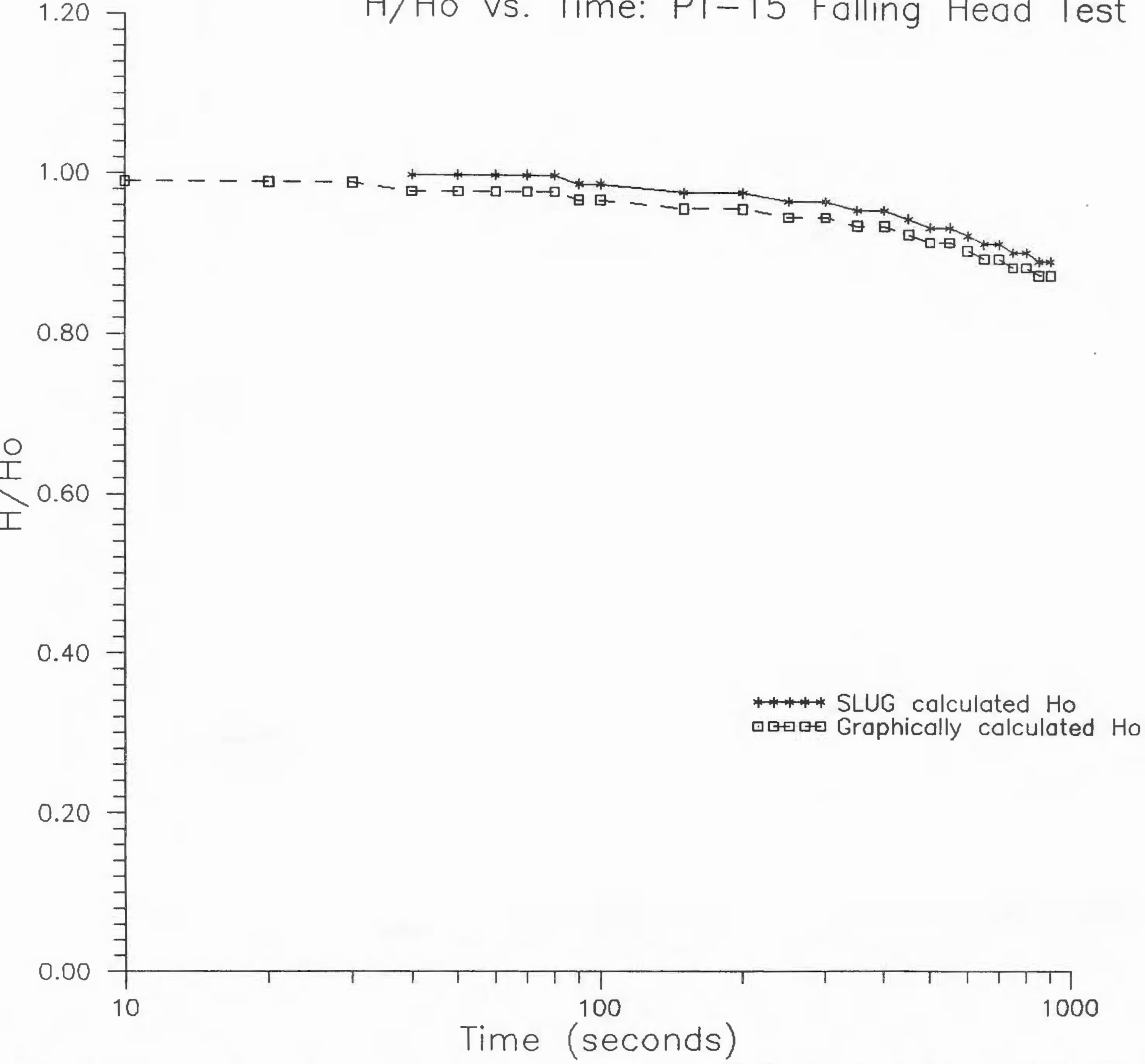


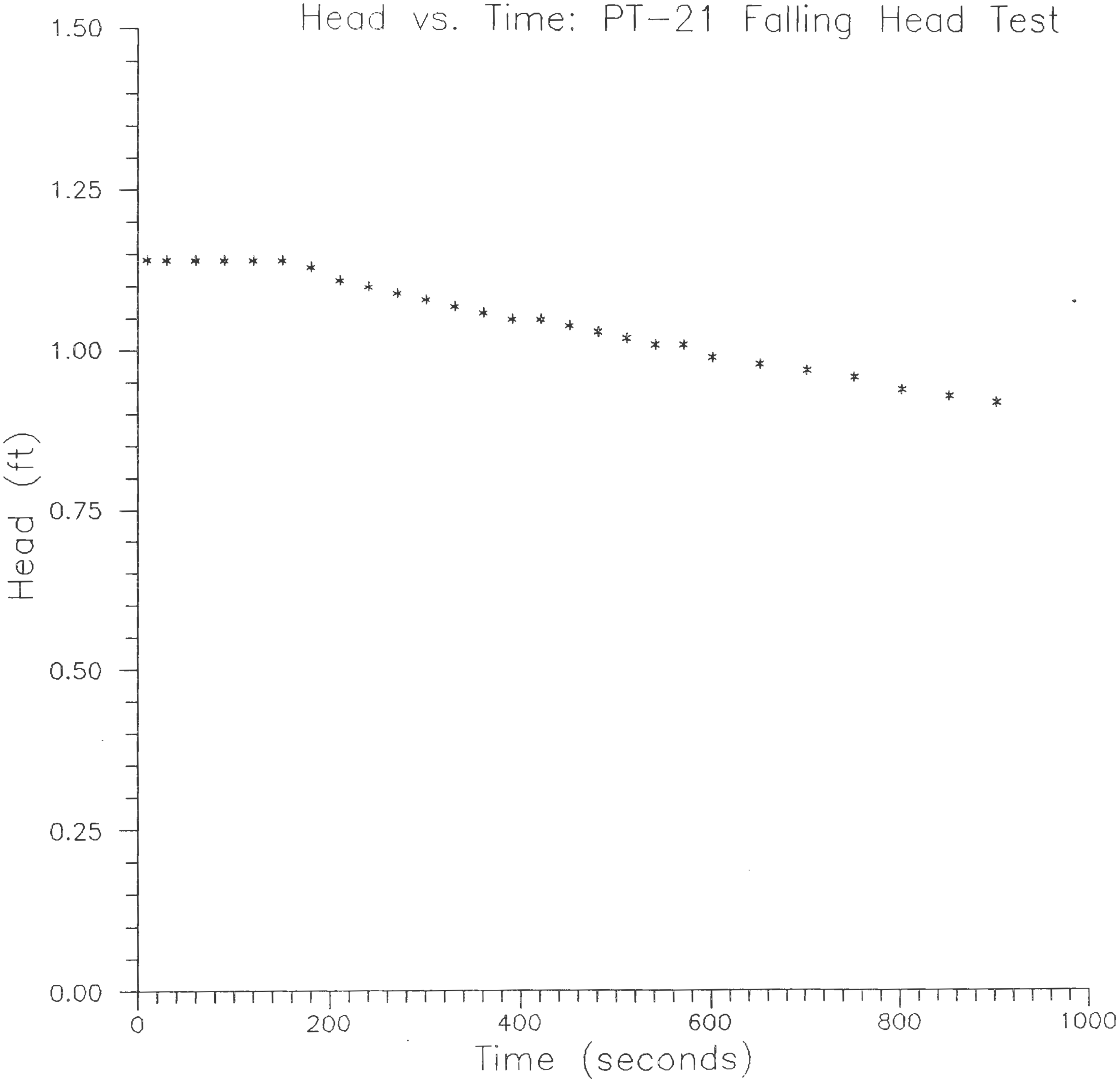
H/Ho vs. Time: PT-15 Falling Head Test



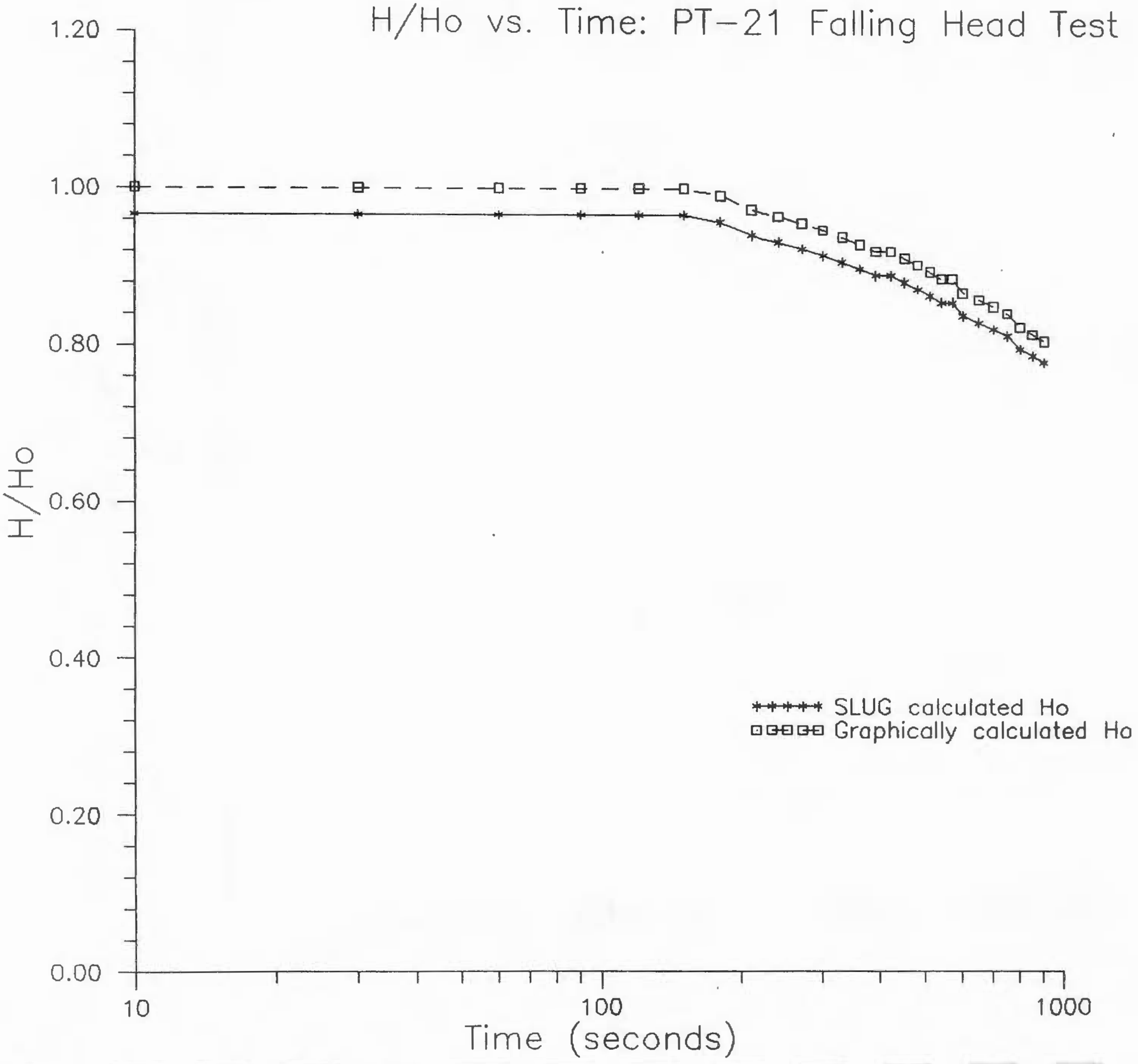
Head vs. Time: PT-15 Falling Head Test

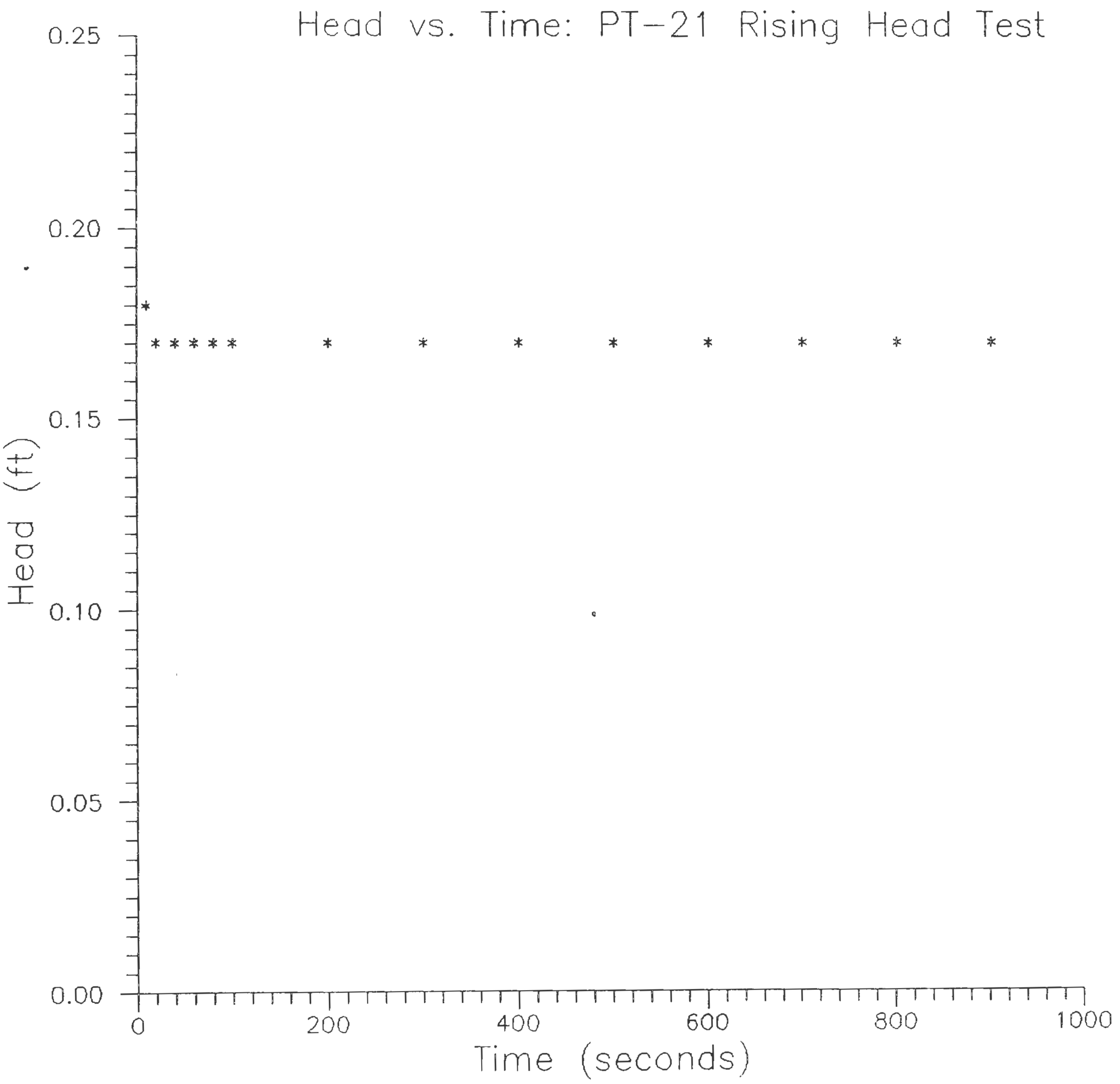
H/Ho vs. Time: PT-15 Falling Head Test



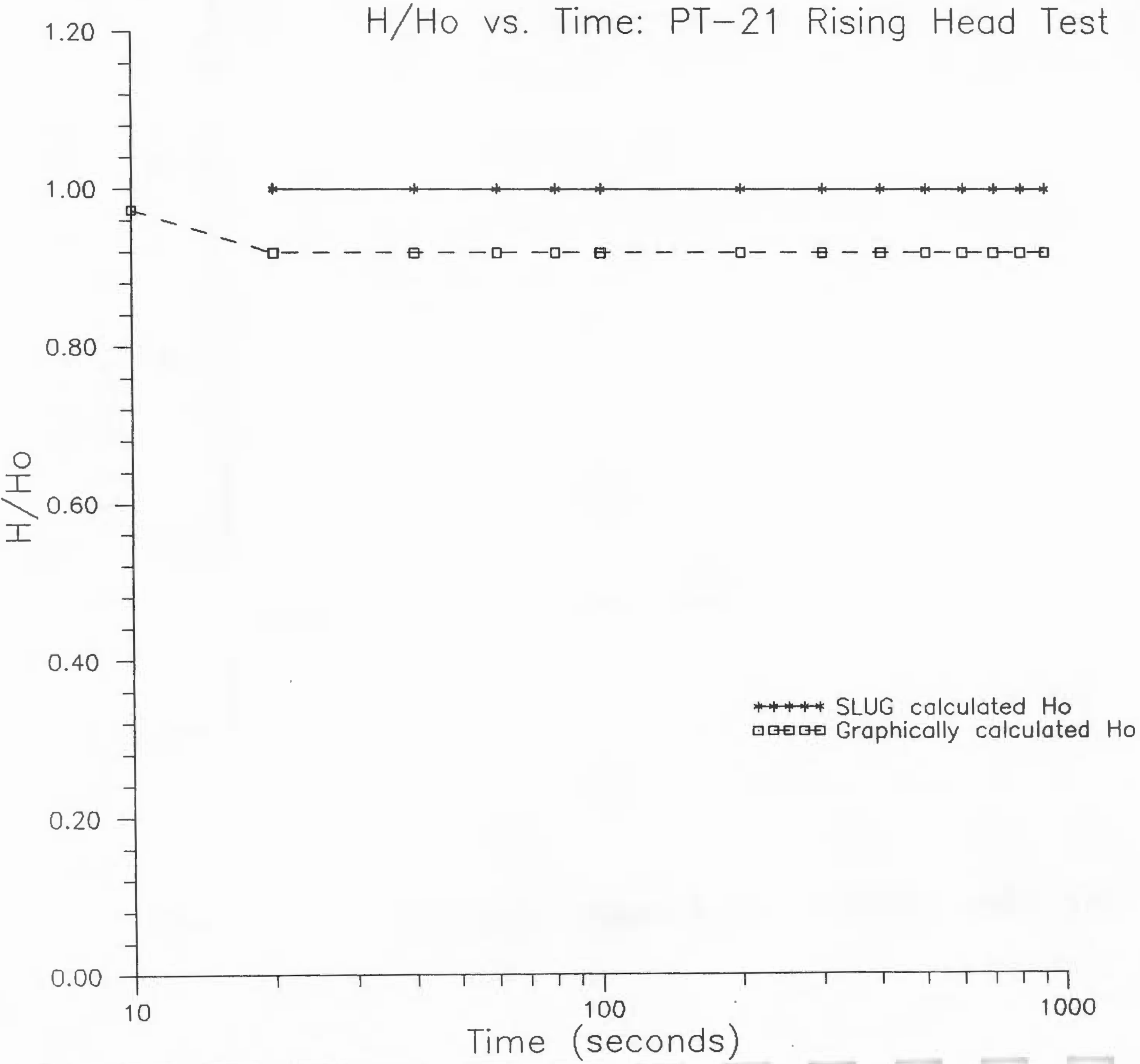


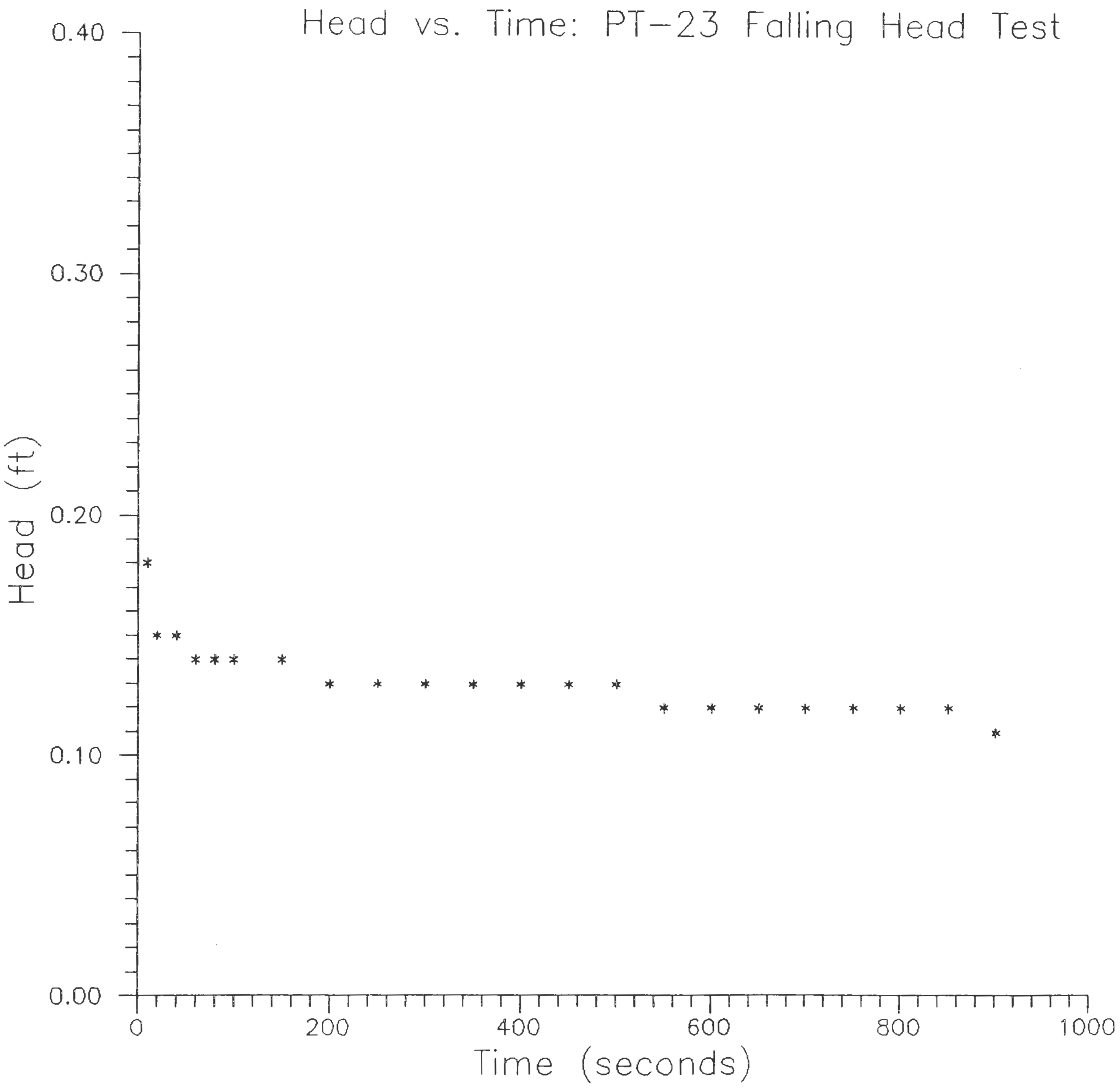
Head vs. Time: PT-21 Falling Head Test


H/Ho vs. Time: PT-21 Falling Head Test
1.20
1.00
0.80
0.60
0.40
0.20
0.00
H/Ho
10
100
1000
Time (seconds)
SLUG calculated Ho
Graphically calculated Ho

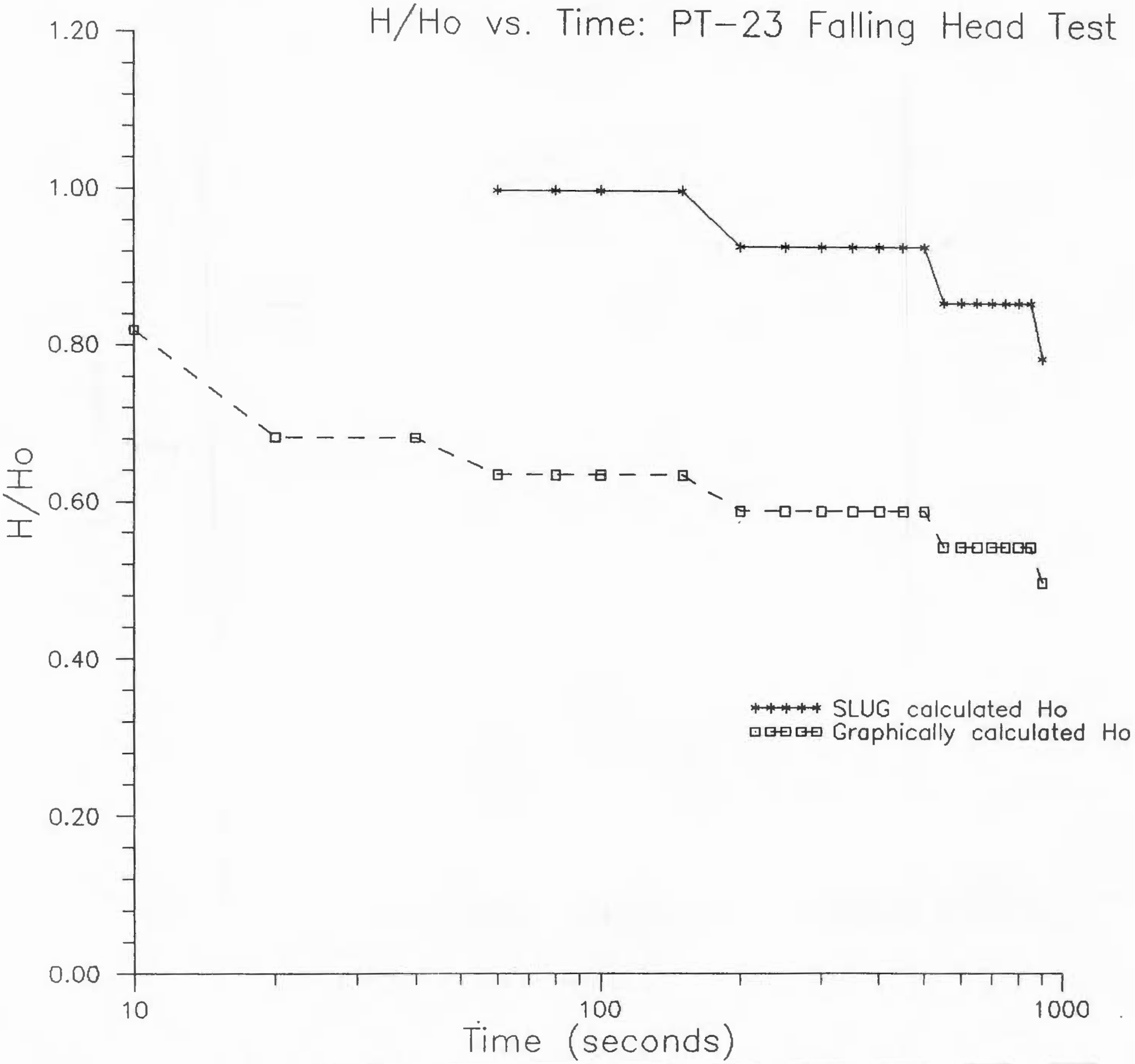


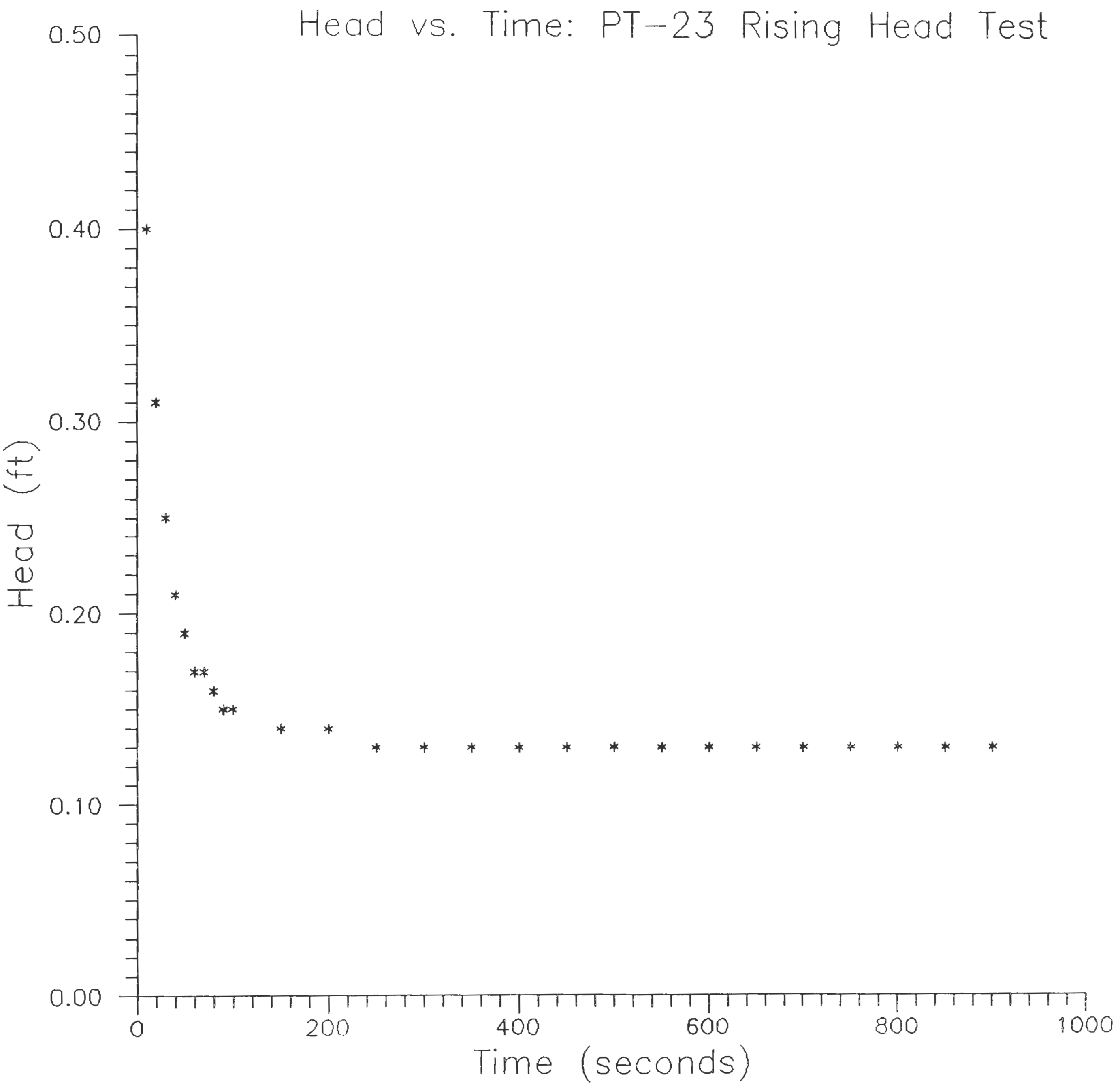
Head vs. Time: PT-21 Rising Head Test


H/Ho vs. Time: PT-21 Rising Head Test



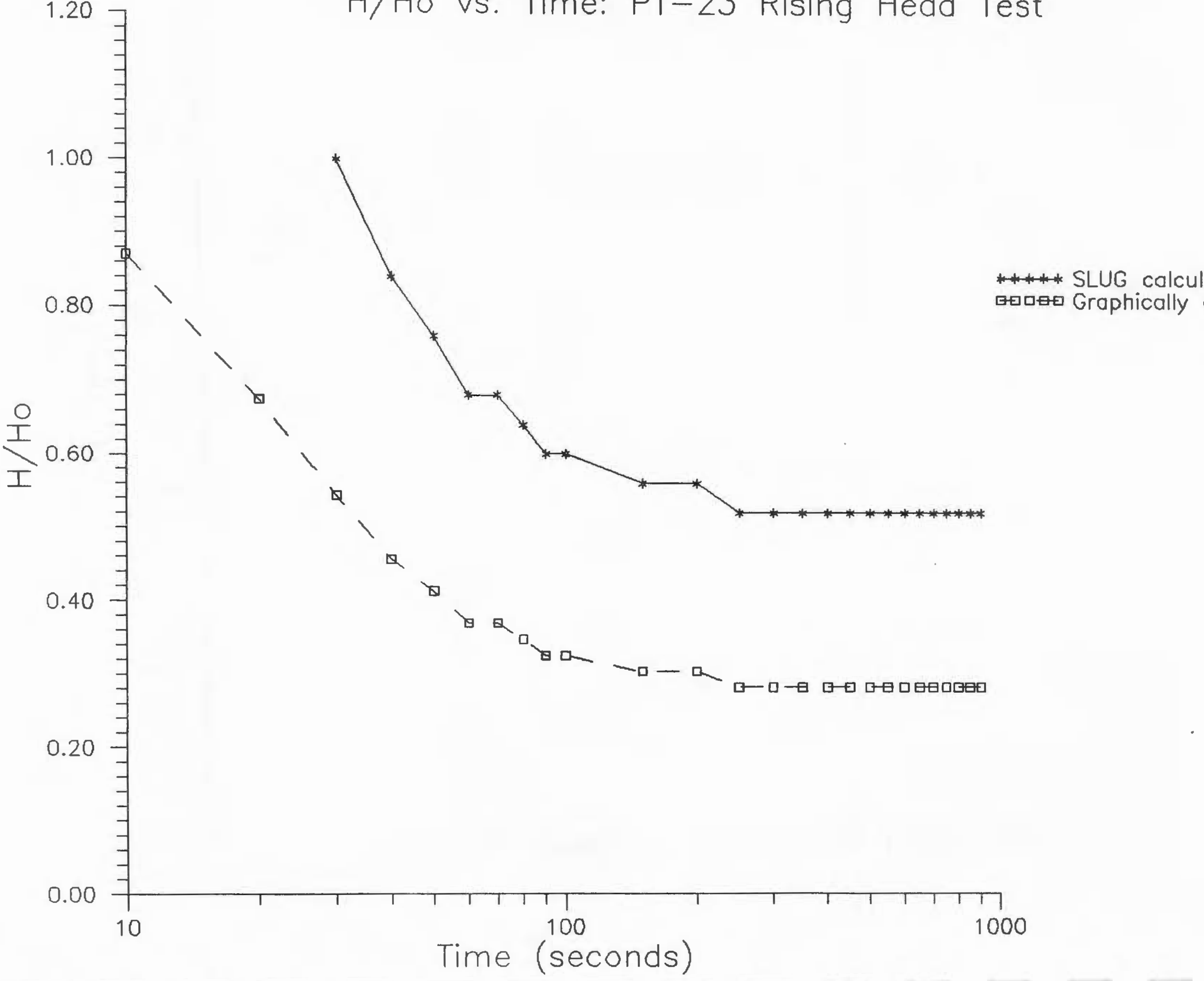
Head vs. Time: PT-23 Falling Head Test


H/Ho vs. Time: PT-23 Falling Head Test



Head vs. Time: PT-23 Rising Head Test

H/Ho vs. Time: PT-23 Rising Head Test



APPENDIX E

CHEMICAL DATA, CERTIFIED REPORTING LIMITS, AND QA CONFORMANCE REPORTS

ETC LABORATORY CERTIFICATION PARAMETERS

DIRECT LOTUS TRANSLATION OF IRDMS METHODS.DBF

ETC CERTIFIED METHODS

METHOD NAME	MEDIA	UNIT MEAS	UNK XXX	STD CODE	HOLD TIME	HOLD TIME1	HOLD TIME2	CERT LVL	CERT DATE	DECERT DATE	CERT REP LIM	MAX CON	TEST NAME	QCT NAME	ACCUR	QCHI MAN	QCHI EXP
ORGANICS/WATER/GCMS	WA	UGL	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	30.20	127.50	13DBD4	Y	1.270	0.00	0
ORGANICS/WATER/GCMS	WA	UGL	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	25.00	115.00	2CLPD4	Y	1.000	0.00	0
ORGANICS/WATER/GCMS	WA	UGL	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	11.30	96.30	ALDRN	N	0.899	0.00	0
ORGANICS/WATER/GCMS	WA	UGL	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	14.30	98.10	ATZ	N	0.921	0.00	0
ORGANICS/WATER/GCMS	WA	UGL	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	4.20	47.90	CL6CP	N	1.170	0.00	0
ORGANICS/WATER/GCMS	WA	UGL	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	11.50	98.10	CLDAN	N	1.090	0.00	0
ORGANICS/WATER/GCMS	WA	UGL	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	5.50	109.40	CPMS	N	1.300	0.00	0
ORGANICS/WATER/GCMS	WA	UGL	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	23.80	48.10	CPMSO	N	0.534	0.00	0
ORGANICS/WATER/GCMS	WA	UGL	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	3.40	98.80	CPMSO2	N	0.978	0.00	0
ORGANICS/WATER/GCMS	WA	UGL	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	10.10	54.40	DBCP	N	1.230	0.00	0
ORGANICS/WATER/GCMS	WA	UGL	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	7.20	99.40	DCPD	N	1.260	0.00	0
ORGANICS/WATER/GCMS	WA	UGL	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	17.30	63.50	DDVP	N	0.940	0.00	0
ORGANICS/WATER/GCMS	WA	UGL	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	7.90	101.30	DEPD4	Y	1.050	0.00	0
ORGANICS/WATER/GCMS	WA	UGL	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	14.70	50.60	DIMP	N	0.595	0.00	0
ORGANICS/WATER/GCMS	WA	UGL	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	6.10	48.10	DITH	N	1.330	0.00	0
ORGANICS/WATER/GCMS	WA	UGL	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	4.40	100.00	DLDRN	N	1.170	0.00	0
ORGANICS/WATER/GCMS	WA	UGL	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	24.90	110.00	DNOPD4	Y	1.380	0.00	0
ORGANICS/WATER/GCMS	WA	UGL	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	10.00	98.10	ENDRN	N	0.903	0.00	0
ORGANICS/WATER/GCMS	WA	UGL	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	8.30	97.50	ISODR	N	0.830	0.00	0
ORGANICS/WATER/GCMS	WA	UGL	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	21.20	47.20	MLTHN	N	0.091	0.00	0
ORGANICS/WATER/GCMS	WA	UGL	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	12.00	50.40	OXAT	N	1.410	0.00	0
ORGANICS/WATER/GCMS	WA	UGL	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	1.60	96.90	PPDDE	N	1.020	0.00	0
ORGANICS/WATER/GCMS	WA	UGL	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	8.80	94.40	PPDDT	N	1.040	0.00	0
ORGANICS/WATER/GCMS	WA	UGL	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	21.60	106.90	PRTHN	N	0.982	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.34	136.00	13DBD4	Y	1.400	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.31	123.00	2CLPD4	Y	1.390	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.40	10.30	ALDRN	N	0.946	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.65	10.50	ATZ	N	0.782	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.88	5.10	CL6CP	N	0.778	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	5.20	26.20	CLDAN	N	1.380	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.29	117.00	CPMS	N	1.160	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.25	5.10	CPMSO	N	0.885	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.26	5.30	CPMSO2	N	0.963	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.30	116.00	DBCP	N	1.190	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.27	106.00	DCPD	N	1.210	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.34	135.00	DDVP	N	1.330	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.27	108.00	DEPD4	Y	1.110	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.27	108.00	DIMP	N	0.997	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.98	103.00	DITH	N	1.100	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.50	10.70	DLDRN	N	0.986	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.35	117.00	DMMP	N	1.210	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.54	117.00	DNOPD4	Y	1.960	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.55	10.50	ENDRN	N	0.979	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.56	10.40	ISODR	N	0.826	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.56	10.10	MLTHN	N	1.030	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.27	107.00	OXAT	N	1.130	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.71	10.30	PPDDE	N	0.935	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.54	5.00	PPDDT	N	1.120	0.00	0
ORGANICS/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.46	11.40	PRTHN	N	1.120	0.00	0

ETC CERTIFIED METHODS

METHOD NAME	MEDIA	UNIT MEAS	UNK XXX	STD CODE	HOLD TIME	HOLD TIME1	HOLD TIME2	CERT LVL	CERT DATE	DECERT DATE	CERT REP LIM	MAX CON	TEST NAME	QCT NAME	ACCUR	QCHI MAN	QCHI EXP	QC MA
VOLATILES/WATER/GCMS	WA	UGL	Y	Y	14	0	0	1A	15-Dec-86	31-Dec-99	2.40	100.00	111TCE	N	0.957	0.00	0	0.
VOLATILES/WATER/GCMS	WA	UGL	Y	Y	14	0	0	1A	15-Dec-86	31-Dec-99	2.40	100.00	112TCE	N	1.010	0.00	0	0.
VOLATILES/WATER/GCMS	WA	UGL	Y	Y	14	0	0	1A	15-Dec-86	31-Dec-99	2.00	100.00	11DCLE	N	0.995	0.00	0	0.
VOLATILES/WATER/GCMS	WA	UGL	Y	Y	14	0	0	1A	15-Dec-86	31-Dec-99	2.60	100.00	12DCD4	Y	0.971	0.00	0	0.
VOLATILES/WATER/GCMS	WA	UGL	Y	Y	14	0	0	1A	15-Dec-86	31-Dec-99	2.60	100.00	12DCE	N	0.979	0.00	0	0.
VOLATILES/WATER/GCMS	WA	UGL	Y	Y	14	0	0	1A	15-Dec-86	31-Dec-99	1.10	100.00	12DCLE	N	0.953	0.00	0	0.
VOLATILES/WATER/GCMS	WA	UGL	Y	Y	14	0	0	1A	15-Dec-86	31-Dec-99	2.90	100.00	13DMB	N	1.010	0.00	0	0.
VOLATILES/WATER/GCMS	WA	UGL	Y	Y	14	0	0	1A	15-Dec-86	31-Dec-99	3.40	100.00	BCHPD	N	0.987	0.00	0	0.
VOLATILES/WATER/GCMS	WA	UGL	Y	Y	14	0	0	1A	15-Dec-86	31-Dec-99	2.20	100.00	C6H6	N	0.951	0.00	0	0.
VOLATILES/WATER/GCMS	WA	UGL	Y	Y	14	0	0	1A	15-Dec-86	31-Dec-99	2.80	100.00	CCL4	N	0.973	0.00	0	0.
VOLATILES/WATER/GCMS	WA	UGL	Y	Y	14	0	0	1A	15-Dec-86	31-Dec-99	2.00	100.00	CD2CL2	Y	1.010	0.00	0	0.
VOLATILES/WATER/GCMS	WA	UGL	Y	Y	14	0	0	1A	15-Dec-86	31-Dec-99	15.70	100.00	CH2CL2	N	0.219	0.00	0	0.
VOLATILES/WATER/GCMS	WA	UGL	Y	Y	14	0	0	1A	15-Dec-86	31-Dec-99	2.10	100.00	CHCL3	N	0.932	0.00	0	0.
VOLATILES/WATER/GCMS	WA	UGL	Y	Y	14	0	0	1A	15-Dec-86	31-Dec-99	1.30	100.00	CLC6H5	N	0.951	0.00	0	0.
VOLATILES/WATER/GCMS	WA	UGL	Y	Y	14	0	0	1A	15-Dec-86	31-Dec-99	3.30	100.00	DBCP	N	1.030	0.00	0	0.
VOLATILES/WATER/GCMS	WA	UGL	Y	Y	14	0	0	1A	15-Dec-86	31-Dec-99	2.10	100.00	DCPD	N	1.000	0.00	0	0.
VOLATILES/WATER/GCMS	WA	UGL	Y	Y	14	0	0	1A	15-Dec-86	31-Dec-99	4.60	100.00	DMDS	N	1.200	0.00	0	0.
VOLATILES/WATER/GCMS	WA	UGL	Y	Y	14	0	0	1A	15-Dec-86	31-Dec-99	1.20	100.00	ETBD10	Y	0.966	0.00	0	0.
VOLATILES/WATER/GCMS	WA	UGL	Y	Y	14	0	0	1A	15-Dec-86	31-Dec-99	2.50	100.00	ETC6H5	N	0.976	0.00	0	0.
VOLATILES/WATER/GCMS	WA	UGL	Y	Y	14	0	0	1A	15-Dec-86	31-Dec-99	2.20	100.00	MEC6H5	N	0.621	0.00	0	0.
VOLATILES/WATER/GCMS	WA	UGL	Y	Y	14	0	0	1A	15-Dec-86	31-Dec-99	5.60	100.00	MIBK	N	0.968	0.00	0	0.
VOLATILES/WATER/GCMS	WA	UGL	Y	Y	14	0	0	1A	15-Dec-86	31-Dec-99	1.30	100.00	TCLEE	N	0.955	0.00	0	0.
VOLATILES/WATER/GCMS	WA	UGL	Y	Y	14	0	0	1A	15-Dec-86	31-Dec-99	2.40	100.00	TRCLE	N	0.957	0.00	0	0.
VOLATILES/WATER/GCMS	WA	UGL	Y	Y	14	0	0	1A	15-Dec-86	31-Dec-99	2.10	100.00	XYLEN	N	1.000	0.00	0	0.
VOLATILES/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.71	25.00	111TCE	N	1.060	0.00	0	0.
VOLATILES/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.64	25.00	112TCE	N	1.260	0.00	0	0.
VOLATILES/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.61	25.00	11DCLE	N	1.220	0.00	0	0.
VOLATILES/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.71	25.00	12DCD4	Y	1.170	0.00	0	0.
VOLATILES/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.75	25.00	12DCE	N	1.210	0.00	0	0.
VOLATILES/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.58	25.00	12DCLE	N	1.150	0.00	0	0.
VOLATILES/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.45	25.00	13DMB	N	1.140	0.00	0	0.
VOLATILES/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.54	25.00	BCHPD	N	1.210	0.00	0	0.
VOLATILES/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.73	25.00	C6H6	N	1.180	0.00	0	0.
VOLATILES/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.70	25.00	CCL4	N	1.220	0.00	0	0.
VOLATILES/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	1.13	25.00	CD2CL2	Y	1.130	0.00	0	0.
VOLATILES/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	1.08	25.00	CH2CL2	N	0.284	0.00	0	0.
VOLATILES/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.61	25.00	CHCL3	N	1.150	0.00	0	0.
VOLATILES/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.40	25.00	CLC6H5	N	1.120	0.00	0	0.
VOLATILES/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.64	25.00	DBCP	N	1.480	0.00	0	0.
VOLATILES/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.59	25.00	DCPD	N	1.190	0.00	0	0.
VOLATILES/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.97	25.00	DMDS	N	1.540	0.00	0	0.
VOLATILES/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.42	25.00	ETBD10	Y	1.120	0.00	0	0.
VOLATILES/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.37	25.00	ETC6H5	N	1.220	0.00	0	0.
VOLATILES/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.47	25.00	MEC6H5	N	0.791	0.00	0	0.
VOLATILES/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.93	25.00	MIBK	N	1.260	0.00	0	0.
VOLATILES/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.48	25.00	TCLEE	N	1.120	0.00	0	0.
VOLATILES/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.90	25.00	TRCLE	N	1.140	0.00	0	0.
VOLATILES/SOIL/GCMS	SO	UGG	Y	Y	0	7	40	1A	15-Dec-86	31-Dec-99	0.90	25.00	XYLEN	N	1.080	0.00	0	0.

ETC CERTIFIED METHODS

METHOD NAME	MEDIA	UNIT MEAS	UNK XXX	STD CODE	HOLD TIME	HOLD TIME1	HOLD TIME2	CERT LVL	CERT DATE	DECERT DATE	CERT REP LIM	MAX CON	TEST NAME	QCT NAME	ACCUR	QCHI MAN	QCHI EXP
ANIONS/WATER/TECHNICON	WA	UGL	N	N	28	0	0	C1	25-Jul-87	31-Dec-99	1380	100000	CL	Y	1.010	1.00	4
ANIONS/WATER/TECHNICON	WA	UGL	N	N	28	0	0	C1	25-Jul-87	31-Dec-99	100	2000	F	Y	1.020	2.00	3
ANIONS/WATER/TECHNICON	WA	UGL	N	N	28	0	0	C1	25-Jul-87	31-Dec-99	23300	200000	SO4	Y	0.960	1.00	5
METALS/WATER/CVAA	WA	UGL	N	N	180	0	0	C1	24-Nov-86	31-Dec-99	0.50	10.00	HG	Y	1.020	0.00	0
METALS/SOIL/CVAA	SO	UGG	N	N	180	0	0	C1	24-Nov-86	31-Dec-99	0.08	1.00	HG	Y	1.060	0.00	0
METALS/WATER/GFAA	WA	UGL	N	N	180	0	0	C1	24-Nov-86	31-Dec-99	7.80	50.00	AS	Y	0.837	0.00	0
METALS/WATER/GFAA	WA	UGL	N	N	180	0	0	C1	21-Apr-87	31-Dec-99	2.50	50.00	PB	Y	0.986	4.00	1
METALS/SOIL/GFAA	SO	UGG	N	N	180	0	0	C1	24-Nov-86	31-Dec-99	5.00	50.00	AS	Y	0.621	0.00	0
METALS/SOIL/GFAA	SO	UGG	N	N	180	0	0	C1	06-Apr-87	31-Dec-99	2.00	40.00	AS	Y	0.975	2.00	1
METALS/WATER/ICP	WA	UGL	N	N	180	0	0	C1	24-Nov-86	31-Dec-99	500	100000	CA	Y	0.995	0.00	0
METALS/WATER/ICP	WA	UGL	N	N	180	0	0	C1	24-Nov-86	31-Dec-99	10.00	500.00	CD	Y	1.000	0.00	0
METALS/WATER/ICP	WA	UGL	N	N	180	0	0	C1	24-Nov-86	31-Dec-99	23.00	500.00	CR	Y	1.010	0.00	0
METALS/WATER/ICP	WA	UGL	N	N	180	0	0	C1	24-Nov-86	31-Dec-99	26.00	1000.00	CU	Y	1.010	0.00	0
METALS/WATER/ICP	WA	UGL	N	N	180	0	0	C1	24-Nov-86	31-Dec-99	510	100000	MG	Y	1.000	0.00	0
METALS/WATER/ICP	WA	UGL	N	N	180	0	0	C1	24-Nov-86	31-Dec-99	2800	100000	NA	Y	1.100	0.00	0
METALS/WATER/ICP	WA	UGL	N	N	180	0	0	C1	24-Nov-86	31-Dec-99	21.00	1000.00	ZN	Y	1.040	0.00	0
METALS/SOIL/ICP	SO	UGG	N	N	180	0	0	C1	30-Oct-87	31-Dec-99	3.37	100.00	CU	Y	0.938	8.00	1
METALS/SOIL/ICP	SO	UGG	N	N	180	0	0	C1	30-Oct-87	31-Dec-99	0.32	10.00	CD	Y	0.913	8.00	0
METALS/SOIL/ICP	SO	UGG	N	N	180	0	0	C1	30-Oct-87	31-Dec-99	7.65	100.00	CR	Y	0.935	8.00	1
METALS/SOIL/ICP	SO	UGG	N	N	180	0	0	C1	30-Oct-87	31-Dec-99	7.84	100.00	PB	Y	0.899	8.00	1
METALS/SOIL/ICP	SO	UGG	N	N	180	0	0	C1	30-Oct-87	31-Dec-99	14.90	100.00	ZN	Y	0.941	8.00	1
			Y	Y	0	0	0	00	01-Jan-85	31-Dec-99	0.00	0.00		N	0.000	0.00	0
			Y	Y	0	0	0	99	01-Jan-85	31-Dec-99	0.00	0.00		N	0.000	0.00	0

CHEMICAL DATA FILES

DIRECT LOTUS TRANSLATION OF LABORATORY LIMS
ASCII FILES

LOT ADN--VOLATILE ORGANIC COMPOUNDS IN WATER

MPLE LOCATION	SMPLDATE	#	PREPDATE	ANALDATE	TEST NAME	DATA-MANT	EXPO	DILU	%MOIS	QC	MEAS	EXPO	SAMPLE	CONC'N	%
NSE BLANK	881031	2	881105	881105	Methylene chloride-D2	5.49	1	1		N	5	1	BH0568	54.9	
NSE BLANK	881031	2	881105	881105	Methylene chloride	BCRL		1					BH0568	0.0	
NSE BLANK	881031	2	881105	881105	1,1-Dichloroethane	BCRL		1					BH0568	0.0	
NSE BLANK	881031	2	881105	881105	1,2-Trans-dichloroethylene	BCRL		1					BH0568	0.0	
NSE BLANK	881031	2	881105	881105	Chloroform	BCRL		1					BH0568	0.0	
NSE BLANK	881031	2	881105	881105	1,2-Dichloroethane	BCRL		1					BH0568	0.0	
NSE BLANK	881031	2	881105	881105	1,2-Dichloroethane-D4	5.54	1	1		N	5	1	BH0568	55.4	
NSE BLANK	881031	2	881105	881105	Carbon tetrachloride	BCRL		1					BH0568	0.0	
NSE BLANK	881031	2	881105	881105	Bicycloheptadiene	BCRL		1					BH0568	0.0	
NSE BLANK	881031	2	881105	881105	Dimethyl disulfide	BCRL		1					BH0568	0.0	
NSE BLANK	881031	2	881105	881105	Trichloroethylene	BCRL		1					BH0568	0.0	
NSE BLANK	881031	2	881105	881105	Benzene	BCRL		1					BH0568	0.0	
NSE BLANK	881031	2	881105	881105	1,1,2-Trichloroethane	BCRL		1					BH0568	0.0	
NSE BLANK	881031	2	881105	881105	Methyl-iso-butyl ketone	BCRL		1					BH0568	0.0	
NSE BLANK	881031	2	881105	881105	Tetrachloroethylene	BCRL		1					BH0568	0.0	
NSE BLANK	881031	2	881105	881105	Toluene	BCRL		1					BH0568	0.0	
NSE BLANK	881031	2	881105	881105	1,1,1-Trichloroethane	BCRL		1					BH0568	0.0	
NSE BLANK	881031	2	881105	881105	Dicyclopentadiene	BCRL		1					BH0568	0.0	
NSE BLANK	881031	2	881105	881105	Chlorobenzene	BCRL		1					BH0568	0.0	
NSE BLANK	881031	2	881105	881105	Ethylbenzene-D10	5.16	1	1		N	5	1	BH0568	51.6	
NSE BLANK	881031	2	881105	881105	Ethylbenzene	BCRL		1					BH0568	0.0	
NSE BLANK	881031	2	881105	881105	1,2-Dibromo-3-chloropropane	BCRL		1					BH0568	0.0	
NSE BLANK	881031	2	881105	881105	m-Xylene	BCRL		1					BH0568	0.0	
NSE BLANK	881031	2	881105	881105	o+p-Xylenes	BCRL		1					BH0568	0.0	
ETHOD BLANK	881031	1	881105	881105	Methylene chloride-D2	5.51	1	1		N	5	1	BH2178	55.1	
ETHOD BLANK	881031	1	881105	881105	Methylene chloride	BCRL		1		M			BH2178	0.0	
ETHOD BLANK	881031	1	881105	881105	1,1-Dichloroethane	BCRL		1		M			BH2178	0.0	
ETHOD BLANK	881031	1	881105	881105	1,2-Trans-dichloroethylene	BCRL		1		M			BH2178	0.0	
ETHOD BLANK	881031	1	881105	881105	Chloroform	BCRL		1		M			BH2178	0.0	
ETHOD BLANK	881031	1	881105	881105	1,2-Dichloroethane	BCRL		1		M			BH2178	0.0	
ETHOD BLANK	881031	1	881105	881105	1,2-Dichloroethane-D4	5.74	1	1		N	5	1	BH2178	57.4	
ETHOD BLANK	881031	1	881105	881105	Carbon tetrachloride	BCRL		1		M			BH2178	0.0	
ETHOD BLANK	881031	1	881105	881105	Bicycloheptadiene	BCRL		1		M			BH2178	0.0	
ETHOD BLANK	881031	1	881105	881105	Dimethyl disulfide	BCRL		1		M			BH2178	0.0	
ETHOD BLANK	881031	1	881105	881105	Trichloroethylene	5.12	0	1		M			BH2178	5.1	*
ETHOD BLANK	881031	1	881105	881105	Benzene	BCRL		1		M			BH2178	0.0	
ETHOD BLANK	881031	1	881105	881105	1,1,2-Trichloroethane	BCRL		1		M			BH2178	0.0	
ETHOD BLANK	881031	1	881105	881105	Methyl-iso-butyl ketone	BCRL		1		M			BH2178	0.0	
ETHOD BLANK	881031	1	881105	881105	Tetrachloroethylene	BCRL		1		M			BH2178	0.0	
ETHOD BLANK	881031	1	881105	881105	Toluene	BCRL		1		M			BH2178	0.0	
ETHOD BLANK	881031	1	881105	881105	1,1,1-Trichloroethane	BCRL		1		M			BH2178	0.0	
ETHOD BLANK	881031	1	881105	881105	Dicyclopentadiene	BCRL		1		M			BH2178	0.0	
ETHOD BLANK	881031	1	881105	881105	Chlorobenzene	BCRL		1		M			BH2178	0.0	
ETHOD BLANK	881031	1	881105	881105	Ethylbenzene-D10	5.09	1	1		N	5	1	BH2178	50.9	
ETHOD BLANK	881031	1	881105	881105	Ethylbenzene	BCRL		1		M			BH2178	0.0	
ETHOD BLANK	881031	1	881105	881105	1,2-Dibromo-3-chloropropane	BCRL		1		M			BH2178	0.0	
ETHOD BLANK	881031	1	881105	881105	m-Xylene	BCRL		1		M			BH2178	0.0	
ETHOD BLANK	881031	1	881105	881105	o+p-Xylenes	BCRL		1		M			BH2178	0.0	

LOT ADS--VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

MPLE	LOCATION	SMPLDATE	#	PREPDATE	ANALDATE	TEST NAME	DATA-MANT	EXPO	DILU	%MOIS	QC	MEAS	EXPO	SAMPLE	CONC'N	%REC
WELL	PT-10	881116	2	881122	881122	Methylene chloride-D2	5	1	1		N	5	1	BH3527	50.0	1
WELL	PT-10	881116	2	881122	881122	Methylene chloride	BCRL		1					BH3527	0.0	
WELL	PT-10	881116	2	881122	881122	1,1-Dichloroethane	BCRL		1					BH3527	0.0	
WELL	PT-10	881116	2	881122	881122	1,2-Trans-dichloroethylene	BCRL		1					BH3527	0.0	
WELL	PT-10	881116	2	881122	881122	Chloroform	BCRL		1					BH3527	0.0	
WELL	PT-10	881116	2	881122	881122	1,2-Dichloroethane	BCRL		1					BH3527	0.0	
WELL	PT-10	881116	2	881122	881122	1,2-Dichloroethane-D4	5.25	1	1		N	5	1	BH3527	52.5	1
WELL	PT-10	881116	2	881122	881122	Carbon tetrachloride	BCRL		1					BH3527	0.0	
WELL	PT-10	881116	2	881122	881122	Bicycloheptadiene	BCRL		1					BH3527	0.0	
WELL	PT-10	881116	2	881122	881122	Dimethyl disulfide	BCRL		1					BH3527	0.0	
WELL	PT-10	881116	2	881122	881122	Trichloroethylene	BCRL		1					BH3527	0.0	
WELL	PT-10	881116	2	881122	881122	Benzene	BCRL		1					BH3527	0.0	
WELL	PT-10	881116	2	881122	881122	1,1,2-Trichloroethane	BCRL		1					BH3527	0.0	
WELL	PT-10	881116	2	881122	881122	Methyl-iso-butyl ketone	BCRL		1					BH3527	0.0	
WELL	PT-10	881116	2	881122	881122	Tetrachloroethylene	BCRL		1					BH3527	0.0	
WELL	PT-10	881116	2	881122	881122	Toluene	BCRL		1					BH3527	0.0	
WELL	PT-10	881116	2	881122	881122	1,1,1-Trichloroethane	BCRL		1					BH3527	0.0	
WELL	PT-10	881116	2	881122	881122	Dicyclopentadiene	BCRL		1					BH3527	0.0	
WELL	PT-10	881116	2	881122	881122	Chlorobenzene	BCRL		1					BH3527	0.0	
WELL	PT-10	881116	2	881122	881122	Ethylbenzene-D10	4.83	1	1		N	5	1	BH3527	48.3	9
WELL	PT-10	881116	2	881122	881122	Ethylbenzene	BCRL		1					BH3527	0.0	
WELL	PT-10	881116	2	881122	881122	1,2-Dibromo-3-chloropropane	BCRL		1					BH3527	0.0	
WELL	PT-10	881116	2	881122	881122	m-Xylene	BCRL		1					BH3527	0.0	
WELL	PT-10	881116	2	881122	881122	o+p-Xylenes	BCRL		1					BH3527	0.0	
WELL	PT-15	881116	3	881122	881122	Methylene chloride-D2	5.07	1	1		N	5	1	BH3528	50.7	1
WELL	PT-15	881116	3	881122	881122	Methylene chloride	BCRL		1					BH3528	0.0	
WELL	PT-15	881116	3	881122	881122	1,1-Dichloroethane	BCRL		1					BH3528	0.0	
WELL	PT-15	881116	3	881122	881122	1,2-Trans-dichloroethylene	BCRL		1					BH3528	0.0	
WELL	PT-15	881116	3	881122	881122	Chloroform	BCRL		1					BH3528	0.0	
WELL	PT-15	881116	3	881122	881122	1,2-Dichloroethane	BCRL		1					BH3528	0.0	
WELL	PT-15	881116	3	881122	881122	1,2-Dichloroethane-D4	5.3	1	1		N	5	1	BH3528	53.0	1
WELL	PT-15	881116	3	881122	881122	Carbon tetrachloride	BCRL		1					BH3528	0.0	
WELL	PT-15	881116	3	881122	881122	Bicycloheptadiene	BCRL		1					BH3528	0.0	
WELL	PT-15	881116	3	881122	881122	Dimethyl disulfide	BCRL		1					BH3528	0.0	
WELL	PT-15	881116	3	881122	881122	Trichloroethylene	BCRL		1					BH3528	0.0	
WELL	PT-15	881116	3	881122	881122	Benzene	BCRL		1					BH3528	0.0	
WELL	PT-15	881116	3	881122	881122	1,1,2-Trichloroethane	BCRL		1					BH3528	0.0	
WELL	PT-15	881116	3	881122	881122	Methyl-iso-butyl ketone	BCRL		1					BH3528	0.0	
WELL	PT-15	881116	3	881122	881122	Tetrachloroethylene	BCRL		1					BH3528	0.0	
WELL	PT-15	881116	3	881122	881122	Toluene	BCRL		1					BH3528	0.0	
WELL	PT-15	881116	3	881122	881122	1,1,1-Trichloroethane	BCRL		1					BH3528	0.0	
WELL	PT-15	881116	3	881122	881122	Dicyclopentadiene	BCRL		1					BH3528	0.0	
WELL	PT-15	881116	3	881122	881122	Chlorobenzene	BCRL		1					BH3528	0.0	
WELL	PT-15	881116	3	881122	881122	Ethylbenzene-D10	4.83	1	1		N	5	1	BH3528	48.3	9
WELL	PT-15	881116	3	881122	881122	Ethylbenzene	BCRL		1					BH3528	0.0	
WELL	PT-15	881116	3	881122	881122	1,2-Dibromo-3-chloropropane	BCRL		1					BH3528	0.0	
WELL	PT-15	881116	3	881122	881122	m-Xylene	BCRL		1					BH3528	0.0	
WELL	PT-15	881116	3	881122	881122	o+p-Xylenes	BCRL		1					BH3528	0.0	
WELL	PT-25	881116	4	881122	881122	Methylene chloride-D2	4.55	1	1		N	5	1	BH3529	45.5	9
WELL	PT-25	881116	4	881122	881122	Methylene chloride	BCRL		1					BH3529	0.0	
WELL	PT-25	881116	4	881122	881122	1,1-Dichloroethane	BCRL		1					BH3529	0.0	
WELL	PT-25	881116	4	881122	881122	1,2-Trans-dichloroethylene	BCRL		1					BH3529	0.0	
WELL	PT-25	881116	4	881122	881122	Chloroform	BCRL		1					BH3529	0.0	
WELL	PT-25	881116	4	881122	881122	1,2-Dichloroethane	BCRL		1					BH3529	0.0	
WELL	PT-25	881116	4	881122	881122	1,2-Dichloroethane-D4	5.2	1	1		N	5	1	BH3529	52.0	1
WELL	PT-25	881116	4	881122	881122	Carbon tetrachloride	BCRL		1					BH3529	0.0	

LOT ADS--VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

AMPLE	LOCATION	SMPLDATE	#	PREPDATE	ANALDATE	TEST NAME	DATA-MANT	EXPO	DILU	%MOIS	QC	MEAS	EXPO	SAMPLE	CONC'N	%RE
WELL	PT-25	881116	4	881122	881122	Bicycloheptadiene	BCRL		1					BH3529	0.0	
WELL	PT-25	881116	4	881122	881122	Dimethyl disulfide	BCRL		1					BH3529	0.0	
WELL	PT-25	881116	4	881122	881122	Trichloroethylene	BCRL		1					BH3529	0.0	
WELL	PT-25	881116	4	881122	881122	Benzene	BCRL		1					BH3529	0.0	
WELL	PT-25	881116	4	881122	881122	1,1,2-Trichloroethane	BCRL		1					BH3529	0.0	
WELL	PT-25	881116	4	881122	881122	Methyl-iso-butyl ketone	BCRL		1					BH3529	0.0	
WELL	PT-25	881116	4	881122	881122	Tetrachloroethylene	BCRL		1					BH3529	0.0	
WELL	PT-25	881116	4	881122	881122	Toluene	BCRL		1					BH3529	0.0	
WELL	PT-25	881116	4	881122	881122	1,1,1-Trichloroethane	BCRL		1					BH3529	0.0	
WELL	PT-25	881116	4	881122	881122	Dicyclopentadiene	BCRL		1					BH3529	0.0	
WELL	PT-25	881116	4	881122	881122	Chlorobenzene	BCRL		1					BH3529	0.0	
WELL	PT-25	881116	4	881122	881122	Ethylbenzene-D10	4.55	1	1		N	5	1	BH3529	45.5	
WELL	PT-25	881116	4	881122	881122	Ethylbenzene	BCRL		1					BH3529	0.0	
WELL	PT-25	881116	4	881122	881122	1,2-Dibromo-3-chloropropane	BCRL		1					BH3529	0.0	
WELL	PT-25	881116	4	881122	881122	m-Xylene	BCRL		1					BH3529	0.0	
WELL	PT-25	881116	4	881122	881122	o+p-Xylenes	BCRL		1					BH3529	0.0	
WELL	PT-24	881116	6	881122	881122	Methylene chloride-D2	6.18	1	1		N	5	1	BH3531	61.8	
WELL	PT-24	881116	6	881122	881122	Methylene chloride	BCRL		1					BH3531	0.0	
WELL	PT-24	881116	6	881122	881122	1,1-Dichloroethane	BCRL		1					BH3531	0.0	
WELL	PT-24	881116	6	881122	881122	1,2-Trans-dichloroethylene	7.11	1	1					BH3531	71.1	***
WELL	PT-24	881116	6	881122	881122	Chloroform	BCRL		1					BH3531	0.0	
WELL	PT-24	881116	6	881122	881122	1,2-Dichloroethane	BCRL		1					BH3531	0.0	
WELL	PT-24	881116	6	881122	881122	1,2-Dichloroethane-D4	5.27	1	1		N	5	1	BH3531	52.7	
WELL	PT-24	881116	6	881122	881122	Carbon tetrachloride	BCRL		1					BH3531	0.0	
WELL	PT-24	881116	6	881122	881122	Bicycloheptadiene	BCRL		1					BH3531	0.0	
WELL	PT-24	881116	6	881122	881122	Dimethyl disulfide	BCRL		1					BH3531	0.0	
WELL	PT-24	881116	6	881122	881122	Trichloroethylene	BCRL		1					BH3531	0.0	
WELL	PT-24	881116	6	881122	881122	Benzene	BCRL		1					BH3531	0.0	
WELL	PT-24	881116	6	881122	881122	1,1,2-Trichloroethane	BCRL		1					BH3531	0.0	
WELL	PT-24	881116	6	881122	881122	Methyl-iso-butyl ketone	BCRL		1					BH3531	0.0	
WELL	PT-24	881116	6	881122	881122	Tetrachloroethylene	BCRL		1					BH3531	0.0	
WELL	PT-24	881116	6	881122	881122	Toluene	BCRL		1					BH3531	0.0	
WELL	PT-24	881116	6	881122	881122	1,1,1-Trichloroethane	BCRL		1					BH3531	0.0	
WELL	PT-24	881116	6	881122	881122	Dicyclopentadiene	BCRL		1					BH3531	0.0	
WELL	PT-24	881116	6	881122	881122	Chlorobenzene	BCRL		1					BH3531	0.0	
WELL	PT-24	881116	6	881122	881122	Ethylbenzene-D10	5.11	1	1		N	5	1	BH3531	51.1	
WELL	PT-24	881116	6	881122	881122	Ethylbenzene	BCRL		1					BH3531	0.0	
WELL	PT-24	881116	6	881122	881122	1,2-Dibromo-3-chloropropane	BCRL		1					BH3531	0.0	
WELL	PT-24	881116	6	881122	881122	m-Xylene	BCRL		1					BH3531	0.0	
WELL	PT-24	881116	6	881122	881122	o+p-Xylenes	BCRL		1					BH3531	0.0	
WELL	PT-21	881117	7	881122	881122	Methylene chloride-D2	6.38	1	1		N	5	1	BH3532	63.8	
WELL	PT-21	881117	7	881122	881122	Methylene chloride	BCRL		1					BH3532	0.0	
WELL	PT-21	881117	7	881122	881122	1,1-Dichloroethane	BCRL		1					BH3532	0.0	
WELL	PT-21	881117	7	881122	881122	1,2-Trans-dichloroethylene	BCRL		1					BH3532	0.0	
WELL	PT-21	881117	7	881122	881122	Chloroform	BCRL		1					BH3532	0.0	
WELL	PT-21	881117	7	881122	881122	1,2-Dichloroethane	BCRL		1					BH3532	0.0	
WELL	PT-21	881117	7	881122	881122	1,2-Dichloroethane-D4	5.24	1	1		N	5	1	BH3532	52.4	
WELL	PT-21	881117	7	881122	881122	Carbon tetrachloride	BCRL		1					BH3532	0.0	
WELL	PT-21	881117	7	881122	881122	Bicycloheptadiene	BCRL		1					BH3532	0.0	
WELL	PT-21	881117	7	881122	881122	Dimethyl disulfide	BCRL		1					BH3532	0.0	
WELL	PT-21	881117	7	881122	881122	Trichloroethylene	BCRL		1					BH3532	0.0	
WELL	PT-21	881117	7	881122	881122	Benzene	BCRL		1					BH3532	0.0	
WELL	PT-21	881117	7	881122	881122	1,1,2-Trichloroethane	BCRL		1					BH3532	0.0	
WELL	PT-21	881117	7	881122	881122	Methyl-iso-butyl ketone	BCRL		1					BH3532	0.0	
WELL	PT-21	881117	7	881122	881122	Tetrachloroethylene	BCRL		1					BH3532	0.0	
WELL	PT-21	881117	7	881122	881122	Toluene	BCRL		1					BH3532	0.0	

LOT ADS--VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

MPLE LOCATION	SMPLDATE	#	PREPDATE	ANALDATE	TEST NAME	DATA-MANT	EXPO	DILU	%MOIS	QC	MEAS	EXPO	SAMPLE	CONC'N	%REC
WELL PT-21	881117	7	881122	881122	1,1,1-Trichloroethane	BCRL		1					BH3532	0.0	
WELL PT-21	881117	7	881122	881122	Dicyclopentadiene	BCRL		1					BH3532	0.0	
WELL PT-21	881117	7	881122	881122	Chlorobenzene	BCRL		1					BH3532	0.0	
WELL PT-21	881117	7	881122	881122	Ethylbenzene-D10	5.16	1	1		N	5	1	BH3532	51.6	1
WELL PT-21	881117	7	881122	881122	Ethylbenzene	BCRL		1					BH3532	0.0	
WELL PT-21	881117	7	881122	881122	1,2-Dibromo-3-chloropropane	BCRL		1					BH3532	0.0	
WELL PT-21	881117	7	881122	881122	m-Xylene	BCRL		1					BH3532	0.0	
WELL PT-21	881117	7	881122	881122	o+p-Xylenes	BCRL		1					BH3532	0.0	
WELL PT-22	881117	8	881122	881122	Methylene chloride-D2	6.69	1	1		N	5	1	BH3533	66.9	1
WELL PT-22	881117	8	881122	881122	Methylene chloride	BCRL		1					BH3533	0.0	
WELL PT-22	881117	8	881122	881122	1,1-Dichloroethane	BCRL		1					BH3533	0.0	
WELL PT-22	881117	8	881122	881122	1,2-Trans-dichloroethylene	8.51	1	1					BH3533	85.1	****
WELL PT-22	881117	8	881122	881122	Chloroform	BCRL		1					BH3533	0.0	
WELL PT-22	881117	8	881122	881122	1,2-Dichloroethane	BCRL		1					BH3533	0.0	
WELL PT-22	881117	8	881122	881122	1,2-Dichloroethane-D4	5.33	1	1		N	5	1	BH3533	53.3	1
WELL PT-22	881117	8	881122	881122	Carbon tetrachloride	BCRL		1					BH3533	0.0	
WELL PT-22	881117	8	881122	881122	Bicycloheptadiene	BCRL		1					BH3533	0.0	
WELL PT-22	881117	8	881122	881122	Dimethyl disulfide	BCRL		1					BH3533	0.0	
WELL PT-22	881117	8	881122	881122	Trichloroethylene	4.18	1	1					BH3533	41.8	****
WELL PT-22	881117	8	881122	881122	Benzene	BCRL		1					BH3533	0.0	
WELL PT-22	881117	8	881122	881122	1,1,2-Trichloroethane	BCRL		1					BH3533	0.0	
WELL PT-22	881117	8	881122	881122	Methyl-iso-butyl ketone	BCRL		1					BH3533	0.0	
WELL PT-22	881117	8	881122	881122	Tetrachloroethylene	BCRL		1					BH3533	0.0	
WELL PT-22	881117	8	881122	881122	Toluene	BCRL		1					BH3533	0.0	
WELL PT-22	881117	8	881122	881122	1,1,1-Trichloroethane	BCRL		1					BH3533	0.0	
WELL PT-22	881117	8	881122	881122	Dicyclopentadiene	BCRL		1					BH3533	0.0	
WELL PT-22	881117	8	881122	881122	Chlorobenzene	BCRL		1					BH3533	0.0	
WELL PT-22	881117	8	881122	881122	Ethylbenzene-D10	5.22	1	1		N	5	1	BH3533	52.2	1
WELL PT-22	881117	8	881122	881122	Ethylbenzene	BCRL		1					BH3533	0.0	
WELL PT-22	881117	8	881122	881122	1,2-Dibromo-3-chloropropane	BCRL		1					BH3533	0.0	
WELL PT-22	881117	8	881122	881122	m-Xylene	BCRL		1					BH3533	0.0	
WELL PT-22	881117	8	881122	881122	o+p-Xylenes	BCRL		1					BH3533	0.0	
THOD BLANK	881117	1	881122	881122	Methylene chloride-D2	4.77	1	1		M	5	1	BH4096	47.7	
THOD BLANK	881117	1	881122	881122	Methylene chloride	BCRL		1		M			BH4096	0.0	
THOD BLANK	881117	1	881122	881122	1,1-Dichloroethane	BCRL		1		M			BH4096	0.0	
THOD BLANK	881117	1	881122	881122	1,2-Trans-dichloroethylene	BCRL		1		M			BH4096	0.0	
THOD BLANK	881117	1	881122	881122	Chloroform	BCRL		1		M			BH4096	0.0	
THOD BLANK	881117	1	881122	881122	1,2-Dichloroethane	BCRL		1		M			BH4096	0.0	
THOD BLANK	881117	1	881122	881122	1,2-Dichloroethane-D4	5.33	1	1		M	5	1	BH4096	53.3	1
THOD BLANK	881117	1	881122	881122	Carbon tetrachloride	BCRL		1		M			BH4096	0.0	
THOD BLANK	881117	1	881122	881122	Bicycloheptadiene	BCRL		1		M			BH4096	0.0	
THOD BLANK	881117	1	881122	881122	Dimethyl disulfide	BCRL		1		M			BH4096	0.0	
THOD BLANK	881117	1	881122	881122	Trichloroethylene	BCRL		1		M			BH4096	0.0	
THOD BLANK	881117	1	881122	881122	Benzene	BCRL		1		M			BH4096	0.0	
THOD BLANK	881117	1	881122	881122	1,1,2-Trichloroethane	BCRL		1		M			BH4096	0.0	
THOD BLANK	881117	1	881122	881122	Methyl-iso-butyl ketone	BCRL		1		M			BH4096	0.0	
THOD BLANK	881117	1	881122	881122	Tetrachloroethylene	BCRL		1		M			BH4096	0.0	
THOD BLANK	881117	1	881122	881122	Toluene	BCRL		1		M			BH4096	0.0	
THOD BLANK	881117	1	881122	881122	1,1,1-Trichloroethane	BCRL		1		M			BH4096	0.0	
THOD BLANK	881117	1	881122	881122	Dicyclopentadiene	BCRL		1		M			BH4096	0.0	
THOD BLANK	881117	1	881122	881122	Chlorobenzene	BCRL		1		M			BH4096	0.0	
THOD BLANK	881117	1	881122	881122	Ethylbenzene-D10	4.76	1	1		M	5	1	BH4096	47.6	
THOD BLANK	881117	1	881122	881122	Ethylbenzene	BCRL		1		M			BH4096	0.0	
THOD BLANK	881117	1	881122	881122	1,2-Dibromo-3-chloropropane	BCRL		1		M			BH4096	0.0	
THOD BLANK	881117	1	881122	881122	m-Xylene	BCRL		1		M			BH4096	0.0	
THOD BLANK	881117	1	881122	881122	o+p-Xylenes	BCRL		1		M			BH4096	0.0	

LOT ADS--VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

AMPLE LOCATION		SMPLDATE	#	PREPDATE	ANALDATE	TEST NAME	DATA-MANT	EXPO	DILU	%MOIS	QC	MEAS	EXPO	SAMPLE	CONC'N	%RE
WELL	PT-17	881116	5	881122	881122	Methylene chloride-D2	6.54	1	1		N	5	1	BH3530	65.4	
WELL	PT-17	881116	5	881122	881122	Methylene chloride	BCRL		1					BH3530	0.0	
WELL	PT-17	881116	5	881122	881122	1,1-Dichloroethane	BCRL		1					BH3530	0.0	
WELL	PT-17	881116	5	881122	881122	1,2-Trans-dichloroethylene	5.68	1	1					BH3530	56.8	***
WELL	PT-17	881116	5	881122	881122	Chloroform	BCRL		1					BH3530	0.0	
WELL	PT-17	881116	5	881122	881122	1,2-Dichloroethane	BCRL		1					BH3530	0.0	
WELL	PT-17	881116	5	881122	881122	1,2-Dichloroethane-D4	5.57	1	1		N	5	1	BH3530	55.7	
WELL	PT-17	881116	5	881122	881122	Carbon tetrachloride	BCRL		1					BH3530	0.0	
WELL	PT-17	881116	5	881122	881122	Bicycloheptadiene	BCRL		1					BH3530	0.0	
WELL	PT-17	881116	5	881122	881122	Dimethyl disulfide	BCRL		1					BH3530	0.0	
WELL	PT-17	881116	5	881122	881122	Trichloroethylene	4.57	1	5					BH3530	228.5	***
WELL	PT-17	881116	5	881122	881122	Benzene	BCRL		1					BH3530	0.0	
WELL	PT-17	881116	5	881122	881122	1,1,2-Trichloroethane	BCRL		1					BH3530	0.0	
WELL	PT-17	881116	5	881122	881122	Methyl-iso-butyl ketone	BCRL		1					BH3530	0.0	
WELL	PT-17	881116	5	881122	881122	Tetrachloroethylene	BCRL		1					BH3530	0.0	
WELL	PT-17	881116	5	881122	881122	Toluene	BCRL		1					BH3530	0.0	
WELL	PT-17	881116	5	881122	881122	1,1,1-Trichloroethane	BCRL		1					BH3530	0.0	
WELL	PT-17	881116	5	881122	881122	Dicyclopentadiene	BCRL		1					BH3530	0.0	
WELL	PT-17	881116	5	881122	881122	Chlorobenzene	BCRL		1					BH3530	0.0	
WELL	PT-17	881116	5	881122	881122	Ethylbenzene-D10	5.51	1	1		N	5	1	BH3530	55.1	
WELL	PT-17	881116	5	881122	881122	Ethylbenzene	BCRL		1					BH3530	0.0	
WELL	PT-17	881116	5	881122	881122	1,2-Dibromo-3-chloropropane	BCRL		1					BH3530	0.0	
WELL	PT-17	881116	5	881122	881122	m-Xylene	BCRL		1					BH3530	0.0	
WELL	PT-17	881116	5	881122	881122	o+p-Xylenes	BCRL		1					BH3530	0.0	
WELL	PT-20	881117	9	881123	881123	Methylene chloride-D2	6.35	1	1		N	5	1	BH3534	63.5	
WELL	PT-20	881117	9	881123	881123	Methylene chloride	BCRL		1					BH3534	0.0	
WELL	PT-20	881117	9	881123	881123	1,1-Dichloroethane	BCRL		1					BH3534	0.0	
WELL	PT-20	881117	9	881123	881123	1,2-Trans-dichloroethylene	5.26	1	1					BH3534	52.6	***
WELL	PT-20	881117	9	881123	881123	Chloroform	BCRL		1					BH3534	0.0	
WELL	PT-20	881117	9	881123	881123	1,2-Dichloroethane	BCRL		1					BH3534	0.0	
WELL	PT-20	881117	9	881123	881123	1,2-Dichloroethane-D4	5.42	1	1		N	5	1	BH3534	54.2	
WELL	PT-20	881117	9	881123	881123	Carbon tetrachloride	BCRL		1					BH3534	0.0	
WELL	PT-20	881117	9	881123	881123	Bicycloheptadiene	BCRL		1					BH3534	0.0	
WELL	PT-20	881117	9	881123	881123	Dimethyl disulfide	BCRL		1					BH3534	0.0	
WELL	PT-20	881117	9	881123	881123	Trichloroethylene	4.18	1	1					BH3534	41.8	***
WELL	PT-20	881117	9	881123	881123	Benzene	BCRL		1					BH3534	0.0	
WELL	PT-20	881117	9	881123	881123	1,1,2-Trichloroethane	BCRL		1					BH3534	0.0	
WELL	PT-20	881117	9	881123	881123	Methyl-iso-butyl ketone	BCRL		1					BH3534	0.0	
WELL	PT-20	881117	9	881123	881123	Tetrachloroethylene	BCRL		1					BH3534	0.0	
WELL	PT-20	881117	9	881123	881123	Toluene	BCRL		1					BH3534	0.0	
WELL	PT-20	881117	9	881123	881123	1,1,1-Trichloroethane	BCRL		1					BH3534	0.0	
WELL	PT-20	881117	9	881123	881123	Dicyclopentadiene	BCRL		1					BH3534	0.0	
WELL	PT-20	881117	9	881123	881123	Chlorobenzene	BCRL		1					BH3534	0.0	
WELL	PT-20	881117	9	881123	881123	Ethylbenzene-D10	5.29	1	1		N	5	1	BH3534	52.9	
WELL	PT-20	881117	9	881123	881123	Ethylbenzene	BCRL		1					BH3534	0.0	
WELL	PT-20	881117	9	881123	881123	1,2-Dibromo-3-chloropropane	BCRL		1					BH3534	0.0	
WELL	PT-20	881117	9	881123	881123	m-Xylene	BCRL		1					BH3534	0.0	
WELL	PT-20	881117	9	881123	881123	o+p-Xylenes	BCRL		1					BH3534	0.0	
WELL	PT-12	881117	10	881123	881123	Methylene chloride-D2	6.52	1	1		N	5	1	BH3535	65.2	
WELL	PT-12	881117	10	881123	881123	Methylene chloride	BCRL		1					BH3535	0.0	
WELL	PT-12	881117	10	881123	881123	1,1-Dichloroethane	BCRL		1					BH3535	0.0	
WELL	PT-12	881117	10	881123	881123	1,2-Trans-dichloroethylene	2.73	2	10					BH3535	2730.0	***
WELL	PT-12	881117	10	881123	881123	Chloroform	BCRL		1					BH3535	0.0	
WELL	PT-12	881117	10	881123	881123	1,2-Dichloroethane	BCRL		1					BH3535	0.0	
WELL	PT-12	881117	10	881123	881123	1,2-Dichloroethane-D4	5.21	1	1		N	5	1	BH3535	52.1	
WELL	PT-12	881117	10	881123	881123	Carbon tetrachloride	BCRL		1					BH3535	0.0	

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                              LOT ADS--VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

PLE LOCATION   SMPLDATE  #  PREPDATE ANALDATE         TEST NAME            DATA-MANT EXPO  DILU %MOIS  QC MEAS  EXPO  SAMPLE   CONC'N   %RECO
============== ========= === ======  ====== ========================== ========= ====  ==== ===== === ===    === =======  ========= =====
WELL   PT-12     881117  10  881123   881123 Bicycloheptadiene          BCRL              1                           BH3535        0.0
WELL   PT-12     881117  10  881123   881123 Dimethyl disulfide         BCRL              1                           BH3535        0.0
WELL   PT-12     881117  10  881123   881123 Trichloroethylene            1.53     2     10                           BH3535     1530.0 *****
WELL   PT-12     881117  10  881123   881123 Benzene                    BCRL              1                           BH3535        0.0
WELL   PT-12     881117  10  881123   881123 1,1,2-Trichloroethane      BCRL              1                           BH3535        0.0
WELL   PT-12     881117  10  881123   881123 Methyl-iso-butyl ketone    BCRL              1                           BH3535        0.0
WELL   PT-12     881117  10  881123   881123 Tetrachloroethylene        BCRL              1                           BH3535        0.0
WELL   PT-12     881117  10  881123   881123 Toluene                    BCRL              1                           BH3535        0.0
WELL   PT-12     881117  10  881123   881123 1,1,1-Trichloroethane      BCRL              1                           BH3535        0.0
WELL   PT-12     881117  10  881123   881123 Dicyclopentadiene          BCRL              1                           BH3535        0.0
WELL   PT-12     881117  10  881123   881123 Chlorobenzene              BCRL              1                           BH3535        0.0
WELL   PT-12     881117  10  881123   881123 Ethylbenzene-D10             5.04     1      1              N    5      1 BH3535       50.4    10
WELL   PT-12     881117  10  881123   881123 Ethylbenzene               BCRL              1                           BH3535        0.0
WELL   PT-12     881117  10  881123   881123 1,2-Dibromo-3-chloropropane BCRL             1                           BH3535        0.0
WELL   PT-12     881117  10  881123   881123 m-Xylene                   BCRL              1                           BH3535        0.0
WELL   PT-12     881117  10  881123   881123 o+p-Xylenes                BCRL              1                           BH3535        0.0
WELL   PT-18     881117  11  881123   881123 Methylene chloride-D2        6.81     1      1              N    5      1 BH3536       68.1    13
WELL   PT-18     881117  11  881123   881123 Methylene chloride         BCRL              1                           BH3536        0.0
WELL   PT-18     881117  11  881123   881123 1,1-Dichloroethane         BCRL              1                           BH3536        0.0
WELL   PT-18     881117  11  881123   881123 1,2-Trans-dichloroethylene   2.18     1     20                           BH3536      436.0 *****
WELL   PT-18     881117  11  881123   881123 Chloroform                   2.28     1     20                           BH3536      456.0 *****
WELL   PT-18     881117  11  881123   881123 1,2-Dichloroethane         BCRL              1                           BH3536        0.0
WELL   PT-18     881117  11  881123   881123 1,2-Dichloroethane-D4        5.41     1      1              N    5      1 BH3536       54.1    10
WELL   PT-18     881117  11  881123   881123 Carbon tetrachloride       BCRL              1                           BH3536        0.0
WELL   PT-18     881117  11  881123   881123 Bicycloheptadiene          BCRL              1                           BH3536        0.0
WELL   PT-18     881117  11  881123   881123 Dimethyl disulfide         BCRL              1                           BH3536        0.0
WELL   PT-18     881117  11  881123   881123 Trichloroethylene            4.73     2     20                           BH3536     9460.0 *****
WELL   PT-18     881117  11  881123   881123 Benzene                    BCRL              1                           BH3536        0.0
WELL   PT-18     881117  11  881123   881123 1,1,2-Trichloroethane      BCRL              1                           BH3536        0.0
WELL   PT-18     881117  11  881123   881123 Methyl-iso-butyl ketone    BCRL              1                           BH3536        0.0
WELL   PT-18     881117  11  881123   881123 Tetrachloroethylene        BCRL              1                           BH3536        0.0
WELL   PT-18     881117  11  881123   881123 Toluene                    BCRL              1                           BH3536        0.0
WELL   PT-18     881117  11  881123   881123 1,1,1-Trichloroethane      BCRL              1                           BH3536        0.0
WELL   PT-18     881117  11  881123   881123 Dicyclopentadiene          BCRL              1                           BH3536        0.0
WELL   PT-18     881117  11  881123   881123 Chlorobenzene              BCRL              1                           BH3536        0.0
WELL   PT-18     881117  11  881123   881123 Ethylbenzene-D10             5.13     1      1              N    5      1 BH3536       51.3    10
WELL   PT-18     881117  11  881123   881123 Ethylbenzene               BCRL              1                           BH3536        0.0
WELL   PT-18     881117  11  881123   881123 1,2-Dibromo-3-chloropropane BCRL             1                           BH3536        0.0
WELL   PT-18     881117  11  881123   881123 m-Xylene                   BCRL              1                           BH3536        0.0
WELL   PT-18     881117  11  881123   881123 o+p-Xylenes                BCRL              1                           BH3536        0.0
STILLED WATER    881015  12  881123   881123 Methylene chloride-D2        4.9      1      1              N    5      1 BH1362       49.0     9
STILLED WATER    881015  12  881123   881123 Methylene chloride         BCRL              1                           BH1362        0.0
STILLED WATER    881015  12  881123   881123 1,1-Dichloroethane         BCRL              1                           BH1362        0.0
STILLED WATER    881015  12  881123   881123 1,2-Trans-dichloroethylene BCRL              1                           BH1362        0.0
STILLED WATER    881015  12  881123   881123 Chloroform                 BCRL              1                           BH1362        0.0
STILLED WATER    881015  12  881123   881123 1,2-Dichloroethane         BCRL              1                           BH1362        0.0
STILLED WATER    881015  12  881123   881123 1,2-Dichloroethane-D4        4.96     1      1              N    5      1 BH1362       49.6     9
STILLED WATER    881015  12  881123   881123 Carbon tetrachloride       BCRL              1                           BH1362        0.0
STILLED WATER    881015  12  881123   881123 Bicycloheptadiene          BCRL              1                           BH1362        0.0
STILLED WATER    881015  12  881123   881123 Dimethyl disulfide         BCRL              1                           BH1362        0.0
STILLED WATER    881015  12  881123   881123 Trichloroethylene          BCRL              1                           BH1362        0.0
STILLED WATER    881015  12  881123   881123 Benzene                    BCRL              1                           BH1362        0.0
STILLED WATER    881015  12  881123   881123 1,1,2-Trichloroethane      BCRL              1                           BH1362        0.0
STILLED WATER    881015  12  881123   881123 Methyl-iso-butyl ketone    BCRL              1                           BH1362        0.0
STILLED WATER    881015  12  881123   881123 Tetrachloroethylene        BCRL              1                           BH1362        0.0
STILLED WATER    881015  12  881123   881123 Toluene                    BCRL              1                           BH1362        0.0
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LOT ADS--VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

MPLE LOCATION	SMPLDATE	#	PREPDATE	ANALDATE	TEST NAME	DATA-MANT	EXPO	DILU	%MOIS	QC	MEAS	EXPO	SAMPLE	CONC'N	%REC
STILLED WATER	881015	12	881123	881123	1,1,1-Trichloroethane	BCRL		1					BH1362	0.0	
STILLED WATER	881015	12	881123	881123	Dicyclopentadiene	BCRL		1					BH1362	0.0	
STILLED WATER	881015	12	881123	881123	Chlorobenzene	BCRL		1					BH1362	0.0	
STILLED WATER	881015	12	881123	881123	Ethylbenzene-D10	4.94	1	1		N	5	1	BH1362	49.4	
STILLED WATER	881015	12	881123	881123	Ethylbenzene	BCRL		1					BH1362	0.0	
STILLED WATER	881015	12	881123	881123	1,2-Dibromo-3-chloropropane	BCRL		1					BH1362	0.0	
STILLED WATER	881015	12	881123	881123	m-Xylene	BCRL		1					BH1362	0.0	
STILLED WATER	881015	12	881123	881123	o+p-Xylenes	BCRL		1					BH1362	0.0	
NSE BLANK	881117	13	881123	881123	Methylene chloride-D2	4.93	1	1		N	5	1	BH4051	49.3	
NSE BLANK	881117	13	881123	881123	Methylene chloride	BCRL		1					BH4051	0.0	
NSE BLANK	881117	13	881123	881123	1,1-Dichloroethane	BCRL		1					BH4051	0.0	
NSE BLANK	881117	13	881123	881123	1,2-Trans-dichloroethylene	BCRL		1					BH4051	0.0	
NSE BLANK	881117	13	881123	881123	Chloroform	BCRL		1					BH4051	0.0	
NSE BLANK	881117	13	881123	881123	1,2-Dichloroethane	BCRL		1					BH4051	0.0	
NSE BLANK	881117	13	881123	881123	1,2-Dichloroethane-D4	5.1	1	1		N	5	1	BH4051	51.0	1
NSE BLANK	881117	13	881123	881123	Carbon tetrachloride	BCRL		1					BH4051	0.0	
NSE BLANK	881117	13	881123	881123	Bicycloheptadiene	BCRL		1					BH4051	0.0	
NSE BLANK	881117	13	881123	881123	Dimethyl disulfide	BCRL		1					BH4051	0.0	
NSE BLANK	881117	13	881123	881123	Trichloroethylene	BCRL		1					BH4051	0.0	
NSE BLANK	881117	13	881123	881123	Benzene	BCRL		1					BH4051	0.0	
NSE BLANK	881117	13	881123	881123	1,1,2-Trichloroethane	BCRL		1					BH4051	0.0	
NSE BLANK	881117	13	881123	881123	Methyl-iso-butyl ketone	BCRL		1					BH4051	0.0	
NSE BLANK	881117	13	881123	881123	Tetrachloroethylene	BCRL		1					BH4051	0.0	
NSE BLANK	881117	13	881123	881123	Toluene	BCRL		1					BH4051	0.0	
NSE BLANK	881117	13	881123	881123	1,1,1-Trichloroethane	BCRL		1					BH4051	0.0	
NSE BLANK	881117	13	881123	881123	Dicyclopentadiene	BCRL		1					BH4051	0.0	
NSE BLANK	881117	13	881123	881123	Chlorobenzene	BCRL		1					BH4051	0.0	
NSE BLANK	881117	13	881123	881123	Ethylbenzene-D10	5.06	1	1		N	5	1	BH4051	50.6	1
NSE BLANK	881117	13	881123	881123	Ethylbenzene	BCRL		1					BH4051	0.0	
NSE BLANK	881117	13	881123	881123	1,2-Dibromo-3-chloropropane	BCRL		1					BH4051	0.0	
NSE BLANK	881117	13	881123	881123	m-Xylene	BCRL		1					BH4051	0.0	
NSE BLANK	881117	13	881123	881123	o+p-Xylenes	BCRL		1					BH4051	0.0	

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                                        LOT ADS--VOLATILES IN WATER (TENTATIVELY IDENTIFIED COMPOUNDS)
PLE LOCATION    SMPLDATE   #  PREPDATE ANALDATE       METHOD                  MEASURE  EXPO  DILU %MOIS  QC MEAS  EXPO  SAMPLE   CONC'N   %RECC
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WELL    PT-10    881116   2   881122   881122 UNK015(CARBON DIOXIDE)           2.32   1     1                         BH3527      23.2 *****
WELL    PT-10    881116   2   881122   881122 UNK056(TETRAHYDROFURAN)          6.16   0     1                         BH3527       6.2 *****
WELL    PT-10    881116   2   881122   881122 UNK073(PENTANE)                  1.39   2     1                         BH3527     139.0 *****
WELL    PT-10    881116   2   881122   881122 UNK104(3-METHYL PENTANE)         1.01   1     1                         BH3527      10.1 *****
WELL    PT-10    881116   2   881122   881122 UNK156(CYCLOTRISILOXANE, HEX     2.08   2     1                         BH3527     208.0 *****
WELL    PT-15    881116   3   881122   881122 UNK013(CARBON DIOXIDE)           6.58   0     1                         BH3528       6.6 *****
WELL    PT-15    881116   3   881122   881122 UNK073(PENTANE)                  1.37   2     1                         BH3528     137.0 *****
WELL    PT-15    881116   3   881122   881122 UNK104(3-METHYL PENTANE)         8.77   0     1                         BH3528       8.8 *****
WELL    PT-15    881116   3   881122   881122 UNK157(CYCLOTRISILOXANE, HEX     2.03   2     1                         BH3528     203.0 *****
WELL    PT-25    881116   4   881122   881122 UNK073(PENTANE)                  1.32   2     1                         BH3529     132.0 *****
WELL    PT-25    881116   4   881122   881122 UNK152((C4-ALKYL)AMINE)          2.37   2     1                         BH3529     237.0 *****
WELL    PT-25    881116   4   881122   881122 UNK157(CYCLOTRISILOXANE, HEX     1.33   2     1                         BH3529     133.0 *****
WELL    PT-25    881116   4   881122   881122 UNK168((C4-ALKYL)AMINE)          2.93   2     1                         BH3529     293.0 *****
WELL    PT-25    881116   4   881122   881122 UNK179((C4-ALKYL)AMINE)          2.49   2     1                         BH3529     249.0 *****
WELL    PT-17    881116   5   881122   881122 UNK015(CARBON DIOXIDE)           3.46   1     1                         BH3530      34.6 *****
WELL    PT-17    881116   5   881122   881122 UNK073(PENTANE)                  1.37   2     1                         BH3530     137.0 *****
WELL    PT-17    881116   5   881122   881122 UNK104(3-METHYL PENTANE)         5.04   0     1                         BH3530       5.0 *****
WELL    PT-17    881116   5   881122   881122 UNK157(CYCLOTRISILOXANE, HEX     2.16   2     1                         BH3530     216.0 *****
WELL    PT-24    881116   6   881122   881122 UNK013(CARBON DIOXIDE)           1.65   1     1                         BH3531      16.5 *****
WELL    PT-24    881116   6   881122   881122 UNK073(PENTANE)                  1.33   2     1                         BH3531     133.0 *****
WELL    PT-24    881116   6   881122   881122 UNK092(UNKNOWN)                  5.26   0     1                         BH3531       5.3 *****
WELL    PT-24    881116   6   881122   881122 UNK157(CYCLOTRISILOXANE, HEX     2.28   2     1                         BH3531     228.0 *****
WELL    PT-21    881117   7   881122   881122 UNK012(CARBON DIOXIDE)              6   0     1                         BH3532       6.0 *****
WELL    PT-21    881117   7   881122   881122 UNK073(PENTANE)                   1.4   2     1                         BH3532     140.0 *****
WELL    PT-21    881117   7   881122   881122 UNK104(METHYL PENTANE)           5.17   0     1                         BH3532       5.2 *****
WELL    PT-21    881117   7   881122   881122 UNK157(CYCLOTRISILOXANE, HEX     2.09   2     1                         BH3532     209.0 *****
WELL    PT-22    881117   8   881122   881122 UNK016(CARBON DIOXIDE)           4.81   1     1                         BH3533      48.1 *****
WELL    PT-22    881117   8   881122   881122 UNK073(PENTANE)                   1.4   2     1                         BH3533     140.0 *****
WELL    PT-22    881117   8   881122   881122 UNK104(METHYL PENTANE)            5.8   0     1                         BH3533       5.8 *****
WELL    PT-22    881117   8   881122   881122 UNK157(CYCLOTRISILOXANE, HEX     2.01   2     1                         BH3533     201.0 *****
WELL    PT-20    881117   9   881123   881123 UNK014(CARBON DIOXIDE)           1.72   1     1                         BH3534      17.2 *****
WELL    PT-20    881117   9   881123   881123 UNK073(PENTANE)                  1.47   2     1                         BH3534     147.0 *****
WELL    PT-20    881117   9   881123   881123 UNK157(CYCLOTRISILOXANE, HEX     2.08   2     1                         BH3534     208.0 *****
WELL    PT-12    881117  10   881123   881123 UNK013(CARBON DIOXIDE)           9.44   0     1                         BH3535       9.4 *****
WELL    PT-12    881117  10   881123   881123 UNK073(PENTANE)                  1.31   2     1                         BH3535     131.0 *****
WELL    PT-12    881117  10   881123   881123 UNK082(UNKNOWN)                  6.34   0     1                         BH3535       6.3 *****
WELL    PT-12    881117  10   881123   881123 UNK104(METHYL PENTANE)           5.43   0     1                         BH3535       5.4 *****
WELL    PT-12    881117  10   881123   881123 UNK157(CYCLOTRISILOXANE, HEX     1.76   2     1                         BH3535     176.0 *****
WELL    PT-18    881117  11   881123   881123 UNK013(CARBON DIOXIDE)           1.16   1     1                         BH3536      11.6 *****
WELL    PT-18    881117  11   881123   881123 UNK073(PENTANE)                  1.19   2     1                         BH3536     119.0 *****
WELL    PT-18    881117  11   881123   881123 UNK104(METHYL PENTANE)           6.47   0     1                         BH3536       6.5 *****
WELL    PT-18    881117  11   881123   881123 UNK124(DIMETHYL HEXENE)          1.11   1     1                         BH3536      11.1 *****
WELL    PT-18    881117  11   881123   881123 UNK157(CYCLOTRISILOXANE, HEX     1.47   2     1                         BH3536     147.0 *****
TILLED WATER     881015  12   881123   881123 UNK073(PENTANE)                  1.29   2     1                         BH1362     129.0 *****
TILLED WATER     881015  12   881123   881123 UNK104(METHYL PENTANE)           1.01   1     1                         BH1362      10.1 *****
TILLED WATER     881015  12   881123   881123 UNK157(CYCLOTRISILOXANE, HEX     3.32   2     1                         BH1362     332.0 *****
SE BLANK         881117  13   881123   881123 UNK073(PENTANE)                  1.35   2     1                         BH4051     135.0 *****
SE BLANK         881117  13   881123   881123 UNK104(METHYL PENTANE)           1.01   1     1                         BH4051      10.1 *****
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                           LOT ADN--VOLATILES IN WATER (TENTATIVELY IDENTIFIED COMPOUNDS)

AMPLE LOCATION   SMPLDATE   #  PREPDATE ANALDATE      METHOD                   MEASURE  EXPO  DILU %MOIS  QC MEAS  EXPO  SAMPLE  CONC'N   %R
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INSE BLANK        881117   13  881123   881123 UNK157(CYCLOTRISILOXANE, HEX   2.58    2     1                       BH4051    258.0 ***
ETHOD BLANK       881117    1  881122   881122 UNK073(PENTANE)                1.41    2     1          M            BH4096    141.0 ***
ETHOD BLANK       881117    1  881122   881122 UNK104(METHYL PENTANE)          8.1    0     1          M            BH4096      8.1 ***
ETHOD BLANK       881117    1  881122   881122 UNK157(CYCLOTRISILOXANE, HEX   2.02    2     1          M            BH4096    202.0 ***

INSE BLANK        881031    2  881105   881105 UNK156(CYCLOTRISILOXANE,       2.15    2     1                       BH0568    215.0 ***
INSE BLANK        881031    2  881105   881105 UNK075(PENTANE)                3.32    2     1                       BH0568    332.0 ***
INSE BLANK        881031    2  881105   881105 UNK103(UNKNOWN)                6.83    0     1                       BH0568      6.8 ***
ETHOD BLANK       881031    1  881105   881105 UNK156(CYCLOTRISILOXANE,       2.03    2     1          M            BH2178    203.0 ***
ETHOD BLANK       881031    1  881105   881105 UNK075(PENTANE)                2.89    2     1          M            BH2178    289.0 ***
ETHOD BLANK       881031    1  881105   881105 UNK103(UNKNOWN)                6.02    0     1          M            BH2178      6.0 ***
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LOT ADO--VOLATILE ORGANIC COMPOUNDS IN SOIL

MPLE	LOCATION	SMPLDATE	#	PREPDATE	ANALDATE	TEST NAME	DATA	MANT	EXPO	DILU	%MOIS	QC	MEAS	EXPO	SAMPLE	CONC'N	%
BORE	SS02A	881031	2	881106	881106	Ethylbenzene	BCRL			1	4.2				BH0566	0.0	
BORE	SS02A	881031	2	881106	881106	Benzene	BCRL			1	4.2				BH0566	0.0	
BORE	SS02A	881031	2	881106	881106	Methyl-iso-butyl ketone	BCRL			1	4.2				BH0566	0.0	
BORE	SS02A	881031	2	881106	881106	Dimethyl disulfide	BCRL			1	4.2				BH0566	0.0	
BORE	SS02A	881031	2	881106	881106	1,1-Dichloroethane	BCRL			1	4.2				BH0566	0.0	
BORE	SS02A	881031	2	881106	881106	1,2-Dichloroethane	BCRL			1	4.2				BH0566	0.0	
BORE	SS02A	881031	2	881106	881106	1,1,1-Trichloroethane	BCRL			1	4.2				BH0566	0.0	
BORE	SS02A	881031	2	881106	881106	1,1,2-Trichloroethane	BCRL			1	4.2				BH0566	0.0	
BORE	SS02A	881031	2	881106	881106	Methylene chloride		2	1	1	4.2				BH0566	20.0	**
BORE	SS02A	881031	2	881106	881106	Chloroform	BCRL			1	4.2				BH0566	0.0	
BORE	SS02A	881031	2	881106	881106	Carbon tetrachloride	BCRL			1	4.2				BH0566	0.0	
BORE	SS02A	881031	2	881106	881106	1,2-Trans-dichloroethylene	BCRL			1	4.2				BH0566	0.0	
BORE	SS02A	881031	2	881106	881106	Toluene	BCRL			1	4.2				BH0566	0.0	
BORE	SS02A	881031	2	881106	881106	Chlorobenzene	BCRL			1	4.2				BH0566	0.0	
BORE	SS02A	881031	2	881106	881106	Tetrachloroethylene	BCRL			1	4.2				BH0566	0.0	
BORE	SS02A	881031	2	881106	881106	Trichloroethylene	BCRL			1	4.2				BH0566	0.0	
BORE	SS02A	881031	2	881106	881106	m-Xylene	BCRL			1	4.2				BH0566	0.0	
BORE	SS02A	881031	2	881106	881106	o+p-Xylenes	BCRL			1	4.2				BH0566	0.0	
BORE	SS02A	881031	2	881106	881106	1,2-Dibromo-3-chloropropane	BCRL			1	4.2				BH0566	0.0	
BORE	SS02A	881031	2	881106	881106	Dicyclopentadiene	BCRL			1	4.2				BH0566	0.0	
BORE	SS02A	881031	2	881106	881106	Bicycloheptadiene	BCRL			1	4.2				BH0566	0.0	
BORE	SS02A	881031	2	881106	881106	1,2-Dichloroethane-D4	BCRL			1	4.2				BH0566	0.0	
BORE	SS02A	881031	2	881106	881106	Methylene chloride-D2		9.03	0	1	4.2	N	1	1	BH0566	9.0	
BORE	SS02A	881031	2	881106	881106	Ethylbenzene-D10		1.04	1	1	4.2	N	1	1	BH0566	10.4	
BORE	SS02B	881031	3	881106	881106	Ethylbenzene	BCRL			1	3.8				BH0567	0.0	
BORE	SS02B	881031	3	881106	881106	Benzene	BCRL			1	3.8				BH0567	0.0	
BORE	SS02B	881031	3	881106	881106	Methyl-iso-butyl ketone	BCRL			1	3.8				BH0567	0.0	
BORE	SS02B	881031	3	881106	881106	Dimethyl disulfide	BCRL			1	3.8				BH0567	0.0	
BORE	SS02B	881031	3	881106	881106	1,1-Dichloroethane	BCRL			1	3.8				BH0567	0.0	
BORE	SS02B	881031	3	881106	881106	1,2-Dichloroethane	BCRL			1	3.8				BH0567	0.0	
BORE	SS02B	881031	3	881106	881106	1,1,1-Trichloroethane	BCRL			1	3.8				BH0567	0.0	
BORE	SS02B	881031	3	881106	881106	1,1,2-Trichloroethane	BCRL			1	3.8				BH0567	0.0	
BORE	SS02B	881031	3	881106	881106	Methylene chloride		3.34	0	1	3.8				BH0567	3.3	**
BORE	SS02B	881031	3	881106	881106	Chloroform	BCRL			1	3.8				BH0567	0.0	
BORE	SS02B	881031	3	881106	881106	Carbon tetrachloride	BCRL			1	3.8				BH0567	0.0	
BORE	SS02B	881031	3	881106	881106	1,2-Trans-dichloroethylene		1.96	1	1	3.8				BH0567	19.6	**
BORE	SS02B	881031	3	881106	881106	Toluene	BCRL			1	3.8				BH0567	0.0	
BORE	SS02B	881031	3	881106	881106	Chlorobenzene	BCRL			1	3.8				BH0567	0.0	
BORE	SS02B	881031	3	881106	881106	Tetrachloroethylene	BCRL			1	3.8				BH0567	0.0	
BORE	SS02B	881031	3	881106	881106	Trichloroethylene		2.21	0	1	3.8				BH0567	2.2	**
BORE	SS02B	881031	3	881106	881106	m-Xylene	BCRL			1	3.8				BH0567	0.0	
BORE	SS02B	881031	3	881106	881106	o+p-Xylenes	BCRL			1	3.8				BH0567	0.0	
BORE	SS02B	881031	3	881106	881106	1,2-Dibromo-3-chloropropane	BCRL			1	3.8				BH0567	0.0	
BORE	SS02B	881031	3	881106	881106	Dicyclopentadiene	BCRL			1	3.8				BH0567	0.0	
BORE	SS02B	881031	3	881106	881106	Bicycloheptadiene	BCRL			1	3.8				BH0567	0.0	
BORE	SS02B	881031	3	881106	881106	1,2-Dichloroethane-D4	BCRL			1	3.8				BH0567	0.0	
BORE	SS02B	881031	3	881106	881106	Methylene chloride-D2		8.75	0	1	3.8	N	1	1	BH0567	8.8	
BORE	SS02B	881031	3	881106	881106	Ethylbenzene-D10		1.01	1	1	3.8	N	1	1	BH0567	10.1	
BORE	SS06	881031	4	881106	881106	Ethylbenzene	BCRL			1	3.2				BH0574	0.0	
BORE	SS06	881031	4	881106	881106	Benzene	BCRL			1	3.2				BH0574	0.0	
BORE	SS06	881031	4	881106	881106	Methyl-iso-butyl ketone	BCRL			1	3.2				BH0574	0.0	
BORE	SS06	881031	4	881106	881106	Dimethyl disulfide	BCRL			1	3.2				BH0574	0.0	
BORE	SS06	881031	4	881106	881106	1,1-Dichloroethane	BCRL			1	3.2				BH0574	0.0	
BORE	SS06	881031	4	881106	881106	1,2-Dichloroethane	BCRL			1	3.2				BH0574	0.0	
BORE	SS06	881031	4	881106	881106	1,1,1-Trichloroethane	BCRL			1	3.2				BH0574	0.0	
BORE	SS06	881031	4	881106	881106	1,1,2-Trichloroethane	BCRL			1	3.2				BH0574	0.0	

LOT ADO--VOLATILE ORGANIC COMPOUNDS IN SOIL

AMPLE	LOCATION	SMPLDATE	#	PREPDATE	ANALDATE	TEST NAME	DATA	MANT	EXPO	DILU	%MOIS	QC	MEAS	EXPO	SAMPLE	CONC'N	
BORE	SS06	881031	4	881106	881106	Methylene chloride		2.04	1	1	3.2				BH0574	20.4	*
BORE	SS06	881031	4	881106	881106	Chloroform	BCRL			1	3.2				BH0574	0.0	
BORE	SS06	881031	4	881106	881106	Carbon tetrachloride	BCRL			1	3.2				BH0574	0.0	
BORE	SS06	881031	4	881106	881106	1,2-Trans-dichloroethylene	BCRL			1	3.2				BH0574	0.0	
BORE	SS06	881031	4	881106	881106	Toluene	BCRL			1	3.2				BH0574	0.0	
BORE	SS06	881031	4	881106	881106	Chlorobenzene	BCRL			1	3.2				BH0574	0.0	
BORE	SS06	881031	4	881106	881106	Tetrachloroethylene	BCRL			1	3.2				BH0574	0.0	
BORE	SS06	881031	4	881106	881106	Trichloroethylene	BCRL			1	3.2				BH0574	0.0	
BORE	SS06	881031	4	881106	881106	m-Xylene	BCRL			1	3.2				BH0574	0.0	
BORE	SS06	881031	4	881106	881106	o+p-Xylenes	BCRL			1	3.2				BH0574	0.0	
BORE	SS06	881031	4	881106	881106	1,2-Dibromo-3-chloropropane	BCRL			1	3.2				BH0574	0.0	
BORE	SS06	881031	4	881106	881106	Dicyclopentadiene	BCRL			1	3.2				BH0574	0.0	
BORE	SS06	881031	4	881106	881106	Bicycloheptadiene	BCRL			1	3.2				BH0574	0.0	
BORE	SS06	881031	4	881106	881106	1,2-Dichloroethane-D4	BCRL			1	3.2				BH0574	0.0	
BORE	SS06	881031	4	881106	881106	Methylene chloride-D2		8.73	0	1	3.2	N	1	1	BH0574	8.7	
BORE	SS06	881031	4	881106	881106	Ethylbenzene-D10		8.86	0	1	3.2	N	1	1	BH0574	8.9	
BORE	SS07	881031	5	881106	881106	Ethylbenzene	BCRL			1	3.8				BH0575	0.0	
BORE	SS07	881031	5	881106	881106	Benzene	BCRL			1	3.8				BH0575	0.0	
BORE	SS07	881031	5	881106	881106	Methyl-iso-butyl ketone	BCRL			1	3.8				BH0575	0.0	
BORE	SS07	881031	5	881106	881106	Dimethyl disulfide	BCRL			1	3.8				BH0575	0.0	
BORE	SS07	881031	5	881106	881106	1,1-Dichloroethane	BCRL			1	3.8				BH0575	0.0	
BORE	SS07	881031	5	881106	881106	1,2-Dichloroethane	BCRL			1	3.8				BH0575	0.0	
BORE	SS07	881031	5	881106	881106	1,1,1-Trichloroethane	BCRL			1	3.8				BH0575	0.0	
BORE	SS07	881031	5	881106	881106	1,1,2-Trichloroethane	BCRL			1	3.8				BH0575	0.0	
BORE	SS07	881031	5	881106	881106	Methylene chloride		1.92	1	1	3.8				BH0575	19.2	*
BORE	SS07	881031	5	881106	881106	Chloroform	BCRL			1	3.8				BH0575	0.0	
BORE	SS07	881031	5	881106	881106	Carbon tetrachloride	BCRL			1	3.8				BH0575	0.0	
BORE	SS07	881031	5	881106	881106	1,2-Trans-dichloroethylene	BCRL			1	3.8				BH0575	0.0	
BORE	SS07	881031	5	8B1106	881106	Toluene	BCRL			1	3.8				BH0575	0.0	
BORE	SS07	881031	5	881106	881106	Chlorobenzene	BCRL			1	3.8				BH0575	0.0	
BORE	SS07	881031	5	881106	881106	Tetrachloroethylene	BCRL			1	3.8				BH0575	0.0	
BORE	SS07	881031	5	881106	881106	Trichloroethylene	BCRL			1	3.8				BH0575	0.0	
BORE	SS07	881031	5	881106	881106	m-Xylene	BCRL			1	3.8				BH0575	0.0	
BORE	SS07	881031	5	881106	881106	o+p-Xylenes	BCRL			1	3.8				BH0575	0.0	
BORE	SS07	881031	5	881106	881106	1,2-Dibromo-3-chloropropane	BCRL			1	3.8				BH0575	0.0	
BORE	SS07	881031	5	881106	881106	Dicyclopentadiene	BCRL			1	3.8				BH0575	0.0	
BORE	SS07	881031	5	881106	881106	Bicycloheptadiene	BCRL			1	3.8				BH0575	0.0	
BORE	SS07	881031	5	881106	881106	1,2-Dichloroethane-D4	BCRL			1	3.8				BH0575	0.0	
BORE	SS07	881031	5	8B1106	881106	Methylene chloride-D2		8.97	0	1	3.8	N	1	1	BH0575	9.0	
BORE	SS07	881031	5	881106	881106	Ethylbenzene-D10		9.38	0	1	3.8	N	1	1	BH0575	9.4	
BORE	SS08	881031	6	881106	881106	Ethylbenzene	BCRL			1	4				BH0583	0.0	
BORE	SS08	881031	6	881106	881106	Benzene	BCRL			1	4				BH0583	0.0	
BORE	SS08	881031	6	881106	881106	Methyl-iso-butyl ketone	BCRL			1	4				BH0583	0.0	
BORE	SS08	881031	6	881106	881106	Dimethyl disulfide	BCRL			1	4				BH0583	0.0	
BORE	SS08	881031	6	881106	881106	1,1-Dichloroethane	BCRL			1	4				BH0583	0.0	
BORE	SS08	881031	6	881106	881106	1,2-Dichloroethane	BCRL			1	4				BH0583	0.0	
BORE	SS08	881031	6	881106	881106	1,1,1-Trichloroethane	BCRL			1	4				BH0583	0.0	
BORE	SS08	881031	6	881106	881106	1,1,2-Trichloroethane	BCRL			1	4				BH0583	0.0	
BORE	SS08	881031	6	881106	881106	Methylene chloride		1.92	1	1	4				BH0583	19.2	*
BORE	SS08	881031	6	881106	881106	Chloroform	BCRL			1	4				BH0583	0.0	
BORE	SS08	881031	6	881106	881106	Carbon tetrachloride	BCRL			1	4				BH0583	0.0	
BORE	SS08	881031	6	881106	881106	1,2-Trans-dichloroethylene	BCRL			1	4				BH0583	0.0	
BORE	SS08	881031	6	881106	881106	Toluene	BCRL			1	4				BH0583	0.0	
BORE	SS08	881031	6	881106	881106	Chlorobenzene	BCRL			1	4				BH0583	0.0	
BORE	SS08	881031	6	881106	881106	Tetrachloroethylene	BCRL			1	4				BH0583	0.0	
BORE	SS08	881031	6	881106	881106	Trichloroethylene	BCRL			1	4				BH0583	0.0	

LOT ADO--VOLATILE ORGANIC COMPOUNDS IN SOIL

LE	LOCATION	SMPLDATE	#	PREPDATE	ANALDATE	TEST NAME	DATA	MANT	EXPO	DILU	%MOIS	QC	MEAS	EXPO	SAMPLE	CONC'N	%RE
ORE	SS08	881031	6	881106	881106	m-Xylene	BCRL			1	4				BH0583	0.0	
ORE	SS08	881031	6	881106	881106	o+p-Xylenes	BCRL			1	4				BH0583	0.0	
ORE	SS08	881031	6	881106	881106	1,2-Dibromo-3-chloropropane	BCRL			1	4				BH0583	0.0	
ORE	SS08	881031	6	881106	881106	Dicyclopentadiene	BCRL			1	4				BH0583	0.0	
ORE	SS08	881031	6	881106	881106	Bicycloheptadiene	BCRL			1	4				BH0583	0.0	
ORE	SS08	881031	6	881106	881106	1,2-Dichloroethane-D4	BCRL			1	4				BH0583	0.0	
ORE	SS08	881031	6	881106	881106	Methylene chloride-D2		9.6	0	1	4	N	1	1	BH0583	9.6	9
ORE	SS08	881031	6	881106	881106	Ethylbenzene-D10		1.05	1	1	4	N	1	1	BH0583	10.5	10
OD	BLANK	881031	1	881106	881106	Ethylbenzene	BCRL			1		M			BH2179	0.0	
OD	BLANK	881031	1	881106	881106	Benzene	BCRL			1		M			BH2179	0.0	
OD	BLANK	881031	1	881106	881106	Methyl-iso-butyl ketone	BCRL			1		M			BH2179	0.0	
OD	BLANK	881031	1	881106	881106	Dimethyl disulfide	BCRL			1		M			BH2179	0.0	
OD	BLANK	881031	1	881106	881106	1,1-Dichloroethane	BCRL			1		M			BH2179	0.0	
OD	BLANK	881031	1	881106	881106	1,2-Dichloroethane	BCRL			1		M			BH2179	0.0	
OD	BLANK	881031	1	881106	881106	1,1,1-Trichloroethane	BCRL			1		M			BH2179	0.0	
OD	BLANK	881031	1	881106	881106	1,1,2-Trichloroethane	BCRL			1		M			BH2179	0.0	
OD	BLANK	881031	1	881106	881106	Methylene chloride	BCRL			1		M			BH2179	0.0	
OD	BLANK	881031	1	881106	881106	Chloroform	BCRL			1		M			BH2179	0.0	
OD	BLANK	881031	1	881106	881106	Carbon tetrachloride	BCRL			1		M			BH2179	0.0	
OD	BLANK	881031	1	881106	881106	1,2-Trans-dichloroethylene	BCRL			1		M			BH2179	0.0	
OD	BLANK	881031	1	881106	881106	Toluene	BCRL			1		M			BH2179	0.0	
OD	BLANK	881031	1	881106	881106	Chlorobenzene	BCRL			1		M			BH2179	0.0	
OD	BLANK	881031	1	881106	881106	Tetrachloroethylene	BCRL			1		M			BH2179	0.0	
OD	BLANK	881031	1	881106	881106	Trichloroethylene	BCRL			1		M			BH2179	0.0	
OD	BLANK	881031	1	881106	881106	m-Xylene	BCRL			1		M			BH2179	0.0	
OD	BLANK	881031	1	881106	881106	o+p-Xylenes	BCRL			1		M			BH2179	0.0	
OD	BLANK	881031	1	881106	881106	1,2-Dibromo-3-chloropropane	BCRL			1		M			BH2179	0.0	
OD	BLANK	881031	1	881106	881106	Dicyclopentadiene	BCRL			1		M			BH2179	0.0	
OD	BLANK	881031	1	881106	881106	Bicycloheptadiene	BCRL			1		M			BH2179	0.0	
OD	BLANK	881031	1	881106	881106	1,2-Dichloroethane-D4		1.28	1	1		M	1.25	1	BH2179	12.8	10
OD	BLANK	881031	1	881106	881106	Methylene chloride-D2		1.28	1	1		M	1.25	1	BH2179	12.8	10
OD	BLANK	881031	1	881106	881106	Ethylbenzene-D10		1.26	1	1		M	1.25	1	BH2179	12.6	10
ORE	SS09	881031	8	881107	881107	Ethylbenzene	BCRL			1	3.3				BH0584	0.0	
ORE	SS09	881031	8	881107	881107	Benzene	BCRL			1	3.3				BH0584	0.0	
ORE	SS09	881031	8	881107	881107	Methyl-iso-butyl ketone	BCRL			1	3.3				BH0584	0.0	
ORE	SS09	881031	8	881107	881107	Dimethyl disulfide	BCRL			1	3.3				BH0584	0.0	
ORE	SS09	881031	8	881107	881107	1,1-Dichloroethane	BCRL			1	3.3				BH0584	0.0	
ORE	SS09	881031	8	881107	881107	1,2-Dichloroethane	BCRL			1	3.3				BH0584	0.0	
ORE	SS09	881031	8	881107	881107	1,1,1-Trichloroethane	BCRL			1	3.3				BH0584	0.0	
ORE	SS09	881031	8	881107	881107	1,1,2-Trichloroethane	BCRL			1	3.3				BH0584	0.0	
ORE	SS09	881031	8	881107	881107	Methylene chloride		1.7	1	1	3.3				BH0584	17.0	****
ORE	SS09	881031	8	881107	881107	Chloroform	BCRL			1	3.3				BH0584	0.0	
ORE	SS09	881031	8	881107	881107	Carbon tetrachloride	BCRL			1	3.3				BH0584	0.0	
ORE	SS09	881031	8	881107	881107	1,2-Trans-dichloroethylene	BCRL			1	3.3				BH0584	0.0	
ORE	SS09	881031	8	881107	881107	Toluene	BCRL			1	3.3				BH0584	0.0	
ORE	SS09	881031	8	881107	881107	Chlorobenzene	BCRL			1	3.3				BH0584	0.0	
ORE	SS09	881031	8	881107	881107	Tetrachloroethylene	BCRL			1	3.3				BH0584	0.0	
ORE	SS09	881031	8	881107	881107	Trichloroethylene	BCRL			1	3.3				BH0584	0.0	
ORE	SS09	881031	8	881107	881107	m-Xylene	BCRL			1	3.3				BH0584	0.0	
ORE	SS09	881031	8	881107	881107	o+p-Xylenes	BCRL			1	3.3				BH0584	0.0	
ORE	SS09	881031	8	881107	881107	1,2-Dibromo-3-chloropropane	BCRL			1	3.3				BH0584	0.0	
ORE	SS09	881031	8	881107	881107	Dicyclopentadiene	BCRL			1	3.3				BH0584	0.0	
ORE	SS09	881031	8	881107	881107	Bicycloheptadiene	BCRL			1	3.3				BH0584	0.0	
ORE	SS09	881031	8	881107	881107	1,2-Dichloroethane-D4	BCRL			1	3.3				BH0584	0.0	
ORE	SS09	881031	8	881107	881107	Methylene chloride-D2		9.52	0	1	3.3	N	1	1	BH0584	9.5	9
ORE	SS09	881031	8	881107	881107	Ethylbenzene-D10		1.03	1	1	3.3	N	1	1	BH0584	10.3	10

LOT ADO--VOLATILE ORGANIC COMPOUNDS IN SOIL

SAMPLE	LOCATION	SMPLDATE	#	PREPDATE	ANALDATE	TEST NAME	DATA	MANT	EXPO	DILU	%MOIS	QC	MEAS	EXPO	SAMPLE	CONC'N
BORE	SS13	881102	11	881107	881107	Ethylbenzene	BCRL			1	4				BH0578	0.0
BORE	SS13	881102	11	881107	881107	Benzene	BCRL			1	4				BH0578	0.0
BORE	SS13	881102	11	881107	881107	Methyl-iso-butyl ketone	BCRL			1	4				BH0578	0.0
BORE	SS13	881102	11	881107	881107	Dimethyl disulfide	BCRL			1	4				BH0578	0.0
BORE	SS13	881102	11	881107	881107	1,1-Dichloroethane	BCRL			1	4				BH0578	0.0
BORE	SS13	881102	11	881107	881107	1,2-Dichloroethane	BCRL			1	4				BH0578	0.0
BORE	SS13	881102	11	881107	881107	1,1,1-Trichloroethane	BCRL			1	4				BH0578	0.0
BORE	SS13	881102	11	881107	881107	1,1,2-Trichloroethane	BCRL			1	4				BH0578	0.0
BORE	SS13	881102	11	881107	881107	Methylene chloride		1.03	1	1	4				BH0578	10.3
BORE	SS13	881102	11	881107	881107	Chloroform	BCRL			1	4				BH0578	0.0
BORE	SS13	881102	11	881107	881107	Carbon tetrachloride	BCRL			1	4				BH0578	0.0
BORE	SS13	881102	11	881107	881107	1,2-Trans-dichloroethylene	BCRL			1	4				BH0578	0.0
BORE	SS13	881102	11	881107	881107	Toluene	BCRL			1	4				BH0578	0.0
BORE	SS13	881102	11	881107	881107	Chlorobenzene	BCRL			1	4				BH0578	0.0
BORE	SS13	881102	11	881107	881107	Tetrachloroethylene	BCRL			1	4				BH0578	0.0
BORE	SS13	881102	11	881107	881107	Trichloroethylene	BCRL			1	4				BH0578	0.0
BORE	SS13	881102	11	881107	881107	m-Xylene	BCRL			1	4				BH0578	0.0
BORE	SS13	881102	11	881107	881107	o+p-Xylenes	BCRL			1	4				BH0578	0.0
BORE	SS13	881102	11	881107	881107	1,2-Dibromo-3-chloropropane	BCRL			1	4				BH0578	0.0
BORE	SS13	881102	11	881107	881107	Dicyclopentadiene	BCRL			1	4				BH0578	0.0
BORE	SS13	881102	11	881107	881107	Bicycloheptadiene	BCRL			1	4				BH0578	0.0
BORE	SS13	881102	11	881107	881107	1,2-Dichloroethane-D4	BCRL			1	4				BH0578	0.0
BORE	SS13	881102	11	881107	881107	Methylene chloride-D2		9.57	0	1	4	N	1	1	BH0578	9.6
BORE	SS13	881102	11	881107	881107	Ethylbenzene-D10		1.02	1	1	4	N	1	1	BH0578	10.2
BORE	SS10	881102	9	881107	881107	Ethylbenzene	BCRL			1	4.1				BH0585	0.0
BORE	SS10	881102	9	881107	881107	Benzene	BCRL			1	4.1				BH0585	0.0
BORE	SS10	881102	9	881107	881107	Methyl-iso-butyl ketone	BCRL			1	4.1				BH0585	0.0
BORE	SS10	881102	9	881107	881107	Dimethyl disulfide	BCRL			1	4.1				BH0585	0.0
BORE	SS10	881102	9	881107	881107	1,1-Dichloroethane	BCRL			1	4.1				BH0585	0.0
BORE	SS10	881102	9	881107	881107	1,2-Dichloroethane	BCRL			1	4.1				BH0585	0.0
BORE	SS10	881102	9	881107	881107	1,1,1-Trichloroethane	BCRL			1	4.1				BH0585	0.0
BORE	SS10	881102	9	881107	881107	1,1,2-Trichloroethane	BCRL			1	4.1				BH0585	0.0
BORE	SS10	881102	9	881107	881107	Methylene chloride		7.34	0	1	4.1				BH0585	7.3
BORE	SS10	881102	9	881107	881107	Chloroform	BCRL			1	4.1				BH0585	0.0
BORE	SS10	881102	9	881107	881107	Carbon tetrachloride	BCRL			1	4.1				BH0585	0.0
BORE	SS10	881102	9	881107	881107	1,2-Trans-dichloroethylene	BCRL			1	4.1				BH0585	0.0
BORE	SS10	881102	9	881107	881107	Toluene	BCRL			1	4.1				BH0585	0.0
BORE	SS10	881102	9	881107	881107	Chlorobenzene	BCRL			1	4.1				BH0585	0.0
BORE	SS10	881102	9	881107	881107	Tetrachloroethylene	BCRL			1	4.1				BH0585	0.0
BORE	SS10	881102	9	881107	881107	Trichloroethylene	BCRL			1	4.1				BH0585	0.0
BORE	SS10	881102	9	881107	881107	m-Xylene	BCRL			1	4.1				BH0585	0.0
BORE	SS10	881102	9	881107	881107	o+p-Xylenes	BCRL			1	4.1				BH0585	0.0
BORE	SS10	881102	9	881107	881107	1,2-Dibromo-3-chloropropane	BCRL			1	4.1				BH0585	0.0
BORE	SS10	881102	9	881107	881107	Dicyclopentadiene	BCRL			1	4.1				BH0585	0.0
BORE	SS10	881102	9	881107	881107	Bicycloheptadiene	BCRL			1	4.1				BH0585	0.0
BORE	SS10	881102	9	881107	881107	1,2-Dichloroethane-D4	BCRL			1	4.1				BH0585	0.0
BORE	SS10	881102	9	881107	881107	Methylene chloride-D2		9.68	0	1	4.1	N	1	1	BH0585	9.7
BORE	SS10	881102	9	881107	881107	Ethylbenzene-D10		1.09	1	1	4.1	N	1	1	BH0585	10.9
BORE	SS11	881102	10	881107	881107	Ethylbenzene	BCRL			1	4.7				BH0586	0.0
BORE	SS11	881102	10	881107	881107	Benzene	BCRL			1	4.7				BH0586	0.0
BORE	SS11	881102	10	881107	881107	Methyl-iso-butyl ketone	BCRL			1	4.7				BH0586	0.0
BORE	SS11	881102	10	881107	881107	Dimethyl disulfide	BCRL			1	4.7				BH0586	0.0
BORE	SS11	881102	10	881107	881107	1,1-Dichloroethane	BCRL			1	4.7				BH0586	0.0
BORE	SS11	881102	10	881107	881107	1,2-Dichloroethane	BCRL			1	4.7				BH0586	0.0
BORE	SS11	881102	10	881107	881107	1,1,1-Trichloroethane	BCRL			1	4.7				BH0586	0.0
BORE	SS11	881102	10	881107	881107	1,1,2-Trichloroethane	BCRL			1	4.7				BH0586	0.0

LOT ADO--VOLATILE ORGANIC COMPOUNDS IN SOIL

AMPLE	LOCATION	SMPLDATE	#	PREPDATE	ANALDATE	TEST NAME	DATA	MANT	EXPO	DILU	%MOIS	QC	MEAS	EXPO	SAMPLE	CONC'N
BORE	SS11	881102	10	881107	881107	Methylene chloride		1.78	1	1	4.7				BH0586	17.8
BORE	SS11	881102	10	881107	881107	Chloroform	BCRL			1	4.7				BH0586	0.0
BORE	SS11	881102	10	881107	881107	Carbon tetrachloride	BCRL			1	4.7				BH0586	0.0
BORE	SS11	881102	10	881107	881107	1,2-Trans-dichloroethylene	BCRL			1	4.7				BH0586	0.0
BORE	SS11	881102	10	881107	881107	Toluene	BCRL			1	4.7				BH0586	0.0
BORE	SS11	881102	10	881107	881107	Chlorobenzene	BCRL			1	4.7				BH0586	0.0
BORE	SS11	881102	10	881107	881107	Tetrachloroethylene	BCRL			1	4.7				BH0586	0.0
BORE	SS11	881102	10	881107	881107	Trichloroethylene		2.54	0	1	4.7				BH0586	2.5
BORE	SS11	881102	10	881107	881107	m-Xylene	BCRL			1	4.7				BH0586	0.0
BORE	SS11	881102	10	881107	881107	o+p-Xylenes	BCRL			1	4.7				BH0586	0.0
BORE	SS11	881102	10	881107	881107	1,2-Dibromo-3-chloropropane	BCRL			1	4.7				BH0586	0.0
BORE	SS11	881102	10	881107	881107	Dicyclopentadiene	BCRL			1	4.7				BH0586	0.0
BORE	SS11	881102	10	881107	881107	Bicycloheptadiene	BCRL			1	4.7				BH0586	0.0
BORE	SS11	881102	10	881107	881107	1,2-Dichloroethane-D4	BCRL			1	4.7				BH0586	0.0
BORE	SS11	881102	10	881107	881107	Methylene chloride-D2		9.43	0	1	4.7	N	1	1	BH0586	9.4
BORE	SS11	881102	10	881107	881107	Ethylbenzene-D10		1.06	1	1	4.7	N	1	1	BH0586	10.6
BORE	SS12	881102	7	881107	881107	Ethylbenzene	BCRL			1	3.1				BH0587	0.0
BORE	SS12	881102	7	881107	881107	Benzene	BCRL			1	3.1				BH0587	0.0
BORE	SS12	881102	7	881107	881107	Methyl-iso-butyl ketone	BCRL			1	3.1				BH0587	0.0
BORE	SS12	881102	7	881107	881107	Dimethyl disulfide	BCRL			1	3.1				BH0587	0.0
BORE	SS12	881102	7	881107	881107	1,1-Dichloroethane	BCRL			1	3.1				BH0587	0.0
BORE	SS12	881102	7	881107	881107	1,2-Dichloroethane	BCRL			1	3.1				BH0587	0.0
BORE	SS12	881102	7	881107	881107	1,1,1-Trichloroethane	BCRL			1	3.1				BH0587	0.0
BORE	SS12	881102	7	881107	881107	1,1,2-Trichloroethane	BCRL			1	3.1				BH0587	0.0
BORE	SS12	881102	7	881107	881107	Methylene chloride		9.5	0	1	3.1				BH0587	9.5
BORE	SS12	881102	7	881107	881107	Chloroform	BCRL			1	3.1				BH0587	0.0
BORE	SS12	881102	7	881107	881107	Carbon tetrachloride	BCRL			1	3.1				BH0587	0.0
BORE	SS12	881102	7	881107	881107	1,2-Trans-dichloroethylene	BCRL			1	3.1				BH0587	0.0
BORE	SS12	881102	7	881107	881107	Toluene	BCRL			1	3.1				BH0587	0.0
BORE	SS12	881102	7	881107	881107	Chlorobenzene	BCRL			1	3.1				BH0587	0.0
BORE	SS12	881102	7	881107	881107	Tetrachloroethylene	BCRL			1	3.1				BH0587	0.0
BORE	SS12	881102	7	881107	881107	Trichloroethylene	BCRL			1	3.1				BH0587	0.0
BORE	SS12	881102	7	881107	881107	m-Xylene	BCRL			1	3.1				BH0587	0.0
BORE	SS12	881102	7	881107	881107	o+p-Xylenes	BCRL			1	3.1				BH0587	0.0
BORE	SS12	881102	7	881107	881107	1,2-Dibromo-3-chloropropane	BCRL			1	3.1				BH0587	0.0
BORE	SS12	881102	7	881107	881107	Dicyclopentadiene	BCRL			1	3.1				BH0587	0.0
BORE	SS12	881102	7	881107	881107	Bicycloheptadiene	BCRL			1	3.1				BH0587	0.0
BORE	SS12	881102	7	881107	881107	1,2-Dichloroethane-D4	BCRL			1	3.1				BH0587	0.0
BORE	SS12	881102	7	881107	881107	Methylene chloride-D2		9.47	0	1	3.1	N	1	1	BH0587	9.5
BORE	SS12	881102	7	881107	881107	Ethylbenzene-D10		1.02	1	1	3.1	N	1	1	BH0587	10.2

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                              LOT ADO--VOLATILES IN SOIL (TENTATIVELY IDENTIFIED COMPOUNDS)

AMPLE LOCATION   SMPLDATE   #  PREPDATE ANALDATE       TEST NAME              DATA-MANT EXPO  DILU %MOIS  QC MEAS  EXPO  SAMPLE   CONC'N   %R
=============== ========= === ======   ====== ========================= ========= ====  ==== ===== === ===   === =======  ======== ==
  BORE    SS02A   881031    2   881106   881106 UNK075(PENTANE)                1.05    2     1   4.2                   BH0566     105.0 **
  BORE    SS02A   881031    2   881106   881106 UNK156(CYCLOTRISILOXANE, HEX   6.14    1     1   4.2                   BH0566      61.4 **
  BORE    SS02B   881031    3   881106   881106 UNK075(PENTANE)                1.15    2     1   3.8                   BH0567     115.0 **
  BORE    SS02B   881031    3   881106   881106 UNK156(CYCLOTRISILOXANE, HEX   2.66    1     1   3.8                   BH0567      26.6 **
  BORE    SS06    881031    4   881106   881106 UNK075(PENTANE)                9.29    1     1   3.2                   BH0574      92.9 **
  BORE    SS06    881031    4   881106   881106 UNK156(CYCLOTRISILOXANE, HEX   2.55    1     1   3.2                   BH0574      25.5 **
  BORE    SS07    881031    5   881106   881106 UNK075(PENTANE)                1.01    2     1   3.8                   BH0575     101.0 **
  BORE    SS07    881031    5   881106   881106 UNK156(CYCLOTRISILOXANE, HEX   2.67    1     1   3.8                   BH0575      26.7 **
  BORE    SS08    881031    6   881106   881106 UNK075(PENTANE)                9.45    1     1     4                   BH0583      94.5 **
  BORE    SS08    881031    6   881106   881106 UNK156(CYCLOTRISILOXANE, HEX    2.3    1     1     4                   BH0583      23.0 **
  BORE    SS09    881031    8   881107   881107 UNK075(PENTANE)                 7.2    0     1   3.3                   BH0584       7.2 **
  BORE    SS09    881031    8   881107   881107 UNK156(CYCLOTRISILOXANE, HEX   2.39    1     1   3.3                   BH0584      23.9 **
ETHOD BLANK       881031    1   881106   881106 UNK075(PENTANE)                7.37    1     1          M                BH2179      73.7 **
ETHOD BLANK       881031    1   881106   881106 UNK156(CYCLOTRISILOXANE, HEX   5.38    1     1          M                BH2179      53.8 **
  BORE    SS13    881102   11   881107   881107 UNK075(PENTANE)                3.42    0     1     4                   BH0578       3.4 **
  BORE    SS13    881102   11   881107   881107 UNK156(CYCLOTRISILOXANE, HEX   2.11    1     1     4                   BH0578      21.1 **
  BORE    SS10    881102    9   881107   881107 UNK075(PENTANE)                2.86    0     1   4.1                   BH0585       2.9 **
  BORE    SS10    881102    9   881107   881107 UNK156(CYCLOTRISILOXANE, HEX   2.25    1     1   4.1                   BH0585      22.5 **
  BORE    SS11    881102   10   881107   881107 UNK075(PENTANE)                 6.4    0     1   4.7                   BH0586       6.4 **
  BORE    SS11    881102   10   881107   881107 UNK155(CYCLOTRISILOXANE, HEX   2.46    1     1   4.7                   BH0586      24.6 **
  BORE    SS12    881102    7   881107   881107 UNK075(PENTANE)                   4    0     1   3.1                   BH0587       4.0 **
  BORE    SS12    881102    7   881107   881107 UNK156(CYCLOTRISILOXANE, HEX   3.02    1     1   3.1                   BH0587      30.2 **
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LOT ADQ--METALS IN GROUNDWATER

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PLE LOCATION    SMPLDATE  #  PREPDATE ANALDATE   TEST NAME     DATA-MANT EXPO DILU %MOIS QC MEAS EXPO SAMPLE  CONC'N %RECOVERY
=============== ======== === ======== ======== ============== ========= ==== ==== ===== == ==== ==== ====== ======= =========
ELL      PT-12  881027    6  881229   890106 Cadmium        BCRL                1                    BH0591     0.0       0.0
ELL      PT-12  881027    6  881229   890106 Chromium       BCRL                1                    BH0591     0.0       0.0
ELL      PT-12  881027    6  881229   890106 Copper         BCRL                1                    BH0591     0.0       0.0
ELL      PT-12  881027    6  881229   890106 Zinc                1.35   2       1                    BH0591   135.0 *********
ELL      PT-12  881027    6  881229   890106 Magnesium           3.75   4       1                    BH0591   37500 *********
ELL      PT-12  881027    6  881229   890106 Calcium             3.00   4      10                    BH0591  300000 *********
ELL      PT-12  881027    6  881229   890106 Sodium              0.60   4       5                    BH0591   30000 *********
ELL      PT-12  881027    6  881229   890106 Potassium           3.46   3       1                    BH0591    3460 *********
ELL      PT-22  881028    7  881229   890106 Cadmium        BCRL                1                    BH0595     0.0       0.0
ELL      PT-22  881028    7  881229   890106 Chromium       BCRL                1                    BH0595     0.0       0.0
ELL      PT-22  881028    7  881229   890106 Copper         BCRL                1                    BH0595     0.0       0.0
ELL      PT-22  881028    7  881229   890106 Zinc                 9.8   1       1                    BH0595    98.0 *********
ELL      PT-22  881028    7  881229   890106 Magnesium           2.41   4       1                    BH0595   24100 *********
ELL      PT-22  881028    7  881229   890106 Calcium              3.8   4       5                    BH0595  190000 *********
ELL      PT-22  881028    7  881229   890106 Sodium              7.01   4       1                    BH0595   70100 *********
ELL      PT-22  881028    7  881229   890106 Potassium           2.02   3       1                    BH0595    2020 *********
ELL      PT-24  881027    8  881229   890106 Cadmium        BCRL                1                    BH0596     0.0       0.0
ELL      PT-24  881027    8  881229   890106 Chromium       BCRL                1                    BH0596     0.0       0.0
ELL      PT-24  881027    8  881229   890106 Copper         BCRL                1                    BH0596     0.0       0.0
ELL      PT-24  881027    8  881229   890106 Zinc                 7.8   1       1                    BH0596    78.0 *********
ELL      PT-24  881027    8  881229   890106 Magnesium           1.42   4       1                    BH0596   14200 *********
ELL      PT-24  881027    8  881229   890106 Calcium              2.6   4       5                    BH0596  130000 *********
ELL      PT-24  881027    8  881229   890106 Sodium              1.74   4       1                    BH0596   17400 *********
ELL      PT-24  881027    8  881229   890106 Potassium              2   3       1                    BH0596    2000 *********
ELL      PT-18  881028    9  881229   890106 Cadmium        BCRL                1                    BH0594     0.0       0.0
ELL      PT-18  881028    9  881229   890106 Chromium       BCRL                1                    BH0594     0.0       0.0
ELL      PT-18  881028    9  881229   890106 Copper         BCRL                1                    BH0594     0.0       0.0
ELL      PT-18  881028    9  881229   890106 Zinc                1.16   2       1                    BH0594   116.0 *********
ELL      PT-18  881028    9  881229   890106 Magnesium           3.04   4       1                    BH0594   30400 *********
ELL      PT-18  881028    9  881229   890106 Calcium              2.5   4      10                    BH0594  250000 *********
ELL      PT-18  881028    9  881229   890106 Sodium               2.4   4       5                    BH0594  120000 *********
ELL      PT-18  881028    9  881229   890106 Potassium           3.79   3       1                    BH0594    3790 *********
ELL      PT-10  881028    5  881229   890106 Cadmium        BCRL                1                    BH0597     0.0       0.0
ELL      PT-10  881028    5  881229   890106 Chromium       BCRL                1                    BH0597     0.0       0.0
ELL      PT-10  881028    5  881229   890106 Copper         BCRL                1                    BH0597     0.0       0.0
ELL      PT-10  881028    5  881229   890106 Zinc                 6.4   1       1                    BH0597    64.0 *********
ELL      PT-10  881028    5  881229   890106 Magnesium           3.57   4       1                    BH0597   35700 *********
ELL      PT-10  881028    5  881229   890106 Calcium             8.08   4       1                    BH0597   80800 *********
ELL      PT-10  881028    5  881229   890106 Sodium              3.61   4       1                    BH0597   36100 *********
ELL      PT-10  881028    5  881229   890106 Potassium           2.53   3       1                    BH0597    2530 *********
SE BLANK        881031   10  881229   890106 Cadmium        BCRL                1                    BH0593     0.0       0.0
SE BLANK        881031   10  881229   890106 Chromium       BCRL                1                    BH0593     0.0       0.0
SE BLANK        881031   10  881229   890106 Copper              1.18   2       1                    BH0593   118.0 *********
SE BLANK        881031   10  881229   890106 Zinc           BCRL                1                    BH0593     0.0       0.0
SE BLANK        881031   10  881229   890106 Magnesium      BCRL        3       1                    BH0593     0.0       0.0
SE BLANK        881031   10  881229   890106 Calcium        BCRL        3       1                    BH0593     0.0       0.0
SE BLANK        881031   10  881229   890106 Sodium         BCRL        3       1                    BH0593     0.0       0.0
SE BLANK        881031   10  881229   890106 Potassium      BCRL        3       1                    BH0593     0.0       0.0
TILLED WATER    881103   11  881229   890106 Cadmium        BCRL                1                    BH0599     0.0       0.0
TILLED WATER    881103   11  881229   890106 Chromium       BCRL                1                    BH0599     0.0       0.0
TILLED WATER    881103   11  881229   890106 Copper              1.17   2       1                    BH0599   117.0 *********
TILLED WATER    881103   11  881229   890106 Zinc                 2.5   1       1                    BH0599    25.0 *********
TILLED WATER    881103   11  881229   890106 Magnesium      BCRL        3       1                    BH0599     0.0       0.0
TILLED WATER    881103   11  881229   890106 Calcium        BCRL        3       1                    BH0599     0.0       0.0
TILLED WATER    881103   11  881229   890106 Sodium         BCRL        3       1                    BH0599     0.0       0.0
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LOT ADQ--METALS IN GROUNDWATER

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AMPLE LOCATION  SMPLDATE   # PREPDATE ANALDATE   TEST NAME     DATA-MANT  EXPO DILU %MOIS  QC   MEAS   EXPO  SAMPLE  CONC'N %RECOVERY
==============  ======== === ======== ======== ============== ========== ==== ==== =====  ==   ====   ====  ====== ======= =========
STILLED WATER    881103   11  881229   890106 Potassium      BCRL          3    1                         BH0599     0.0       0.0
THOD BLANK       881103    1  881229   890106 Cadmium        BCRL               1         M               BH4080     0.0       0.0
THOD BLANK       881103    1  881229   890106 Chromium       BCRL               1         M               BH4080     0.0       0.0
THOD BLANK       881103    1  881229   890106 Copper         BCRL               1         M               BH4080     0.0       0.0
THOD BLANK       881103    1  881229   890106 Zinc           BCRL               1         M               BH4080     0.0       0.0
THOD BLANK       881103    1  881229   890106 Magnesium      BCRL          3    1         M               BH4080     0.0       0.0
THOD BLANK       881103    1  881229   890106 Calcium        BCRL          3    1         M               BH4080     0.0       0.0
THOD BLANK       881103    1  881229   890106 Sodium         BCRL          3    1         M               BH4080     0.0       0.0
THOD BLANK       881103    1  881229   890106 Potassium      BCRL          3    1         M               BH4080     0.0       0.0
SPIKEHIGH        881103    3  881229   890106 Cadmium              1.86    2    1         S      2      2   BH4082   186.0      93.0
SPIKEHIGH        881103    3  881229   890106 Chromium             2.36    2    1         S    2.5      2   BH4082   236.0      94.4
SPIKEHIGH        881103    3  881229   890106 Copper               2.27    2    1         S    2.5      2   BH4082   227.0      90.8
SPIKEHIGH        881103    3  881229   890106 Zinc                  2.4    2    1         S    2.5      2   BH4082   240.0      96.0
SPIKEHIGH        881103    3  881229   890106 Magnesium            1.92    4    1         S      2      4   BH4082   19200      96.0
SPIKEHIGH        881103    3  881229   890106 Calcium              9.27    3    1         S      1      4   BH4082    9270      92.7
SPIKEHIGH        881103    3  881229   890106 Sodium               4.67    4    1         S      5      4   BH4082   46700      93.4
SPIKEHIGH        881103    3  881229   890106 Potassium            5.18    3    1         S      5      3   BH4082    5180     103.6
SPIKEHIGH        881103    4  881229   890106 Cadmium              1.82    2    1         S      2      2   BH4083   182.0      91.0
SPIKEHIGH        881103    4  881229   890106 Chromium              2.3    2    1         S    2.5      2   BH4083   230.0      92.0
SPIKEHIGH        881103    4  881229   890106 Copper               2.25    2    1         S    2.5      2   BH4083   225.0      90.0
SPIKEHIGH        881103    4  881229   890106 Zinc                 2.31    2    1         S    2.5      2   BH4083   231.0      92.4
SPIKEHIGH        881103    4  881229   890106 Magnesium            1.92    4    1         S      2      4   BH4083   19200      96.0
SPIKEHIGH        881103    4  881229   890106 Calcium              9.35    3    1         S      1      4   BH4083    9350      93.5
SPIKEHIGH        881103    4  881229   890106 Sodium               5.13    4    1         S      5      4   BH4083   51300     102.6
SPIKEHIGH        881103    4  881229   890106 Potassium            5.11    3    1         S      5      3   BH4083    5110     102.2
SPIKELOW         881103    2  881229   890106 Cadmium               1.6    1    1         S      2      1   BH4086    16.0      80.0
SPIKELOW         881103    2  881229   890106 Chromium              4.9    1    1         S      5      1   BH4086    49.0      98.0
SPIKELOW         881103    2  881229   890106 Copper                3.4    1    1         S      5      1   BH4086    34.0      68.0
SPIKELOW         881103    2  881229   890106 Zinc                  3.8    1    1         S      5      1   BH4086    38.0      76.0
SPIKELOW         881103    2  881229   890106 Magnesium            1.73    3    1         S      2      3   BH4086    1730      86.5
SPIKELOW         881103    2  881229   890106 Calcium              0.82    3    1         S      1      3   BH4086     820      82.0
SPIKELOW         881103    2  881229   890106 Sodium                4.6    3    1         S      5      3   BH4086    4600      92.0
SPIKELOW         881103    2  881229   890106 Potassium            1.97    3    1         S      2      3   BH4086    1970      98.5
```

LOT ADR--METALS IN SOIL

MPLE	LOCATION	SMPLDATE	#	PREPDATE	ANALDATE	TEST NAME	DATA-MANT	EXPO	DILU	%MOIS	QC	MEAS	EXPO	SAMPLE	CONC'N	%RECOVERY
BORE	SS02A	881031	6	881230	890103	Cadmium	1.12	0	1	4.2				BH0588	1.1	*********
BORE	SS02A	881031	6	881230	890103	Chromium	2.23	1	1	4.2				BH0588	22.3	*********
BORE	SS02A	881031	6	881230	890103	Copper	6.76	1	1	4.2				BH0588	67.6	*********
BORE	SS02A	881031	6	881230	890103	Lead	4.2	1	5	4.2				BH0588	210.0	*********
BORE	SS02A	881031	6	881230	890103	Zinc	6.4	1	100	4.2				BH0588	6400.0	*********
BORE	SS04	881031	5	881230	890103	Cadmium	2	0	1	3				BH0589	2.0	*********
BORE	SS04	881031	5	881230	890103	Chromium	2.88	1	1	3				BH0589	28.8	*********
BORE	SS04	881031	5	881230	890103	Copper	9.85	1	1	3				BH0589	98.5	*********
BORE	SS04	881031	5	881230	890103	Lead	4.3	1	5	3				BH0589	215.0	*********
BORE	SS04	881031	5	881230	890103	Zinc	6.35	1	250	3				BH0589	15875.0	*********
BORE	SS03	881031	7	881230	890103	Cadmium	2.78	0	1	3.8				BH0590	2.8	*********
BORE	SS03	881031	7	881230	890103	Chromium	2.87	1	1	3.8				BH0590	28.7	*********
BORE	SS03	881031	7	881230	890103	Copper	6.17	1	1	3.8				BH0590	61.7	*********
BORE	SS03	881031	7	881230	890103	Lead	5	1	5	3.8				BH0590	250.0	*********
BORE	SS03	881031	7	881230	890103	Zinc	6.4	1	50	3.8				BH0590	3200.0	*********
BORE	SS01	881031	8	881230	890103	Cadmium	BCRL		1	3.2				BH0592	0.0	0.0
BORE	SS01	881031	8	881230	890103	Chromium	2.03	1	1	3.2				BH0592	20.3	*********
BORE	SS01	881031	8	881230	890103	Copper	1.53	1	1	3.2				BH0592	15.3	*********
BORE	SS01	881031	8	881230	890103	Lead	9.04	0	1	3.2				BH0592	9.0	*********
BORE	SS01	881031	8	881230	890103	Zinc	5.29	1	1	3.2				BH0592	52.9	*********
BORE	SS05	881031	9	881230	890103	Cadmium	2.57	0	1	6.6				BH0598	2.6	*********
BORE	SS05	881031	9	881230	890103	Chromium	3.62	1	1	6.6				BH0598	36.2	*********
BORE	SS05	881031	9	881230	890103	Copper	4	1	5	6.6				BH0598	200.0	*********
BORE	SS05	881031	9	881230	890103	Lead	5.2	1	10	6.6				BH0598	520.0	*********
BORE	SS05	881031	9	881230	890103	Zinc	5.9	1	500	6.6				BH0598	29500.0	*********
ETHOD BLANK		881031	1	881230	890103	Cadmium	BCRL		1		M			BH4081	0.0	0.0
ETHOD BLANK		881031	1	881230	890103	Chromium	8.04	0	1		M			BH4081	8.0	*********
ETHOD BLANK		881031	1	881230	890103	Copper	1.26	1	1		M			BH4081	12.6	*********
ETHOD BLANK		881031	1	881230	890103	Lead	9.12	0	1		M			BH4081	9.1	*********
ETHOD BLANK		881031	1	881230	890103	Zinc	3.09	1	1		M			BH4081	30.9	*********
CSPIKEHIGH		881031	3	881230	890103	Cadmium	7.09	0	1		S	7.5	0	BH4084	7.1	94.5
CSPIKEHIGH		881031	3	881230	890103	Chromium	7.22	1	1		S	7.5	1	BH4084	72.2	96.3
CSPIKEHIGH		881031	3	881230	890103	Copper	6.72	1	1		S	7.5	1	BH4084	67.2	89.6
CSPIKEHIGH		881031	3	881230	890103	Lead	6.86	1	1		S	7.5	1	BH4084	68.6	91.5
CSPIKEHIGH		881031	3	881230	890103	Zinc	7.47	1	1		S	7.5	1	BH4084	74.7	99.6
CSPIKEHIGH		881031	4	881230	890103	Cadmium	6.46	0	1		S	7.5	0	8H4085	6.5	86.1
CSPIKEHIGH		881031	4	881230	890103	Chromium	6.87	1	1		S	7.5	1	BH4085	68.7	91.6
CSPIKEHIGH		881031	4	881230	890103	Copper	6.44	1	1		S	7.5	1	BH4085	64.4	85.9
CSPIKEHIGH		881031	4	881230	890103	Lead	6.77	1	1		S	7.5	1	BH4085	67.7	90.3
CSPIKEHIGH		881031	4	881230	890103	Zinc	7.15	1	1		S	7.5	1	BH4085	71.5	95.3
CSPIKELO		881031	2	881230	890103	Cadmium	0.89	0	1		S	1	0	BH4087	0.9	89.0
CSPIKELO		881031	2	881230	890103	Chromium	1.51	1	1		S	1.5	1	BH4087	15.1	100.7
CSPIKELO		881031	2	881230	890103	Copper	9.13	0	1		S	1	1	BH4087	9.1	91.3
CSPIKELO		881031	2	881230	890103	Lead	1.15	1	1		S	1.5	1	BH4087	11.5	76.7
CSPIKELO		881031	2	881230	890103	Zinc	2.79	1	1		S	3	1	BH4087	27.9	93.0

```
                              LOT ADT--LEAD IN WATER

AMPLE LOCATION   SMPLDATE   #  PREPDATE ANALDATE  TEST NAME      DATA-MANT EXPO  DILU %MOIS  QC MEAS  EXPO  SAMPLE  CONC'N   %RECOVERY
================ ========= === ======   ====== ============== ========= ====  ==== ===== === ===    === ======= ======== =========
ISTILLED WATER    881103    5   890115   890115 Lead                1.47    1     1                           BH0599      14.7 *********
CBLANK            881103    1   890115   890115 Lead           BCRL               1          M                BH8682       0.0       0.0
CSPIKEHIGH        881103    3   890115   890115 Lead                2.68    1     1          S  2.5      1 BH8683      26.8     107.2
CSPIKEHIGH        881103    4   890115   890115 Lead                2.71    1     1          S  2.5      1 BH8684      27.1     108.4
CSPIKELOW         881103    2   890115   890115 Lead                5.09    0     1          S    5      0 BH8685       5.1     101.8
```

CHEMICAL DATA FILES

DIRECT OUTPUT OF IRDMS FILES

```
                                                                page -      1  date - 03/14/89
ab Lot No Meth No Units Meas Analyst
-- ------ ------- ---------- -------
N   ADN      EJB      UGL       JB


al No File Site Type Site Id      Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
----- ---- --------- ----------   ------------- --------- ---- ------ -- ------------ --------- ---------
       COC                          RH2178         /  /    G0A    0.0     BH21/8      11/05/88  11/05/88

ne Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
-- ---- -------- ------- -------- ------- ----- -- -- ------- ------
    LT    2.40      0       .                        M   0.00      0
    LT    2.40      0       .                        M   0.00      0
    LT    2.00      0       .                        M   0.00      0
          5.74      1       .                        N   5.00      1
    LT    2.60      0       .                        M   0.00      0
    LT    1.10      0       .                        M   0.00      0
    LT    2.90      0       .                        M   0.00      0
    LT    3.40      0       .                        M   0.00      0
    LT    2.20      0       .                        M   0.00      0
    LT    2.80      0       .                        M   0.00      0
          5.51      1       .                        N   5.00      1
    LT    1.57      1       .                        M   0.00      0
    LT    2.10      0       .                        M   0.00      0
    LT    1.30      0       .                        M   0.00      0
    LT    3.30      0       .                        M   0.00      0
    LT    2.10      0       .                        M   0.00      0
    LT    4.60      0       .                        M   0.00      0
          5.09      1       .                        N   5.00      1
    LT    2.50      0       .                        M   0.00      0
    LT    2.20      0       .                        M   0.00      0
    LT    5.60      0       .                        M   0.00      0
    LT    1.30      0       .                        M   0.00      0
          5.12      0       .                        M   0.00      0
          2.89      2       .                        M   0.00
          6.02      0       .                        M   0.00
          2.03      2       .                        M   0.00
    LT    2.10      0       .                        M   0.00      0

al No File Site Type Site Id      Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
----- ---- --------- ----------   ------------- --------- ---- ------ -- ------------ --------- ---------
       CSO    BORE    SS02B         RH0568      10/31/88  G0A    0.0 B   BH0568      11/05/88  11/05/88
:
ne Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
-- ---- -------- ------- -------- ------- ----- -- -- ------- ------
    LT    2.40      0      1.0       0               R   0.00      0
    LT    2.40      0      1.0       0               R   0.00      0
    LT    2.00      0      1.0       0               R   0.00      0
          5.54      1      1.0       0               N   5.00      1

icates that the data is either in error or has not been validated
```

```
 Instl: SE  Lab: EN  Lot No: ADN                       page -     2  date - 03/14/89
 Sample Analysis No: 002

:
me Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
-- ---- -------- ------- -------- ------- ----- -- -- ------- ------
    LT     2.60        0      1.0       0             R    0.00      0
    LT     1.10        0      1.0       0             R    0.00      0
    LT     2.90        0      1.0       0             R    0.00      0
    LT     3.40        0      1.0       0             R    0.00      0
    LT     2.20        0      1.0       0             R    0.00      0
    LT     2.80        0      1.0       0             R    0.00      0
           5.49        1      1.0       0             N    5.00      1
    LT     1.57        1      1.0       0             R    0.00      0
    LT     2.10        0      1.0       0             R    0.00      0
    LT     1.30        0      1.0       0             R    0.00      0
    LT     3.30        0      1.0       0             R    0.00      0
    LT     2.10        0      1.0       0             R    0.00      0
    LT     4.60        0      1.0       0             R    0.00      0
           5.16        1      1.0       0             R    0.00      0
    LT     2.50        0      1.0       0             N    5.00      1
    LT     2.20        0      1.0       0             R    0.00      0
    LT     5.60        0      1.0       0             R    0.00      0
    LT     1.30        0      1.0       0             R    0.00      0
    LT     2.40        0      1.0       0             R    0.00      0
           3.32        2      1.0       0             R    0.00
           6.83        0      1.0       0             R    0.00
           2.15        2      1.0       0             N    5.00      1
                       0       .0       0             R     .00      0
```

```
                                                              page -      1  date - 03/14/89
Lot No Meth No Units Meas Analyst
------ ------- ---------- -------
 ADO     EW9      UGG       JB


 No File Site Type Site Id    Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
--- ---- --------- ---------- ------------- --------- ---- ------ -- ----------- --------- ---------
    COC                         BH2179          /  /    GOA    0.0     BH2179      11/06/88  11/06/88

 Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
 ---- -------- ------- -------- ------- ----- -- -- ------- ------
  LT    7.10      -1       .                      M   0.00
  LT    6.40      -1       .                      M   0.00
  LT    6.10      -1       .                      M   0.00
        1.28       1       .                      N   1.00      1
  LT    7.50      -1       .                      M   0.00
  LT    5.80      -1       .                      M   0.00
  LT    4.50      -1       .                      M   0.00
  LT    5.40      -1       .                      M   0.00
  LT    7.30      -1       .                      M   0.00
  LT    7.00      -1       .                      M   0.00
        1.28       1       .                      N   1.00      1
  LT    1.08       0       .                      M   0.00
  LT    6.10      -1       .                      M   0.00
  LT    4.00      -1       .                      M   0.00
  LT    6.40      -1       .                      M   0.00
  LT    5.90      -1       .                      M   0.00
  LT    9.70      -1       .                      M   0.00
        1.26       1       .                      N   1.00      1
  LT    3.70      -1       .                      M   0.00
  LT    4.70      -1       .                      M   0.00
  LT    9.30      -1       .                      M   0.00
  LT    4.80      -1       .                      M   0.00
  LT    9.00      -1       .                      M   0.00
        7.37       1       .               .      M   0.00
        5.38       1       .               .      M   0.00
  LT    9.00      -1       .                      M   0.00

 No File Site Type Site Id    Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
--- ---- --------- ---------- ------------- --------- ---- ------ -- ----------- --------- ---------
    CSO    CORE     SS02A       BH0566       10/31/88  GOA    2.4 U   BH0566      11/06/88  11/06/88

 Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
 ---- -------- ------- -------- ------- ----- -- -- ------- ------
  LT    7.10       1      1.
```

```
          9.03      0     1.0       0     4.2    N   1.00       1
icates that the data is either in error or has not been validated




 Instl: SE  Lab: EN  Lot No: ADO                        page -     2  date - 03/14/89
 Sample Analysis No: 002
:
me Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
-- ---- -------- ------- -------- ------- ----- -- -- ------- ------
     LT     7.50      -1      1.0       0   4.2
     LT     5.80      -1      1.0       0   4.2
     LT     4.50      -1      1.0       0   4.2
     LT     5.40      -1      1.0       0   4.2
     LT     7.30      -1      1.0       0   4.2
     LT     7.30      -1      1.0       0   4.2
     LT     7.00      -1      1.0       0   4.2
            9.03       0      1.0       0   4.2       N   1.00       1
            2.00       1      1.0       0   4.2
     LT     6.10      -1      1.0       0   4.2
     LT     4.00      -1      1.0       0   4.2
     LT     6.40      -1      1.0       0   4.2
     LT     5.90      -1      1.0       0   4.2
     LT     9.70      -1      1.0       0   4.2
     LT     9.70      -1      1.0       0   4.2
            1.04       1      1.0       0   4.2       N   1.00       1
     LT     3.70      -1      1.0       0   4.2
     LT     3.70      -1      1.0       0   4.2
     LT     3.70      -1      1.0       0   4.2
     LT     4.70      -1      1.0       0   4.2
     LT     9.30      -1      1.0       0   4.2
     LT     9.30      -1      1.0       0   4.2
     LT     4.80      -1      1.0       0   4.2
     LT     9.00      -1      1.0       0   4.2
            1.05       2      1.0       0   4.2
            6.14       1      1.0       0   4.2
     LT     9.00      -1      1.0       0   4.2

al No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
----- ---- --------- ---------   ------------- --------- ---- -----  -- ----------- --------- ---------
      CSU    BORE    SS02B          BH0567      10/31/88 GOA     3.9 U  BH0567      11/06/88  11/06/88
:
me Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
-- ---- -------- ------- -------- ------- ----- -- -- ------- ------
     LT     7.10      -1      1.0       0   3.8            .
     LT     6.40      -1      1.0       0   3.8            .
     LT     6.10      -1      1.0       0   3.8            .
     LT     7.10      -1      1.0       0   3.8            .
            1.96       1      1.0       0   3.8            .
     LT [illegible]    1      [illegible] 0 3.8            .
     LT [illegible]   -1      1.0       0   3.8            .
     LT     5.40       1      1.0
```

cate that the [illegible] ted

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Instl: SE  Lab: EN  Lot No: ADO                              page -     3  date - 03/14/89
Sample Analysis No: 003

ne Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
-- ---- -------- ------- -------- ------- ----- -- -- ------- ------
           8.75      0      1.0       0     3.8      N   1.00     1
           3.34      0      1.0       0     3.8           .
     LT    6.10     -1      1.0       0     3.8           .
     LT    4.00     -1      1.0       0     3.8           .
     LT    6.40     -1      1.0       0     3.8           .
     LT    5.90     -1      1.0       0     3.8           .
     LT    9.70     -1      1.0       0     3.8           .
           1.01      1      1.0       0     3.8      N   1.00     1
     LT    3.70     -1      1.0       0     3.8           .
     LT    4.70     -1      1.0       0     3.8           .
     LT    9.30     -1      1.0       0     3.8           .
     LT    4.80     -1      1.0       0     3.8           .
           2.21      0      1.0       0     3.8           .
           1.15      2      1.0       0     3.8
           2.66      1      1.0       0     3.8
     LT    9.00     -1      1.0       0     3.8           .

al No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
----- ---- --------- ---------   ------------- --------- ---- ------ -- ------------- --------- ---------
      CSO    BORE      SS06          RH0574      10/31/88  GQA    [illegible].0 U   RH0574     11/06/88  11/06/88

ne Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
-- ---- -------- ------- -------- ------- ----- -- -- ------- ------
     LT    7.10     -1      1.0       0     3.2
     LT    6.40     -1      1.0       0     3.2
     LT    6.10     -1      1.0       0     3.2
     LT    7.10     -1      1.0       0     3.2
     LT    7.50     -1      1.0       0     3.2
     LT    5.80     -1      1.0       0     3.2
     LT    4.50     -1      1.0       0     3.2
     LT    5.40     -1      1.0       0     3.2
     LT    7.30     -1      1.0       0     3.2
     LT    7.00     -1      1.0       0     3.2
           8.73      0      1.0       0     3.2      N   1.00     1
           2.04      1      1.0       0     3.2
     LT    6.10     -1      1.0       0     3.2
     LT    4.00     -1      1.0       0     3.2
     LT    6.40      1      1.0       0     3.2
     LT    5.90     -1      1.0       0     3.2
     LT    9.70     -1      1.0       0     3.2
           8.86      0      1.0       0     3.2      N   1.00     1
     LT    [illegible]
```

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ator that the data is either in error or has not been validated

nstl: SE  Lab: EN  Lot No: ADO                          page -     4  date - 03/14/89
Sample Analysis No: 004

 Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
 ---- -------- ------- -------- ------- ----- -- -- ------- ------
  LT    4.80      -1      1.0       0     3.2
  LT    9.00      -1      1.0       0     3.2
        9.29       1      1.0       0     3.2
        2.55       1      1.0       0     3.2
  LT    9.00      -1      1.0       0     3.2

 No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
 -- ---- --------- ---------- ------------- --------- ---- ------ -- ----------- --------- ---------
     CSO    BORE      SS07          BH0575       10/31/88  GQA    3.1 U   BH0575     11/06/88  11/06/88

 Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
 ---- -------- ------- -------- ------- ----- -- -- ------- ------
  LT    7.10      -1      1.0       0     3.8
  LT    6.40      -1      1.0       0     3.8
  LT    6.10      -1      1.0       0     3.8
  LT    7.10      -1      1.0       0     3.8
  LT    7.50      -1      1.0       0     3.8
  LT    5.80      -1      1.0       0     3.8
  LT    4.50      -1      1.0       0     3.8
  LT    5.40      -1      1.0       0     3.8
  LT    7.30      -1      1.0       0     3.8
  LT    7.00      -1      1.0       0     3.8
        8.97       0      1.0       0     3.8     N    1.00       1
  LT    1.08       0      1.0       0     3.8
  LT    6.10      -1      1.0       0     3.8
  LT    4.00      -1      1.0       0     3.8
  LT    6.40      -1      1.0       0     3.8
  LT    5.90      -1      1.0       0     3.8
  LT    9.70      -1      1.0       0     3.8
        9.38       0      1.0       0     3.8     N    1.00       1
  LT    3.70      -1      1.0       0     3.8
  LT    4.70      -1      1.0       0     3.8
  LT    9.30      -1      1.0       0     3.8
  LT    4.80      -1      1.0       0     3.8
  LT    9.00      -1      1.0       0     3.8
        1.01       2      1.0       0     3.8
        2.67       1      1.0       0     3.8
  LT    9.00      -1      1.0       0     3.8

at   hat   dat   s e   ir   or   as   bee   lid
```

```
al No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
----- ---- --------- ---------   ---- ------- --------- ---- ------  -- ----------- --------- ---------
       CSO    BORE     SS08          BH0583      10/31/88  GOA     1.9 U   BH0583      11/06/88  11/06/88

:
me Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
--- ---- -------- ------- -------- ------- ----- -- -- ------- ------
     LT    7.10       -1      1.0       0     4.0            .
     LT    6.40       -1      1.0       0     4.0            .
     LT    6.10       -1      1.0       0     4.0            .
     LT    7.10       -1      1.0       0     4.0            .
     LT    7.50       -1      1.0       0     4.0            .
     LT    5.80       -1      1.0       0     4.0            .
     LT    4.50       -1      1.0       0     4.0            .
     LT    5.40       -1      1.0       0     4.0            .
     LT    7.30       -1      1.0       0     4.0            .
     LT    7.00       -1      1.0       0     4.0            .
           9.60        0      1.0       0     4.0      N    1.00       1
           1.92        1      1.0       0     4.0            .
     LT    6.10       -1      1.0       0     4.0            .
     LT    4.00       -1      1.0       0     4.0            .
     LT    6.40       -1      1.0       0     4.0            .
     LT    5.90       -1      1.0       0     4.0            .
     LT    9.70       -1      1.0       0     4.0            .
           1.05        1      1.0       0     4.0      N    1.00       1
     LT    3.70       -1      1.0       0     4.0            .
     LT    4.70       -1      1.0       0     4.0            .
     LT    9.30       -1      1.0       0     4.0            .
     LT    4.80       -1      1.0       0     4.0            .
     LT    9.00       -1      1.0       0     4.0            .
           9.45        1      1.0       0     4.0
           2.30        1      1.0       0     4.0
     LT    9.00       -1      1.0       0     4.0            .

al No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
----- ---- --------- ---------   ---- ------- --------- ---- ------  -- ----------- --------- ---------
       CSO    BORE     SS12          BH0587      11/02/88  GOA     1.6 U   BH0587      11/07/88  11/07/88

:
me Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
--- ---- -------- ------- -------- ------- ----- -- -- ------- ------
           4.00        0      1.0       0     3.1            .
           3.02        1      1.0       0     3.1            .

icates that the data is eith
```

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 Instl: SE  Lab: EN  Lot No: ADO                         page -     6  date - 03/14/89

al No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
----- ---- --------- ---------- ------------- --------- ---- ------ -- ----------- --------- ---------
      CSO    BORE     SS09         BH0584      10/31/88  GQA    2.9 U  BH0584      11/07/88  11/07/88
:
me Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
-- ---- -------- ------- -------- ------- ----- -- -- ------- ------
     LT    7.10      -1     1.0       0    3.3
     LT    6.40      -1     1.0       0    3.3
     LT    6.10      -1     1.0       0    3.3
     LT    7.10      -1     1.0       0    3.3
     LT    7.50      -1     1.0       0    3.3
     LT    5.80      -1     1.0       0    3.3
     LT    4.50      -1     1.0       0    3.3
     LT    5.40      -1     1.0       0    3.3
     LT    7.30      -1     1.0       0    3.3
     LT    7.00      -1     1.0       0    3.3
           9.52       0     1.0       0    3.3       N    1.00        1
           1.70       1     1.0       0    3.3
     LT    6.10      -1     1.0       0    3.3
     LT    4.00      -1     1.0       0    3.3
     LT    6.40      -1     1.0       0    3.3
     LT    5.90      -1     1.0       0    3.3
     LT    9.70      -1     1.0       0    3.3
           1.03       1     1.0       0    3.3       N    1.00        1
     LT    3.70      -1     1.0       0    3.3
     LT    4.70      -1     1.0       0    3.3
     LT    9.30      -1     1.0       0    3.3
     LT    4.80      -1     1.0       0    3.3
     LT    9.00      -1     1.0       0    3.3
           7.20       0     1.0       0    3.3
           2.39       1     1.0       0    3.3
     LT    9.00      -1     1.0       0    3.3

al No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
----- ---- --------- ---------- ------------- --------- ---- ------ -- ----------- --------- ---------
      CSO    BORE     SS10         BH0585      11/02/88  GQA    2.9 U  BH0585      11/07/88  11/07/88
:
me Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
-- ---- -------- ------- -------- ------- ----- -- -- ------- ------
     LT    7.10      -1     1.0       0    4.1        .
                      1      .0       0    4.
     LT    6.10      -1     1.0       0    4.1        .
```

```
    LT     5.40       -1      1.0                    4

icates that the data is either in error or has not been validated




 Instl: SE  Lab: EN  Lot No: ADO                            page -     7  date - 03/14/89
 Sample Analysis No: 009

ne Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
-- ---- -------- ------- -------- ------- ----- -- -- ------- ------
    LT     7.30       -1      1.0       0    4.1          .
    LT     7.00       -1      1.0       0    4.1          .
           9.68        0      1.0       0    4.1     N  1.00       1
           7.34        0      1.0       0    4.1          .
    LT     6.10       -1      1.0       0    4.1          .
    LT     4.00       -1      1.0       0    4.1
    LT     6.40       -1      1.0       0    4.1
    LT     5.90       -1      1.0       0    4.1
    LT     9.70       -1      1.0       0    4.1          .
           1.09        1      1.0       0    4.1     N  1.00       1
    LT     3.70       -1      1.0       0    4.1          .
    LT     4.70       -1      1.0       0    4.1
    LT     9.30       -1      1.0       0    4.1          .
    LT     4.80       -1      1.0       0    4.1
    LT     9.00       -1      1.0       0    4.1
           2.86        0      1.0       0    4.1          .
           2.25        1      1.0       0    4.1          .
    LT     9.00       -1      1.0       0    4.1

al No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Iq Lab Samp No Prep Date Anal Date
-- -- ---- ---------- ---------- ------------- --------- ---- ------- -- ------------ --------- ---------
      LSO    BORE      SS11        BH0586      11/02/88  GOA     2.6 U   BH0586     11/07/88  11/07/88

ne Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
-- ---- -------- ------- -------- ------- ----- -- -- ------- ------
    LT     7.10       -1      1.0       0    4.7
    LT     6.40       -1      1.0       0    4.7
    LT     6.10       -1      1.0       0    4.7
    LT     7.10       -1      1.0       0    4.7
    LT     7.50       -1      1.0       0    4.7
    LT     5.80       -1      1.0       0    4.7
    LT     4.50       -1      1.0       0    4.7
    LT     5.40       -1      1.0       0    4.7
    LT     7.30       -1      1.0       0    4.7
    LT     7.00       -1      1.0       0    4.7
           9.43        0      1.0       0    4.7     N  1.00       1
           1.78        1      1.0       0    4.7
    LT     6.10       -1      1.0       0    4.7
    LT     4.00       -1      1.0       0    4.7
    LT     6.40       -1      1.0       0    4.7
    LT     5.90       -1      1.0       0    4.7
    LT
```

```
cates that the data is either in error or has not been validated

 Instl: SE  Lab: EN  Lot No: ADO                          page -      8  date - 03/14/89
 Sample Analysis No: 010

me Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
-- ---- -------- ------- -------- ------- ----- -- -- ------- ------
     LT    4.70       -1      1.0       0   4.7
     LT    9.30       -1      1.0       0   4.7
     LT    4.80       -1      1.0       0   4.7
           2.54        0      1.0       0   4.7
           6.40        0      1.0       0   4.7          .
           2.46        1      1.0       0   4.7          .
     LT    9.00       -1      1.0       0   4.7

al No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
----- ---- --------- ---------   ------------- --------- ---- -----  -- ----------- --------- ---------
       CSO    BORE    SS13          BH0578       11/02/88  GQA    1.9 U  BH0578      11/07/88  11/07/88

me Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
-- ---- -------- ------- -------- ------- ----- -- -- ------- ------
     LT    7.10       -1      1.0       0   4.0
     LT    6.40       -1      1.0       0   4.0
     LT    6.10       -1      1.0       0   4.0
     LT    7.10       -1      1.0       0   4.0
     LT    7.50       -1      1.0       0   4.0
     LT    5.80       -1      1.0       0   4.0
     LT    4.50       -1      1.0       0   4.0
     LT    5.40       -1      1.0       0   4.0
     LT    7.30       -1      1.0       0   4.0
     LT    7.00       -1      1.0       0   4.0
           9.57        0      1.0       0   4.0     N   1.00      1
           1.03        1      1.0       0   4.0
     LT    6.10       -1      1.0       0   4.0
     LT    4.00       -1      1.0       0   4.0
     LT    6.40       -1      1.0       0   4.0
     LT    5.90       -1      1.0       0   4.0
     LT    9.70       -1      1.0       0   4.0
           1.02        1      1.0       0   4.0     N   1.00      1
     LT    3.70       -1      1.0       0   4.0
     LT    4.70       -1      1.0       0   4.0
     LT    9.30       -1      1.0       0   4.0
     LT    4.80       -1      1.0       0   4.0
     LT    9.00       -1      1.0       0   4.0
           3.42        0      1.0       0   4.0          .
           2.11        1      1.0       0   4.0          .
     LT [illegible]    1      1.0       0   4.0

cates that the data is in [illegible]
```

```
                                                                           page -      1  date - 03/14/89
ab Lot No Meth No Units Meas Analyst
-- ------ ------- ---------- -------
N   ADO     EG8      UGL      RW


al No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
------ ---- ---------- ------------ ------------- ---------- ---- ------- -- ------------- --------- ---------
        CDC                        BH4080          /  /     G0A    0.0      BH4080     12/29/88  01/06/89
:
me Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
-- ---- -------- ------- -------- ------- ----- -- -- ------- ------
     LT    5.00       2       .                      M   0.00      0
     LT    1.00       1       .                      M   0.00      0
     LT    2.30       1       .                      M   0.00      0
     LT    2.60       1       .                      M   0.00      0
     LT    5.10       2       .                      M   0.00      0
     LT    2.80       3       .                      M   0.00      0
     LT    2.10       1       .                      M   0.00      0

al No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
------ ---- ---------- ------------ ------------- ---------- ---- ------- -- ------------- --------- ---------
        CDC                        BH4086          /  /     G0A    0.0      BH4086     12/29/88  01/06/89
:
me Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
```

```
       3.40       1                                          S   5.00      1
       1.73       3                                          S   2.00      3
       4.60       3                                          S   5.00      3
       3.80       1                                          S   5.00      1

 No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
---- ---- --------- ---------- ------------- --------- ---- ------ -- ----------- --------- ---------
     CQC                           BH4082        /  /    GQA    0.0     BH4082     12/29/88  01/06/89

e Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
- ---- -------- ------- -------- ------- ----- -- -- ------- ------
       9.27       3                                 S   1.00      4
       1.86       2                                 S   2.00      2
       2.36       2                                 S   2.50      2
       2.27       2                                 S   2.50      2
       1.92       4                                 S   2.00      4
       4.67       4                                 S   5.00      4
       2.40       2                                 S   2.50      2
cates that the data is either in error or has not been validated
```

```
Instl: SE  Lab: EN  Lot No: ADQ                        page -     2  date - 03/14/89

 No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
---- ---- --------- ---------- ------------- --------- ---- ------ -- ----------- --------- ---------
     CQC                           BH4083        /  /    GQA    0.0     BH4083     12/29/88  01/06/89

e Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
- ---- -------- ------- -------- ------- ----- -- -- ------- ------
       9.35       3                                 S   1.00      4
       1.82       2                                 S   2.00      2
       2.30       2                                 S   2.50      2
       2.25       2                                 S   2.50      2
       1.92       4                                 S   2.00      4
       5.13       4                                 S   5.00      4
       2.31       2                                 S   2.50      2

l No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
---- ---- --------- ---------- ------------- --------- ---- ------ -- ----------- --------- ---------
     CGW  WELL      FT-10          BH0597     10/28/88  GQA    6.0 B    BH0597     12/29/88  01/06/89

e Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
- ---- -------- ------- -------- ------- ----- -- -- ------- ------
       8.08       4       1.0        0
 [illegible]  1 [illegible]       0
  LT   2.30       1       1.0        0
```

```
l No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
---- ---- --------- ----------- ------------- --------- ---- ------ -- ----------- --------- ---------
     CGW   WELL     PT-12          BH0591     10/27/88  GOA     6.0 B   BH0591    12/29/88  01/06/89

e Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
- ---- -------- ------- -------- ------- ----- -- -- ------- ------
          3.00       4      1.0       0
    LT    1.00       1      1.0       0
    LT    2.30       1      1.0       0
    LT    2.60       1      1.0       0
          3.75       4      1.0       0
          0.60       4      5.0       0
          1.35       2      1.0       0

cates that the data is either in error or has not been validated




Instl: SE  Lab: EN  Lot No: ADO                              page -      3  date - 03/14/89


l No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No
---- ---- --------- ----------- ------------- --------- ---- ------ --
     CGW   WELL     PT-22          BH0

e Bool Unc Mant



l No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
---- ---- --------- ----------- ------------- --------- ---- ------ -- ----------- --------- ---------
     CGW   WELL     PT-24          BH0596     10/27/88  GOA     4.0 B   BH0596    12/29/88  01/06/89

e Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
- ---- -------- ------- -------- ------- ----- -- -- ------- ------
          2.60       4      5.0       0
    LT    1.00       1      1.0       0
    LT    2.30       1      1.0       0
    LT
```

```
No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
-- ---- --------- ----------- ------------- --------- ---- ------- -- ----------- --------- ---------
   CGW    WELL    PT-18         BH0594      10/28/88  GOA     7.0 B   BH0594     12/29/88  01/06/89

Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
---- -------- ------- -------- ------- ----- -- -- ------- ------
        2.50       4      1.0       1
 LT     1.00       1      1.0       0
 LT     2.30       1      1.0       0
 LT     2.60       1      1.0       0
        3.04       4      1.0       0
       ~2.40       4      5.0       0
        1.16       2      1.0       0

ates that the data is either in error or has not been validated




stl: SE  Lab: EN  Lot No: ADQ                      page -     4  date - 03/14/89


No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
-- ---- --------- ----------- ------------- --------- ---- ------- -- ----------- --------- ---------
   CGW    WELL    PT-18         BH0593      10/31/88  GOA     0.0 B   BH0593     12/29/88  01/06/89

Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
---- -------- ------- -------- ------- ----- -- -- ------- ------
 LT     5.00       2      1.0       0           R    0.00      0
 LT     1.00       1      1.0       0           R    0.00      0
 LT     2.30       1      1.0       0           R    0.00      0
        1.18       2      1.0       0           R    0.00      0
 LT     5.10       2      1.0       0           R    0.00      0
 LT     2.80       3      1.0       0           R    0.00      0
 LT     2.10       1      1.0       0           R    0.00      0

No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
-- ---- --------- ----------- ------------- --------- ---- ------- -- ----------- --------- ---------
   CGW    WELL    PT-A-MARK     BH0599      11/03/88  GOA     0.0 B   BH0599     12/29/88  01/06/89

Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
---- -------- ------- -------- ------- ----- -- -- ------- ------
 LT     5.00       2      1.0       0
 L      1.
 LT     2.30       1      1.0       0
```

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icates that the data is in error or that it has not been validated




                                                                                      page -     1  date - 03/14/89
ab Lot No Meth No Units Meas Analyst
-- ------ ------- ---------- -------
J   ADR      ER9       UGG        RW


al No File Site Type Site Id     Field Samp No Samp Date Prog Depth   Tq Lab Samp No Prep Date Anal Date
------ ---- --------- ---------- ------------- --------- ---- ------- -- ----------- --------- ---------
      CSO    BORE      SSOMB        BH4081       10/31/88  GOA     0.0 U   BH4081      12/30/88  01/03/89

ne Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC OC OC Mant OC Exp
-- ---- -------- ------- -------- ------- ----- -- -- ------- ------
   LT     3.17      -1       .               99.9    M   0.00      0
   LT     3.17      -1       .               99.9    M   0.00      0
          8.04       0       .               99.9    M   0.00      0
          8.04       0       .               99.9    M   0.00      0
          1.00       1       .               99.9    M   0.00      0
          1.26       1       .               99.9    M   0.00      0
          9.12       0       .               99.9    M   0.00      0
          9.12       0       .               99.9    M   0.00      0
  [illegible].09       1       .               99.9    M   0.00      0
  [illegible].09       1       .               99.9    M   0.00      0

al No File Site Type Site Id     Field Samp No Samp Date Prog Depth   Tq Lab Samp No Prep Date Anal Date
------ ---- --------- ---------- ------------- --------- ---- ------- -- ----------- --------- ---------
      CSO    BORE      SSOMB        BH4087       10/31/88  GOA     0.0 U   BH4087      12/30/88  01/03/89
```

```
      0.89       0       .             99.9     S   1.00      0
      0.89       0       .             99.9     S   1.00      0
      1.51       1       .             99.9     S   1.50      1
      1.51       1       .             99.9     S   1.50      1
      9.13       0       .             99.9     S   1.00      1
      9.13       0       .             99.9     S   1.00      1
      1.15       1       .             99.9     S   1.50      1
      1.15       1       .             99.9     S   1.50      1
      2.79       1       .             99.9     S   3.00      1
      2.79       1       .             99.9     S   3.00      1
tes that the data is either in error or has not been validated




stl: SE  Lab: EN  Lot No: ADR                        page -     2  date - 03/14/89

No File Site Type Site Id     Field Samp No Samp Date Prog Depth   Tq Lab Samp No Prep Date Anal Date
-- ---- --------- ----------  ------------- --------- ---- ------  -- ----------- --------- ---------
   CSO    BORE    SSOMB         BH4084        10/31/88  GQA     0.0 U   BH4084     12/30/88  01/03/89

Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
---- -------- ------- -------- ------- ----- -- -- ------- ------
       7.09        0       .                    S    7.50      0
       7.09        0       .           99.9     S    7.50      0
       7.22        1       .           99.9     S    7.50      1
       7.22        1       .           99.9     S    7.50      1
       6.72        1       .           99.9     S    7.50      1
       6.72        1       .           99.9     S    7.50      1
       6.86        1       .           99.9     S    7.50      1
       6.86        1       .           99.9     S    7.50      1
       7.47        1       .           99.9     S    7.50      1
       7.47        1       .           99.9     S    7.50      1

No File Site Type Site Id     Field Samp No Samp Date Prog Depth   Tq Lab Samp No Prep Date Anal Date
-- ---- --------- ----------  ------------- --------- ---- ------  -- ----------- --------- ---------
   CSO    BORE    SSOMB         BH4085        10/31/88  GQA     0.0 U   BH4085     12/30/88  01/03/89

Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
```

```
  [illegible]      1       .               99          7.50       1
       14          1       .               99.9    S   7.50       1
     6.44          1       .               99.9    S   7.50       1
     6.77          1       .               99.9    S   7.50       1
     6.77          1       .               99.9    S   7.50       1
     7.15          1       .               99.9    S   7.50       1
     7.15          1       .               99.9    S   7.50       1

l No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
----- ---- --------- ---------- ------------- --------- ---- ------- -- ------------- --------- ---------
      CSO  BORE      SS04       RH0589        10/31/88  G0A      1.7 U  BH0589        12/30/88  01/03/89

e Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
- ---- -------- ------- -------- ------- ----- -- -- ------- -------
            2.00       0       1.0       0   3.0
            2.00       0       1.        0   3.0
            2.88       1       1.0       0   3.0
            2.88       1       1.        0   3.0

cates that the data is either in error or has not been validated




Instl: SE  Lab: EN  Lot No: ADR                        page -     3  date - 03/14/89
Sample Analysis No: 005

e Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
- ---- -------- ------- -------- ------- ----- -- -- ------- -------
            9.85       1       1.0       0   3.0
            9.85       1       1.        0   3.0
            4.30       1       5.0       0   3.0
            4.30       1       5.        0   3.0
            6.35       1       2.5       0   3.0
            6.35       1       2.5       1   3.0

l No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
----- ---- --------- ---------- ------------- --------- ---- ------- -- ------------- --------- ---------
      CSO  BORE      SS02A      RH0588        10/31/88  G0A      2.4 U  RH0588        12/30/88  01/03/89

e Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
- ---- -------- ------- -------- ------- ----- -- -- ------- -------
            1.12       0       1.0       0   4.2
            1.12       0       1.        1   4.2
     [illegible]       1       1.0       0   4.2
     [illegible]       1       1.        0   4.2
            6.76       1       1.0       0   4.[illegible]
            6.76       1       1.        0   4.[illegible]
            4.20       1       5.0       0   4.2
            4.20       1       5.        0   4.2
            6.40       1       1.0       0   [illegible]
```

```
 No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
   ---- --------- ----------- -------------- --------- ---- ------ -- ------------ --------- ---------
     CSO    BORE     SS03          BH0590      10/31/88  G0A     1.9 U  BH0590      12/30/88  01/03/89

e Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
- ---- -------- ------- -------- ------- ----- -- -- ------- ------
           2.78      0     1.0       0    3.8
           2.78      0     1.        0    3.8
           2.87      1     1.0       0    3.8
           2.87      1     1.        0    3.8
           6.17      1     1.0       0    3.8
           6.17      1     1.        0    3.8
           5.00      1     5.0       0    3.8
           5.00      1     5.        0    3.8
           6.40      1     5.0       0    3.8
           6.40      1     5.        0    3.8

ates that the data is either in error or has not been validated




Instl: SE  Lab: EN  Lot No: ADR                       page -     4  date - 03/14/89


l No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
- ---- ---- ---- ----------- -------------- --------- ---- ------ -- ------------ --------- ---------
     CSO    BORE     SS01          BH0592      10/31/88  G0A     2.5 U  BH0592      12/30/88  01/03/89

e Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
- ---- -------- ------- -------- ------- ----- -- -- ------- ------
   LT      3.17     -1     1.0       0    3.2
   LT      3.17     -1     1.        0    3.2
           2.03      1     1.0       0    3.2
           2.03      1     1.        0    3.2
           1.53      1     1.0       0    3.2
           1.53      1     1.        0    3.2
           9.04      0     1.0       0    3.2
           9.04      0     1.        0    3.2
           5.29      1     1.0       0    3.2
           5.29      1     1.        0    3.2

l No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
- ---- ---- ---- ----------- -------------- --------- ---- ------ -- ------------ --------- ---------
     CSO    BORE     SS05          BH0598      10/31/88  G0A     1.8 U  BH0598      12/30/88  01/03/89

e Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
```

```
      [illegible]      1     .         0     6.
      4.90             1     5.0       0     6.6
      4.00             1     5.        0     6.6
      5.20             1     1.0       0     6.6
      5.20             1     1.        1     6.6
      5.90             1     5.0       0     6.6
      5.90             1     5.        2     6.6

ates that the data is in error or that it has not been validated
```

```
                                                            page -      1  date - 03/14/89
 Lot No Meth No Units Meas Analyst
 ------ ------- ---------- -------
  ADS      EJB      UGL        JB


 No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
 --- ---- ---------- ---------- ------------- --------- ---- ----- -- ----------- --------- ---------
     COC                           BH4096          /  /    GOA     0.0      BH4096     11/22/88  11/22/88


 Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC UC Mant UC Exp
 ---- -------- ------- -------- ------- ----- -- -- ------- ------
  LT     2.40       0      .                .      M   0.00
  LT     2.40       0      .                       M   0.00
  LT     2.00       0      .                       M   0.00
         5.33       1      .                       N   1.00      1
  LT     2.60       0      .                       M   0.00
  LT     1.10       0      .                       M   0.00
  LT     2.90       0      .                       M   0.00
  LT     3.40       0      .                .      M   0.00
  LT     2.20       0      .                       M   0.00
  LT     2.80       0      .                .      M   0.00
         4.77       1      .                       N   0.00      0
  LT     1.57       1      .                       M   0.00
  LT     2.10       0      .                .      M   0.00
  LT     1.70       0      .                .      M   0.00
  LT     1.30       0      .                       M   0.00
  LT     2.10       0      .                       M   0.00
  LT     4.60       0      .                       M   0.00
         4.76       1      .                       N   0.00      0
```

```
  LT    [illegible]   0       .                                     M    0.00
  LT      5.60        0       .                                     M    0.00
  LT      1.30        0       .                                     M    0.00
  LT      2.40        0       .                                     M    0.00
          1.41        2       .                                     M    0.00
          8.10        0       .                                     M    0.00
          2.02        2       .                                     M    0.00
  LT      2.10        0       .                                     M    0.00

al No File Site Type Site Id      Field Samp No Samp Date Prog Depth   Tq Lab Samp No Prep Date Anal Date
----- ---- --------- ----------   ------------- --------- ---- ------  -- ----------- --------- ---------
      CGW    WELL     PT-10          BH3527     11/16/88  GQA     6.2 B   BH3527      11/22/88  11/22/88

ne Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
-- ---- -------- ------- -------- ------- ----- -- -- ------- ------
   LT     2.40      0      1.0       0                     .
   LT     2.40      0      1.0       0                     .
   LT     2.00      0      1.0       0                     .
          5.25      1      1.0       0               N   5.00       1

cates that the data is either in error or has not been validated



 Instl: SE  Lab: EN  Lot No: ADS                      page -     2  date - 03/14/89
 Sample Analysis No: 002

ne Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
-- ---- -------- ------- -------- ------- ----- -- -- ------- ------
   LT     2.60      0      1.0       0                     .
   LT     1.10      0      1.0       0                     .
   LT     2.90      0      1.0       0                     .
   LT     3.40      0      1.0       0                     .
   LT     2.20      0      1.0       0                     .
   LT     2.80      0      1.0       0                     .
          5.00      1      1.0       0               N   5.00       1
   LT     1.57      1      1.0       0                     .
   LT     2.10      0      1.0       0                     .
   LT     1.30      0      1.0       0                     .
   LT     3.30      0      1.0       0                     .
   LT     2.10      0      1.0       0                     .
   LT     4.60      0      1.0       0                     .
          4.83      1      1.0       0               N   5.00       1
   LT     2.50      0      1.0       0                     .
   LT     2.20      0      1.0       0                     .
   LT     5.60      0      1.0       0                     .
   LT     1.30      0      1.0       0                     .
   LT     2.40      0      1.0       0                     .
          2.32      1      1.0       0
          6.16      0      1.0       0
          1.92      2      1.0       0
   [illegible]      1      1.0       0
          2.08  [illegible] 1.0      0
```

```
 No File Site Type Site Id    Field Samp No Samp Date Prog Depth  Iq Lab Samp No Prep Date Anal Date
 ------- --------- --------   ------------- --------- ---- ------- -- ----------- --------- ---------
   CGW     WELL    FT 15          RH3528      11/16/88  GOA    6.2 B   RH3528      11/22/88  11/22/88

e Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QL QC Mant QC Exp
  ---- -------- ------- -------- ------- ----- -- -- ------- ------
   LT    2.40       0      1.0       0                  .
   LT    2.40       0      1.0       0                  .
   LT    2.00       0      1.0       0                  .
         5.30       1      1.0       0            N   5.00       1
   LT    2.60       0      1.0       0                  .
   LT    1.10       0      1.0       0                  .
   LT    2.90       0      1.0       0
   LT    3.40       0      1.0       0                  .
   LT    2.20       0      1.0       0                  .
   LT    2.80       0      1.0       0                  .
         5.07       1      1.0       0            N   5.00       1
   LT    1.57       1      1.0       0                  .

cates that the data is either in error or has not been validated




Instl: SE  Lab: EN  Lot No: ADS                        page -    3  date - 03/14/89
Sample Analysis No: 003

e Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
  ---- -------- ------- -------- ------- ----- -- -- ------- ------
   LT    2.10       0      1.0       0                  .
   LT    1.30       0      1.0       0                  .
   LT    3.30       0      1.0       0
   LT    2.10       0      1.0       0                  .
   LT    4.60       0      1.0       0                  .
         4.83       1      1.0       0            N   5.00       1
   LT    2.50       0      1.0       0
   LT    2.20       0      1.0       0                  .
   LT    5.60       0      1.0       0                  .
   LT    1.30       0      1.0       0                  .
   LT    2.40       0      1.0       0                  .
         6.58       0      1.0       0
         1.37       2      1.0       0
         8.77       0      1.0       0
         2.03       2      1.0       0
   LT    2.10       0      1.0       0

 No File Site Type Site Id    Field Samp No Samp Date Prog Depth  Iq Lab Samp No Prep Date Anal Date
 ------- --------- --------   ------------- --------- ---- ------- -- ----------- --------- ---------
   CGW     WELL    FT-25          RH3529      11/16/88  GOA    7.6 B   RH3529      11/22/88  11/22/88

s Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
```

```
LT    [illegible]     0     1.0     0                     .
       5.20     1     1.0     0              N   5.00      1
LT     2.60     0     1.0     0                   .
LT     1.10     0     1.0     0                   .
LT     2.90     0     1.0     0
LT     3.40     0     1.0     0                   .
LT     2.20     0     1.0     0                   .
LT     2.80     0     1.0     0                   .
       4.55     1     1.0     0              N   5.00      1
LT     1.57     1     1.0     0                   .
LT     2.10     0     1.0     0                   .
LT     1.30     0     1.0     0                   .
LT     3.30     0     1.0     0
LT     2.10     0     1.0     0                   .
LT     4.60     0     1.0     0                   .
       4.55     1     1.0     0              N   5.00      1
LT     2.50     0     1.0     0
LT     2.20     0     1.0     0                   .
LT     5.60     0     1.0     0                   .
tes that the data is either in error or has not been validated




stl: SE  Lab: EN  Lot No: ADS                     page -     4  date - 03/14/89
mple Analysis No: 004

Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
---- -------- ------- -------- ------- ----- -- -- ------- -------
 LT    1.30       0      1.0       0                  .
 LT    2.40       0      1.0       0                  .
       1.32       2      1.0       0
       2.37       2      1.0       0
       1.33       2      1.0       0
       2.93       2      1.0       0
       2.49       2      1.0       0
 LT    2.10       0      1.0       0

No File Site Type Site Id    Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
-- ---- --------- ---------- ------------- --------- ---- ------ -- ----------- --------- ---------
   CGW    WELL    PT-17         BH3530       11/16/88  GQA     6.6 B  BH3530     11/22/88  11/22/88

Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
---- -------- ------- -------- ------- ----- -- -- ------- -------
 LT    2.40       0      1.0       0
 LT    2.40       0      1.0       0                  .
 LT    2.00       0      1.0       0                  .
       5.57       1      1.0       0              N  5.00      1
 LT    2.60       0      1.0       0                  .
      [illegible]
 LT    2.90       0      1.0       0                  .
```

```
      [illegible]     1      1.               N    5.00      1
  LT  [illegible]     1      1.0       0             .
  LT      2.10        0      1.0       0             .
  LT      1.30        0      1.0       0
  LT      3.30        0      1.0       0             .
  LT      2.10        0      1.0       0
  LT      4.60        0      1.0       0             .
          5.51        1      1.0       0        N    5.00      1
  LT      2.50        0      1.0       0             .
  LT      2.20        0      1.0       0
  LT      5.60        0      1.0       0             .
  LT      1.30        0      1.0       0             .
          4.57        1      5.0       0             .
          3.46        1      1.0       0
          1.37        2      1.0       0
          5.04        0      1.0       0
          2.16        2      1.0       0
  LT      2.10        0      1.0       0             .
cates that the data is either in error or has not been validated
```

```
Instl: SE  Lab: EN  Lot No: ADS                            page -     5  date - 03/14/89

al No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
----- ---- --------- ----------- ------------- --------- ---- ------ -- ----------- --------- ---------
       CGW    WELL     FT-24         BH3531     11/16/88  G0A     4.0 B  BH3531      11/22/88  11/22/88

ne Rool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
-- ---- -------- ------- -------- ------- ----- -- -- ------- ------
   LT     2.40        0      1.0       0             .
   LT     2.40        0      1.0       0             .
   LT     2.00        0      1.0       0             .
          5.27        1      1.0       0        N    5.00      1
          7.11        1      1.0       0
   LT     2.90        0      1.0       0             .
   LT     3.40        0      1.0       0             .
   LT     2.20        0      1.0       0             .
   LT     2.80        0      1.0       0             .
          6.18        1      1.0       0        N    5.00      1
   LT     1.57        1      1.0       0             .
   LT     2.10        0      1.0       0
   LT     1.30        0      1.0       0             .
   LT     3.30        0      1.0       0             .
   LT     2.10        0      1.0       0             .
   LT     4.60        0      1.0       0             .
          5.11        1      1.0       0        N    5.00      1
   LT     2.50        0      1.0       0             .
   LT     2.20        0      1.0
```

```
           1.60        1      1.0        0
           1.33        2      1.0        0
           5.26        0      1.0        0
           2.28        2      1.0        0
      LT   2.10        0      1.0        0

al No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
----- ---- --------- ----------  ------------- --------- ---- ------ -- ------------ --------- ---------
       CGW   WELL     PT-21         BH3532      11/17/88  GQA    13.7 B  BH3532      11/22/88  11/22/88

e Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
- ---- -------- ------- -------- ------- ----- -- -- ------- ------
      LT   2.40        0      1.0        0                     .
      LT   2.40        0      1.0        0                     .
      LT   2.00        0      1.0        0                     .
           5.24        1      1.0        0              N   5.00       1
      LT   2.60        0      1.0        0                     .
      LT   1.10        0      1.0        0                     .
      LT   2.90        0      1.0        0                     .

cates that the data is either in error or has not been validated




Instl: SE  Lab: EN  Lot No: ADS                        page -     6  date - 03/14/89
Sample Analysis No: 007

e Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
- ---- -------- ------- -------- ------- ----- -- -- ------- ------
      LT   3.40        0      1.0        0                     .
      LT   2.20        0      1.0        0                     .
      LT   2.80        0      1.0        0                     .
           6.38        1      1.0        0              N   5.00       1
      LT   1.57        1      1.0        0                     .
      LT   2.10        0      1.0        0                     .
      LT   1.30        0      1.0        0                     .
      LT   3.30        0      1.0        0                     .
      LT   2.10        0      1.0        0                     .
      LT   4.60        0      1.0        0                     .
           5.16        1      1.0        0              N   5.00       1
      LT   2.50        0      1.0        0                     .
      LT   2.20        0      1.0        0                     .
      LT   5.60        0      1.0        0                     .
      LT   1.30        0      1.0        0                     .
      LT   2.40        0      1.0        0                     .
           6.00        0      1.0        0
           1.40        2      1.0        0
           5.17        0      1.0        0
           2.09        2      1.0        0
      LT   2.10        0      1.0        0                     .

al No File Site Type Site Id     Field Samp No Samp Date Prog
```

```
e Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
------ -------- ------- -------- ------- ----- -- -- ------- ------
    LT     2.40        0      1.0        0
    LT     2.40        0      1.0        0
    LT     2.00        0      1.0        0                     .
           5.33        1      1.0        0              N    5.00      1
           8.51        1      1.0        0
    LT     1.10        0      1.0        0                     .
    LT     2.90        0      1.0        0                     .
    LT     3.40        0      1.0        0                     .
    LT     2.20        0      1.0        0
    LT     2.80        0      1.0        0                     .
           6.69        1      1.0        0              N    5.00      1
    LT     1.57        1      1.0        0                     .
    LT     2.10        0      1.0        0
    LT     1.30        0      1.0        0
    LT     3.30        0      1.0        0                     .
    LT     2.10        0      1.0        0

cates that the data is either in error or has not been validated




Instl: SE  Lab: EN  Lot No: ADS                          page -      7  date - 03/14/89
Sample Analysis No: 008

e Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
------ -------- ------- -------- ------- ----- -- -- ------- ------
    LT     4.60        0      1.0        0                     .
           5.22        1      1.0        0              N    5.00      1
    LT     2.50        0      1.0        0                     .
    LT     2.20        0      1.0        0
    LT     5.60        0      1.0        0
    LT     1.30        0      1.0        0
           4.18        1      1.0        0                     .
           4.81        1      1.0        0
           1.40        2      1.0        0
           5.80        0      1.0        0
           2.01        2      1.0        0
    LT     2.10        0      1.0        0                     .

al No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
------ -- --------- -------      ------------- --------- ---- -----  -- ----------- --------- ---------
       CGW    WELL     FT-20         BH3534       11/17/88  G0A      6.0 B  BH3534      11/23/88  11/23/88

e Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
------ -------- ------- -------- ------- ----- -- -- ------- ------
    LT     2.40        0      1.0        0
    LT     2.40        0      1.0        0
    LT     2.00        0      1.0        0                     .
```

```
LT   [illegible]    0    1.0    0
LT   3.40    0    1.0    0                           .
LT   2.20    0    1.0    0                           .
LT   2.80    0    1.0    0
     6.35    1    1.0    0                   N   5.00      1
LT   1.57    1    1.0    0                           .
LT   2.10    0    1.0    0                           .
LT   1.30    0    1.0    0
LT   3.30    0    1.0    0                           .
LT   2.10    0    1.0    0
LT   4.60    0    1.0    0                           .
     5.29    1    1.0    0                   N   5.00      1
LT   2.50    0    1.0    0                           .
LT   2.20    0    1.0    0
LT   5.60    0    1.0    0
LT   1.30    0    1.0    0
     4.18    1    1.0    0                           .
     1.72    1    1.0    0
     1.47    2    1.0    0
ates that the data is either in error or has not been validated
```

```
nstl: SE  Lab: EN  Lot No: ADS                        page -    8  dat [illegible]
ample Analysis No: 009

 Bool Unc Mant Unc Exp Dil Mant Dil E [illegible]
           2.08

 [illegible]                                 [illegible] Depth  Tp Loc Samp No Prep Date Anal Date

                       [illegible]      [illegible]      11-17/88  GUA    5.9 B   BH3535    11/23/88  11/23/88

 Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
 LT   2.40    0    1.0    0                           .
 LT   2.40    0    1.0    0                           .
 LT   2.00    0    1.0    0
      5.21    1    1.0    0                   N   5.00      1
      2.73    2    1.0    1
 LT   1.10    0    1.0    0
 LT   2.90    0    1.0    0
 LT   3.40    0    1.0    0                           .
 LT   2.20    0    1.0    0                           .
 LT   2.80    0    1.0    0                           .
      6.52    1    1.0    0                   N   5.00      1
 L[illegible]  1.[illegible]  [illegible]  [illegible]  0
 LT   2.10    0    1.0    0
```

```
  LT    4.00      0     1.0      0                         .
   [illegible]4      1     1.0      0                   N    5.00     1
  LT    2.50      0     1.0      0
  LT    2.20      0     1.0      0                         .
  LT    5.60      0     1.0      0                         .
  LT    1.30      0     1.0      0                         .
        1.53      2     1.0      1                         .
        9.44      0     1.0      0
        1.31      2     1.0      0
        6.34      0     1.0      0
        5.43      0     1.0      0
        1.76      2     1.0      0
  LT    2.10      0     1.0      0
cates that the data is either in error or has not been validated
```

```
Instl: SE  Lab: EN  Lot No: ADS                              page -     9  date - 03/14/89

al No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
------ ---- --------- ---------- ------------- --------- ---- ------ -- ----------- --------- ---------
       CGW   WELL     PT-18        RH3536       11/17/88  GQA    6.8 B  RH3536       11/23/88  11/23/88

ne Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
-- ---- -------- ------- -------- ------- ----- -- -- ------- ------
   LT     2.40      0     1.0      0
   LT     2.40      0     1.0      0
   LT     2.00      0     1.0      0                         .
          5.41      1     1.0      0                  N    5.00      1
          2.18      1     2.0      1                         .
   LT     1.10      0     1.0      0                         .
   LT     2.90      0     1.0      0                         .
   LT     3.40      0     1.0      0                         .
   LT     2.20      0     1.0      0
   LT     2.80      0     1.0      0                         .
          6.81      1     1.0      0                  N    5.00      1
   LT     1.57      1     1.0      0                         .
          2.28      1     2.0      1                         .
   LT     1.30      0     1.0      0
   LT     3.30      0     1.0      0                         .
   LT     2.10      0     1.0      0
   LT     4.60      0     1.0      0                         .
          5.13      1     1.0      0                  N    5.00      1
   LT     2.50      0     1.0      0
```

```
        4.[illegible]       1      [illegible]
        1.16       1      1.0       0
        1.19       2      1.0       0
        6.47       0      1.0       0
        1.11       1      1.0       0
        1.47       2      1.0       0
 LT     2.10       0      1.0       0

No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
--- ----- --------- ----------- ------------- --------- ---- ------ -- ----------- --------- ---------
  CGW    WELL     PT-10         BH1362       11/15/88  GQA     0.0 B  BH1362      11/23/88  11/23/88

Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
---- -------- ------- -------- ------- ----- -- -- ------- ------
 LT     2.40       0      1.0       0                  .
 LT     2.40       0      1.0       0                  .
 LT     2.00       0      1.0       0                  .
        4.96       1      1.0       0             N  5.00       1
 LT     2.60       0      1.0       0                  .
ates that the data is either in error or has not been validated




nstl: SE  Lab: EN  Lot No: ADS                    page -    10  date - 03/14/89
ample Analysis No: 012

Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
---- -------- ------- -------- ------- ----- -- -- ------- ------
 LT     1.10       0      1.0       0                  .
 LT     2.90       0      1.0       0                  .
 LT     3.40       0      1.0       0                  .
 LT     2.20       0      1.0       0                  .
 LT     2.80       0      1.0       0                  .
        4.90       1      1.0       0             N  5.00       1
 LT     1.57       1      1.0       0                  .
 LT     2.10       0      1.0       0                  .
 LT     1.30       0      1.0       0                  .
 LT     3.30       0      1.0       0                  .
 LT     2.10       0      1.0       0                  .
 LT     4.60       0      1.0       0                  .
        4.94       1      1.0       0             N  5.00       1
 LT     2.50       0      1.0       0                  .
 LT     2.20       0      1.0       0                  .
 LT     5.60       0      1.0       0                  .
 LT     1.30       0      1.0       0                  .
 LT     2.40       0      1.0       0                  .
        1.29       2      1.0       0
        1.01       1      1.0       0
        3.32       2      1.0       0
 LT     2.10       0      1.0       0                  .
```

```
 Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
 ---- -------- -------- -------- ------- ----- -- -- ------- ------
  LT     2.40       0      1.0       0            R    0.00
  LT     2.40       0      1.0       0            R    0.00
  LT     2.00       0      1.0       0            R    0.00
         5.10       1      1.0       0            N    5.00      1
  LT     2.60       0      1.0       0            R    0.00
  LT     1.10       0      1.0       0            R    0.00
  LT     2.90       0      1.0       0            R    0.00
  LT     3.40       0      1.0       0            R    0.00
  LT     2.20       0      1.0       0            R    0.00
  LT     2.80       0      1.0       0            R    0.00
         4.93       1      1.0       0            N    5.00      1
  LT     1.57       1      1.0       0            R    0.00
  LT     2.10       0      1.0       0            R    0.00
  LT     1.30       0      1.0       0            R    0.00
  LT     3.30       0      1.0       0            R    0.00

ates that the data is either in error or has not been validated
```

```
nstl: SE  Lab: EN  Lot No: ADS                         page -    11  date - 03/14/89
Sample Analysis No: 013

 Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
 ---- -------- -------- -------- ------- ----- -- -- ------- ------
  LT     2.10       0      1.0       0            R    0.00
  LT     4.60       0      1.0       0            R    0.00
         5.06       1      1.0       0            N    5.00      1
  LT     2.50       0      1.0       0            R    0.00
  LT     2.20       0      1.0       0            R    0.00
  LT     5.60       0      1.0       0            R    0.00
  LT     1.30       0      1.0       0            R    0.00
  LT     2.40       0      1.0       0            R    0.00
         1.35       2      1.0       0            R    0.00      0
         1.01       1      1.0       0            R    0.00      0
         2.58       2      1.0       0            R    0.00      0
  LT     2.10       0      1.0       0            R    0.00

ates that the data is in error or that it has not been validated
```

```
Lot No Meth No Units Meas Analyst
------ ------- ---------- -------
 ADT     EKB     UGL        RW


No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
-- ---- --------- ----------- ------------- --------- ---- ------ -- ----------- --------- ---------
   CDC                         BH8682          /  /    GQA    0.0     BH8682     01/15/89  01/15/89

Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
---- -------- ------- --------- -------- ----- -- -- ------- ------
 LT    2.50      0        .                        M   0.00      0

No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
-- ---- --------- ----------- ------------- --------- ---- ------ -- ----------- --------- ---------
   CDC                         BH8685          /  /    GQA    0.0     BH8685     01/15/89  01/15/89

Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
---- -------- ------- --------- -------- ----- -- -- ------- ------
       5.09      0        .                 .      S   5.00      0

No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
-- ---- --------- ----------- ------------- --------- ---- ------ -- ----------- --------- ---------
   CDC                         BH8683          /  /    GQA    0.0
```

```
           8       1      .                      S   2.50      1

l No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
---- ---- --------- ----------- ------------- --------- ---- ------ -- ------------ --------- ---------
    CQC                         BH8684             / /   G0A      0.0    BH8684       01/15/89  01/15/89

e Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
- ---- -------- ------- -------- ------- ----- -- -- ------- ------
        2.71       1      .                      S   2.50      1

cates that the data is either in error or has not been validated




Instl: SE  Lab: EN  Lot No: ADT                     page -     2  date - 03/14/89

l No File Site Type Site Id     Field Samp No Samp Date Prog Depth  Tq Lab Samp No Prep Date Anal Date
---- ---- --------- ----------- ------------- --------- ---- ------ -- ------------ --------- ---------
    CGW   WELL    PT-B-MARK     BH0599      11/03/88   G0A      0.0 B   BH0599       01/15/89  01/15/89

e Bool Unc Mant Unc Exp Dil Mant Dil Exp Moist FC QC QC Mant QC Exp
- ---- -------- ------- -------- ------- ----- -- -- ------- ------
        1.47       1     1.0       0

cates that the data is in error or that it has not been validated
```

LABORATORY QUALITY CONTROL COORDINATOR

NON-CONFORMANCE REPORTS

Environmental Testing and Certification Corp.
284 Raritan Center Parkway
P.O. Box 7808
Edison, New Jersey 08818-7808
201-225-5600

ETC

November 18, 1988

Mr. Bryant
USATHAMA
AMSMC-PCB
Aberdeen Proving Ground, MD, 21010-5423

Dear Mr. Bryant,

Please find enclosed quality control charts and a summary sheet pertaining to the work that ETC has been employed to perform under contract DAAA15-88-D-0009/ICF Technology. The samples are from Seneca Army Depot and analyzed per Task Order No. 1.

Lot ADN - Volatiles by Method EJ8

DCED4 - The recovery and range charts indicate that this method is under control concerning both precision and accuracy.

DCMD2 - The recovery and range charts indicate that this method is under control concerning both precision and accuracy.

EBD10 - The recovery and range charts indicate that this method is under control concerning both precision and accuracy. The range appears to be improving with time.

It should be noted that the units on the tabular data which has been reported in the past has been incorrectly identified as UG/L. The correct units should be NG; corrections have been made and future data will reflect this change.

If you have any questions concerning the enclosed, please feel free to contact me at (201) 225-6764.

Sincerely,

Lori Anne Hendel

Lori Anne Hendel
Quality Assurance/Quality Control Officer

pc: David N. Speis/ETC-Edison
Robert J York/USATHAMA
Gary L. McKown/ICF Technology

NON-CONFORMANCE SUMMARY FOR LOT # ADN

1) In the initial calibration methylene chloride-d2 was not seen in th 2.0 ug/L and 4.0 ug/L standards even though its CRL is 2.0 ug/L. This is because the quantitation ion that had to be chosen (m/z 53) is very weak. This ion had to be chosen because this compound co-elutes with methylene chloride. The fact that methylene chloride-d2 was not seen at the concentrations mentioned above, however, does not affect the data of samples because this compound is a surrogate and was spiked into samples at a concentration of 50 ug/l. The data for this compound in the 10.0 ug/L, 20.0 ug/L, 40.0 ug/L, and 100.0 ug/L are good.

2) The RSD for methylene chloride, chloroform, methyldisulfide, benzene, methyl isobutylketone, tetrachloroethylene, ethylbenzene, 1,2-dibromo-3-chloropropane, m-xylene, and o+p-xylene is more than 25.0 %. According to the USATHAMA QAPP of 1985 the RSD for all compounds should not be more than 25.0 %. However, the certified method used for this work was based on the USATHAMA QAPP of 1982 which has no such requirement.

Environmental Testing and Certification Corp.
284 Raritan Center Parkway
P.O. Box 7808
Edison, New Jersey 08818-7808
201-225-5600

ETC

December 01, 1988

Mr. D. Graves
USATHAMA
AMXTH-TE-A
Aberdeen Proving Ground, MD, 21010-5401

Dear Mr. Graves,

Please find enclosed quality control charts and a summary sheet pertaining to the work that ETC has been employed to perform under contract DAAA15-88-D-0009/ICF Technology. The samples are from Seneca Army Depot and analyzed per Task Order No. 1.

Lot ADO was analyzed by method EW9 (Volatile Organics in Soil) on 11/6-7/88 within the seven day hold time. The methanol which had been used for the methanol extraction was determined to contain high levels of methylene chloride. Consequently, the samples were re-analyzed for methylene chloride using a new lot of methanol on 11/8/88 within the fourteen day hold time for Volatile Halocarbons. The results reported are from the analyses on 11/6-7/88 with the exception of methylene chloride which has been reported from the analyses on 11/8/88.

ETC did not receive USATHAMA Standard soil with these samples in order to perform the method blank analysis. The analyst used a water method blank as specified in method EJ8, so that the samples could be analyzed within hold time. This is the standard operating procedure which ETC uses to analyze blanks for Volatile analyses in soil as specified in the USEPA SOW. The results for this method blank were entered on the Control Chart for method EJ8.

Lot ADS contains ten water samples which are from the resampled wells and three DI rinse water samples.

The data points for 1,2-Dichloroethane-D4 for both lots (ADO & ADS) failed the Dixon test, however, the data points do not appear to be outliers and the data was not failed. These points have been used in the calculations for Average Recovery and Range.

A Subsidiary of Environmental Treatment and Technologies Corp.
The Environmental Services Company

Lots ADO & ADS - Volatile Organics

DCED4 - The recovery and range charts indicate that this analysis is under control concerning both precision and accuracy for both lots of samples. The range appears to be improving over time as the analysts gain more experience with the methods.

DCMD2 - The recovery and range charts indicate that this analysis is under control concerning both precision and accuracy for both lots of samples. The trend seems to be improvement over time with respect to the range. This may be attributed to the analysts gaining more experience with the methods.

EBD10 - The recovery and range charts indicate that this analysis is under control concerning both precision and accuracy for both lots of samples. Again, the range appears to be improving over time as the analysts gain more experience with the method.

If you have any questions concerning the enclosed, please feel free to contact me at (201) 225-6764.

Sincerely,

Lori Anne Hendel

Lori Anne Hendel
Quality Assurance/Quality Control Officer

pc: David N. Speis/ETC-Edison
Robert J. York/USATHAMA
Gary L. McKown/ICF Technology ✓

NON-CONFORMANCE SUMMARY FOR LOT # ADO

1) In the initial calibration methylene chloride-d2 was not seen in the 2 ug/L and 4 ug/L standards even though its CRL in water is 2 ug/L. This is because the quantitation ion that had to be chosen (m/z 53) is very weak. This ion had to be chosen because this compound co-elutes with methylene chloride. The fact that methylene chloride-d2 was not seen at the concentrations mentioned above, however, does not affect the data of samples because this compound is a surrogate and was spiked into samples at a concentration of 50 ug/l. The data for this compound in the 10 ug/L, 20 ug/L, 40 ug/L, and 100 ug/L are good.

2) The RSD for methylene chloride, chloroform, methyldisulfide, benzene, methyl isobutylketone, tetrachloroethylene, ethylbenzene, 1,2-dibromo-3-chloropropane, m-xylene, and o+p-xylene is more than 25.0 %. According to the USATHAMA QAPP of 1985 the RSD for all compounds should not be more than 25.0 %. However, the certified method used for this work was based on the USATHAMA QAPP of 1982 which has no such requirement.

3) The difference between the mean RF in the initial calibration and the corresponding RF in three continuing calibrations (>D3953, >D3981, and >D3992) was more than 25.0 % for methylene chloride, bicycloheptadiene, methyldisulfide, and ethyl benzene. In addition, the difference was more than 25.0 % for methyl isobutylketone in >D3953 and >D3992 and for 1,2-dibromo-3-chloropropane in >D3953. According to the USATHAMA QAPP of 1985 the difference between the

mean RF in the initial calibration and the RF in any continuing calibration should not be more than 25.0 % for any compound. However, the method used for this work was based on the USATHAMA QAPP of 1982 which has no such requirement.

4) A soil blank was not run since standard USATHAMA soil had not yet been received from ICF. Instead, a DI water blank was run.

5) The methanol used on 11/6/88 was contaminated with methylene chloride and hence, all samples analysed on 11/6/88 were re-analysed on 11/8/88. The data for methylene chloride for these samples (BH0566, BH0567, BH0574, BH0575, and BH0583) were reported from the re-runs on 11/8/88 which was eight days after sampling (for non-aromatic compounds the hold time is fourteen days).

NON-CONFORMANCE SUMMARY FOR LOT # ADS

1) In the initial calibration methylene chloride-d2 was not seen in the 2.0 ug/L and 4.0 ug/L standards even though its CRL is 2.0 ug/L. This is because the quantitation ion that had to be chosen (m/z 53) is very weak. This ion had to be chosen because this compound co-elutes with methylene chloride. The fact that methylene chloride-d2 was not seen at the concentrations mentioned above, however, does not affect the data of samples because this compound is a surrogate and was spiked into samples at a concentration of 50 ug/l. The data for this compound in the 10.0 ug/L, 20.0 ug/L, 40.0 ug/L, and 100.0 ug/L are good.

2) The RSD for methylene chloride-d2, methylene chloride, chloroform, methyl disulfide, methyl isobutylketone, and dicyclopentadiene is more than 25.0 %. According to the USATHAMA QAPP of 1985 the RSD for all compounds should not be more than 25.0 %. However, the certified method used for this work was based on the USATHAMA QAPP of 1982 which has no such requirement.

3) The difference between the mean RF in the initial calibration and the corresponding RF in two continuing calibrations (>E5331 and >E5344) was more than 25.0 % for methylene chloride, methyldisulfide, and methyl isobutylketone. According to the USATHAMA QAPP of 1985 the difference between the mean RF in the initial calibration and the RF in any continuing calibration should not be more than 25.0 % for any compound. However, the method used for this work was based on the USATHAMA QAPP of 1982 which has no such requirement.

4) Sample # BH3535 contained 1363.18 ng of 1,2-trans-dichloroethylene and 766.55 ng of trichloroethylene in 5 mL of diluted sample (1:10 dilution). These figures exceeded the URL for these compounds. Further dilution was not possible because only two vials of the sample were received.

5) Sample # BH3536 contained 2364.99 ng of trichloroethylene in 5 mL of diluted sample (1:20 dilution) which is above its URL. Further dilution was not possible because only two vials of the sample were received.

Environmental Testing and Certification Corp.
284 Raritan Center Parkway
P.O. Box 7808
Edison, New Jersey 08818-7808
201-225-5600

ETC

January 17, 1989

Mr. D. Graves
USATHAMA
AMXTH-TE-A
Aberdeen Proving Ground, MD, 21010-5401

Dear Mr. Graves,

Please find enclosed quality control charts and a summary sheet pertaining to the work that ETC has been employed to perform under contract DAAA15-88-D-0009/ICF Technology. The samples are from Seneca Army Depot and analyzed per Task Order No. 1.

Lot ADT Pb by Furnace

Pb - The recovery and range chart for the Low Spike indicate that the method is under control. The recovery chart for the High Spike shows a recovery which exceeds the Upper Control Limit, however, this is not an indication that the method is not in control. The Certification Data yielded recoveries with a high degree of precision which resulted in very narrow recovery ranges. The Lower Control Limit is 101% and the Upper Control Limit is 106%. I believe that a recovery of 108% indicates acceptable accuracy and that the data for this lot is of acceptable quality. The range chart for the High Spike indicates acceptable precision.

Lot ADR ICAP Metals in Soil

Cd - The recovery and range charts of both the Low and the High Spikes indicate acceptable accuracy and precision. The recovery of this analyte appears to be improving with time.

Cr - The recovery and range charts of both the Low and the High Spikes indicate acceptable accuracy and precision for this analyte.

Cu - The recovery and range charts of both the Low and the High Spikes indicate acceptable accuracy and precision for this analyte.

Lot ADR ICAP Metals in Soil (continued)

Pb - The recovery and the range charts of both the Low and the High Spikes indicate acceptable accuracy and precision for this analyte.

Zn - The recovery and the range charts of both the Low and the High Spikes indicate acceptable accuracy and precision for this analyte.

General Discussion

The Quality Control data for both lots were reviewed for errors and none were identified. Upon review of the historical data, it is my opinion that the present control limits are too stringent and do not necessarily reflect the ability of the method (at this point in time). It appears that the present limits are too restrictive due to the limited number of data points and the unusually precise data generated during certification.

It should be noted that the Control Charts generated for the ICAP Metals used the certification data from ETC's original certification of this method. ETC did not use USATHAMA standard soil for this certification; the standard soil which was used was provided by USATHAMA, but was representative of another installation. In order to generate the charts for this lot of data, it was necessary to use the data obtained from certification. As the control charts demonstrate, there does not seem to be any significant loss of precision and accuracy due to the use of the different standard soils.

It is my opinion that the sample data from both these lots is of acceptable quality for inclusion in the USATHAMA database.

If you have any questions concerning the enclosed, please feel free to contact me at (201) 225-6764.

Sincerely,

Lori Anne Hendel

Lori Anne Hendel
Quality Assurance/Quality Control Officer

pc: David N. Speis/ETC-Edison
Robert J. York/USATHAMA
Gary L. McKown/ICF Technology

Environmental Testing and Certification Corp.
284 Raritan Center Parkway
P.O. Box 7808
Edison, New Jersey 08818-7808
201-225-5600

ETC

January 25, 1989

Mr. D. Graves
USATHAMA
AMXTH-TE-A
Aberdeen Proving Ground, MD, 21010-5401

Dear Mr. Graves,

Please find enclosed quality control charts and a summary sheet pertaining to the work that ETC has been employed to perform under contract DAAA15-88-D-0009/ICF Technology. The samples are from Seneca Army Depot and analyzed per Task Order No. 1.

Lot ADQ ICAP Metals in Water

Cd - The recovery and range chart of the Low Spike indicates that the method is under control. The recovery chart for the High Spike shows a recovery which is less than the Lower Control Limit, however, this is not an indication that the method is not in control. The Certification data yielded recoveries with a high degree of precision which resulted in very narrow recovery ranges. Presently the LCL is 92% and the UCL is 99%. I believe that a recovery of 92% indicates acceptable accuracy and that the data for this lot is of acceptable quality. The range chart for the High Spike indicates acceptable precision.

Cr - The recovery and range chart of the Low Spike indicates that the method is under control. The recovery chart for the High Spike shows a recovery which is less than the Lower Control Limit, however, this is not an indication that the method is not in control. The Certification data yielded recoveries with a high degree of precision which resulted in very narrow recovery ranges. Presently the LCL is 94% and the UCL is 100%. I believe that a recovery of 93% indicates acceptable accuracy and that the data for this lot is of acceptable quality. The range chart for the High Spike indicates acceptable precision.

Lot ADQ ICAP Metals in Water (continued)

Mg - The recovery and range chart of the Low Spike indicates that the method is under control. The recovery chart for the High Spike shows a recovery which is less than the Lower Control Limit, however, this is not an indication that the method is not in control. The Certification data yielded recoveries with a high degree of precision which resulted in very narrow recovery ranges. Presently the LCL is 96% and the UCL is 100%. I believe that a recovery of 96% indicates acceptable accuracy and that the data for this lot is of acceptable quality. The range chart for the High Spike indicates acceptable precision.

Cu - The recovery and range chart of the Low Spike indicates that the method is under control, however, the data point for this lot is below the Lower Warning Limit on the recovery chart. We shall pay close attention to this in order to determine if a trend might be developing for this analyte. The recovery chart for the High Spike shows a recovery which is less than the Lower Control Limit, however, this is not an indication that the method is not in control. The Certification data yielded recoveries with a high degree of precision which resulted in very narrow recovery ranges. Presently the LCL is 92% and the UCL is 98%. I believe that a recovery of 90% indicates acceptable accuracy and that the data for this lot is of acceptable quality. The range chart for the High Spike indicates acceptable precision.

Ca - The recovery and range chart of the Low Spike indicates that the method is under control, however, the data point for this lot is at the Lower Warning Limit on the recovery chart and at the Upper Control Limit on the range chart. We shall pay close attention to this in order to determine if a trend might be developing for this analyte. The recovery chart for the High Spike shows a recovery which is less than the Lower Control Limit, however, this is not an indication that the method is not in control. The Certification data yielded recoveries with a high degree of precision which resulted in very narrow recovery ranges. Presently the LCL is 95% and the UCL is 101%. I believe that a recovery of 93% indicates acceptable accuracy and that the data for this lot is of acceptable quality. The range chart for the High Spike indicates acceptable precision.

Lot ADQ ICAP Metals in Water (continued)

Na - The data point on the recovery chart for the Low Spike is above the Upper Control Limit and the data point on the range chart is at the UCL. The certification data yielded recoveries with a high degree of precision which resulted in very narrow recovery ranges. Presently the LCL is 74% and the UCL is 92%. I believe that a recovery of 92% indicates acceptable accuracy and that the data for this lot is of acceptable quality. The recovery range charts for the High Spike indicates that the method is under control.

Zn - The recovery and range chart of the Low Spike indicates that the method is under control, however, the data point for this lot is below the Lower Warning Limit on the recovery chart. We shall pay close attention to this in order to determine if a trend might be developing for this analyte. The recovery and range charts for the High Spike indicates that the method is under control.

K - The recovery and the range charts of both the Low and the High Spikes indicate acceptable accuracy and precision for this analyte.

General Discussion

The Quality Control data for both lots were reviewed for errors and none were identified. Upon review of the historical data, it is my opinion that the present control limits are too stringent and do not necessarily reflect the ability of the method (at this point in time). It appears that the present limits are too restrictive due to the limited number of data points and the unusually precise data generated during certification. It is my opinion that the sample data from this lot is of acceptable quality for inclusion in the USATHAMA database.

If you have any questions concerning the enclosed, please feel free to contact me at (201) 225-6764.

Sincerely,

Lori Anne Hendel

Lori Anne Hendel
Quality Assurance/Quality Control Officer

pc: David N. Speis/ETC-Edison
Robert J. York/USATHAMA
Gary L. McKown/ICF Technology

APPENDIX F

LOCATION-, CHEMICAL-, AND ACTION-SPECIFIC ARARs

ATTACHMENT A

LOCATION-SPECIFIC ARARs

J. TRANSMITTAL

LEASE PURCHASE CONTRACT

SELECTED LOCATION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

	Requirement	Prerequisite	Citation
1 meters (200 feet) of a splaced in Holocene time	New treatment, storage, or disposal of hazardous waste prohibited	RCRA hazardous waste; treatment, storage, or disposal	40 CFR 264.18(a)
00-year floodplain	Facility must be designed, constructed, operated, and maintained to avoid washout	RCRA hazardous waste; treatment, storage, or disposal	40 CFR 264.18(b)
loodplain b/	Action to avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial values	Action that will occur in a floodplain, i.e., lowlands, and relatively flat areas adjoining inland and coastal waters and other flood prone areas	Protection of floodplains, b/ (40 CFR 6, Appendix A); Fish and Wildlife Coordination Act (16 USC 661 *et seq.*); 40 CFR 6.302
alt dome formation, und mine, or cave	Placement of non-containerized or bulk liquid hazardous waste prohibited	RCRA hazardous waste; placement	40 CFR 264.18(c)
rea where action may reparable harm, loss, or ion of significant s	Action to recover and preserve artifacts	Alteration of terrain that threatens significant scientific, prehistorical, historical or archaeological data	National Historical Preservation Act (16 USC Section 469); 36 CFR Part 65
project owned or ed by Federal agency	Action to preserve historic properties; planning of action to minimize harm to National Historic Landmarks	Property included in or eligible for the National Register of Historic Places	National Historic Preservation Act, Section 106 (16 USC 470 *et seq.*); 36 CFR Part 800
habitat upon which ed species or threatened depends	Action to conserve endangered species or threatened species, including consultation with the Department of Interior	Determination of presence of endangered or threatened species	Endangered Species Act of 1973 (16 USC 1531 *et seq.*); 50 CFR Part 200, 50 CFR Part 402 Fish and Wildlife Coordination Act (16 USC 661 *et seq.*); 33 CFR Parts 320-330.

SELECTED LOCATION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

	Requirement	Prerequisite	Citation
b/	Action to prohibit discharge of dredged or fill material into wetlands without permit	Wetlands as defined in U.S Army Corps of Engineers regulations	Clean Water Act section 404; 40 CFR Parts 230, 33 CFR Parts 320-330.
	Action to avoid adverse effects, minimize potential harm, and preserve and enhance wetlands, to the extent possible (see discussion in section 3.4.4.1)	Action involving construction of facilities or management of property in wetlands, as defined by 40 CFR Part 6, Appendix A, section 4 (j)	40 CFR Part 6, Appendix A
e area	Area must be administered in such manner as will leave it unimpaired as wilderness and to preserve its wilderness	Federally-owned area designated as wilderness area	Wilderness Act (16 USC 1131 *et seq.*); 50 CFR 35.1 *et seq.*
refuge	Only actions allowed under the provisions of 16 USC Section 668 dd(c) may be undertaken in areas that are part of the National Wildlife Refuge System	Area designated as part of National Wildlife Refuge System	16 USC 668dd *et seq.*; 50 CFR Part 27
cting stream or river	Action to protect fish or wildlife	Diversion, channeling or other activity that modifies a stream or river and affects fish or wildlife	Fish and Wildlife Coordination Act (16 USC 661 *et seq.*); 40 CFR 6.302
ea effecting national nic, or recreational	Avoid taking or assisting in action that will have direct adverse effect on scenic river	Activities that affect or may affect any of the rivers specified in section 1276(a)	Wild and Scenic Rivers Act (16 USC 1271 *et seq.* section 7 (a)); 40 CFR 6.302(e)
astal zone	Conduct activities in manner consistent with approved State management programs	Activities affecting the coastal zone including lands therein and thereunder and adjacent shorelands	Coastal Zone Management Act (16 USC Section 1451 *et seq.*)
signated coastal barrier	Prohibits any new Federal expenditure within the Coastal Barrier Resource System	Activity within the Coastal Barrier Resource System	Coastal Barrier Resources Act (16 USC 3501 *et seq.*)

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tional location-specific requirements will be added after analysis of additional sources and will be included in a subsequent this manual.

FR Part 6 Subpart A sets forth EPA policy for carrying out the provisions of Executive Orders 11988 (Floodplain Management) and rotection of Wetlands). Executive orders [illegible] binding on [illegible] level [illegible], F[illegible]l, S[illegible] of government which [illegible] are

ATTACHMENT B

CHEMICAL-SPECIFIC ARARs

SELECTED CHEMICAL-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

RCRA AND SDWA MCLS

	Potential ARARs b/	
e	RCRA Maximum Concentration Limits (mg/1)	SDWA Maximum Contaminant Levels (mg/1)
	5.0×10^{-2}	5.0×10^{-2}
	1.0	1.0
		5.0×10^{-3}
e Photon Radioactivity		4 millirems
	1.0×10^{-2}	1.0×10^{-2}
chloride		5.0×10^{-3}
	5.0×10^{-2}	5.0×10^{-2}
teria		1 per 100 ml
nzene		7.5×10^{-2}
ethane		5.0×10^{-3}
ethylene		7.0×10^{-3}
phenoxyacetic Acid (2,4-D)	1.0×10^{-1}	1.0×10^{-1}
	2.0×10^{-4}	2.0×10^{-4}
		4.0
	5.0×10^{-2}	5.0×10^{-2}
	4.0×10^{-3}	4.0×10^{-3}
y	2.0×10^{-3}	2.0×10^{-3}
	1.0×10^{-1}	1.0×10^{-1}
N)		10
s, gross alpha particle activity		15 pCi/1
Radium-226		5 pCi/1
	1.0×10^{-2}	1.0×10^{-2}
	5.0×10^{-2}	5.0×10^{-2}
	5.0×10^{-3}	5.0×10^{-3}
vex	1.0×10^{-2}	1.0×10^{-2}
oroethene		2.0×10^{-1}
ylene		5.0×10^{-3}
omethanes		1.0×10^{-1}
		1 Tu
d.		

SELECTED CHEMICAL-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

	Potential ARARs b/				For Use In Special Circumstances
	CWA Water Quality Criteria for Protection of Human Health		CWA Ambient Water Quality Criteria for Protection of Aquatic Life c/		
e	Water and Fish Ingestion (mg/l)	Fish Consumption Only (mg/l)	Freshwater Acute/Chronic (mg/l)	Marine Acute/Chronic (mg/l)	SDWA/MCL Goal (mg/l) d/
			1.7*/0.5*	0.9*/0.7*	
ne				3.0x10-01*	
	3.2x10-01	7.8x10-01	6.8x10-02*/2.1x10-02*	5.5x10-02*	
e	5.8x10-05	6.5x10-04	7.5*/2.6*		
	7.4x10-08	7.9x10-08	3.0x10-03	1.3x10-03	
Compounds	1.5x10-01	45	9.0/1.6		
Compounds	2.2x10-06	1.8x10-05			
and Compounds			0.8*/4.8x10-02*	2.3*/1.3x10-02	
) and Compounds			0.3/0.1	6.9x10-02/3.6x10-02	
Compounds	1				
ecene					
line					0
	6.6x10-04	4.0x10-02	5.3*	5.1*/0.7*	
	1.2x10-04	5.3x10-04	2.5*		
ne					
ranthene					
rylene					
ranthene					
d Compounds	6.8x10-06	1.2x10-04	0.1*/5.3x10-03*		
ethyl)ether					
isopropyl)ether					
thyl)ether					

SELECTED CHEMICAL-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

	Potential ARARs b/				For Use In Specia Circumstances
	CWA Water Quality Criteria for Protection of Human Health		CWA Ambient Water Quality Criteria for Protection of Aquatic Life c/		
e	Water and Fish Ingestion (mg/l)	Fish Consumption Only (mg/l)	Freshwater Acute/Chronic (mg/l)	Marine Acute/Chronic (mg/l)	SDWA/MCL Goal (mg/l) d/
Compounds	1.0x10-02		3.9x10-03+/1.1x10-03+	4.3x10-02/9.3x10-02	
achloride	4.0x10-04	6.9x10-03	3.5x10+01	5.0x10+01	0
	4.6x10-07	4.8x10-07	2.4x10-03/4.3x10-06	9.0x10-05/4.0x10-06	
Benzenes			2.5x10-01*/5.0x10-02*	1.6x10-01*/1.2x10-01*	
Naphthalenes			1.6*	7.5x10-03*	
Ethers			2.3x10+02*		
ne (Mono)					
omethane					
	1.9x10-04	1.8x10-02	2.8x10+01*/1.2*		
nol			4.3*/2.0*		
I and Compounds	170	3433	1.7+/0.2+	1.0x10+01	
and Compounds	5.0x10-02		1.6x10-02/1.1x10-02	1.1/5.0x10-02	
Compounds			1.8x10-02+/1.2x10-02+	2.9x10-03/2.9x10-03	
	2x10-01		2.2x10-02/5.2x10-03	1.0x10-03/1.0x10-03	
	2.4x10-08	2.4x10-08	1.1x10-03/1.0x10-06	1.3x10-04/1.0x10-06	
alate	35	154			
zenes	4x10-01	2.6	1.1*/7.6x10-01*	1.9*	
obenzene					
obenzene					
obenzene					7.5x10-01
robenzidine	1x10-04	2x10-05			
oethane (EDC)	9.4x10-04	2.4x10-01	1.1x10+02*/2.0x10+01*	1.1x10+02*	0
ylenes	3.3x10-05	1.9x10-03	1.1x10+01*	2.2+02*	

SELECTED CHEMICAL-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

	Potential ARARs b/				For Use In Speci Circumstances
	CWA Water Quality Criteria for Protection of Human Health		CWA Ambient Water Quality Criteria for Protection of Aquatic Life c/		
me	Water and Fish Ingestion (mg/1)	Fish Consumption Only (mg/1)	Freshwater Acute/Chronic (mg/1)	Marine Acute/Chronic (mg/1)	SDWA/MCL Goal (mg/1) d/
roethylene	3.1		1.1x10+01*	2.2x10+02*	7.0x10-03
rophenol			2.0*/0.3*		
rophenol					
rophenol					
rophenol					
rophenol					
rophenoxyacetic Acid (2,4-D)					7.0x10-03
ropropene	8.7x10-02	14.1	6.0*/0.2*	0.7*	
	7.1x10-08	7.6x10-08	2.5x10-03/1.9x10-06	0.7x10-03/1.9x10-06	
halate	350	1800			
lhexyl)phthalate (DEHP)					
rosamine					
hylbenz(a)anthracene					
trosamine					
ylphenol			2.1*		
thelate	313	2900			
o-o-cresol					
rophenol					
ylhydrazine					
	7.4x10-02	1.6x10-01	2.2x10-04/5.6x10-05	3.4x10-05/0.7x10-06	
	1x10-03		1.8x10-04/2.3x10-06	3.7x10-05/2.3x10-06	
	1.4	3.3	3.2x10+01	4.3x10-01*	
ne	4.2x10-02	5.4x10-02	3.9*	4.0x10-02*/1.6x10-02*	
		4.0			

SELECTED CHEMICAL-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

	Potential ARARs b/				Circumstances
	CWA Water Quality Criteria for Protection of Human Health		CWA Ambient Water Quality Criteria for Protection of Aquatic Life c/		
ne	Water and Fish Ingestion (mg/l)	Fish Consumption Only (mg/l)	Freshwater Acute/Chronic (mg/l)	Marine Acute/Chronic (mg/l)	SDWA/MCL Goal (mg/l) d/
	2.8x10-07	2.9x10-07	5.2x10-04/3.8x10-06	5.3x10-05/3.6x10-06	
nzene	7.2x10-07	7.4x10-07			
utadiene	4.5x10-04	5x10-02	9.0x10-02/9.3x10-03*	3.2x10-02*	
hlorocyclohexane (HCCH)	9.2x10-06	3.1x10-05			
(Lindane)					
CCH	1.2x10-05	4.1x10-05			
yclopentadiene	2.1x10-01		7.0x10-03*/5.2x10-03*	7.0x10-03*	
thane	1.9x10-03	8.74x10-03	9.8x10-01*/5.4x10-01*	9.4x10-01*	
			1.17x10+02*	1.2x10+01*	
[redacted]	5x10-02		8.0x10-02/3.2x10-03+	0.1/5.6x10-03	
Compounds (Alkyl)			2.4x10-03/1.2x10-05	2.14x10-03/2.5x10-05	
Compounds (Inorganic)	1.4x10-04	1.5x10-04	2.4x10-03/1.2x10-05	2.1x10-03/2.5x10-05	
r	1x10-01		0.3x10-04*	0.3x10-04*	
ride					
chlorophenol					
chlorophenol					
chlorophenol					
ophenol					
ophenol					
Compounds	1.3x10-10	1x10-01	1.4+/1.6x10-01+	7.5x10-02/8.3x10-03	
N)	10				
e	20		2.7x10+01*	6.6	
s			2.3x10-01*/1.5x10-01*	4.8*	

SELECTED CHEMICAL-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

	Potential ARARs b/				For Use In Speci Circumstances
	CWA Water Quality Criteria for Protection of Human Health		CWA Ambient Water Quality Criteria for Protection of Aquatic Life c/		
me	Water and Fish Ingestion (mg/l)	Fish Consumption Only (mg/l)	Freshwater Acute/Chronic (mg/l)	Marine Acute/Chronic (mg/l)	SDWA/MCL Goal (mg/l) d/
s			5.8*	3.3x10+03*	
iphenylamine	4.9x10-03	1.6x10-02			
yrrolidine	1.6x10-05	9.2x10-02			
robenzene					
inated Ethenes			7.2*/1.1*	3.9x10-01*/2.8x10-01*	
obenzene	7.4x10-02	8.5x10-02			
ophenol	1		2.0x10-02/1.3x10-02	1.3x10-02/7.9x10-03	
ne					
	3.5		1.0x10+01/2.5	5.8	
Esters			9.4x10-01*/3.0x10-03*	2.9*/3.4x10-03*	
nated Biphenyls (PCBs)	7.9x10-08	7.9x10-08	2.0x10-03/1.4x10-05	1.0x10-02/3.0x10-05	
des, Gross alpha activity		15 pCi/1			
and 228		5 pCi/1			
nd Compounds	1.0x10-02	1.0x10-02	2.6x10-01/3.5x10-02	4.1x10-01/5.4x10-02	
Compounds	5.0x10-02	5.0x10-02	4.1x10-03+/1.2x10-04	2.3x10-03	
90		8 pCi/1			
DD (Dioxin)			<1.0x10-05*/<1.0x10-08		
inated Ethanes			9.3*		
trachlorobenzene	3.8x10-02	4.8x10-02			
trachloroethane	1.7x10-04	1.1x10-02	2.4*	9.0*	
oethanes			9.3*		
oethylene	8x10-04	8.9x10-03	5.2*/8.4x10-01*	1.0x10+01*/4.5x10-01*	
trachlorophenol				4.4x10-01	
nd Compounds	1.3x10-02	4.8x10-02	1.4*/4.0x10-02*	2.1x10-03*	

SELECTED CHEMICAL-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

	Potential ARARs b/				For Use In Special Circumstances
	CWA Water Quality Criteria for Protection of Human Health		CWA Ambient Water Quality Criteria for Protection of Aquatic Life c/		
	Water and Fish Ingestion (mg/l)	Fish Consumption Only (mg/l)	Freshwater Acute/Chronic (mg/l)	Marine Acute/Chronic (mg/l)	SDWA/MCL Goal (mg/l) d/
	14	420	1.7x10+01*	6.3*/5.0*	
	7.1x10-07	7.3x10-07	7.3x10-04/2.0x10-07	2.1x10-04/2x10-07	
ne (Bromoform)					
d Ethenes			1.8x10+01*		
roethane	18	1000		3.1x10+01*	2.0x10-01
roethane	6x10-04	4.2x10-02	9.4*		
lene	2.7x10-03	8.1x10-02	4.5x10+01*/2.1x10+01*	2.0*	0
fluoromethane					
rophenol	2.6				
rophenol	1.2x10-03	3.6x10-03	9.7x10-01*		
rophenoxypropionic Acid					
es (Total) b					
le	2x10-03	5.3x10-01			0
ounds			1.3x10-01/1.1x10-01	9.6x10-02/8.6x10-02	

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chemical-specific requirements will be added (e.g. National Ambient Air Quality Criteria) after analysis of additional statutes.

r more values conflict, the lower value generally should be used.

ter quality criteria (FWQC) are not legally enforceable standards, but are potentially relevant and appropriate to CERCLA actions. CERCLA (1) requires consideration of four factors when determining whether FWQC are relevant and appropriate: 1) the designated or potential use oundwater, 2) the environmental media affected, 3) the purposes for which such criteria were developed, and 4) the latest information avai

r thet is to be used for drinking, the MCLs set under the SDWA are generally the applicable or relevant and appropriate standard. A stand
ter more stringent than an MCL may be needed in special circumstances, such as where multiple contaminants in ground water or multiple pat
esent extraordinary risks. In setting a level more stringent than the MCL in such cases, a site-specific determination should be made by
MCLGs, the Agency's policy on the use of appropriate risk ranges for carcinogens (10-4 to 10-7 individual lifetime risk), levels of quant
ertinent guidelines. Prior consultation with Headquarters is encouraged in such cases.

served Effect Level.

dependent criteria (100 mg/l used); refer to specific criteria documents for equations to calculate criteria based on other water hardness

.S. EPA, Superfund Public Health Evaluation Manual, EPA 540/1-86/060 (OSWER Directive 9285.4-1) October 1986 and U.S. EPA, Quality Criteri
EPA 440/5-86-001, May 1986 (51 Federal Register 43665).

Proposed Maximum Contaminant Level Goals (MCLGs)
Under the Safe Drinking Water Act a/
(1985)

CHEMICAL	PROPOSED MCLGs (mg/l) b/
Acrylamide	0
Alachlor	0
Aldicarb	0.009
Aldicarb sulfoxide	0.009
Aldicarb sulfone	0.009
Arsenic	0.05
Asbestos	7.1 c/
Barium	1.5
Cadmium	0.005
Carbofuran	0.036
Chlordane	0
Chromium	0.12
Copper	1.3
Dibromochloropropane	0
o-Dichlorobenzene	0
1,2-cis-Dichloroethylene	0.07
1,2-trans-Dichloroethylene	0.07
1,2-Dichloropropane	0.006
2,4-D	0.07
Epichlorohydrin	0
Ethylbenzene	0.68
Ethylene dibromide (EDB)	0
Heptachlor	0
Heptachlor epoxide	0
Lead	0.02
Lindane	0.0002
Mercury	0.003
Methoxychlor	0.34
Monochlorobenzene	0.06
Nitrate	10
Nitrite	1
Polychlorinated biphenyls	0
Pentachlorophenol	0.22
Selenium	0.045
Styrene	0.14
Tetrachloroethylene	0

Proposed Maximum Contaminant Level Goals (MCLGs) Under the Safe Drinking Water Act (1985)

CHEMICAL	PROPOSED MCLGs (mg/l) a/
Toluene	2
Toxaphene	0
2,4,5-TP	0.052
Xylene	0.44

a/ A list of final MCLs and MCLGs is presented in Exhibit 1-1. There are currently no proposed MCLs.

b/ MCLG - Maximum contaminant level goal; proposed values taken from 50 FR 46936 (November 13, 1985). EPA will repropose these MCLGs with the proposal of MCLs for these chemicals. This proposal is expected in May/June 1988.

c/ Million fibers per liter >10q in length.

List of 83 Contaminants for Which MCLs Must Be Promulgated by June 1989

9 MCLs Currently Final

Benzene
Carbon Tetrachloride
p- Dichlorobenzene
1,2-Dichloroethane
1,1-Dichloroethylene
Flouride
1,1,1-Trichloroethane
Trichloroethylene
Vinyl Chloride

40 Contaminants Mandated for MCL Promulgation by June 1988[6]

Acrylamide
Aldicarb
Alachlor
*Arsenic
Asbestos
*Barium
*Cadmium
Carbofuran
Chlordane
Chlorobenzene
*Chromium
*Coliform Bacteria
Copper
Dibromochloropropane (DBCP)
o-Dichlorobenzene
cis-1,2, Dichloroethylene
trans- 1,2, Dichloroethylene
*2,4- Dichlorophenoxyacetic Acid (2,4-D)
1-2, Dichloropropane
Epichlorohydrin
Ethyl Benzene
Ethylene Dibromide
Giardia Lamblia
Heptachlor
Heptachlor Epoxide
*Lead
*Lindane
*Mercury
*Methoxychlor
*Nitrate
PCBs
Pentachlorophenol
*Selenium
*2,4,5- TP Silvex
Styrene
Toluene
*Toxaphene
*Turbidity
Viruses
Xylene

34 Contaminants Mandated for MCL Promulgation by June 1989

Adipates
Aldicarb Sulfone
Aldicarb Sulfoxide
Antimony
Atrazine
Beryllium
*Beta Particle - Photon Radioactivity
Cyanide
Dalapon
Dinoseb
Diquat
*Endrin
Endothall
Glyphosate
*Gross alpha particle activity
Hexachlorocyclopentadiene
Legionella
Methylene Chloride
Nickel
PAHs
Phthalates
Pichloram
*Radium 226 and 228
Radon
Simazine
Standard Plate Count
Sulfate
2,3,7,8 - TCDD (Dioxin)
Tetrachloroethylene
Thallium
Trichlorobenzine
1,1,2 - Trichloroethane
Uranium
Vydate

* 19 MCLs to be reproposed.

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[6] At the time of this manual's publication, no MCLs for these contaminants had been proposed or promulgated under the SDWA amendments of 1986.

Secondary Maximum Contaminant Levels (SMCLs)
Under the Safe Drinking Water Act

CONTAMINANT	LEVEL
Chloride	250 mg/l
Color	15 color units
Copper	1 mg/l
Corrosivity	Noncorrosive
Fluoride	2.0 mg/l
Foaming agents	0.5 mg/l
Iron	0.3 mg/l
Manganese	0.05 mg/l
Odor	3 threshold odor number
pH	6.5-8.5
Sulfate	250 mg/l
Total dissolved solids (TDS)	500 mg/l
Zinc	5 mg/l

Source: 40 CFR §143.3.

(d) Article 70 of the Environmental Conservation Law and the rules and regulations promulgated thereunder shall govern applications for variances.

701.17 Referenced Materials. All materials referenced in this Part can be purchased from the U.S. Government Printing Office, Washington, D.C., and are available for copying and inspection at: Department of Environmental Conservation, Division of Water, 50 Wolf Road, Albany, N.Y. 12233.

701.18 Class N. Best usage of waters. Enjoyment of water in its natural condition and, where compatible, as source of water for drinking or culinary purposes, bathing, fishing and fish propagation, recreation and any other usages except for the discharge of sewage, industrial wastes or other wastes or any sewage or waste effluent.

Quality Standards for Class N Waters

Items: 1. Sewage, industrial wastes, or other wastes, waste effluents or any sewage effluents not having had filtration resulting from at least 200 feet* of lateral travel through unconsolidated earth.

Specifications: None.

Items: 2. Deleterious substances, hydrocarbons, substances which would contribute to eutrophication or surface runoff containing any of such substances.

Specifications: None.

*A greater distance may be required if an inspection shows that due to peculiar geological conditions this distance is inadequate to protect the water from pollution.

701.19 Classes and standards for fresh surface waters. The following items and specifications shall be the standards applicable to all New York fresh waters which are assigned the classification of AA, A, B, C, or D, in addition to the specific standards which are found in this Part under the heading of each such classification.

Quality Standards for Fresh Surface Waters

Item: 1. Turbidity.

Specifications: No increase except from natural sources that will cause a substantial visible contrast to natural conditions. In cases of naturally turbid waters, the contrast will be due to increased turbidity.

Item: 2. Color.

Specifications: None from man-made sources that will be detrimental to anticipated best usage of waters.

Item: 3. Suspended, colloidal or settleable solids.

Specifications: None from sewage, industrial wastes or other wastes which will cause deposition or be deleterious for any best usage determined for the specific waters which are assigned to each class.

Items: 4. Oil and floating substances.

Specifications: No residue attributable to sewage, industrial wastes or other wastes nor visible oil film nor globules of grease.

Items: 5. Taste and odor-producing substances, toxic wastes and deleterious substances.

Specifications: None in amounts that will be injurious to fishlife or which in any manner shall adversely affect the flavor, color or odor thereof, or impair the waters for any best usage as determined for the specific waters which are assigned to each class.

Item: 6. Thermal discharges.

Specifications: (*See Part 704 of this Title.*)

Class AA

Best usage of waters. Source of water supply for drinking, culinary or food processing purposes and any other usages.

Conditions related to best usage of waters. The waters, if subjected to approved disinfection treatment, with additional treatment if necessary to remove naturally present impurities, will meet New York State Department of Health drinking water standards and will be considered safe and satisfactory for drinking water purposes.

Quality Standards for Class AA Waters

Item: 1. Coliform.

Specifications: The monthly median coliform value for 100 ml of sample shall not exceed 50 from a minimum of five examinations and provided that not more than 20 percent of the samples shall exceed a coliform value of 240 for 100 ml of sample.

Item: 2. pH.

Specifications: Shall be between 6.5 and 8.5.

Item: 3. Total dissolved solids.

Specifications: Shall be kept as low as practicable to maintain the best usage of waters, but in no case shall it exceed 500 milligrams per liter.

Item: 4. Dissolved oxygen.

Specifications: For cold waters suitable for trout spawning, the DO concentration shall not be less than 7.0 mg/l from other than natural conditions. For trout waters, the minimum daily average shall not be less than 6.0 mg/l. At no time shall the DO concentration be less than 5.0 mg/l. For nontrout waters, the minimum daily average shall not be less than 5.0 mg/l. At no time shall the DO concentration be less than 4.0 mg/l.

Item: 5. [Repealed]

Item: 6. [Repealed]

Note 1: [Repealed]

CLASS A

Best usage of waters. Source of water supply for drinking, culinary or food processing purposes and any other usages.

Conditions related to best usage of waters. The waters, if subjected to approved treatment equal to coagulation, sedimentation, filtration and disinfection, with additional treatment if necessary to reduce naturally present impurities will meet New York State Department of Health drinking water standards and will be considered safe and satisfactory for drinking water purposes.

Quality Standards for Class A Waters

Item: 1. Coliform.

Specifications: The monthly median coliform value for 100 ml of sample shall not exceed 5,000 from a minimum of five examinations and provided that not more than 20 percent of the samples shall exceed a coliform value of 20,000 for 100 ml of sample and the monthly geometric mean fecal coliform value for 100 ml of sample shall not exceed 200 from a minimum of five examinations.

Item: 2. pH.

Specifications: Shall be between 6.5 and 8.5.

Item: 3. Total dissolved solids.

Specifications: Shall be kept as low as practicable to maintain the best usage of waters, but in no case shall it exceed 500 milligrams per liter.

Item: 4. Dissolved oxygen.

Specifications: For cold waers suitable for trout spawning, the DO concentration shall not less than 7.0 mg/l from other than natural conditions. For trout waters, the minimum daily average shall not be less than 6.0 mg/l. At no time shall the DO concentration be less than 5.0 mg/l. For nontrout waters, the minimum daily average shall not be less than 5.0 mg/l. At no time shall the DO concentration be less than 4.0 mg/l.

Item: 5. [Repealed]

Item: 6. [Repealed]

Note 1: [Repealed]

CLASS B

Best usage of waters. Primary contact recreation and any other uses except as a source of water supply for drinking, culinary or food processing purposes.

Quality Standards for Class B Waters

Item: 1. Coliform.

Specifications: The monthly median coliform value for 100 ml of sample shall not exceed 2,400 from a minimum of five examinations and provided that not more than 20 percent of the samples shall exceed a coliform value of 5,000 for 100 ml of sample and the monthly geometric mean fecal coliform value for 100 ml of sample shall not exceed 200 from a minimum of five examinations. This standard shall be met during all periods when disinfection is practiced.

Item: 2. pH.

Specifications: Shall be between 6.5 and 8.5.

Item: 3. Total dissolved solids.

Specifications: None at concentrations which will be detrimental to the growth and propagation of aquatic life. Waters having present levels less than 500 milligrams per liter shall be kept below this limit.

Item: 4. Dissolved oxygen.

Specifications: For cold waters suitable for trout spawning, the DO concentration shall not be less than 7.0 mg/l from other than natural conditions. For trout waters, the minimum daily average shall not be less than 6.0 mg/l. At no time shall the DO concentration be less than 5.0 mg/l. For nontrout waters, the minimum daily average shall not be less than 5.0 mg/l. At no time shall the DO concentration be less than 4.0 mg/l.

Note 1: [Repealed]

CLASS C

Best usage of waters. Suitable for fishing and all other uses except as a source of water supply for drinking, culinary or food processing purposes and primary contact recreation.

Quality Standards for Class C Waters

Item: 1. Coliform.

Specifications: The monthly geometric mean total coliform value for 100 ml of sample shall not exceed 10,000 and the monthly geometric mean fecal coliform value for 100 ml of sample shall not exceed 2,000 from a minimum of five examinations. This standard shall be met during all periods when disinfection is practiced.

Item: 2. pH.

Specifications: Shall be between 6.5 and 8.5.

Item: 3. Total dissolved solids.

Specifications: None at concentrations which will be detrimental to the growth and propagation of aquatic life. Waters having present levels less than 500 milligrams per liter shall be kept below this limit.

Item: 4. Dissolved oxygen.

Specifications: For cold waters suitable for trout spawning, the DO concentration shall not be less than 7.0 mg/l from other than natural conditions. For trout waters, the minimum daily average shall not be less than 6.0 mg/l. At no time shall the DO concentration be less than 5.0 mg/l. For nontrout waters, the minimum daily average shall not be less than 5.0 mg/l. At no time shall the DO concentration be less than 4.0 mg/l.

Note 1: [Repealed]

CLASS D

Best usage of waters. These waters are suitable for secondary contact recreation, but due to such natural conditions as intermittency of flow, water conditions not conducive to propagation of game fishery or stream bed conditions, the waters will not support the propagation of fish.

Conditions related to best usage of waters. The waters must be suitable for fish survival.

Quality Standards for Class D Waters

Item: 1. pH.

Specifications: Shall be between 6.0 and 9.5.

Item: 2. Dissolved·oxygen.

Specifications: Shall not be less than three milligrams per liter at any time.

Note 1: [Repealed]

701.20 Classes and standards for saline surface waters. The following items and specifications shall be the standards applicable to all New York Saline Surfaces Waters which are assigned the classification of SA, SB, SC or SD, in addition to the specific standards which are found in this Part under the heading of each such classification.

Quality Standards for Saline Surface Waters

Items: 1. Garbage, cinders, ashes, oils, sludge or other refuse.

Specifications: None in any waters of the marine district as defined by Environmental Conservation Law (§17-0105).

Item: 2. pH.

Specifications: The normal range shall not be extended by more than 0.1 pH unit.

Item: 3. Turbidity.

Specifications: No increase except from natural sources that will cause a substantial visible contrast to natural conditions. In cases of naturally turbid waters, the contrast will be due to increased turbidity.

Item: 4. Color.

Specifications: None from man-made sources that will be detrimental to anticipated best usage of waters.

Item: 5. Suspended, colloidal or settleable solids

Specifications: None from sewage, industrial wastes or other wastes which will cause deposition or be deleterious for any best usage determined for the specific waters which are assigned to each class.

Items. 6. Oil and floating substances.

Specifications: No residue attributable to sewage, industrial wastes or other wastes, nor visible oil film nor globules of grease.

Item: 7. Thermal discharges.

Specifications: (See Part 704 of this Title.)

CLASS SA

Best usage of waters. The waters shall be suitable for shellfishing for market purposes and primary and secondary contact recreation.

Quality Standards for Class SA Waters

Item: 1. Coliform.

Specifications: The median MPN value in any series of samples representative of waters in the shellfish growing area shall not be in excess of 70 per 100 ml.

Item: 2. Dissolved oxygen.

Specifications: Shall not be less than 5.0 mg/l at any time.

Items: 3. Toxic wastes and deleterious substances.

Specifications: None in amounts that will interfere with use for primary contact recreation or that will be injurous to edible fish or shellfish or the culture or propagation thereof, or which in any manner shall adversely affect the flavor, color, odor or sanitary condition thereof or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.

CLASS SB

Best usage of waters. The waters shall be suitable for primary and secondary contact recreation and any other use except for the taking of shellfish for market purposes.

Quality Standards for Class SB Waters

Item: 1. Coliform

Specifications: The monthly median coliform value for 100 ml of sample shall not exceed 2,400 from a minimum of five examinations and provided that not more than 20 percent of the samples shall exceed a coliform value of 5,000 for 100 ml of sample and the monthly geometric mean fecal coliform value for 100 ml of sample shall not exceed 200 from a minimum of five examinations. This standard shall be met during all periods when disinfection is practiced.

Item: 2. Dissolved oxygen.

Specifications: Shall not be less than 5.0 mg/l at any time.

Item: 3. Toxic wastes and deleterious substances.

Specifications: None in amounts that will interfere with use for primary contact recreation or that will be injurious to edible fish or shellfish or the culture or propagation thereof, or which in any manner shall adversely affect the flavor, color, odor or sanitary condition thereof, or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.

CLASS SC

Best usage of waters. The waters shall be suitable for fishing and all other uses except for primary contact recreation and for the taking of shellfish for market pruposes.

Quality Standards for Class SC Waters

Item: 1. Coliform

Specifications: The monthly geometric mean total coliform value for 100 ml of sample shall not exceed 10,000 and the monthly geometric mean fecal coliform value for 100 ml of sample shall not exceed 2,000 from a minimum of five examinations. This standard shall be met during all periods when disinfection in practiced.

Item: 2. Dissolved oxygen.

Specifications: Shall not be less than 5.0 mg/l at any time.

Item: 3. Toxic wastes and deleterious substances.

Specifications: None in amounts that will interfere with use for secondary contract recreation or that will be injurious to edible fish or shellfish or the culture or propagation thereof, or which in any manner shall adversely affect the flavor, color, odor or sanitary condition thereof or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.

CLASS SD

Best usage of waters. All waters not primarily for recreational purposes, shellfish culture or the development of fish life and because of natural or man-made conditions cannot meet the requirements of these uses.

Quality Standards for Class SD Waters

Item: 1. Dissolved oxygen.

Specifications: Shall not be less than 3.0 mg/l at any time.

Item: 2. Toxic wastes and deleterious substances.

Specifications: None alone or in combination with other substances or wastes in sufficient amounts to prevent survival of fish life or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.

PART 702
SPECIAL CLASSIFICATIONS AND STANDARDS

Section 702.1 Class A — Special (International boundary waters).

(GREAT LAKES WATER QUALITY AGREEMENT OF 1972)

Best usage of waters. Source of water supply for drinking, culinary or food processing purposes, primary contact recreation and other usages.

Conditions related to best usage. The waters, if subjected to approved treatment, equal to coagulation, sedimentation, filtration and disinfection with additional treatment, if necessary, to reduce naturally present impurities, meet or will meet New York State Department of Health drinking water standards and are or will be considered safe and satisfactory for drinking water purposes.

Quality Standards for Class A — Special Waters

(International Boundary Waters)

Item: 1. Coliform.

Specifications: The geometric mean of not less than five samples taken over not more than a 30-day period should not exceed 1,000 per 100 ml total coliform nor 200 per 100 ml fecal coliform.

Item: 2. Dissolved oxygen.

Specifications: In the rivers and upper waters of the lakes not less than 6.0 mg/l at any time. In hypolimnetic waters, it should be not less than necessary for the support of fish life, particularly cold water species.

Item: 3. Total dissolved solids.

Specifications: Should not exceed 200 milligrams per liter.

Item: 4. pH

Specifications: Should not be outside the range of 6.7 to 8.5.

Item: 5. Iron.

Specifications: Should not exceed 0.3 milligrams per liter as Fe.

Item: 6. Phosphorus

Specifications: Concentrations should be limited to the extent necessary to prevent nuisance growths of algae, weeds and slimes that are or may become injurious to any beneficial water use.

Item: 7. Radioactivity.

Specifications: Should be kept at the lowest practicable levels and in any event should be controlled to the extent necessary to prevent harmful effects on health.

Item: 8. Taste and odor-producing substances, toxic wastes and deleterious substances.

Specifications: None in amounts that will interfere with use for primary contact recreation or that will be injurious to the growth and propagation of fish, or which in any manner shall adversely affect the flavor, color or odor thereof or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.

Item: 9. Suspended, colloidal or settleable solids.

Specifications: None from sewage, industrial wastes or other wastes which will cause deposition or be deleterious for any best usage determined for the specific waters which are assigned to this class.

Item: 10. Oil and floating substances.

Specifications: No residue attributable to sewage, industrial wastes or other wastes nor visible oil film nor globules of grease.

Item: 11. Thermal discharges.

Specifications: (See Part 704 of this Title.)

To meet the water quality objectives referred to in the "Great Lakes Water Quality Agreement of 1972," the standards listed above shall be subject to revision from time to time after further hearings on due notice.

Note: [Repealed]

702.2 Class AA — Special (Lake Champlain drainage basin).

CLASS AA — SPECIAL

Best usage of waters. Any usage except for disposal of sewage, industrial wastes or other wastes.

Quality Standards for Class AA — Special Waters (Lake Champlain Drainage Basin)

Item: 1. Floating solids, settleable solids, oil, sludge deposits, toxic wastes, deleterious substances, colored or other wastes or heated liquids.

Specifications: None attributable to sewage, industrial waste or other wastes.

2. Sewage or waste effluents.

None into waters of this class.

702.3 Special classes and standards for the Lower Hudson River, Arthur Kill, Kill Van Kull, Harlem River, Raritan Bay and Lower East River drainage basins, New York Bay area, Nassau County including Long Island Sound, Suffolk County, Upper East River, Long Island Sound drainage basins, within Queens, Bronx and Westchester Counties and Jamaica Bay drainage basin within Kings and Queens Counties including a certain portion of Rockaway Inlet. (a) This section applies to the waters within the following areas, which constitute the Interstate Sanitation District:

(1) The drainage basin of the Lower Hudson River from the mouth to northern Westchester-Rockland county lines, except Saw Mill River and Sparkill Creek drainage basins.

(2) The drainage basins of Arthur Kill, Kill Van Kull, and Harlem River, and Raritan Bay.

(3) The drainage basin of Lower East River from the mouth to a line across East River north of Wards Island between Stony Point in Bronx County and Lawrence Point in Queens County.

(4) New York Bay including Gravesend Bay, Coney Island Creek, Atlantic Basin, Erie Basin, Gowanus Bay, Gowanus Canal, the Narrows and Atlantic Ocean waters off Coney Island lying westerly of a north-south line from Light Inlet at the southeasterly tip of Conel Island Peninsula to the south tip of Rockaway Point, thence along the jetty to Rockaway jetty light, thence due south to the New York-New Jersey boundary line.

(5) Nassau County including the waters of Long Island Sound between Nassau-Queens and Nassau-Suffolk county lines and the waters of Atlantic Ocean to the three mile limit between said county lines.

(6) The area within Suffolk County lying west of a north-south topographical limit line and its extensions to a point in Long Island Sound at the New York Connecticut State boundary line due north of Miller Place Beach and to Blue Point on the south mainland thence southward across Great South Bay to Water Island, thence three miles due south to a point in Atlantic Ocean at the south State boundary line.

(7) Certain tidal waters which are within the Upper East River and Long Island Sound drainage basins within Queens, Bronx and Westchester Counties.

(8) Jamaica Bay drainage basin within Kings and Queens Counties and including Rockaway Inlet east of a north-south line drawn from Light Inlet at the southeasterly tip of Coney Island peninsula near Manhattan Beach to the westerly shoreline west of Lookout Tower on Rockaway Point.

b. Said classes and standards of quality and purity applicable thereto are set forth hereinafter and designated Class I and Class II.

CLASS I

Best usage of waters. The waters shall be suitable for secondary contact recreation and any other usage except for primary contact recreation and shellfishing for market purposes.

Quality Standards for Class I Waters

Items: 1. Garbage, cinders, ashes, oils, sludge or other refuse.

Specificatins: None in any waters of the marine district as defined by Environmental Conservation Law (§17-0105).

Item: 2. Coliform.

Specifications: The monthly geometric mean total coliform value for 100 ml of sample shall not exceed 10,000 and the monthly geometric mean fecal coliform value for 100 ml of sample shall not exceed 2,000 from a minimum of five examinations. This standard shall be met during all periods when disinfection is practiced.

Item: 3. Dissolved oxygen.

Specifications: Shall not be less than 4.0 mg/l at any time.

Item: 4. pH.

Specifications: The normal range shall not be extended by more than 0.1 pH unit.

Item: 5. Turbidity.

Specifications: No increase except from natural sources that will cause a substantial visible contrast to natural conditions. In cases of naturally turbid waters, the contrast will be due to increased turbidity.

Item: 6. Color.

Specifications: None from man-made sources that will be detrimental to anticipated best usage of waters.

Item: 7. Taste and odor-producing substances, toxic wastes and deleterious substances.

Specifications: None in amounts that will interfere with use for secondary contact recreation or that will be injurious to edible fish or shellfish or the culture or propagation thereof, or which in any manner shall adversely affect the flavor, color, odor or sanitary conditions thereof, or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.

Item: 8. Suspended, colloidal or settleable solids.

Specifications: None from sewage, industrial wastes or other wastes which will cause deposition or be deleterious for any best usage determined for the specific waters which are assigned to this class.

Item: 9. Oil and floating substances.

Specifications: No residue attributable to sewage, industrial wastes or other wastes, nor visible oil film nor globules of grease.

Item: 10. Thermal discharges.

Specifications: (See Part 704 of this Title.)

CLASS II

Best usage of waters. All waters not primarily for recreational purposes, shellfish culture or the development of fish life.

Quality Standards for Class II Waters

Items: 1. Floating solids, settleable solids, sludge deposits.

Specifications: None which are readily visible and attributable to sewage, industrial wastes or other wastes or which deleteriously increase the amounts of these constituents in receiving waters after opportunity for reasonable dilution and mixture with the wastes discharged thereto.

Item: 2. Garbage, cinders, ashes, oils, sludge or other refuse.

Specifications: None in any waters of the marine district as defined by Environmental Conservation Law (§17-0105).

Item: 3. Dissolved oxygen.

Specifications: An average of not less than 30 percent saturation during any week of the year, provided such saturation levels insure adequate oxygen to support fish and shellfish life at all times.

Item: 4. Toxic wastes, oil, deleterious substances, colored or other wastes, or thermal discharges.

Specifications: None alone or in combination with other substances or wastes in sufficient amounts to be injurious to edible fish and shellfish, or the culture or propagation thereof, or which shall in any manner affect the flavor, color, odor or sanitary condition of such fish or shellfish so as to injuriously affect the sale thereof, or which shall cause any injury to the public and private shellfisheries of this State. See Part 704 for thermal discharges.

702.4 Class AA — Special (Upper Hudson River drainage basin).

CLASS AA — SPECIAL

Best usage of waters. Any usage except for disposal of sewage, industrial waste or other waste.

Quality Standards for Class AA — Special Waters
(Upper Hudson River Drainage Basin)

Items: 1. **Floating solids, settleable solids, oil, sludge deposits, toxic wastes, deleterious substances, colored or other wastes or heated liquids.**

Specifications: None attributable to sewage, industrial wastes or other wastes.

2. Sewage or waste effluents.

None into waters of this class.

Appendix 31 Ambient Water Quality Standards

The following ambient water quality standards (units are micrograms/liter unless otherwise noted) apply to the designated water classifications. The chemical name is listed with associated Chemical Abstract Service registry numbers in brackets where applicable. Separate standards, where warranted, are listed for Classes A and AA based on human and aquatic life protection. Where more then one standard is listed for a classification, the most stringent standard applies. A letter note referencing the basis of the standard appears following the criterion and refers to Table 1. Special interpretive remarks are provided following the water classification list, as necessary.

The "acid-soluble form" of a substance is defined as the part of the substance that passes through a 0.45 micrometer membrane filter after the sample is acidified to pH 1.5 to 2.0 with nitric acid.

Table 1. Basis for Establishment of Ambient Water Quality Standards

Consideration	Note	Methodology Used to Establish Standards	Rules & Regulations Section Reference
HUMAN	A	Oncogenic	701.4
	B	Non-oncogenic	701.5
	C	Aesthetic	701.6
	D	Chemical correlation	701.7
AQUATIC	H	EPA published criteria	701.8(b)
	I	Propagation (chronic toxicity); chronic tests available	701.9(a)
	J	Propagation (chronic toxicity); chronic tests not available	701.9(b)
	K	Survival (acute toxicity)	701.10
	L	Aquatic food tainting	701.11
	M	Bioaccumulation	701.12
	N	Chemical and aquatic species correlation	701.13

SUBSTANCE [CAS No.]	WATER CLASSES	STANDARDS micrograms/liter	NOTES
Acenaphthene [83-32-9]	AA;AA-s;A;A-s (Human)	20	C
Aldicarb [116-06-3]	AA;AA-s;A;A-s (Human)	7	B

SUBSTANCE [CAS No.]	WATER CLASSES	STANDARDS micrograms/liter	NOTES
Aldrin [309-00-2]			
	AA;AA-s;A;A-s (Aquatic)	*	
	B;C	*	
	D	*	
	SA;SB;SC	*	
	SD	*	
	Remarks: * - Refer to standards for "Aldrin and Dieldrin"		
Aldrin and Dieldrin [309-00-2; 60-57-11]			
	AA;AA-s;A;A-s (Aquatic)	0.001	H
	B;C	0.001	H
	D	0.001	H
	SA;SB;SC	0.001	H
	SD	0.001	H
	Remarks: Applies to sum of aldrin and dieldrin		
Alkyl dimethyl benzyl ammonium chloride [68391-01-5]			
	AA;AA-s;A;A-s (Aquatic)	*	
	B;C	*	
	Remarks: * - Refer to standards for "Quaternary ammonium compounds".		
Aluminum, ionic	AA;AA-s;A;A-s (Aquatic)	100	I
	B;C	100	I
Aminocresols [95-84-1; 2835-95-2; 2835-99-6]			
	AA;AA-s;A;A-s (Human)	*	
	AA;AA-s;A;A-s (Aquatic)	**	
	B;C	**	
	D	**	
	* - Refer to standards for Phenolic Compounds Remarks: ** - Refer to standards for Phenols - Total Unchlorinated.		

SUBSTANCE [CAS No.]	WATER CLASSES	STANDARDS micrograms/liter	NOTES
Ammonia	AA;AA-s;A;A-s (Human)	2000*	10 NYCRR Part 170
	AA;AA-s;A;A-s (Aquatic)	**	H
	B;C	**	H
	D	**	H

Remarks: * - $NH_3 + NH_4$ as N
** - unionized ammonia only as NH_3; formulae for calculating standards at varying pH and temperature for different classes are as follows:

AA; AA-s; A; A-s; B; C;

$$AWQC\ (mg/L) = 0.031\ [f(T))/g(pH)]$$

T = Temperature in °C and

$$g(pH) = 1 \quad ; \quad \text{if } pH \geq 7.7$$

$$g(pH) = 10^{[0.74(7.7-pH)]} \quad ; \quad \text{if } pH < 7.7$$

$$f(T) = 1 \quad ; \quad \text{if } T \geq 10^{\circ}C$$

$$f(T) = \frac{1 + 10^{(9.73-pH)}}{1 + 10^{(pK_T-pH)}} \quad ; \quad \text{if } T < 10^{\circ}C$$

$$pK_T = 0.090 + \frac{2730}{(T + 273.2)}$$

D;

$$AWQC\ (mg/L) = 0.15\ [f(T))/g(pH)]$$

$$g(pH) = 1 + 10^{[1.03(7.32-pH)]}$$

f(T) as above

Arsenic [NA]	AA;AA-s;A;A-s (Human)	50	10 NYCRR PART 5
	AA;AA-s;A;A-s (Aquatic)	190*	H
	B;C	190*	H
	D	360*	H
	SA;SB;SC	63*	H
	SD	120*	H

Remarks: * - Dissolved arsenic form

SUBSTANCE [CAS No.]	WATER CLASSES	STANDARDS micrograms/liter	NOTES
Azinphosmethyl [86-50-0]	AA;AA-s;A;A-s (Aquatic)	0.005	J
	B;C	0.005	J
	SA;SB;SC	0.01	J
Barium [NA]	AA;AA-s;A;A-s (Human)	1,000	10 NYCRR Part 5
Benzidine [92-87-5]	AA;AA-s;A;A-s (Aquatic)	0.1	H
	B;C	0.1	H
	D	0.1	H
Beryllium (Acid-Soluble) [NA]	AA;AA-s;A;A-s (Aquatic)	11* or 1,100**	H
	B;C	11* or 1,100**	H
	Remarks: * - when hardness is less than or equal to 75 ppm ** - when hardness is greater than 75 ppm		
Bis(2-ethylhexyl) phthalate [117-81-7]	AA;AA-s;A;A-s (Aquatic)	0.6	I
	B;C	0.6	I
Boron (Acid-Soluble) [NA]	AA;AA-s;A;A-s (Aquatic)	10,000	J
	B;C	10,000	J
	SA;SB;SC	1,000	J
Cadmium [NA]	AA;AA-s;A;A-s (Human)	10	10 NYCRR PART 5
	AA;AA-s;A;A-s (Aquatic)	*	I
	B;C (aquatic)	*	I
	D (aquatic)	**	H

SUBSTANCE [CAS No.]	WATER CLASSES	STANDARDS micrograms/liter	NOTES
Cadmium—Cont'd. [NA]	Remarks: * - exp(0.7852 [ln (ppm hardness)] - 3.490) ** - exp(1.128 [In (ppm harndess)] - 3.828) - all standards except (Human) apply to acid-soluble form		
Carbofuran [1563-66-2]	AA;AA-s;A;A-s (Human)	15	B
	AA;AA-s;A;A-s (Aquatic)	1.0	J
	B;C	1.0	J
	D	10	K
Chloride [NA]	AA;AA-s;A;A-s (Human)	250,000	10 NYCRR Part 170
Chlorobenzene [108-90-7]	AA;AA-s;A;A-s (Human)	20	C
	AA;AA-s;A;A-s (Aquatic)	5	I
	B;C	5	I
	D	50	L
Chloroform [67-66-3]	AA;AA-s;A;A-s (Human)	0.2	A
2-Chloronaphthalene [91-58-7]	AA;AA-s;A;A-s (Human)	10	D
Chromium [NA]	AA;AA-s;A;A-s (Human)	50	10 NYCRR Part 5
	AA;AA-s;A;A-s (Aquatic)	*	H
	B;C	*	H
	D	**	H
	Remarks: * - exp (0.819 [ln(ppm hardness)] + 1.561) ** - exp (0.819 [ln(ppm hardness)] + 3.688) - all standards except (Human) apply to acid-soluble form		

SUBSTANCE [CAS No.]	WATER CLASSES	STANDARDS micrograms/liter	NOTES
Chromium (VI) (Acid-Soluble) [NA]			
	AA;AA-s;A;A-s (Aquatic)	11	H
	B;C	11	H
	D	16	H
	SA;SB;SC	54	H
	SD	1,200	H
Cobalt (Acid-Soluble [NA]			
	AA;AA-s;A;A-s (Aquatic)	5	I
	B;C	5	I
Copper [NA]			
	AA;AA-s;A;A-s (Human)	200	10 NYCRR PART 170
	AA;AA-s;A;A-S (Aquatic)	*	H
	B;C	*	H
	D	**	H
	SA;SB;SC	2.0	H
	SD	3.2	H

Remarks: * - exp (0.8545 [ln(ppm hardness)] - 1.465)
** - exp (0.9422 [ln(ppm hardness)] - 1.464)
- all standards except (Human) apply to acid-soluble form

Cyanide [NA]			
	AA;AA-s;A;A-s (Human)	100	10 NYCRR PART 170
	AA;AA-s;A;A-s (Aquatic)	5.2*	H
	B;C	5.2*	H
	D	22*	H
	SA;SB;SC	1.0*	H
	SD	1.0*	H

Remarks: * - as free cyanide - the sum of HCN and CN^- - expressed as CN.

2,4-D [94-75-7]			
	AA;AA-s;A;A-s (Human)	100	10 NYCRR PART 5

SUBSTANCE [CAS No.]	WATER CLASSES	STANDARDS micrograms/liter	NOTES
DDT, DDD, and DDE [50-29-3; 72-54-8; 72-55-9]	AA;AA-s;A;A-s (Human)	0.01	A
	AA;AA-s;A;A-s (Aquatic)	0.001	H
	B;C	0.001	H
	D	0.001	H
	SA;SB;SC	0.001	H
	SD	0.001	H
Demeton [8065-48-3; 298-03-3 126-75-0]	AA;AA-s;A;A-s (Aquatic)	0.1	J
	B;C	0.1	J
	SA;SB;SC	0.1	J
Diazinon [333-41-5]	AA;AA-s;A;A-s (Aquatic)	0.08	J
	B;C	0.08	J
Dichlorobenzenes [95-50-1; 106-46-7; 541-73-1]	AA;AA-s;A;A-s (Human)	20*/30**	C
	AA;AA-s;A;A-s (Aquatic)	5	I,N
	B;C	5	I,N
	D	50	L
	Remarks: * - applies to meta (1,3-) isomer only ** - applies to para (1,4-) isomer only Other standards apply to total dichlorobenzenes.		
1,2-Dichloroethane [107-06-2]	AA;AA-s;A;A-s (Human)	0.8	A
2,4-Dichlorophenol [120-83-2]	AA;AA-s;A;A-s (Human)	0.3	C
	AA;AA-s;A;A-s (Aquatic)	*	
	B;C	*	
	D	*	
	Remarks: * - Refer to standard for Phenols - Total Chlorinated.		

SUBSTANCE [CAS No.]	WATER CLASSES	STANDARDS micrograms/liter	NOTES
Dieldrin [60-57-1]			
	AA;AA-s;A;A-s (Aquatic)	0.001*	H
	Remarks: * - Refer to standard for "Aldrin and Dieldrin" combined.		
Dyphylline [479-18-5]			
	AA;AA-s;A;A-s (Human)	50	D
Endosulfan [115-29-7]			
	AA;AA-s;A;A-s (Aquatic)	0.009	H
	B;C	0.009	H
	D	0.22	H
	SA;SB;SC	0.001	H
	SD	0.034	H
Endrin [72-20-8]			
	AA;AA-s;A;A-s (Human)	0.2	10 NYCRR PART 5
	AA;AA-s;A;A-s (Aquatic)	0.002	H
	B;C	0.002	H
	D	0.002	H
	SA;SB;SC	0.002	H
	SD	0.002	H
Fluoride [NA]			
	AA;AA-s;A;A-s (Human)	1,500	10 NYCRR PART 170
	AA;AA-s;A;A-s (Aquatic)	*	J
	B;C	*	J
	D	**	J
	Remarks: * - (0.02) exp (0.907 [ln (ppm hardness)] + 7.394) ** - (0.1) exp (0.907 [ln (ppm hardness)] + 7.394)		
Gross Alpha Radiation [NA]			
	AA;AA-s;A;A-s (Human)	15pCi/L*	10 NYCRR PART 5
	Remarks: * - 15 picocuries per liter excluding radon and uranium.		

SUBSTANCE [CAS No.]	WATER CLASSES	STANDARDS micrograms/liter	NOTES
Gross Beta Radiation [NA]			
	AA;A (Human)	1,000 pCi/l*	10 NYCRR PART 170
	Remarks: * - 1,000 picocuries per liter, excluding strontium-90 and alpha emitters.		
Heptachlor and Heptachlor epoxide [76-44-8; 1024-57-3]			
	AA;AA-s;A;A-s (Human)	0.009	A
	AA;AA-s;A;A-s (Aquatic)	0.001	H
	B;C	0.001	H
	D	0.001	H
	SA;SB;SC	0.001	H
	SD	0.001	H
Hexachlorobutadiene [87-68-3]			
	AA;AA-s;A;A-s (Human)	0.5	A
	AA;AA-s;A;A-s (Aquatic)	1.0	J
	B;C	1.0	J
	D	10	K
	SA;SB;SC	0.3	J
	SD	3.0	K
Hexachlorocyclohexane [58-89-9; 319-84-6; 319-85-7; 319-86-8; 6108-10-7; 608-73-1]			
	AA;AA-s;A;A-s (Aquatic)	0.01	H
	B;C	0.01	H
	D	2	H
	SA;SB;SC	0.004	H
	SD	0.16	H
	Remarks: - applies to sum of all isomers		
Hexachlorcyclopentadiene [77-47-4]			
	AA;AA-s;A;A-s (Human)	1.0	C
	AA;AA-s;A;A-s (Aquatic)	0.45	J
	B;C	0.45	J
	D	4.5	K
	SA;SB;SC	0.07	K
	SD	0.7	K

SUBSTANCE [CAS No.]	WATER CLASSES	STANDARDS micrograms/liter	NOTES
Hydrazine [302-01-2]			
	AA;AA-s;A;A-s (Aquatic)	*	J
	B;C	*	J
	D	**	K
	Remarks: * - 5 ug/L at < 50 ppm hardness and 10 ug/L at ≥ 50 ppm hardness ** - 50 ug/L at < 50 ppm hardness and 100 ug/L at ≥ 50 ppm hardness		
Hydrogen sulfide [7783-06-4]			
	AA;AA-s;A;A-s (Aquatic)	2.0*	H
	B;C	2.0*	H
	SA;SB;SC	2.0*	H
	Remarks: * - undissociated		
Hydroquinone [123-31-9]			
	AA;AA-s;A;A-s (Aquatic)	2.2	J
	B;C	2.2	J
	D	4.4	K
Iron [NA]			
	AA;AA-s;A;A-s (Human)	300	10 NYCRR Part 5
	AA;AA-s;A;A-s (Aquatic)	300	J
	B;C	300	J
	D	300	K
Isodecyl diphenyl phosphate [29761-21-5]			
	AA;AA-s;A;A-s (Aquatic)	1.73	I
	B;C	1.73	I
	D	22	K
Isothiazolones, Total (isothiazolinones) (includes 5-chloro-2-methyl-4-isothiazolin-3-one and 2-methyl-4-isothiazolin-3-one)			
	AA;AA-s;A;A-s (Aquatic)	1	J
	B;C	1	J
	D	10	K

SUBSTANCE [CAS No.]	WATER CLASSES	STANDARDS micrograms/liter	NOTES
Lead [NA]			
	AA;AA-s;A;A-s (Human)	50	10 NYCRR Part 5
	AA;AA-s;A;A-s (Aquatic)	*	H
	B;C	*	H
	D	**	H
	SA;SB;SC	8.6	H
	SD	220	H
	Remarks: * - exp (1.266 [ln(ppm hardness)] - 4.661) ** - exp (1.266 [ln(ppm hardness)] - 1.416) - all standards except (Human) apply to acid-soluble form		
Linear alkyl benzene sulfonates (LAS) [NA]			
	AA;AA-s;A;A-s (Aquatic)	40*	J
	B;C	40*	J
	Remarks: * - LAS with side chains greater than 13 carbons only.		
Magnesium [NA]			
	AA;AA-s;A;A-s (Human)	35,000	B
Malathion [121-75-5]			
	AA;AA-s;A;A-s (Aquatic)	0.1	H
	B;C	0.1	H
	SA;SB;SC	0.1	H
Manganese [NA]			
	AA;AA-s;A;A-s (Human)	300	10 NYCRR Part 5
Mercury [NA]			
	AA;AA-s;A;A-s (Human)	2	10 NYCRR Part 5

SUBSTANCE [CAS No.]	WATER CLASSES	STANDARDS micrograms/liter	NOTES
Methoxychlor [72-43-5]	AA;AA-s;A;A-s (Human)	35	10 NYCRR Part 170
	AA;AA-s;A;A-s (Aquatic)	0.03	H
	B;C	0.03	H
	SA;SB;SC	0.03	H
Methylene bisthiocyanate [6317-18-6]	AA;AA-s;A;A-s (Aquatic)	1.0	J
	B;C	1.0	J
Mirex [2385-85-5]	AA;AA-s;A;A-s (Aquatic)	0.001	H
	B;C	0.001	H
	D	0.001	H
	SA;SB;SC	0.001	H
Naphthalene [91-20-3]	AA;AA-s;A;A-s (Human)	10	C
Niacinamide [98-92-0]	AA;AA-s;A;A-s (Human)	500	B
Nickel (Acid-Soluble) [NA]	AA;AA-s;A;A-s (Aquatic)	*	H
	B;C	*	H
	D	**	H
	SA;SB;SC	7.1	H
	SD	140	H
	Remarks: * - exp (0.76[ln(ppm hardness)] + 1.06) ** - exp (0.76 [ln(ppm hardness)] + 4.02)		
Nitrate [NA]	AA;AA-s;A;A-s (Human)	10,000*	10 NYCRR Part 5
	Remarks: * - as N		

SUBSTANCE [CAS No.]	WATER CLASSES	STANDARDS micrograms/liter	NOTES
Nitrilotriacetate (NTA) [NA]			
	AA;AA-s;A;A-s (Aquatic)	5,000	J
	B;C	5,000	J
Nitrite [NA]			
	AA;AA-s;A;A-s (Aquatic)	100* or 20**	J
	B;C	100* or 20**	J
	Remarks: * - warm water fishery waters ** - cold water fishery waters		
Nitrobenzene [98-95-3]			
	AA;AA-s;A;A-s (Human)	30	C
Parathion and Methyl Parathion [56-38-2; 298-00-0]			
	AA;AA-s;A;A-s (Aquatic)	0.008	I,N
	B;C	0.008	I,N
Pentachlorophenol [87-86-5]			
	AA;AA-s;A;A-s (Human)	*	
	AA;AA-s;A;A-s (Aquatic)	0.4	I
	B;C	0.4	I
	D	**	L
	Remarks: * - Refer to standard for Phenolic compounds (total phenols) ** - Refer to standard for Phenols, total chlorinated.		
Phenol [108-95-2]			
	AA;AA-s;A;A-s (Human)	*	
	AA;AA-s;A;A-s (Aquatic)	**	L
	B;C	**	L
	D	**	L
	Remarks: * - Refer to standard for Phenolic compounds (total phenols) ** - Refer to standard for Phenols, total unchlorinated		

SUBSTANCE [CAS No.]	WATER CLASSES	STANDARDS micrograms/liter	NOTES
Phenolic compounds (total phenols) [NA]	AA;AA-s;A;A-s (Human)	1	10 NYCRR Part 170
Phenols, total chlorinated [NA]	AA;AA-s;A;A-s (Human)	*	
	AA;AA-s;A;A-s (Aquatic)	1.0	L
	B;C	1.0	L
	D	1.0	L
	Remarks: * - Refer to standard for Phenolic compounds (total phenols)		
Phenols, total unchlorinated [NA]	AA;AA-s;A;A-s (Aquatic)	5.0	L
	B;C	5.0	L
	D	5.0	L
Phenyl ether [101-84-8	AA;AA-s;A;A-s (Human)	10	C
Polychlorinated Biphenyl, PCB [NA]	AA;AA-s;A;A-s (Human)	0.01	A
	AA;AA-s;A;A-s (Aquatic)	0.001	H
	B;C	0.001	H
	D	0.001	H
	SA;SB;SC	0.001	H
	SD	0.001	H
Quaternary ammonium compounds (including dimethyl benzyl ammonium chloride and dimethyl ethyl benzyl ammonium chloride) [NA]	AA;AA-s;A;A-s (Aquatic)	10	J
	B;C	10	J

SUBSTANCE [CAS No.]	WATER CLASSES	STANDARDS micrograms/liter	NOTES
Radium 226 [NA]	AA (Human)	3 pCi/L*	10 NYCRR Part 170
	Remarks: * - 3 picocuries per liter.		
Radium 226 plus Radium 228 [NA]	AA;AA-s;A;A-s (Human)	5 pCi/L*	10 NYCRR Part 5
	Remarks: * - 5 picocuries per liter		
Selenium [NA]	AA;AA-s;A;A-s (Human)	10	10 NYCRR Part 5
	AA;AA-s;A;A-s (Aquatic)	1.0*	I
	B;C	1.0*	I
	Remarks: * - all standards except (Human) apply to acid-soluble form		
Silver [NA]	AA;AA-s;A;A-s (Human)	50	10 NYCRR Part 5
	AA;AA-s;A;A-s (Aquatic)	0.1*	I
	B;C	0.1*	I
	D	**	H,K
	SD	2.3	H
	Remarks: * - ionic silver ** - exp (1.72 [ln(ppm hardness)] - 6.52) - acid-soluble form applies to D and SD classes		
Strontium 90 [NA]	AA;AA-s;A;A-s (Human)	8pCi/L*	10 NYCRR Part 5
	Remarks: * - if two or more radionuclides are present, the sum of their doses shall not exceed annual potential dose of 4 millirems per year.		

SUBSTANCE [CAS No.]	WATER CLASSES	STANDARDS micrograms/liter	NOTES
Styrene [100-42-5]	AA;AA-s;A;A-s (Human)	50	C
Sulfate [NA]	AA;AA-s;A;A-s (Human)	250,000	10 NYCRR Part 5
Sulfite [NA]	AA;AA-s;A;A-s (Aquatic)	200	J
	B;C	200	J
Tetrachlorobenzenes [95-94-3; 634-66-2; 634-90-2]	AA;AA-s;A;A-s (Human)	10	C
2,3,7,8-Tetrachloro-dibenzo-p-dioxin (TCDD) [1746-01-6]	AA;AA-s;A;A-s (Aquatic)	0.000001	M
	B;C	0.000001	M
	D	0.000001	M
Thallium (Acid-Soluble) [NA]	AA;AA-s;A;A-s (Aquatic)	8	I
	B;C	8	I
	D	20	K
Theophylline [58-55-9]	AA;AA-s;A;A-s (Human)	40	B
Toxaphene [8001-35-2]	AA;AA-s;A;A-s (Aquatic)	0.005	H
	B;C	0.005	H
	D	1.6	H
	SA;SB;SC	0.005	H
2,4,5-TP (Silvex) [93-72-1]	AA;AA-s;A;A-s (Human)	10	10 NYCRR Part 5

SUBSTANCE [CAS No.]	WATER CLASSES	STANDARDS micrograms/liter	NOTES
Trichlorobenzenes [87-61-6; 108-70-3; 120-82-1; 12002-48-1]	AA;AA-s;A;A-s (Human)	10	C
	AA;AA-s;A;A-s (Aquatic)	5	I,N
	B;C	5	I,N
	D	50	L
	SA;SB;SC	5	I,N
	SD	50	L
	Remarks: - Applies to sum of isomers		
1,1,2-Trichloroethane [79-00-5]	AA;AA-s;A;A-s (Human)	0.6	A
Triphenyl phosphate [115-86-6]	AA;AA-s;A;A-s (Aquatic)	4	J
	B;C	4	J
	D	40	K
Tritium [NA]	**AA;AA-s;A;A-s (Human)**	20,000 pCi/l*	10 NYCRR Part 5
	Remarks: * - 20,000 picocuries per liter; if two or more radionuclides are present, the sum of their annual dose equivalent to the total body or any organ shall not exceed 4 millirems per year.		
Vanadium (Acid-Soluble) [NA]	**AA;AA-s;A;A-s (Aquatic)**	14	J
	B;C	14	J
	D	190	K

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SUBSTANCE [CAS No.]	WATER CLASSES	STANDARDS micrograms/liter	NOTES
Zinc [NA]	AA;AA-s;A;A-s (Human)	300	10 NYCRR Part 170
	AA;AA-s;A;A-s (Aquatic)	30	I
	B;C	30	I
	D	*	H
	SA;SB;SC	58	H
	SD	170	H

Remarks: * = exp (0.83 [ln(ppm hardness)] + 1.95)
- all standards except (Human) apply to acid-soluble form

PART 703

GROUND WATER CLASSIFICATIONS, QUALITY STANDARDS, AND EFFLUENT STANDARDS AND/OR LIMITATIONS

(April 2, 1972; Amended August 2, 1978, Effective September 1, 1978; November 5, 1984)

703.1 Definitions: The terms, words or phrases used in Part 703 shall have the following meaning:

(a) *Administrator* shall mean the Administrator of the United States Environmental Protection Agency.

(b) *Best usage of waters* as specified for each class shall be those uses as determined by the Commissioner in accordance with the considerations prescribed by the Environmental Conservation Law.

(c) *Commissioner* shall mean the Commissioner of Environmental Conservation.

(d) *Consolidated rock or bed rock* is the compact or solid hard rock exposed at the surface of the earth or overlain by the unconsolidated deposits.

(e) *Department* shall mean the New York State Department of Environmental Conservation.

(f) *Disposal System* means a system for disposing of sewage, industrial waste or other wastes, and including sewer systems and treatment works.

(g) *Effluent standard and/or limitation* shall mean any restriction on quantities, quality, rates and concentrations of chemical, physical, biological, and other constituents of effluents which are discharged or allowed to run from an outlet, point source or any other discharge within the meaning of ECL 17-0501 into the unsaturated or saturated zones.

(h) *Fresh Water* is that water having a chloride concentration equal to or less than 250 mg/l, or a total dissolved solids concentration equal to or less than 1000 mg/l.

(i) *Ground waters* are those waters in the saturated zone, including perched water areas.

(j) *Industrial waste* means any liquid, gaseous, solid or waste substance or a combination thereof resulting from any process of industry, manufacturing, trade, or business or from the development or recovery of any natural resources, which may cause or might reasonably be expected to cause pollution of the waters of the State in contravention of the standards adopted as provided in ECL, Article 17.

(k) *Land application techniques* include the following three basic methods of waste discharge application: irrigation, infiltration-percolation; overland flow.

(l) *Land utilization practices* entails the use of plants, the soil surface, and soil matrix for removal of certain wastewater constituents.

(m) *Micrograms per liter, ug/l,* is the weight in micrograms of any specific substance or substances contained in one liter of solution.

(n) *Milligrams per liter, mg/l,* is the weight in milligrams of any specific substance or substances contained in one liter of solution.

(o) *Other wastes* means garbage, refuse, decayed wood, sawdust, shavings, bark, sand, lime, cinders, ashes, offal, oil, tar, dyestuffs, acids, chemicals, leachate, sludge, salt, and all other discarded matter not sewage or industrial waste which may cause or might reasonably be expected to cause pollution of the waters of the State in contravention of the standards adopted as provided in ECL, Article 17.

(p) *Outlet* means the terminus of a sewer system, or the point of emergence of any water-borne sewage, industrial waste or other wastes or the effluent therefrom, into the saturated or unsaturated zones.

(q) *Pathogenic organism* shall mean any disease-producing organism.

(r) *Perched ground water* shall mean unconfined ground water separated from an underlying body of ground water by an unsaturated zone.

(s) *Person or persons* shall mean any individual, public or private corporation, political subdivision, government agency, municipality, industry, co-partnership, association, firm, trust, estate or any other legal entity whatsoever.

(t) *Point source* means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation or vessel or other floating stock from which pollutants are or may be discharged.

(u) *Pollutant* means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand and industrial, municipal, and agricultural waste discharged into water.

(v) *Pollution* shall mean the presence in the environment of conditions and or contaminants in quantities of characteristics which are or may be injurious to human, plant or animal life or to property or which unreasonably interfere with the comfortable enjoyment of life and property throughout such areas of the state as shall be affected thereby.

(w) *Potable waters* are those fresh waters usable for drinking, culinary or food processing purposes.

(x) *Quality standard* shall mean such measure of purity or quality for any ground waters in relation to their best usage.

(y) *Saline water* is that water having a chloride concentration of more than 250 mg/l or a total dissolved solids concentration of more than 1000 mg/l.

(z) The *saturated zone* is that extensive portion of the earth's crust which is saturated with water. (Includes perched water areas.)

(aa) *Sewage* means the water-carried human or animal wastes from residences, buildings, industrial establishments or other places, together with such ground water infiltration and surface water as may be present.

(bb) *Subsurface sewage disposal system* shall mean a disposal system which discharges sewage beneath the surface of the ground.

(cc) *Toxic pollutant* means those pollutants, or combination of pollutants, including disease-causing agents, which after discharge and upon exposure, ingestion, inhalation or assimilation into any organism, either directly from the environment or indirectly through food chains, will, on the basis of information available to the department, cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions, including malfunctions in reproduction, or physical deformations, in such organisms or their offspring.

(dd) *Treatment works* means any plant, disposal field, lagoon, pumping station, constructed drainage ditch or surface water intercepting ditch, incinerator, area devoted to sanitary land fills, or other works not specifically mentioned herein, installed for the purpose of treating, neutralizing, stabilizing or disposing of sewage, industrial waste or other wastes.

(ee) *Unconsolidated deposits* are full non-or poorly indurated soil materials above the bed rock.

(ff)The *unsaturated zone* is that portion of the earth's crust which does not contain sufficient water to fill all interconnected voids or pore spaces. Perched water bodies may exist within the unsaturated zone.

(gg) *Waste management system* includes the management of mechanical equipment, crops, irrigation and monitors as an operational unit.

703.2 Purpose of classifications, quality standards, and effluent standards and/or limitations. The purpose of these classes, quality standards, and effluent standards and/or limitations is to prevent pollution of ground waters and to protect the ground waters for use as a potable water.

703.3 Collection of samples. (a) The determination of compliance or non-compliance of sewage, industrial waste or other waste discharges with the requirements of this Part shall be made through tests or analytical determinations of ground water or effluent samples collected in such manner as are approved by the Department.

(b) The location at which ground water samples are collected shall be determined by the Department. In selecting or approving such locations, the Department shall consider all relevant facts, including but not limited to:

(1) The mobility of pollutants in the unsaturated zone is governed by the rate of movement of percolating water and the active pollutant attenuation mechanisms in this zone.

(2) Attenuation mechanisms may remove potential pollutants in passage through topsoil and adequate thicknesses of the unsaturated zone.

(3) Attention of pollutant concentrations with distance may occur in the saturated zone, similar to that in the unsaturated zone, as a result of attenuation processes occurring below the water table.

(c) The location at which effluent samples are collected shall be at a point where the effluent emerges from a treatment works, disposal system, outlet or point source and prior to being discharged to the ground.

703.4 Tests or analytical determinations. Tests or analytical determinations to determine compliance or non-compliance with standards shall be made in accordance with:

(a) *Standard Methods for the Examination of Water and Wastewater (see section 705.2 of this Title);*

(b) *Methods for Chemical Analysis of Water and Wastes (see section 705.2 of this Title);*

(c) *Water standards of the American Society for testing and Materials (see section 705.2 of this Title); or*

(d) by other methods approved by the Commissioner as giving results equal to or superior to methods listed above.

703.5 Classes and quality standards for ground waters. *(a) Class GA* (1) The best usage of Class GA waters is as a source of potable water supply. Class GA waters are fresh ground waters found in the saturated zone of unconsolidated deposits and consolidated rock or bed rock.

(2) Quality standards for class GA waters shall be the most stringent of:

(i) the items and specifications applicable to such waters found in this section;

(ii) the maximum contaminant levels for drinking water promulgated by the Commissioner of Health as found in 10 NYCRR Subpart 5-1, *Public Water Supplies* or any subsequent revision thereto or replacement thereof;

(iii) the maximum contaminant levels for drinking water promulgated by the Administrator under the Safe Drinking Water Act (see section 705.1 of this Title) and 40 CFR Part 141, effective July 1, 1978 (see section 705.1);

(iv) the standards for raw water quality promulgated by the Commissioner of Health as found in 10 NYCRR Part 170, *Sources of Water Supply* or any subsequent revision thereto or replacement thereof.

(3) The following quality standards shall be applicable to Class GA Water:

Items	*Specifications*
(a) Sewage, industrial waste or other wastes, taste or odor producing substances, toxic pollutants, thermal discharges, radioactive substances or other deleterious matter.	1. None which may impair the quality of the ground waters to render them unsafe or unsuitable for a potable water supply or which may cause or contribute to a condition in contravention of standards for other classified waters of the State.
(b) The concentration of the following substances or chemicals:	2. Shall not be greater than the limit specified, except where exceeded due to natural conditions:
(1) Arsenic (As)	(1) 0.025 mg/l
(2) Barium (Ba)	(2) 1.0 mg/l
(3) Cadmium (Cd)	(3) 0.01 mg/l
(4) Chloride (Cl)	(4) 250 mg/l
(5) Chromium (Cr) Hexavalent	(5) 0.05 mg/l
(6) Copper (Cu)	(6) 1.0 mg/l
(7) Cyanide (CN)	(7) 0.2 mg/l
(8) Fluoride (F)	(8) 1.5 mg/l
(9) Foaming Agents[1]	(9) 0.5 mg/l
(10) Iron (Fe)[2]	(10) 0.3 mg/l
(11) Lead (Pb)	(11) 0.025 mg/l
(12) Manganese (Mn)[2]	(12) 0.3 mg/l
(13) Mercury (Hg)	(13) 0.002 mg/l
(14) Nitrate (as N)	(14) 10.0 mg/l
(15) Phenols	(15) 0.001 mg/l
(16) Selenium (Se)	(16) 0.02 mg/l
(17) Silver (Ag)	(17) 0.05 mg/l
(18) Sulfate (SO^4)	(18) 250 mg/l
(19) Zinc (Zn)	(19) 5 mg/l
(20) pH Range	(20) 6.5-8.5
(21) Aldrin, or 1,2,3,4,10,10-hexachloro-1,4,4a, 5,8,8a-hexahydro-*endo*-1 4-exo-5, 8-dimethanonaphthalene.	(21) not detectable[3]

Items	*Specifications*
(22) Chlordane, or 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-4,7-methanoindene.	(22) 0.1 ug/l
(23) DDT, or 2,2-bis- (*p*-chlorophenyl)-1,1,1-trichloroethane and metabolites.	(23) not detectable[3]
(24) Dieldrin, or 6,7-epoxy aldrin.	(24) not detectable[3]
(25) Endrin, or 1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-*endo*-1,4-*endo*-5,8-dimethanonaphthalene.	(25) not detectable[3]
(26) Heptachlor, or 1,4,5,6,7,8,8-heptachloro- 3a,4,7,7a-tetrahydro-4,7-methanoindene and metabolites.	(26) not detectable[3]
(27) Lindane and other Hexachlorocyclohexanes or mixed isomers of 1,2,3,4,5,6-hexachlorocyclohexane.	(27) not detectable[3]
(28) Methoxychlor, or 2,2-bis-(*p*-methoxyphenyl)-1,1,1-trichloroethane.	(28) 35.0 ug/l
(29) Toxaphene (a mixture of at least 175 chlorinated camphene derivatives).	(29) not detectable[3]
(30) 2,4-Dichlorophenoxyacetic acid (2,4-D)	(30) 4.4 ug/l
(31) 2,4,5-Trichlorophenoxypropionic acid (2,4,5-TP) (Silvex)	(31) 0.26 ug/l
(32) Vinyl chloride (chloroethene)	(32) 5.0 μg/l
(33) Benzene	(33) not detectable[3]
(34) Benzo(a) pyrene	(34) not detectable[3]
(35) Kepone or decachlorooctahydro-1,3,4-metheno-2H - cyclobuta (*cd*) pentalen - 2 - one (chlordeone).	(35) not detectable[3]
(36) Polychlorinated biphenyls (PCB) (Aroclor)	(36) 0.1 μg/l
(37) Ethylene thiourea (ETU)	(37) not detectable[3]
(38) Chloroform	(38) 100 μg/l
(39) Carbon tetrachloride (tetrachloromethane)	(39) 5 μg/l
(40) Pentachloronitrobenzene (PCNB)	(40) not detectable[3]
(41) Trichloroethylene	(41) 10 μg/l
(42) Diphenylhydrazine	(42) not detectable[3]
(43) bis (2 - chloroethyl) ether	(43) 1.0 μg/l
(44) 2,4,5 - Trichlorophenoxyacetic acid (2,4,5-T)	(44) 35 μg/l
(45) 2,3,7,8 - Tetrachlorodibenzo - *p* - dioxin (TCDD)	(45) 3.5 x 10^{-5} μg/l
(46) 2 - Methyl - 4 - chlorophenoxyacetic acid (MCPA)	(46) 0.44 μg/l
(47) Amiben, or 3 - amino -2,5 - dichlorobenzoic acid (chloramben)	(47) 87.5 μg/l
(48) Dicamba, or 2 - methoxy - 3, 6 - dichlorobenzoic acid	(48) 0.44 μg/l
(49) Alachlor, or 2 - chloro - 2′, 6′ - diethyl - *N* - (meth oxymethyl) - acetanilide (Lasso)	(49) 35.0 μg/l
(50) Butachlor, or 2 - chloro - 2′, 6′ - diethyl - N - (butoxymethyl) - acetanilide (Machete)	(50) 3.5 μg/l
(51) Propachlor, or 2 - chlor - N - isopropyl - N - acetanilide (Ramrod)	(51) 35.0 μg/l
(52) Propanil, or 3′, 4′ - dichloropropionanilide	(52) 7.0 μg/l
(53) Aldicarb, [2 - methyl - 2 - (methylthio) propionaldehyde O - (methyl carbamoyl) oxime] and methomyl [1 - methylthioacetaldhyde O - (methyl - carbamoyl) oxime]	(53) 0.35 μg/l
(54) Bromacil or 5 - bromo - 3 - *sec* - butyl - 6 - methluracil	(54) 4.4 μg/l

Items	*Specifications*
(55) Paraquat, or 1,1' dimethyl - 4,4' - dipyridylium	(55) 2.98 µg/l
(56) Trifluralin, or *a*. *a*. *a* trifluoro - 2, 6 - dinitro - N - dipropyl - *p* - toluidine (Treflan)	(56) 35.0 µg/l
(57) Nitralin, or 4 - (methylsulfonyl) — 2, 6 - dinitro - N, N - dipropylaniline (Planavin)	(57) 35.0 µg/l
(58) Benefin, or N - butyl — N - ethyl - *a*. *a*. *a* - trifluoro - 2,6 - dinitro - *p* - toluidene (Balan)	(58) 35.0 µg/l
(59) Azinphosmethyl, or O, O - dimethyl - *S* - 4 - oxo - 1,2,3 - benzotriazin - 3(4H) - ylmethylphosphoro - dithioate (Guthion)	(59) 4.4 µg/l
(60) Diazinon, or O, O-diethyl O-(2-isopropyl-4-methyl - 6 - pyrimidinyl) - phosphorothioate.	(60) 0.7 µg/l
(61) Phorate (also for Disulfoton), or O, O - diethyl - *S* - [(ethylthio)methyl] - phosphoro - dithioate (Thimet R), and disulfoton, or O, O-diethyl-*S*-[(2-ethylthio)ethyl] phosphorodithioate (Di-System R)	(61) not detectable [3]
(62) Carbaryl, or 1 - naphthyl - N - methylcarbamate	(62) 28.7 µg/l
(63) Ziram, or zinc salts of dimethyl - dithiocarbamic acid.	(63) 4.18 µg/l
(64) Ferbam, or iron salts of dimethyl - dithiocarbamic acid.	(64) 4.18 µg/l
(65) Captan, or *N* - trichloromethylthio - 4 - cyclohexene - 1, *2* - dicarboxmide.	(65) 17.5 µg/l
(66) Folpet, or N - trichloromethylthiophthalimide.	(66) 56.0 µg/l
(67) Hexachlorobenzene (HCB)	(67) 0.35 µg/l
(68) Paradichlorobenzene (PDB) (also orthodichlorobenzene)	(68) 4.7 µg/l
(69) Parathion (and Methyl parathion), or (O, - O - diethyl O *p* - nitrophenylphosphorothioate, and methyl parathion, or O, O - dimethyl - O - *p* - nitrophenylphosphorothioate.	(69) 1.5 µg/l
(70) Malathion, or *S* - 1, *2* - *bis* (ethoxycarbonyl) ethyl O, O - dimethylphosphorodithioate.	(70) 7.0 µg/l
(71) Maneb, or - manganese salt of ethylene - bis - dithiocarbamic acid.	(71) 1.75 µg/l
(72) Zineb, or zinc salt of ethylene - bis - dithiocarbamic acid.	(72) 1.75 µg/l
(73) Dithane, or zincate of manganese ethylene - bis - dithiocarbamate.	(73) 1.75 µg/l
(74) Thiram, or tetramethylthiuramdisulfide	(74) 1.75 µg/l
(75) Atrazine, or 2 - chloro - 4 - ethylamino - 6 - isopropylamino - S - triazine.	(75) 7.5 µg/l
(76) Propazine, or 2 - chloro - 4, 6 - diisopropyl - amino - S - triazine.	(76) 16.0 µg/l
(77) Simazine, or 2 - chloro - 4, 6 - diethylamino - S - triazine.	(77) 75.25 µg/l
(78) di - n - butylphthalate	(78) 770 µg/l
(79) Di (2 - ethylhexyl) phthalate (DEHP)	(79) 4.2 mg/l
(80) Hexachlorophene, or 2,2' - methylene - bis (3,4,6 - trichlorophenol)	(80) 7 µg/l
(81) Methyl methacrylate	(81) 0.7 mg/l
(82) Pentachlorophenol (PCP)	(82) 21 µg/l
(83) Styrene	(83) 931 µg/l

Notes:

1. Foaming agents determined as methylene blue active substances (MBAS) or other tests as specified by the Commissioner.

2. Combined concentration of iron and manganese shall not exceed 0.5 mg/l.

3. "*Not detectable*" means by tests or analytical determinations referenced in Section 703.4.

(b) *Class GSA.* (1) The best usage of Class GSA waters is as a source of potable mineral waters, for conversion to fresh potable waters, or as raw material for the manufacture of sodium chloride or its derivatives or similar products. Such waters are saline waters found in the saturated zone.

(2) The following quality standards shall be applicable to Class GSA waters.

Items	*Specifications*
Items: 1. Sewage, industrial wastes or other wastes, color, taste or odor producing substances, toxic pollutants, thermal discharges, radioactive substances or other deleterious matter.	*Specifications:* 1. None which may impair the waters for use as sources of saline waters for the best usage outlined above or as to cause or contribute to a condition in contravention of standards for other classified waters of the State.

(1) *Class GSB.* (1) The best usage of Class GSB waters is as a receiving water for disposal of wastes. Such waters are those saline waters found in the saturated zone which have a chloride concentration in excess of 1000 miligrams per liter or a total dissolved solids concentration in excess of 2000 milligrams per liter.

(2) The following quality standards shall be applicable to Class GSB waters.

Items	*Specifications*
Items: 1. Sewage, industrial wastes or other wastes, color, taste or odor producing substances, toxic pollutants, thermal discharges, radioactive substances or other deleterious matter.	*Specifications:* 1. None which may be deleterious, harmful, detrimental or injurious to the public health, safety or welfare or which may cause or contribute to a condition in contravention of standards for other classified waters of the State.

(3) Class GSB shall not be assigned to any ground waters of the State unless the Commissioner finds that adjacent and tributary ground waters and the best usage thereof will not be impaired by such classification.

703.6 Effluent standards and/or limitations for discharges to Class GA waters. (a) The effluent standards and/or limitations in Schedules I and II of this section apply to a discharge from a point source or outlet or any other discharge within the meaning of ECL 17-0501 which discharge will or may enter the unsaturated or saturated zones.

(b) The Department may establish additional effluent standards and/or limitations as set forth in Section 703.7.

(c) The effluent standards and/or limitations shall be incorporated in SPDES permits (under Part 750 et seq.) for discharges to ground waters, where applicable.

Schedule I

Applicability. The following effluent standards and/or limitations shall apply to all Class GA waters in New York State.

Biological organisms. Coliform and/or pathogenic organisms shall not be discharged in amounts sufficient to render fresh ground waters detrimental to public health, safety or welfare.

Chemical Characteristics *Substance*	*Maximum Allowable Concentration in mg/l (unless otherwise noted)*
(1) Aluminum	(1) 2.0
(2) Arsenic	(2) 0.05
(3) Barium	(3) 2.0
(4) Cadmium	(4) 0.02
(5) Chloride	(5) 500

Chemical Characteristics Substance	*Maximum Allowable Concentration in mg/l (unless otherwise noted)*
(6) Chromium (Cr) (Hexavalent)	(6) 0.10
(7) Copper	(7) 1.0
(8) Cyanide	(8) 0.40
(9) Fluoride	(9) 3.0
(10) Foaming Agents [1]	(10) 1.0
(11) Iron [2]	(11) 0.6
(12) Lead	(12) 0.05
(13) Manganese [2]	(13) 0.6
(14) Mercury	(14) 0.004
(15) Nickel	(15) 2.0
(16) Nitrate (as N)	(16) 20
(17) Oil and Grease	(17) 15
(18) Phenols	(18) 0.002
(19) Selenium	(19) 0.04
(20) Silver	(20) 0.1
(21) Sulfate	(21) 500
(22) Sulfide	(22) 1.0
(23) Zinc	(23) 5.0
(24) pH Range [3]	(24) 6.5-8.5
(25) Aldrin, or 1,2,3,4,10,10 - hexachloro - 1,4,4a,5,8,8a - hexahydro - *endo* - 1,4 - *exo* - 5,8 - 5,8 - dimethanonaphthalene	(25) not detectable [4]
(26) Chlordane, or 1,2,4,5,6,7,8,8 - octachloro - 2,3,3a,4,7,7a - hexahydro - 4,7 - methanoindene	(26) 0.1 ug/l
(27) DDT, or 2,2 - bis - (*p* - chlorophenyl) - 1,1,1 - trichloroethane and metabolites	(27) not detectable [4]
(28) Dieldrin, or 6,7 - epoxy aldrin	(28) not detectable [4]
(29) Endrin, or 1,2,3,4,10,10 - hexachloro - 6,7 - expoxy- 1,4,4a, 5,6,7,8,8a - octahydro - endo - 1,4 - *endo* - 5,8 - dimethanonaphthalene	(29) not detectable [4]
(30) Heptachlor, or 1,4,5,6,7,8,8 - heptachloro - 3a,4,7,7a - tetrahydro - 4,7 - methanoindene and metabolites	(30) not detectable [4]
(31) Lindane and other Hexachlorocyclohexanes or mixed isomers of 1,2,3,3,5,6 - hexachloro - cyclohexane	(31) not detectable [4]
(32) Methoxychlor, or 2,2 - bis - (*p*-methoxphenyl) - 1,1,1-trichloroethane	(32) 35 ug/l
(33) Toxaphene (a mixture of at least 175 chlorinated camphene derivatives)	(33) not detectable [4]
(34) 2,4 - Dichlorophenoxyacetic acid (2,4 - D)	(34) 4.4 ug/l
(35) 2,4,5 - Trichlorophenoxypropionic acid (2,4,5 - TP) (Silvex)	(35) 0.26 ug/l
(36) Vinyl chloride (chloroethene)	(36) 5.0 ug/l
(37) Benzene	(37) not detectable [4]
(38) Benzo(a) pyrene	(38) not detectable [4]
(39) Kepone or decachlorooctahydro - 1,3,4 - metheno - 2H - cyclobuta (cd) pentalen - 2 - one (chlordeone)	(39) not detectable [4]
(40) Polychlorinated biphenyls (PCB) (Aroclor)	(40) 0.1 ug/l
(41) Ethylene thiourea (ETU)	(41) not detectable [4]
(42) Chloroform	(42) 100 ug/l
(43) Carbon tetrachloride (tetrachloromethane)	(43) 5 ug/l
(44) Pentachloronitrobenzene (PCNB)	(44) not detectable [4]
(45) Trichloroethylene	(45) 10 ug/l

Chemical Characteristics Substance	*Maximum Allowable Concentration in mg/l (unless otherwise noted)*
(46) Diphenylhydrazine	(46) not detectable[4]
(47) bis (2 - chloroethyl) ether	(47) 1.0 ug/l
(48) 2,4,5 - Trichlorophenoxyacetic acid (2,4,5 - T)	(48) 35 ug/l
(49) 2,3,7,8 - Tetrachlorodibenzo - p - dioxin (TCDD)	(49) 3.5×10^{-5} ug/l
(50) 2 - Methyl - 4 - chlorophenoxyacetic acid (MCPA)	(50) 0.44 ug/l
(51) Amiben, or 3 - amino - 2,5 - dichlorobenzoic acid (chloramben)	(51) 87.5 ug/l
(52) Dicamba, or 2 - methoxy - 3,6 - dichlorobenzoic acid	(52) 0.44 ug/l
(53) Alachlor, or 2 - chloro - 2', 6' - diethyl - *N* - (methoxymethyl) - acetanilide (Lasso)	(53) 35.0 ug/l
(54) Butachlor, or 2 - chlor - 2', 6' diethyl - N - (butoxymethyl) - acetanilide (Machete)	(54) 3.5 ug/l
(55) Propachlor, or 2 - chlor - N - isopropyl - N - acetanilide (Ramrod)	(55) 35.0 ug/l
(56) Propanil, or 3', 4'- dichloropropionanilide	(56) 7.0 ug/l
(57) Aldicarb, [2 - methyl - 2 - (methylthio) propionaldehyde O - (methyl carbamoyl) oxime] and methomyl [1 - methylthioacetaldehyde O - (methyl - carbamoyl) oxime]	(57) 0.35 ug/l
(58) Bromacil, or 5 - broma - 3 - sec - butyl - 6 - methluracil	(58) 4.4 ug/l
(59) Paraquat, or 1,1' - dimethyl - 4,4' - dipyridylium	(59) 2.98 ug/l
(60) Trifluralin, or *a,a,a,* - trifluoro - 2,6 - dinitro - N - dipropyl - p - toluidine (Treflan)	(60) 35.0 ug/l
(61) Nitralin, or 4 - (methylsulfonyl) - 2,6 - dinitro - N,N - dipropylaniline (Planavin)	(61) 35.0 ug/l
(62) Benefin, or N — butyl - N - ethyl *a,a,a,* - trifluoro- 2,6 - dinitro - *p* - toluidine (Balan)	(62) 35.0 ug/l
(63) Azinphosmethyl, or O,O - dimethyl - *S* - 4 - oxo - 1,2,3, - benzotriazin - 3 (4H) - ylmethylphosphorodithioate (Guthion)	(63) 4.4 ug/l
(64) Diazinon, or O,O - diethyl O - (2 - isopropyl - 4 - methyl - 66 - pyrimidinyl) - phosphorothioate	(64) 0.7 ug/l
(65) Phorate (also for Disulfoton), or O,O - diethyl - *S* - [(ethylthio)methyl] - phosphorodithioate (Thimet R), and disulfoton, or O,O - diethyl - *S* - [(2 - ethylthio- ethyl] phosphorodithioate (Di-System R)	(65) not detectable[4]
(66) Carbaryl, or 1 - naphthyl - N - methylcarbamate	(66) 28.7 ug/l
(67) Ziram, or zinc salts of dimethyldithiocarbamic acid	(67) 4.18 ug/l
(68) Ferbam, or iron salts of dimethyl - dithiocarbamic acid	(68) 4.18 ug/l
(69) Captan, or *N* - trichloromethylthio - 4 - cyclohexene - 1,2, - dicarboximide	(69) 17.5 ug/l
(70) Folpet, or *N*-trichloromethylthiophthalimide	(70) 56.0 ug/l
(71) Hexachlorobenzene (HCB)	(71) 0.35 ug/l
(72) Paradichlorobenzene (PDB) (also orthodichlorobenzene)	(72) 4.7 ug/l
(73) Parathion (and Methyl parathion), or (O, - O - diethyl - O - *p* - nitrophenylphosphorothioate, and methyl parathion, or O, O - dimethyl - O - *p* - 1 nitrophenylphosphorothioate	(73) 1.5 ug/l

Chemical Characteristics Substance	*Maximum Allowable Concentration in mg/l unless otherwise noted)*
(74) Malathion, or *S* - 1,2 - *bix* (ethoxycarbonyl) ethyl - O,O - dimethylphosphorodithioate	(74) 7.0 ug/l
(75) Maneb, or - manganese salt of ethylene - bis - dithiocarbamic acid	(75) 1.75 ug/l
(76) Zineb, or zinc salt of ethylene - bis - dithiocarbamic acid	(76) 1.75 ug/l
(77) Dithane, or zincate of manganese ethylene - bis - dithiocarbamate	(77) 1.75 ug/l
(78) Thiram, or tetramethylthiuramdisulfide	(78) 1.75 ug/l
(79) Atrazine, or 2 - chlor - 4 - ethylamino - 6 - isopropylamino - S - triazine	(79) 7.5 ug/l
(80) Propazine, or 2 - chloro - 4,6 - diisopropylamino - S - triazine	(80) 16.0 ug/l
(81) Simazine, or 2 - chloro - 4,6 - diethylamino - S - triazine	(81) 75.25 ug/l
(82) di - n - butylphthalate	(82) 770 ug/l
(83) Di (2 - ethylhexyl) phthalate (DEHP)	(83) 4.2 mg/l
(84) Hexachlorophene, or 2,2′ - methylene - bis (3,4,6 - trichlorophenol)	(84) 7 ug/l
(85) Methyl methacrylate	(85) 0.7 mg/l
(86) Pentachlorophenol (PCP)	(86) 21 ug/l
(87) Styrene	(87) 931 ug/l

Notes:

1. Foaming agents determined as methylene blue active substances (MBAS) or other tests as specified by the Commissioner.
2. Combined concentration iron and manganese shall not exceed 1.0 mg/l.
3. When natural ground waters have a pH outside the range indicated above, that natural pH may be one extreme of the allowable range.
4. *Not detectable* means by tests or analytical determinations referenced in Section 703.4.

Schedule II

Applicability. In addition to the effluent standards and/or limitations in Schedule I, the following also apply in the counties of Nassau and Suffolk.

Chemical Characteristics

Substance	*Maximum Allowable Concentration in mg/l*
Dissolved Solids, Total	*1000*
Nitrogen, Total (as N)	*10*

703.7 Additional effluent standards and/or limitations. (a) The Department, after consultation with the State Department of Health, may establish on a case by case basis more stringent effluent standards and/or limitations than those set forth in Schedule I or II of Section 703.6 and may impose effluent standards and/or limitations for a toxic pollutant or any substance not included in Schedule I or II, when necessary, to prevent pollution and protect the ground waters for their best usage. The Department shall consider rules and regulations promulgated by the Administrator or the New York State Department of Health in establishing such standards and/or limitations. Additionally, the Department shall consider Action Levels for compounds determined to exhibit toxic effects which are established by the New York State Commissioner of Health.

(b) Circumstances under which the Department may consider more stringent effluent standards and/or limitations include, but are not limited to:

(1) a discharge to an aquifer which is the sole or principal source of a potable water supply;

(2) an existing or proposed discharge is directly on or into consolidated rock or bed rock;

(3) a discharge containing one or more substances which in combination with precipitation and/or natural soil constituents is likely to produce a toxic pollutant; or

(4) where adverse accumulative or synergistic effects can be established for constitutents in a discharge.

(c) Where a discharge is proposed or exists which would or does contain a pollutant for which there is a quality standard under this part but there is no applicable effluent standard and/or limitation under this part for such a pollutant, the Department, after consultation with

ATTACHMENT C

ACTION-SPECIFIC ARARs

SELECTED ACTION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

Actions b/	Requirements	Prerequisites for Applicability c/,d/	Citation
Stripping	[CAA requirements to be provided.]		
ping also Closure with Waste Place for additional ciated requirements)	Placement of a cap over waste (e.g., closing a landfill, or closing a surface impoundment or waste pile as a landfill, or similar action) requires a cover designed and constructed to: o Provide long-term minimization of migration of liquids through the capped area; o Function with minimum maintenance; o Promote drainage and minimize erosion or abrasion of the cover; o Accommodate settling and subsidence so that the cover's integrity is maintained; and o Have a permeability less than or equal to the permeability of any bottom liner system or natural sub-soils present.	RCRA hazardous waste placed at site after the effective date of the requirements, or placement of hazardous waste into another unit will make requirements applicable when the waste is being covered with a cap for the purpose of leaving it behind after the remedy is completed. Capping without such placement will not make requirements applicable. d/	40 CFR 264.228((Surface Impoun 40 CFR 264.258(Piles) 40 CFR 264.310((Landfills)

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a/ Currently only RCRA, CWA, and SDWA requirements are included. Additional action-specific requirements will be added as additional stat
lyzed.

b/ Action alternatives from ROD keyword index, FY1986 Record of Decision Annual Report, January 1987, Hazardous Site Control Division, EPA.

c/ Requirements have been proposed but not promulgated for air stripping, hybrid closure, gas collection and miscellaneous unit treatment.
e regulations are promulgated, they will be included in the matrix.

d/ Some action-specific requirements listed may be relevant and appropriate even if RCRA definitions of storage, disposal, or hazardous wa
met, or if the waste at the site is similar to but not identifiable as a RCRA hazardous waste. See Chapter 2 for information on relevant
ropriate RCRA requirements.

SELECTED ACTION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

ctions b/	Requirements	Prerequisites for Applicability c/,d/	Citation
ng (continued)	Eliminate free liquids, stabilize wastes before capping (surface impoundments).		40 CFR 264.228(a
	Restrict post-closure use of property as necessary to prevent damage to the cover.		40 CFR 264.117(c
	Prevent run-on and run-off from damaging cover.		40 CFR 264.228(b 40 CFR 264.310(b
	Protect and maintain surveyed benchmarks used to locate waste cells (landfills, waste piles).		40 CFR 264.310(b
re with No Post-Closure (e.g. Clean Closure)	General performance standard requires elimination of need for further maintenance and control; elimination of post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products.	Applicable to land-based unit containing hazardous waste.[g] Applicable to RCRA hazardous waste (listed or characteristic) placed at site after the effective date of the requirements, or placed into another unit. Not applicable to material treated, stored, or disposed only before the effective date of the requirements, or if treated in-situ, or consolidated within area of contamination. Designed for cleanup that will not require long-term management. Designed for cleanup to health-based standards.	40 CFR 264.111
	Disposal or decontamination of equipment, structures, and soils.	May apply to surface impoundments and container or tank liners and hazardous waste residues, and to contaminated soil, including soil from dredging or soil disturbed in the course of drilling or excavation, and returned to land.	40 CFR 264.111 40 CFR 264.178 40 CFR 264.197 40 CFR 264.288(c 40 CFR 264.258
	Removal or decontamination of all waste residues, contaminated containment system components (e.g., liners, dikes), contaminated subsoils, and structures and equipment contaminated with waste and leachate, and management of them as hazardous waste.		
	Meet health-based levels at unit.		40 CFR 244.111

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a/ Some action-specific requirements listed may be relevant and appropriate even if RCRA definitions of storage, disposal, or hazardous was
met, or if the waste at the site is similar to but not identifiable as a RCRA hazardous waste. See Chapter 2 for information on relevant a
opriate RCRA requirements.

SELECTED ACTION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

Actions b/	Requirements	Prerequisites for Applicability c/,d/	Citation
sure with Waste In Place	Eliminate free liquide by removal or solidification. Stabilization of remaining waste and waste residues to support cover.	Applicable to land disposal of hazardous waste.d/ Applicable to RCRA hazardous waste (listed or characteristic) placed at site after the effective date of the requirements, or placed into another unit. Not applicable to material treated, stored, or disposed only before the effective date of the requirements, or if treated in-situ or consolidated within area of contamination.	40 CFR 264.228 40 CFR 264.228 40 CFR 264.258
	Installation of final cover to provide long-term minimization of infiltration (see Capping).		40 CFR 264.310
	30-year post-closure care and ground-water monitoring.g/		40 CFR 264.310
sure of Land Treatment its	Maximize degradation, transformation, or immobilization of hazardous constituents within the treatment zone, minimize run-off of constituents, maintain run-on control system and run-off management system, control wind dispersal of hazardous waste, maintain unsaturated zone monitoring, establish vegetative cover, and establish background soil values to determine consistency with permit values.	Closure of land treatment units.	40 CFR 264.280
solidation within a Unit	None applicable.d/	Consolidation within a unit.f/	

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g/ Regional administrator may revise length of post-closure care period (40 CFR 264.117).

SELECTED ACTION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

ons b/	Requirements	Prerequisites for Applicability c/,d/	Citation
ation between Units	With respect to the waste that is moved, see requirements in the following sections: Capping, Closure with Waste in Place, Container Storage, Construction of a New Landfill On-Site, Construction of a New Surface Impoundment On-Site, Incineration (On-Site), Land Treatment, Operation and Maintenance, Tank Storage, and Treatment.	Movement of hazardous waste and placement into another unit.	See Capping, Closur Waste in Place, Con Storage, Constructi a New Landfill On-S Construction of a N Surface Impoundment Site, Incineration Site), Land Treatme Operation and Maint ance, Tank Storage, Treatment in this exhibit.
r Storage	Containers of RCRA hazardous waste must be:	Storage of RCRA hazardous waste (listed or characteristic) not meeting small quantity generator criteria held for a temporary period greater than 90 days before treatment, disposal, or storage elsewhere (40 CFR 264.10), in a container (i.e., any portable device in which a material is stored, transported, disposed of, or handled). A generator who accumulates or stores hazardous waste on-site for 90 days or less in compliance with 40 CFR 262.34(a)(1-4) is not subject to full RCRA storage requirements. Small quantity generators are not subject to the 90 day limit (40 CFR 262.34(c),(d), and (e)).	
	o Maintained in good condition;		40 CFR 264.171
	o Compatible with hazardous waste to be stored; and		40 CFR 264.172
	o Closed during storage (except to add or remove waste).		40 CFR 264.173
	Inspect container storage areas weekly for deterioration.		40 CFR 264.174
	Place containers on a sloped, crack-free base, and protect from contact with accumulated liquid. Provide containment system with a capacity of 10 percent of the volume of containers of free liquids. Remove spilled or leaked waste in a timely manner to prevent overflow of the containment system.		40 CFR 264.175

In many cases, there are no defined "units" at a CERCLA site. Instead, there are areas of contamination with differing concentration level ing hot spots) of hazardous substances, pollutants, or contaminants. When RCRA hazardous wastes are moved into or out of an area of nation, RCRA disposal requirements are applicable to the waste being managed and certain treatment, storage, or disposal requirements (such sure) are applicable to the area where the waste is received.

SELECTED ACTION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

Actions b/	Requirements	Prerequisites for Applicability c/,d/	Citation
ntainer Storage ntinued)	Keep containers of ignitable or reactive waste at least 50 feet from the facility's property line.		40 CFR 264.176
	Keep incompatible materials separate. Separate incompatible materials stored near each other by a dike or other barrier.		40 CFR 264.177
	At closure, remove all hazardous waste and residues from the containment system, and decontaminate or remove all containers, liners.		40 CFR 264.178
	Storage of banned wastes must be in accordance with 40 CFR 268. When such storage occurs beyond one year, the owner/operator bears the burden or proving that such storage is solely for the purpose of accumulating sufficient quantities to allow for proper recovery, treatment, and disposal.		40 CFR 268.50
nstruction of New Landfill -Site (see Closure with ste in Place).	<u>Minimum Technology Requirements</u>: Install two liners or more, a top liner that prevents waste migration into the liner, and a bottom liner that prevents waste migration through the liner.h/	RCRA hazardous waste (listed or characteristic) currently being placed in a new, replacement, or expanded landfill.	40 CFR 264.301
	Install leachate collection systems above and between the liners.		40 CFR 264.301

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h/ Landfill units meeting the requirements of 40 CFR 264.301(f) are not subject to RCRA minimum technology requirements.

SELECTED ACTION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

ctions b/	Requirements	Prerequisites for Applicability c/,d/	Citation
ruction of New Landfill Closure with Waste in) (continued)	Construct run-on and run-off control systems capable of handling the peak discharge of a 25-year storm.		40 CFR 264.301
	Control wind dispersal of particulates.		40 CFR 264.301
	Operation and maintenance.		40 CFR 264.303-3
	Close each cell with a final cover after the last waste has been received.		40 CFR 264.310
	<u>Ground-water Monitoring</u>		
	Establish a detection monitoring program (264.98). Establish a compliance monitoring program (264.99) and corrective action monitoring program (264.100) when required by 40 CFR 264.91. All monitoring programs must meet RCRA general ground-water monitoring requirements (264.97)	Creation of a new landfill unit to treat, store, or dispose of RCRA hazardous wastes as part of a response action.	40 CFR 264.91- 2

SELECTED ACTION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

Actions b/	Requirements	Prerequisites for Applicability c/,d/	Citation
truction of a New Surface ndment (see Closure with e in Place and Closure no Post-Closure Care)	<u>Minimum Technology Requirements</u>:		
	Use two liners, a top liner that prevents waste migration into the liner and a bottom liner that prevents waste migration through the liner (throughout the post-closure period).	RCRA hazardous waste (listed or characteristic) currently being placed in a new surface impoundment, or use of replacement or lateral extension of existing landfills or surface impoundments.	40 CFR 264.220
	Design liners to prevent failure due to pressure gradients, contact with the waste, climatic conditions, and the stress of installation and daily operations.		40 CFR 264.221
	Provide a leachate collection system between the two liners.		40 CFR 264.221
	Use a leak detection system that will detect leaks at the earliest possible time.		40 CFR 264.221
	<u>Ground-water Monitoring</u>		
	Establish a detection monitoring program (264.98). Establish a compliance monitoring program (264.99) and corrective action monitoring program (264.100) when required by 40 CFR 264.91. All monitoring programs must meet RCRA general ground-water monitoring requirements (264.97)	Creation of a new landfill unit to treat, store, or dispose of RCRA hazardous wastes as part of a remedial action.	40 CFR 264.91-26

SELECTED ACTION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

ions b/	Requirements	Prerequisites for Applicability c/,d/	Citation
abilization	Design and operate facility to prevent overtopping due to overfilling: wind and wave action; rainfall; run-on; malfunctions of level controllers, alarms, and other equipment; and human error.	Existing surface impoundment containing hazardous waste, or creation of a new surface impoundment.	40 CFR 264.221
	Construct dikes with sufficient strength to prevent massive failure.		40 CFR 264.221
	Inspect liners and cover systems during and after construction.		40 CFR 264.226
	Inspect weekly for proper operation and integrity of the containment devices.		40 CFR 264.226
	Remove surface impoundment from operation if the dike leaks or there is a sudden drop in liquid level.		40 CFR 264.227
	At closure, remove or decontaminate all waste residues and contaminated materials. Otherwise, free liquids must be removed, the remaining wastes stabilized, and the facility closed in the same manner as a landfill.		40 CFR 264.228
	Manage ignitable or reactive wastes so that it is protected from materials or conditions that may cause it to ignite or react.		40 CFR 264.227

SELECTED ACTION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

Actions b/	Requirements	Prerequisites for Applicability c/,d/	Citation
scharge of Treatment System fluent	<u>Best Available Technology</u>:		
	Use of best available technology (BAT) economically achievable is required to control toxic and nonconventional pollutants. Use of best conventional pollutant control technology (BCT) is required to control conventional pollutants. Technology-based limitations may be determined on a case-by-case basis.	Point source discharge to waters of the United States. i/ j/	40 CFR 122.44(
	<u>Water Quality Standards</u>:		
	Applicable Federally approved State water quality standards must be complied with. These standards may be in addition to or more stringent than other Federal standards under the CWA. k/		40 CFR 122.44 regulations ap under 40 CFR 1
	Discharge limitations must be established at more stringent levels than technology-based standards for toxic pollutants.		40 CFR 122.44(
	<u>Best Management Practices</u>:		
	Develop and implement a Best Management Practices program to prevent the release of toxic constituents to surface waters.		40 CFR 125.100

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i/ "Waters of the U.S." is defined broadly in 40 CFR 122.2 and includes essentially any water body and wetland.

j/ Section 121 of SARA exempts on-site CERCLA activities from obtaining permits. However, the substantive requirements of a law or regul
met. In particular, on-site discharges to surface waters are exempt from procedural NPDES permit requirements. Off-site dischargers woul
quired to apply for and obtain an NPDES permit.

k/ Federal Water Quality Criteria may be relevant and appropriate depending on the designated or potential use of the water, the media af
rposes of the criteria, and current information. (CERCLA §121(d)(2)(B)(i)) Federal Water Quality Criteria for the protection of aquatic li
levant and appropriate when environmental factors (e.g., protection of aquatic organisms) are being considered. (50 FR 30784 (July 29, 198

SELECTED ACTION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

ctions b/	Requirements	Prerequisites for Applicability c/,d/	Citation
arge of Treatment System ent (continued)	The Best Management Practices program must: o Establish specific procedures for the control of toxic and hazardous pollutant spills. o Include a prediction of direction, rate of flow, and total quantity of toxic pollutants where experience indicates a reasonable potential for equipment failure. o Assure proper management of solid and hazardous waste in accordance with regulations promulgated under RCRA.	Discharge to waters of the U.S. j/	40 CFR 125.104
	<u>Monitoring Requirements</u>: Discharge must be monitored to assure compliance. Discharge will monitor: o The mass of each pollutant o The volume of effluent o Frequency of discharge and other measurements as appropriate		40 CFR 122.41(i
	Approved test methods for waste constituent to be monitored must be followed. Detailed requirements for analytical procedures and quality controls are provided. Sample preservation procedures, container materials, and maximum allowable holding times are prescribed.		40 CFR 136.1-13

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j/ Section 121 of SARA exempts on-site CERCLA activities from obtaining permits. However, the substantive requirements of a law or regulat
et. In particular, on-site discharges to surface waters are exempt from procedural NPDES permit requirements. Off-site dischargers would
ired to apply for and obtain an NPDES permit.

SELECTED ACTION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

Actions b/	Requirements	Prerequisites for Applicability c/,d/	Citation
charge of Treatment System ment (continued)	Comply with additional substantive conditions such as: o Duty to mitigate any adverse effects of any discharge; and o Proper operation and maintenance of treatment systems.		40 CFR 122.41(1
ct Discharge to Ocean	Discharges causing "unreasonable degradation of the marine environment" are not permitted.	Discharge to the marine environment. l/	40 CFR 125.123(
	A determination of whether a discharge will cause reasonable degradation of the marine environment must be made, based on consideration of: o Quantity, composition, or persistence of pollutants to be discharged; o Potential transport of pollutants by biological, chemical, or physical processes; o Composition and vulnerability of exposed communities; o Importance of the receiving water to spawning, migratory paths, and surrounding biological community; o Existence of special aquatic sites; o Impact on human health and commercial fishing;		40 CFR 125.122

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l/ CWA §403 requires that an NPDES permit be issued for discharges into marine waters, including territorial seas, the contiguous zone, a
ans. (40 CFR 122.2.) A permit is not required if point of discharge is on-site.

SELECTED ACTION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

ctions b/	Requirements	Prerequisites for Applicability c/,d/	Citation
t Discharge to Ocean inued)	o Applicable requirements of the Coastal Zone Management Plan (see Vol. 3 of this manual); and o Marine Water Quality Criteria developed under CWA §304(a)(1).		
	Comply with the limiting permissible concentrations (LPCs) at the mixing zone boundary that are established in the permit.		40 CFR 125.123(d
harge to Publicly Owned tment Works (POTW) (off- activity, see note g/)	Discharge of pollutants that pass-through the POTW without treatment, interfere with POTW operation, contaminate POTW sludge, or endanger health/safety of POTW workers, is prohibited. Specific prohibitions preclude the discharge of pollutants to POTWs that: o Create a fire or explosion hazard in the POTW; o Will cause corrosive structural change to POTW; o Obstruct flow resulting in interference; o Are discharged at a flow rate and/or concentration that will result in interference; and o Increase the temperature of wastewater entering the treatment plant that would result in interference, but in no case raise the POTW influent temperature above 104°F (40°C).	Indirect discharge to a POTW.	40 CFR 403.5

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g/ Discharge to POTWs is considered an off-site activity (see p. 3-21 for discussion of requirements); therefore, requirements related to d
POTW are not ARARs, but are included in this exhibit for reference. Off-site actions must comply with all legally applicable requirements
tantive and administrative. The concept of "relevant and appropriate" is not available for off-site actions.

SELECTED ACTION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

Actions b/	Requirements	Prerequisites for Applicability c/,d/	Citation
harge to Publicly Owned tment Works (POTW) tinued)	o Discharge must comply with local POTW pretreatment program, including POTW-specific pollutants, spill prevention program requirements, and reporting and monitoring requirements.		40 CFR 403.5 and POTW regulations
	o RCRA permit-by-rule requirements (including corrective action where the NPDES permit was issued after November 8, 1984) must be complied with for discharges of RCRA hazardous wastes to POTWs.	Transport of RCRA hazardous wastes to POTWs by truck, rail, or dedicated pipe (i.e., pipe solely dedicated for hazardous waste [as defined in 40 CFR 264] which discharges from within the boundaries of the CERCLA site to within the boundaries of the POTW).	40 CFR 270.60
harge of Dredge and Fill rial to Waters of the or Ocean Waters	The four conditions that must be satisfied before dredge and fill is an allowable alternative are: o There must be no practical alternative. o Discharge of dredged or fill material must not cause a violation of State water quality standards, violate any applicable toxic effluent standards, jeopardize an endangered species, or injure a marine sanctuary. o No discharge shall be permitted that will cause or contribute to significant degradation of the water. o Appropriate steps to minimize adverse effects must be taken. Determine long- and short-term effects on physical, chemical, and biological components of the aquatic ecosystem.	Capping, dike stabilization, construction of beams and levees, and disposal of contaminated soil, waste materiel or dredged material are examples of activities that may involve a discharge of dredged or fill material.	40 CFR 230 33 CFR 320-330

SELECTED ACTION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

ctions b/	Requirements	Prerequisites for Applicability c/,d/	Citation
ging	Removal of all contaminated soil.	RCRA hazardous waste placed at site after the effective date of the requirements, or placed into another unit.	See Closure in t Exhibit.
	Dredging must comply with Section 10 of the Rivers and Harbors Act and U.S. Army Corps of Engineers regulations.	Dredging in navigable waters of the United States.	33 U.S.C. 403 33 CFR 320-330
vation	Movement of excavated materials to new location and placement in or on land will trigger land disposal restrictions for the excavated waste or closure requirements for the unit in which the waste is being placed.	Materials containing RCRA hazardous wastes subject to land disposal restrictions are placed in another unit.	40 CFR 268 (Subp
	Area from which materials are excavated may require cleanup to levels established by closure requirements.	RCRA hazardous waste placed at site after the effective date of the requirements.	See Closure in t Exhibit.
Collection	[CAA requirements to be provided.]		
d-Water Diversion	Excavation of soil for construction of slurry wall may trigger closure or land disposal restrictions.	Materials containing RCRA hazardous waste subject to land disposal restrictions are placed into another unit.	See Consolidatio Exhibit.
neration	Analyze the waste feed.	RCRA hazardous waste.	40 CFR 264.341
	Dispose of all hazardous waste and residues, including ash, scrubber water, and scrubber sludge.		40 CFR 264.351
	No further requirements apply to incinerators that only burn wastes that are listed as hazardous solely by virtue of combination with other wastes, and if the waste analysis demonstrates that no Appendix VII constituent is present that might reasonably be expected to be present.		40 CFR 264.340

SELECTED ACTION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

Actions b/	Requirements	Prerequisites for Applicability c/,d/	Citation
neration (continued)	Performance standards for incinerators:	RCRA hazardous waste.	
	o Achieve a destruction and removal efficiency of 99.99 percent for each principal organic hazardous constituent in the waste feed and 99.9999 percent for dioxins:		40 CFR 264.343
	o Reduce hydrogen chloride emissions to 1.8 kg/hr or 1 percent of the HCl in the stack gases before entering any pollution control devices; and		40 CFR 264.342
	o Not release particulate in excess of 180 mg/dscm corrected for amount of oxygen in stack gas.		40 CFR 264.343
	Monitoring of various parameters during operation of the incinerator is required. These parameters include: o Combustion temperature; o Waste feed rate; o An indicator of combustion gas velocity; and o Carbon monoxide.		40 CFR 264.343
	Control fugitive emissions either by: o Keeping combustion zone sealed or o Maintaining combustion-zone pressure lower then atmospheric pressure		40 CFR 264.345
	Utilize automatic cutoff system to stop waste feed when operating conditions deviate.		

SELECTED ACTION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

ions b/	Requirements	Prerequisites for Applicability c/,d/	Citation
ration (continued)	Special performance standard for incineration of PCBs: o Achieve a destruction and removal efficiency of 99.9999 percent; o Either 2 second dwell time at 1200 degrees C^{o} ($\pm$100) and 3 percent excess oxygen in stack gas; or 1.5 second dwell time at 1600 degrees C. and 2 percent excess oxygen in stack gas; and o For non-liquid PCBs, mass air emissions from the incinerator shall be no greater than 0.001 g. KB per kg of the PCBs entering the incinerator.	Liquid and non-liquid PCBs at concentrations of 50 ppm or greater.	40 CFR 761.70
reatment	Prior to land treatment, the waste must be treated to BDAT levels or meet a no migration standard.	RCRA hazardous waste being treated or placed into another unit.	
	Ensure that hazardous constituents are degraded, transformed, or immobilized within the treatment zone.		40 CFR 264.271
	Maximum depth of treatment zone must be no more than 1.5 meters (5 feet) from the initial soil surface and more than 1 meter (3 feet) above the seasonal high water table.		40 CFR 264.271
	Demonstrate that hazardous constituents for each waste can be completely degraded, transformed, or immobilized in the treatment zone.		40 CFR 264.271
	Minimize run-off of hazardous constituents.		40 CFR 264.273
	Maintain run-on/run-off control and management system.		40 CFR 264.273

SELECTED ACTION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

Actions b/	Requirements	Prerequisites for Applicability c/,d/	Citation
d Treatment (continued)	Special application conditions if food-chain crops are grown in or on treatment zone.		40 CFR 264.276
	Unsaturated zone monitoring.		40 CFR 264.278
	Special requirements for ignitable or reactive waste.		40 CFR 264.281
	Special requirements for incompatible wastes.		40 CFR 264.282
	Special testing and location requirements for certain hazardous wastes.	RCRA waste #s F020, F021, F022, F023, F026, F027 (dioxin-containing wastes).	40 CFR 264.283
ration and Maintenance M)	30-year post-closure care to ensure that site is maintained and monitored.	Land disposal closure.	40 CFR 264.310
cement of Liquid Waste in dfill	Liquids in Landfills Prohibition:		
	No bulk or non-containerized liquid hazardous waste or hazardous waste containing free liquids may be disposed of in landfills.	Placement of a bulk or non-containerized RCRA hazardous waste in a landfill.	40 CFR 264.314
	Containers holding free liquids may not be placed in a landfill unless the liquid is mixed with an absorbent or solidified.		40 CFR 264.314
cement of Waste in Land posal Unit	Land Disposal Restrictions:		
	Attain land disposal "treatment standards" before putting waste into landfill in order to comply with land ban restrictions. A treatment standard can be either: (1) a concentration level to be achieved (performance-based) or (2) a specified technology that must be used (technology-based). If the standard is performance-based, any technology can be used to achieve the standard. (See Treatment when Waste will be Land Disposed.)	Placement of RCRA hazardous waste in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, salt bed formation, or underground mine or cave.	40 CFR 268 (Su

SELECTED ACTION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

Actions b/	Requirements	Prerequisites for Applicability c/,d/	Citation
rry Wall	Excavation of soil for construction of slurry wall may trigger land disposal restrictions.	Materials containing RCRA hazardous waste subject to land disposal restrictions are placed in another unit. (See Treatment section for LDR schedule. Also see Consolidation, Excavation sections in this Exhibit.)	
face Water Control	Prevent run-on and control and collect run-off from a 24-hour 25-year storm (waste piles, land treatment facilities, landfills).	RCRA hazardous waste treated, stored, or disposed after the effective date of the requirements.	40 CFR 264.251(40 CFR 264.273(40 CFR 264.301(
	Prevent over-topping of surface impoundment.		40 CFR 264.221(
k Storage (On-Site)	Tanks must have sufficient structural strength to ensure that they do not collapse, rupture, or fail.	Storage of RCRA hazardous waste (listed or characteristic) not meeting small quantity generator criteria held for a temporary period greater than 90 days before treatment, disposal, or storage elsewhere (40 CFR 264.10), in a tank (i.e., any portable device in which a material is stored, transported, disposed of, or handled). A generator who accumulates or stores hazardous waste on-site for 90 days or less in compliance with 40 CFR 262.34(a)(1-4) is not subject to full RCRA storage requirements. Small quantity generators are not subject to the 90 day limit (40 CFR 262.34(c),(d), and (e)).	40 CFR 264.190
	Wastes must not be incompatible with the tank material unless the tank is protected by a liner or by other means.		40 CFR 264.191
	Tanks must be provided with secondary containment and controls to prevent overfilling, and sufficient freeboard maintained in open tanks to prevent overtopping by wave action or precipitation.		40 CFR 264.193-
	Inspect the following: overfilling control, control equipment, monitoring data, waste level (for uncovered tanks), tank condition, above-ground portions of tanks (to assess their structural integrity), and the area surrounding the tank (to identify signs of leakage).		40 CFR 264.195
	Repair any corrosion, crack, or leak.		40 CFR 264.196

SELECTED ACTION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

Actions b/	Requirements	Prerequisites for Applicability c/,d/	Citation
k Storage (On-Site) ntinued)	At closure, remove all hazardous waste and hazardous waste residues from tanks, discharge control equipment, and discharge confinement structures.		40 CFR 264.197
	Store ignitable and reactive waste so as to prevent the waste from igniting or reacting. Ignitable or reactive wastes in covered tanks must comply with buffer zone requirements in "Flammable and Combustible Liquids Code," Tables 2-1 through 2-6 (National Fire Protection Association, 1976 or 1981).		40 CFR 264.198
	Storage Prohibitions:		
	Storage of banned wastes must be in accordance with 40 CFR 268. When such storage occurs beyond one year, the owner/operator bears the burden of proving that such storage is solely for the purpose of accumulating sufficient quantities to allow for proper recovery, treatment and disposal.		40 CFR 268.50
eatment (in a unit)	Design and operating standards for unit in which hazardous waste is treated. (See citations at right for design and operating requirements for specific unit.)	Treatment of hazardous waste in a unit.	40 CFR 264.190 (Tanks) 40 CFR 264.221 Impoundments) 40 CFR 264.251 Piles) 40 CFR 264.273 Treatment Uni 40 CFR 264.343 (Incinerators 40 CFR 264.601 (Miscellaneou Units) 40 CFR 265.373 Treatment Un

SELECTED ACTION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

ctions b/	Requirements	Prerequisites for Applicability c/,d/		Citation
ment (when Waste will be Disposed)	Treatment of waste subject to ban on land disposal must attain levels achievable by best demonstrated available treatment technologies (BDAT) for each hazardous constituent in each listed waste, if residual is to be land disposed. If residual is to be further treated, initial treatment and any subsequent treatment that produces residual to be treated need not be BDAT, if it does not exceed value in CCWE (Constituent Concentration in Waste Extract) Table for each applicable water. (See 51 FR 40642, November 6, 1986.)	Disposal of contaminated soil and debris resulting from CERCLA response actions or RCRA corrective actions is __not__ subject to land disposal prohibitions and/or treatment standards for solvents, dioxins, or California list wastes until November 8, 1990 (and for certain first third wastes until August 8, 1990).		40 CFR 268.10 40 CFR 268.11 40 CFR 268.12 40 CFR 268.41 40 CFR 268 (Subp
		All wastes listed as hazardous in 40 CFR Part 261 as of November 8, 1984, except for spent solvent wastes and dioxin-containing wastes, have been ranked with respect to volume and intrinsic hazards, and are scheduled for land disposal prohibition and/or treatment standard determinations as follows:		51 FR 40641 52 FR 25760
		Solvents and dioxins	Nov. 8, 1986	
		California list wastes	July 8, 1987	
		One-third of all ranked and hazardous wastes	Aug. 8, 1988	
		Underground injection of solvents and dioxins and California list wastes	Aug. 8, 1988	
		CERCLA response action and RCRA corrective action soil and debris	Nov. 8, 1988	
		Two-thirds of all ranked and listed hazardous wastes	July 8, 1989	
		All remaining ranked and listed hazardous wastes identified by characteristic under RCRA section 3001	May 8, 1990	
		Any hazardous waste listed or identified under RCRA section 3001 after November 8, 1984	Within 6 mos. of the date of identification or listing.	

SELECTED ACTION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

Actions b/	Requirements	Prerequisites for Applicability c/,d/	Citation
atment (when Waste will be d Disposed) (continued)	BDAT standards for spent solvent wastes and dioxin-containing wastes are based on one of four technologies or combinations: for waste waters, (1) steam stripping, (2) biological treatment, or (3) carbon absorption [alone or in combination with (1) or (2)]; and for all other wastes, (4) incineration. Any technology may be used, however, if it will achieve the concentration levels specified.		40 CFR 268.30 RCRA Sections (e)(3) 42 U.S.C. 6924 (e)(3)
derground Injection of stes and Treated Ground ter	UIC program prohibits:	Approved UIC program is required in States listed under SDWA section 1422. (All States have been listed.) Class I wells and Class IV wells are the relevant classifications for CERCLA sites. <u>Class I</u> wells are used to inject hazardous waste, beneath the lowermost formation containing, within one quarter mile, an underground source of drinking water (USDW). n/ <u>Class IV</u> wells are used to inject hazardous or radioactive waste into or above a formation which contains, within one quarter mile of the well, an underground source of drinking water.	
	o Injection activities that allow movement of contaminants into underground sources of drinking water which may result in violations of MCLs or adversely affects health.		40 CFR 144.12
	o Construction of new Class IV wells, and operation and maintenance of existing wells.		40 CFR 144.13
	Class IV wells are banned except for reinjection of treated ground water into the same formation from which it was withdrawn, as part of a CERCLA cleanup or RCRA corrective action.		40 CFR 144.13(

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n/ An underground source of drinking water (USDW) is a non-exempted aquifer or its portion which: (1) supplies any public water system, o
ich contains a sufficient quantity of ground water to supply a public water system and currently supplies drinking water for human consumpt
ntains fewer than 10,000 mg/l total dissolved solids. (40 CFR 144.3.)

SELECTED ACTION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

tions b/	Requirements	Prerequisites for Applicability c/,d/	Citation
round Injection of and Treated Ground (continued)	The Director of the UIC program in a state may lessen the stringency of 40 CFR 144.52 construction, operation, and manifesting requirements for a well if injection does not occur into, through, or above a USDW or if the radius of endangering influence (see 40 CFR 146.06(c)) is less than or equal to the radius of the well.		40 CFR 144.16
	o Report non-compliance orally within 24 hours.	Class I wells.	40 CFR 144.28(b) 40 CFR 144.51(b)
	o Prepare, maintain, and comply with plugging and abandonment plan.		
	Monitor Class I wells by: o frequent analysis of injection fluid; o continuous monitoring of injection pressure, flow rate, and volume; <u>and</u> o installation and monitoring of ground-water monitoring wells.	Class I wells are used to inject hazardous waste, beneath the lowermost formation containing, within one quarter mile, an underground source of drinking water (USDW).	40 CFR 144.28(g)(
	Applicants for Class I permits must: o Identify all injection wells within the area of review. o Task action as necessary to ensure that such well are properly sealed, completed, or abandoned to prevent contamination of USDW.		40 CFR 144.55
	Criteria for determining whether an aquifer may be determined to be an exempted aquifer include current and future use, yield, and water quality characteristics.		40 CFR 146.4

SELECTED ACTION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

Actions b/	Requirements	Prerequisites for Applicability c/,d/	Citation
erground Injection of tes and Treated Ground er (continued)	Case and cement all Class I wells to prevent movement of fluids into USDW, taking into consideration well depth, injection pressure, hole size, composition of injected waste, and other factors.	(See above)	40 CFR 144.28(e
	Conduct appropriate geologic drilling logs and other tests during construction.		40 CFR 146.12(d
	Injection pressure may not exceed a maximum level designed to ensure that injection does not initiate new fractures or propagate existing ones and cause the movement of fluids into a USDW.		40 CFR 146.13
	Continuous monitoring of injection pressure, flow rate, and volume, and annual pressure, if required.		
	Demonstration of mechanical integrity is required every 5 years.		
	Ground-water monitoring may also be required.		
	Comply with State underground injection requirements.		40 CFR 147
	Hazardous waste to be injected is subject to land ban regulations. (See section 4.2.2.1 of this manual.) Treated ground water that meets the definition of hazardous waste and is to be injected also is subject to land ban regulations.		40 CFR 268.2

SELECTED ACTION-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

ons b/	Requirements	Prerequisites for Applicability c/,d/	Citation
le	Use a single liner and leachate collection system.	RCRA hazardous waste, non-containerized accumulation of solid, nonflammable hazardous waste that is used for treatment or storage.	40 CFR 264.251
	Waste put into waste pile subject to land ban regulations (see Appendix of this manual).		40 CFR 268.2