

Response Action Outcome Report
Suffolk Downs
East Boston and Revere, Massachusetts
RTN 3-0014857

Submitted to:
**Massachusetts Department of Environmental
Protection**

Prepared by:
Rizzo Associates, Inc.

February 12, 1998

February 12, 1998

Commonwealth of Massachusetts
Department of Environmental Protection
Northeast Regional Office
Bureau of Waste Site Cleanup
10 Commerce Way
Woburn, MA 01801

**Re: Response Action Outcome Statement
Suffolk Downs
East Boston and Revere, Massachusetts
RTN 3-0014857**

Dear Sir/Madam:

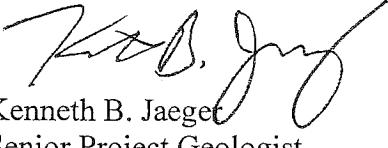
This Class B-1 Response Action Outcome (RAO) Report is being submitted on behalf of Sterling Suffolk Racecourse, LLC for releases of oil and hazardous materials at the Suffolk Downs property located in East Boston and Revere, Massachusetts (the Site). The releases of oil and hazardous materials were reported to DEP on February 21, 1997 by Belle Isle Limited Partnership, the former owner of the Site. This report summarizes investigations at the Site for evidence of a release of oil or hazardous materials, as defined by Massachusetts General Law, chapter 21E. This investigation included the advancement of 29 soil borings with the completion of 14 of those borings as groundwater monitoring wells, the collection of soil samples from the borings, the collection of groundwater samples from the 14 newly installed monitoring wells and 18 existing monitoring wells, a groundwater elevation survey, and laboratory analysis of soil, groundwater, and pond sediment samples. This report contains a description of the subsurface field activities and a summary of the analytical results from the samples.

A Method 3 Risk Characterization has been performed based on the data gathered at the Site. The Risk Characterization found that a condition of No Significant Risk to human health or the environment exists at the release areas on the Site, based on the existing data. The Risk Characterization is bound in a separate volume dated February 12, 1998 and is being submitted concurrently with this RAO.

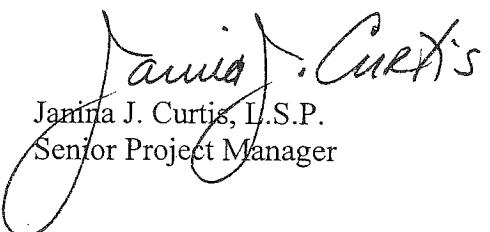
Massachusetts Department of Environmental Protection
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The original RAO Transmittal Form is attached to the front of this report. A copy of the form is included in Appendix F of this report. Please contact us if you have any questions or require additional information concerning this submittal.

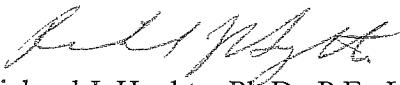
Very truly yours,



Kenneth B. Jaeger
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1.0 Introduction

This Response Action Outcome (RAO) Statement report is intended to conclude the environmental response actions undertaken pursuant to the Massachusetts Contingency Plan (MCP) at the Suffolk Downs Racetrack in East Boston and Revere, Massachusetts (the Site). The Site was reported to the Massachusetts Department of Environmental Protection (DEP) by the former owner, Belle Isle Limited Partnership, on February 21, 1997 after reportable conditions were identified during a due diligence environmental investigation related to a real estate transaction. Additional investigations have been conducted at the Site to further characterize release areas. The data from the Site have been used to determine whether certain reported conditions were, in fact, background conditions and also have been used in a Method 3 Risk Characterization. During the Method 3 Risk Characterization we found that a condition of "No Significant Risk" to human health or the environment exists at the identified release areas at the Site. Therefore, this Class B-1 RAO is being submitted.

The following report presents the subsurface investigation data from the Site and summarizes the Risk Characterization findings. The full Risk Characterization is presented in a companion document.

1.1 Site Description

The Site is a 190-acre parcel located between Winthrop Avenue, Waldemar Avenue, Route 1A, and the Massachusetts Bay Transportation Authority (MBTA) Blue Line tracks on the borders of East Boston and Revere, Massachusetts. The location of the Site is shown on Figure 1, Site Locus Map, and the surface features of the Site are shown on Figure 2. The Site is abutted to the north by commercial properties and land owned by the Commonwealth of Massachusetts, to the west by a petroleum product tank farm and the Lee Burbank Highway (Route 1A), to the south by Waldemar Avenue and residential properties, and to the east by Washburn Avenue and by the MBTA.

The Site is occupied by the Suffolk Downs racetrack, grandstands, large parking areas, and many small buildings and stables. Sales Creek, a freshwater creek, crosses the Site from northwest to southeast. A small kidney-shaped pond is located in the infield of the track. Tomasello Boulevard and Diner Road provide vehicular access to the Site from Route 1A.

1.2 Site Background

The buildings and the racetrack that currently occupy the Site were built in 1935 on filled land. The Site has been used as a horse racetrack since 1935 with the exception of a brief period at the turn of the last decade when the track was temporarily closed. The Massachusetts Water Resources Authority (MWRA) has leased the parking area on the southwest portion of the Site since 1990.

A series of environmental assessment reports have been prepared for the Site for due diligence purposes by Geotechnical Engineers, Inc. and Rizzo Associates, Inc. between 1986 and 1996. The studies included site reconnaissance, municipal and regulatory agency record review, interviews, historical land use review, and subsurface investigations. The subsurface investigations have included the installation of soil borings, monitoring wells, test pit excavation, and the collection and analyses of soil, groundwater and sediment samples.

The following conditions were observed at the Site during reviews of the Site history and were the focus of subsurface investigations.

- Four current or former underground storage tank (UST) locations were identified at the Site: (1) the former 1,000-gallon Number 2 fuel oil UST location at the southwest corner of the clubhouse; (2) the former 3,000-gallon diesel fuel storage UST located at the northeast corner of the maintenance garage; (3) the former 4,000-gallon gasoline UST at the northeast curve of the racetrack; (4) the current 7,000-gallon UST (partitioned to store both gasoline and diesel fuel) is located near the northwest corner of the maintenance garage.
- The Site has three septic systems. One of these systems serves the maintenance building; the second serves a small office trailer; and the third serves the superintendent's office. Based on the use of the maintenance garage, its septic system appeared to have a potential to act as a conduit for releases to Site groundwater. The other two septic systems receive only domestic sewage, and it appeared unlikely that oil and hazardous materials would be discharged to these systems.
- DEP-listed Locations to Be Investigated and Confirmed Disposal Sites are documented to the northwest and southwest of the Site. The majority of these releases involve the bulk fuel storage facility located upgradient from and abutting the Site to the west. Because

the DEP-listed state sites and spills are upgradient from the Site, we evaluated the Site for potential migration of releases to the Site. No such migration was found.

- Historical records indicate that the Site was filled land.
- A landfill containing dredged sediments from Sales Creek is located in the northern portion of the track infield area. The landfill was reportedly designed and constructed in 1980 by contractors working directly for the Massachusetts Division of Waterways, Department of Environmental Management.
- An easement for a Union Petroleum Corporation underground pipeline exists in the far northwestern area of the Site on Diner Road abutting the Lee Burbank Highway and a gasoline station. Underground pipelines for the transmission of oil, gas, and other petroleum products exist in the easement.
- An off-site auto body shop and an auto repair shop (former gasoline station) are located on Diner Road, the northern access road into the Site.

I.3 Regulatory Status of Site

The Site was reported to DEP on February 21, 1997 after several constituents were identified during a subsurface investigation at concentrations then thought to be above reportable concentrations applicable to the Site. Table 1, which is taken from the Release Notification Form, shows the constituents detected above reportable concentrations (RCs), the concentration detected, and the applicable RCs. The Site was assigned Release Tracking Number 3-0014857.

The regulations regarding petroleum analysis methods have changed between the time the Release Notification Form (RNF) was submitted in February 1997 and the submission of this RAO (February 1998). As a result, the reporting status of the analysis results obtained from monitoring well RIZ-7 have changed from non-reportable to reportable. The groundwater sample from RIZ-7 was analyzed for total petroleum hydrocarbons (TPH) by gas chromatography, and 6.7 milligrams/liter of hydrocarbon identified as gasoline were detected in the sample. No volatile organic compounds (VOCs) were detected in the sample. That result was below the GW-2 RC of 50 mg/L for TPH in effect at that time; however, the policy issued by DEP on October 31, 1997,

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"Characterizing Risks Posed by Petroleum Contaminated Sites: Implementation of MADEP VPH/EPH Approach," caused a reevaluation of the results. Under the new policy, the release at RIZ-7 would be reportable; therefore, we have considered the area around RIZ-7 as part of the disposal site and have evaluated it in the Risk Assessment for this RAO.

Subsequent review of the TPH chromatograms showed that the original interpretation of the chromatograms incorrectly identified motor oil. The laboratory report was later corrected to report "unknown hydrocarbons" in place of "motor oil."

Table I **Name and Quantities of Oils (O) and Hazardous Materials (HM) as Originally Reported**

O or HM released	O (check one)	HM (If known)	CAS #	Concentration	Units	Reportable Concentrations Exceeded
Detected in Soil						
benzo(a)anthracene	X	00056-55-3	4,800	µg/kg	700	RCS-1
benzo(a)pyrene	X	00050-32-8	5,200	µg/kg	700	
benzo(a)fluoranthene	X	00020-99-2	6,000	µg/kg	700	
indeno(1,2,3-cd)pyrene	X	00193-39-5	3,700	µg/kg	700	
2-methylnaphthalene	X	00091-57-6	5,300	µg/kg	700	
Beryllium	X	07440-41-7	1.7	mg/kg	0.7	
Copper	X	07440-50-8	1,200	mg/kg	1,000	
Lead	X	07439-92-1	14,000	mg/kg	300	
Number 2 fuel oil/diesel	X	NA	2,500	mg/kg	500	
motor oil	X	NA	1,900	mg/kg	500	
unknown hydrocarbon	X	NA	1,200	mg/kg	500	
Detected in groundwater						
Nickel	X	07440-02-0	89	µg/kg	80	RCGW-2

NA Not available

I.3.1 Reportable Conditions Interpreted as Background

As part of the Risk Characterization, the nature and distribution of the oil and hazardous materials in Site soils and groundwater was evaluated. Many of the constituents detected in the soil at the Site which were reported to the DEP are interpreted to be present as part of the normal background composition of the soil in the area. Specifically, lead, copper, unknown hydrocarbons, and polynuclear aromatic hydrocarbons [benzo(a)pyrene, benzo(a)anthracene, benzo(a)fluoranthene, and indeno(1,2,3-cd)pyrene, and 2-

methylnaphthalene] are ubiquitous across the Site at relatively consistent levels. Their widespread distribution and their association with urban waste processes (e.g., coal ash, paint chips, wood ash, etc.) are consistent with the interpretation that urban fill was deposited to form the land in the area. It is difficult to establish an explanation for the introduction of these insoluble, immobile contaminants if the land was formed from clean fill and contaminated later.

Three characteristics of the fill support the conclusion that the constituents listed above are part of a background condition: 1) the top 5 to 20 feet of soil at the Site is urban fill deposited at the Site and surrounding areas apparently in the early 1900s, a time when the use of rubble and ash as fill was common practice; 2) the compounds detected are strongly associated with urban waste processes; and 3) coal ash was observed in more than half of the soil collected from the soil borings.

A statistical analysis of the likely background constituents was conducted to test the conclusion that they are background and to establish an average background concentration. The background concentration we established set a level of comparison for concentrations detected on-site. Sample results exceeding the calculated background concentrations may indicate that a release occurred on-site after filling was concluded. The full details of the statistical analysis of the data are included in the Risk Characterization Report being submitted concurrently as a separate document. The statistical analysis supports the conclusion that the lead, copper, unknown hydrocarbon, and polynuclear aromatic hydrocarbons (PAHs) are part of the normal background soil in the area.

The highest lead concentration detected at the Site was from a soil sample from boring RB-5. That result of 14,000 milligrams per kilogram (mg/kg) was reported in the Release Notification Form. GEI, Inc. returned to the area of RB-5 and excavated test pits for soil sample collection on March 18, 1997. Seven soil samples were collected and analyzed for lead. The average lead concentration in the seven samples was 1,740 mg/kg. Therefore, the 14,000 mg/kg result is interpreted to be anomalous and unconfirmed. GEI observed old pottery, ceramics, and glass fragments in the excavations. These artifacts could contribute to an elevated lead concentration. The 1,740 mg/kg average concentration is consistent with the background concentrations of lead found across the Site.

1.3.2 Potential Non-Background Releases

Based on the background contaminant review in the Risk Characterization, the PAHs, metals, and some of the hydrocarbons detected at the Site appear to be part of the normal soil in the area. Therefore, only five locations on the Site may have had releases related to operations on the Site after filling was complete. The five locations where releases may have occurred on the Site are shown on Figure 2 and are listed below.

- **Area 1.** The area near RIZ-5 on the north edge of the Site where an elevated beryllium concentration (1.7 mg/kg) was detected in one soil sample.
- **Area 2.** The former gasoline UST area near RIZ-7 and MW-12 on the northeast portion of the Site where gasoline was detected in a groundwater sample at 6.7 mg/L.
- **Area 3.** The current gasoline and diesel fuel tandem UST area located near the maintenance garage and monitoring wells RIZ-6, RIZ-9, MW-10 and MW-11 and boring RB-8. Petroleum constituents were detected in the soil and groundwater near the UST area. Diesel fuel/number 2 heating oil was detected in soil samples from RIZ-6 (2,500 mg/kg) and RB-8 (570 mg/kg). RIZ-6 is downgradient from a current UST area, and RB-8 is in a former UST area located near the northwest and northeast corners of the maintenance building, respectively. The current UST is a double-walled, coated steel tank with an interstitial monitoring and alarm system. The tank is also equipped with an overfill protection device.
- **Area 4.** The former heating oil UST area near the southern corner of the grandstand/clubhouse building. Petroleum was detected in one groundwater sample from the UST location at a concentration of 44 mg/L in 1996, but was not detected in a repeat sample.
- **Area 5.** Dissolved nickel was detected at elevated concentrations of 89 µg/L, 84 µg/L, and 160 µg/L on three separate occasions in monitoring well MW-206, located in the northeast portion of the infield of the racetrack. MW-206 is believed to be located in a dredge spoil landfill which had been reportedly designed and constructed by contractors working directly for the Massachusetts Division of Waterways, Department of Environmental Management.

These potential non-background releases have been the focus of the assessment and risk characterization activities relating to this RAO.

1.4 Risk Characterization Summary

The data gathered from the entire Site and the data sets from the five release locations were used in a Risk Characterization. The Risk Characterization found that a condition of No Significant Risk to human health or to the environment exists for the conditions observed at the Site. No significant risk was identified for both the current uses of the Site and for a future, hypothetical residential use of the property. The Risk Characterization is presented in a companion document being submitted concurrently to DEP.

2.0 Subsurface Investigation

Subsurface investigations were undertaken at the Site to investigate the potential sources of contamination identified during due diligence site assessments and then to further characterize the identified release areas. The subsurface investigation consisted of the following activities: advancement of 29 soil borings with the completion of 14 of those borings as groundwater monitoring wells, the collection of soil samples from the borings, the collection of groundwater samples from the 14 newly installed monitoring wells and 18 existing monitoring wells, a groundwater elevation survey, the collection of a sediment sample from the pond in the track infield, and laboratory analysis of soil, sediment, and groundwater samples. Figure 2 shows boring and monitoring well locations.

2.1 Placement of Soil Borings and Monitoring Wells

The soil boring and groundwater monitoring well locations were selected to investigate potential releases of oil or hazardous materials from adjacent properties and USTs located on the Site currently and in the past; to characterize fill materials on the Site; and, due to the size of the Site, to provide general coverage to evaluate subsurface conditions. Monitoring wells installed at the Site in 1988 by GEI were used where they could be found undamaged. The rationale for selecting soil boring and monitoring well locations are discussed below.

Track Infield Area. Soil borings RB-11 and RB-12 were installed in the track infield area to characterize the fill material. Soil boring RB-10 was installed in the location of the dredge spoils landfill located in the northern portion of the track infield. This boring was installed to investigate and characterize the structure of the landfill which had been designed and constructed by contractors working for the Massachusetts Division of Waterways, Department of Environmental Management.

Underground Storage Tank Locations. Soil boring/monitoring well RIZ-6 was installed to investigate the area of the current 7,000-gallon tandem diesel fuel/gasoline UST located near the northwest corner of the maintenance building. Soil boring/monitoring well RIZ-7 was installed to investigate the area of the former 4,000-gallon gasoline UST in the stable area. Soil borings/monitoring wells RIZ-8, RIZ-13, and RIZ-14 were installed near the location of a former 1,000-gallon fuel oil UST at the southwest corner of the clubhouse. Soil boring RB-8 was advanced at the location of a former 3,000-gallon diesel fuel UST located near the northeast corner of the maintenance building.

Stable Area. Soil boring/monitoring well RIZ-5 and soil boring RB-7 were advanced to characterize subsurface conditions in the stable area. Soil borings RB-13 and RB-14 were installed beside RIZ-5 to collect additional samples to evaluate the first round of soil sample analysis results from RIZ-5.

Maintenance Garage Septic System. Soil boring/monitoring well RIZ-9 was installed downgradient from the septic tank and leach field serving the Site maintenance garage to investigate the possibility of releases from the septic discharge.

North End of Diner Road. Three borings were advanced and completed as monitoring wells (RIZ-10, RIZ-11, and RIZ-12) at the north end of Diner Road to investigate possible releases from the petroleum pipeline, current and former gasoline stations, and automotive service businesses in that area.

Previously Installed Monitoring Well Locations. To further characterize the Site, soil borings were advanced near the locations of existing monitoring wells that were installed on-site during prior investigations. RB-9 was advanced near MW-1 in the track area; RB-4 was advanced near MW-17 in the parking lot located on the central

portion of the Site; and RB-3 was advanced near MW-4 in the parking lot on the southwest portion of the Site.

Adjacent Properties and General Coverage. Soil borings/monitoring wells were installed to investigate if releases on properties adjacent to the Site have affected subsurface conditions at the Site and to provide general coverage. Soil borings/monitoring wells RIZ-1, RIZ-2, RIZ-3, and RIZ-4 were installed along the western boundary of the Site. Soil borings RB-1, RB-2, RB-5, and RB-6 were installed near the northwest, west, and central portions of the Site.

2.2 Soil Borings

Soil boring and monitoring well installation has been conducted on three occasions at the Site by Rizzo Associates. On September 30, October 1, and November 12 and 13, 1996 Redwing Environmental Technologies of Framingham, Massachusetts advanced 19 soil borings with a hollow-stem auger and completed 11 of the borings as groundwater monitoring wells. The soil borings are identified as RB-1 through RB-7 and RB-9. The monitoring wells are identified as RIZ-1 through RIZ-12. On October 3, 1996 Technical Drilling Services of Clinton, Massachusetts advanced five small diameter soil borings using the Geoprobe system and completed one of the small borings as a groundwater monitoring well. The soil borings are identified as RB-8 and RB-10, RB-11, and RB-12. The small diameter groundwater monitoring well is identified as RIZ-8.

Four additional small diameter soil borings, two of which were completed as small diameter monitoring wells, were advanced at the Site on December 9, 1997. Drilling was conducted by Soil Exploration, Inc. of Leominster, Massachusetts using an Earth Probe rig. Soil borings and monitoring wells RIZ-13 and RIZ-14 were advanced near the former UST location at the southwest corner of the grandstand. Soil borings RB-13 and RB-14 were advanced in the stable area near RIZ-5 and were not completed as monitoring wells. Soil boring and monitoring well locations are shown on Figure 2. Well construction diagrams are presented in Appendix D.

Soil samples were collected during soil boring advancement. Soil samples were placed in soil jars, and the headspace over each sample was screened in the field using an HNu photoionization detector (PID) following the standard procedure presented in Appendix B. Positive PID screening results indicate that VOCs may be present in a soil

sample. Positive PID responses were recorded above ambient air, or background levels (0.2 parts per million [ppm]), from 10 of the borings. Strong organic (decaying marsh) odors were observed in a majority of the borings.

Hand Auger Boring. A sediment sample was collected from the pond in the track infield on November 8, 1996 using a hand auger. The sample location was approximately 3 feet into the pond from the northwest shore of the pond. The sediment sample was collected using a hand auger and was taken from 0 to 6 inches below the sediment surface. The sediment sample was placed in laboratory-prepared bottles, kept cool, and delivered to Alpha Analytical Labs (Alpha) on November 8, 1996 under chain of custody.

Soil samples from the borings were collected for laboratory analysis. The sampling and analysis results are discussed in Section 4.0.

2.3 Subsurface Geology

The subsurface materials were generally observed to be fill from approximately the surface grade to as deep as 19 feet. This fill consisted of materials ranging from fine to coarse sand with silt, gravel, glass, porcelain, coal, coal ash, brick, asphalt, and wood. Underlying the fill material in most areas of the Site were peat and clay with organic materials such as shell fragments and reed roots. Dense glacial till consisting of fine sand and silt with medium sand and pebbles was encountered beneath the surficial fill layer in the borings advanced at the north end of Diner Road and south of Tomasello Boulevard. Groundwater was encountered at about 0.5 to 10 feet below the ground surface except for WE(OW)-4 which is located on a hill and had a depth to water of 19 feet. Soil boring logs/well construction diagrams are in Appendix D.

Soil boring RB-10 was installed in the northern portion of the track infield to investigate and characterize the DEM dredge spoil landfill structure. Layers of gray clay were observed at depths of 2 feet and 5 to 8 feet below the ground surface. We interpret these clay layers to be the lining and cap for the landfill, designed to limit migration of contaminants from the dredge spoils. The soil boring was refilled with bentonite clay pellets to reseal the landfill liners.

2.4 Monitoring Well Installation

Groundwater monitoring wells RIZ-1 through RIZ-7 and RIZ-9 through RIZ-12 were constructed of 10-foot lengths of two-inch inside-diameter, 0.01-inch machine-slotted, schedule 40 polyvinyl chloride (PVC) well screen and flush-mounted schedule 40 PVC solid riser.

Groundwater monitoring wells RIZ-8, RIZ-13, and RIZ-14 were constructed of 5-foot lengths of one-inch inside-diameter, 0.01-inch machine-slotted, schedule 40 PVC well screen and flush-mounted schedule 40 PVC solid riser.

The screened section of the wells was placed to intercept the observed groundwater table at the well location. Clean filter sand was backfilled in the annular space around the wells to approximately 1 foot below the top of the well casing. In some of the wells, an approximately 0.5-foot-thick bentonite clay seal was placed on the sand pack to protect the well from runoff infiltration. The monitoring wells were completed with a flush-mounted road box that was cemented in place to protect the well. Groundwater monitoring well construction diagrams are included in Appendix D.

2.5 Groundwater Elevation Survey

The elevations and locations of 8 of the newly installed monitoring wells and 18 existing groundwater monitoring wells at the Site were surveyed on October 10, 1996 by Rizzo Associates personnel. The four monitoring wells installed on November 12 and 13, 1996 were surveyed on November 13, 1996. The two wells installed on December 9, 1997 were located by measurement tape but were not surveyed for elevation.

The elevations were surveyed relative to an elevation benchmark of 11.40 feet above the National Geodetic Vertical Datum (NGVD) established on a PK nail on the west side of the Site access road shown on a plan of the Site in Figure 2. The depth to groundwater was measured in all of the existing Site monitoring wells using an electronic water level meter on October 15, 1996. The depths to groundwater in the four monitoring wells installed on November 12 and 13, 1996 were gauged on November 13, 1996. Groundwater elevations were determined by subtracting the depths to groundwater from casing elevations. Casing elevations, depths to groundwater, and groundwater elevation data are presented in Table 2.

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Based on the data obtained from the survey, the groundwater flow direction at the Site was determined to be in northerly, southerly, and easterly directions toward the Sales Creek culvert that transects the Site. Figure 2 shows potentiometric (groundwater surface) contours based on the October 15, 1996 water level measurements. The water elevation data from monitoring wells RIZ-9 through RIZ-12, measured on November 13, 1996, concur with the October 15 data but were not used for plotting the contours because the data were collected on different days.

Table 2

Groundwater Elevation Data

Well Number	Casing elevation* (feet)	Depth to Groundwater (feet)	Groundwater Elevation* (feet)
RIZ-1	10.47	4.74	5.73
RIZ-2	7.36	2.87	4.49
RIZ-3	9.49	1.65	7.84
RIZ-4	8.32	1.55	6.77
RIZ-5	7.52	7.36	0.16
RIZ-6	8.25	5.24	3.01
RIZ-7	10.34	4.46	5.88
RIZ-8	22.28	13.75	8.53
RIZ-9**	9.05	5.78	3.27
RIZ-10**	9.66	5.14	4.52
RIZ-11**	9.80	5.68	4.12
RIZ-12**	9.17	4.46	4.71
MW-1	11.94	5.96	5.98
MW-2	10.57	1.88	8.69
MW-4	10.75	2.72	8.03
MW-10	8.39	5.86	2.53
MW-11	10.55	7.74	2.81
MW-12	10.29	4.33	5.96
MW-14	9.08	5.43	3.65
MW-15	19.07	10.60	8.47
MW-17	11.32	4.48	6.84
MW-201	17.10	8.20	8.90
MW-202	11.27	3.58	7.69
MW-203	7.62	2.84	4.78
MW-204	7.34	3.40	3.94
MW-205	2.55	3.83	-1.28
MW-206	6.00	4.72	1.28
MW-208	4.24	0.58	3.66
MW-209	4.48	1.68	2.80
WE(OW)-4	33.08	19.20	13.88

* Measured relative to a benchmark on top of a PK nail on the west side of the access road.
Elevation 11.4 NGVD (1929).

** Wells gauged on November 13, 1996.

3.0 Classification of Site Soil and Groundwater

The MCP, 310 CMR 40.0000, provides the regulatory framework pursuant to Massachusetts General Law, chapter 21E for the assessment and remediation of releases of oil and hazardous materials. The MCP establishes RCs for oil and hazardous materials in soil and groundwater. The reporting categories are based on the presence of sensitive receptors in the Site area. We reviewed the Massachusetts DEP MassGIS Map (included in Appendix C), which depicts water resources and other environmentally sensitive receptors in the Site area. Based on the criteria set in the MCP, the reporting categories for the Site soil and groundwater are RCS-1 and RCGW-2. Laboratory analytical results for soil and groundwater are tabulated and compared to the MCP reportable concentrations in Appendices G and H. Method 1 risk assessment standards presented in the MCP are included in the tables to enable a preliminary evaluation of the level of risk at the Site.

4.0 Soil and Groundwater Sample Collection and Analyses

Soil and groundwater samples have been collected at the Site for laboratory analysis on several occasions. The sample collection and analysis results are discussed below. The soil and groundwater samples were collected following the standard protocols outlined in Appendix B.

4.1 Soil Sample Collection

One laboratory soil sample was collected from the fill material in each soil boring advanced at the Site during this subsurface investigation. The exceptions to this sampling pattern were borings RIZ-13 and RIZ-14, where no soil samples were laboratory analyzed, as discussed further below.

The soil samples were placed in laboratory-prepared bottles, kept cool, and delivered to Alpha under chain of custody. The samples collected on October 1 and 2, 1996 and December 9, 1997 were delivered to the laboratory by an Alpha courier. The soil samples collected on November 12 and 13, 1996 were delivered by Rizzo Associates.

In general, samples were submitted for laboratory analysis for total 13 priority pollutant metals and barium by Environmental Protection Agency (EPA) Method 6010, for total cyanide by EPA Method 9010, for VOCs by EPA Method 8260, and for TPH by EPA Method 8100 Modified. All of the soil samples were analyzed for acid and base/neutral extractable compounds (ABNs) with polychlorinated biphenyls (PCBs)/pesticides by EPA Method 8080. Positive laboratory analytical results for soil are shown in Appendix G.

The samples submitted on December 9, 1997 were intended to analyze for previously detected constituents and were analyzed only for specific targets. The soil samples from borings RB-13 and RB-14, near boring/monitoring well RIZ-5, were analyzed for beryllium to evaluate earlier positive beryllium results from soil samples from RIZ-5. The soil samples from RIZ-13 and RIZ-14, located downgradient from the former heating oil UST at the south of the grandstand/clubhouse building, were PID field screened and examined. Because no indication of petroleum contamination was observed and petroleum was the constituent of concern at that location, no laboratory samples were submitted.

4.2 Positive Laboratory Analytical Results for Soil

The laboratory analytical results for the soil samples collected at the Site are listed in Appendix G. The Laboratory Certificates of Analysis are included as an appendix to the Risk Characterization report being submitted to DEP concurrently as a separate volume.

As discussed in Section 1.3.1, lead, copper, unknown hydrocarbon, and PAHs were detected at concentrations greater than the RCs in soil samples from the Site. These constituents have been interpreted to be part of the normal background soil composition at the Site from deposition of urban fill material. Soil contaminants not interpreted to be part of background were detected above the RCs at two locations on the Site, as described below.

- Beryllium was detected at a concentration of 1.7 mg/kg in a soil sample from 3 to 5 feet at RIZ-5. Two borings were advanced 10 to 12 feet from RIZ-5 to collect additional samples to evaluate the extent of the beryllium. RB-13 was sampled from 2 to 4 feet and 4 to 6 feet below grade, and RB-14 was sampled from 3 to 5 feet below grade. The analysis results from RB-13 were 0.44 mg/kg from 2 to 4 feet and 0.48 mg/kg from 4 to 6 feet, and the result from

4 to 6 feet in RB-14 was <0.40 mg/kg. The RB-13 and RB-14 sample analysis results were below the RC for beryllium of 0.7 mg/kg.

- Diesel fuel/Number 2 heating oil was detected in soil samples from RIZ-6 (2,500 mg/kg) and RB-8 (570 mg/kg). RIZ-6 is downgradient from a current UST area located near the northwest corner of the maintenance building and RB-8 is in a former UST area located near the northeast corner of the maintenance building, respectively.

4.3 Groundwater Sample Collection

Newly installed groundwater monitoring wells RIZ-1 through RIZ-8 and the 18 existing groundwater monitoring wells were sampled by Rizzo Associates personnel on October 1 through October 3, 1996. Monitoring wells RIZ-9 through RIZ-12 were installed on November 12 and 13, 1996 and sampled on the same day they were installed. The wells were purged by removing a minimum of three well volumes of water prior to sampling. The groundwater was analyzed in the field for temperature, specific conductance, and pH (as shown in Table 3). MW-206 was resampled on October 29, 1996 and November 18, 1997. Microwells RIZ-13 and RIZ-14 were sampled on December 9, 1997, and microwell RIZ-8 was resampled on January 7, 1998.

The groundwater samples were placed in laboratory-prepared bottles and stored in coolers with ice packs for transport. The samples collected on October 1 through 3, 1996 were taken to Rizzo Associates' office and delivered to Alpha on October 2 and 3, 1996 by an Alpha courier under chain of custody. Similarly, the samples collected on November 18 and December 9, 1997 were picked up on the day of collection by an Alpha courier. Additional samples were delivered to Alpha by Rizzo Associates personnel on October 3, 1996, November 13, 1996, and January 7, 1998 under chain of custody. The dissolved metals samples collected on October 1 and 2, 1996 and December 9, 1997 were field filtered prior to analysis. The dissolved metals samples collected on October 3 and November 12 and 13, 1996 were filtered by the lab prior to analysis.

The first rounds of samples were submitted for laboratory analysis for dissolved 13 priority pollutant metals and barium by EPA Method 6010, for total cyanide by EPA Method 9010, for VOCs by

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EPA Method 8260, and for TPH by EPA Method 8100 Modified. Groundwater samples from RIZ-1, RIZ-2, RIZ-4, RIZ-5, RIZ-6, RIZ-7, RIZ-9, RIZ-10, RIZ-11, MW-1, MW-4, MW-10, MW-11, MW-12, MW-15, MW-17, MW-206, and WE(OW)-4 were submitted for additional analysis for ABNs with PCBs/pesticides by EPA Method 8080. Positive laboratory analytical results for groundwater are shown in Appendix H.

Table 3
Specific Conductance, Temperature, and pH Measurements for Groundwater

Well Number	Gallons Purged	Temperature (°C)	Specific Conductance ($\mu\text{mhos}/\text{cm}$)	pH
RIZ-1	5	16	800	6
RIZ-2	6.5	18	2,350	6
RIZ-3	4	18	550	6
RIZ-4	4.5	16 (15)	1,200 (1,700)	6 (6)
RIZ-5	6.4	13	7,000	6
RIZ-6	20	NM	NM	NM
RIZ-7	4.8	15 (11)	6,000 (4,300)	6 (6)
RIZ-8	0.5	10 (12)	1,900 (1,250)	6 (6)
RIZ-9	3	14	1,700	6
RIZ-10	Bailed dry	15	1,800	6
RIZ-11	Bailed dry	14	1,600	6
RIZ-12	Bailed dry	16	1,550	6
RIZ-13	3	12	1,400	6
RIZ-14	2.5	12	1,700	6
MW-1	8	16	1,200	6
MW-2	6.5	16	260	6
MW-4	6	18	1,300	6
MW-10	25	17	3,900	7
MW-11	5	17	50,000	6
MW-12	10	19	5,700	6
MW-14	4	18	1,100	6
MW-15	7	16	1,500	6
MW-17	7	19	2,100	6
MW-201	10	19	2,100	6
MW-202	12	19	1,900	6
MW-203	10	19	2,150	6
MW-204	10	19	2,000	6
MW-205	10	18	1,900	6
MW-206	10	14 (12)	2,000 (1,400)	6 (6)
MW-208	10	NM	NM	NM
MW-209	10	17	1,900	6
WE(OW)-4	18	16	2,100	6

NM Not Measured

() Measurements during resampling of selected wells on October 29, 1996.

Later sample rounds were generally submitted for a single analysis in order to evaluate the results obtained from earlier analyses.

Groundwater samples from MW-206 were submitted to be analyzed for nickel, and the groundwater samples from RIZ-8, RIZ-13, and RIZ-14 were analyzed for extractable petroleum hydrocarbons.

4.4 Positive Laboratory Analytical Results for Groundwater

The laboratory analytical results for the groundwater samples collected at the Site are listed in Appendix H. The Laboratory Certificates of Analysis are included as an appendix to the Risk Characterization report being submitted to DEP concurrently as a separate volume.

The background conditions which were detected across the Site in soil samples were not detected in the groundwater samples. Groundwater contaminants were detected above the RCs at three locations on the Site and are described below.

- Nickel has been detected at concentrations of 89 µg/L, 84 µg/L, and 160 µg/L in three groundwater samples collected on separate occasions from monitoring well MW-206.
- Total petroleum hydrocarbons, identified as gasoline, were detected at a concentration of 6.7 mg/L in a groundwater sample from monitoring well RIZ-7. This result was below the GW-2 RC of 50 mg/L for TPH at the time that the sample was collected. However, the policy issued by DEP on October 31, 1997, "Characterizing Risks Posed by Petroleum Contaminated Sites: Implementation of the MADEP VPH/EPH Approach," caused a reevaluation of the results. Under the new policy, the release at RIZ-7 would be reportable; therefore, we consider the area around RIZ-7 as a disposal site and evaluate it in the risk assessment.
- Total petroleum hydrocarbons, identified as unknown hydrocarbon, were detected at a concentration of 44 mg/L in a groundwater sample collected on October 3, 1996 from monitoring well RIZ-8, located near the former heating oil UST at the south of the grandstand/clubhouse building. RIZ-8 was resampled on January 7, 1998 using a low-flow sampling technique to recover a silt-free sample. That sample was analyzed for extractable petroleum hydrocarbons (EPHs), which were not detected.

Cyanide was originally found in four groundwater samples at concentrations, which initially appeared to exceed RCs. However, the results of subsequent resampling and analysis of filtered and unfiltered samples showed that the cyanide was contributed by particulate matter. Based on the available data, we conclude that there is no reportable condition for cyanide in the groundwater.

5.0 Risk Characterization Summary

Rizzo Associates conducted a Method 3 Human Health and Environmental Risk Characterization in accordance with the MCP. It is being submitted to DEP as a separate volume.

The Risk Characterization began by evaluating which of the constituents detected at the Site were part of the normal background composition of the soil in that area. That evaluation identified levels of lead, copper, unknown hydrocarbons, and polynuclear aromatic hydrocarbons [benzo(a)pyrene, benzo(a)anthracene, benzo(a)fluoranthene, and indeno(1,2,3-cd)pyrene, and 2-methylnaphthalene] that are typical of the fill material at the Site and surrounding areas. Background concentrations of these materials were calculated and are not considered releases from or at the Site.

Based on releases identified at the Site, which may not be part of the normal background, the Disposal Site was divided into five areas as shown on Figure 2. All compounds detected at the Site were evaluated in the risk characterization. The five areas are:

- **Area 1.** The area near RIZ-5 on the north edge of the Site where an elevated beryllium concentration was detected in one soil sample.
- **Area 2.** The former gasoline UST area near RIZ-7 and MW-12 on the northeast portion of the Site where gasoline was detected in a groundwater sample.
- **Area 3.** The current gasoline and diesel fuel UST area located near the maintenance garage and monitoring wells RIZ-6, RIZ-9, MW-10, and MW-11. Petroleum constituents were detected in the soil and groundwater near the UST area.
- **Area 4.** The former heating oil UST area near the southwest corner of the grandstand/clubhouse building. Petroleum was detected in

one groundwater sample from the UST location but was not detected in a repeat sample.

- **Area 5.** Dissolved nickel was detected at an elevated concentration in monitoring well MW-206, located in the Department of Environmental Management dredge spoil landfill on the northeast portion of the infield of the racetrack.

The locations of the subareas are shown on Figure 2. The risk characterization assessed risks to the following groups of people:

- Current Suffolk Downs employees in all five areas who may dermally contact or ingest compounds of concern in soil, inhale and ingest fugitive dust containing compounds of concern, or inhale compounds that may volatilize from groundwater to soil gas from groundwater to soil gas and be entrained into buildings;
- Construction/utility workers in all five areas who may dermally contact or ingest compounds of concern in soil, inhale and ingest fugitive dust containing compounds of concern, or inhale compounds that may volatilize from groundwater to soil gas and be released into utility trenches, or have dermal contact with compounds in groundwater;
- Current seasonal residents in Area 1 who may dermally contact or ingest compounds of concern in soil, inhale and ingest fugitive dust containing compounds of concern, or inhale compounds that may volatilize from groundwater to soil gas from groundwater to soil gas and be entrained into buildings; and
- Future hypothetical residents who may dermally contact or ingest compounds of concern in soil, inhale and ingest fugitive dust containing compounds of concern, or inhale compounds that may volatilize from groundwater to soil gas and be entrained into buildings.

Risks to Suffolk Downs patrons were not expressly calculated since patrons would have less frequency, duration and intensity of exposure than Site employees. The risk characterization showed that a condition of No Significant Risk exists for Site employees; therefore, a condition of No Significant Risk would exist for Suffolk Downs patrons.

We estimated potential adverse human health risks for carcinogenic and noncarcinogenic effects using Method 3 as outlined in the MCP. Since Suffolk Downs was built on historically filled land, Site background concentrations were determined from the 95th percentile of the average non-release area sample concentrations. For each area, we calculated the exposure point concentrations to which any receptor could potentially be exposed as the average concentration reported in each medium for each compound minus the site-specific background concentrations. We then compared estimated Total Area Hazard Indices for each receptor for noncarcinogenic effects to the DEP acceptable noncancer risk limit of 1.0, and we compared estimated Total Area Cancer Risks for each receptor to the DEP acceptable cancer risk limit of 1×10^{-5} (or 1 in 100,000). None of the estimated Total Area Hazard Indices or Cancer Risks for any receptor evaluated in this risk characterization exceeded the DEP risk limits. Thus, we find that a condition of "no significant risk of harm to human health" exists for the conditions observed at the Site.

Similarly, we conducted a Method 3 ecological risk characterization in accordance with the MCP to evaluate potential risks to the environment from compounds detected in Disposal Site soil and groundwater. It was determined that a condition of "no significant risk of harm to the environment" exists for the conditions observed at the Site.

There are no open pits, lagoons, drums, dangerous structures, or other apparent threats to public safety, and no danger of fire or explosion from any of the conditions evaluated in this report. Thus, we find that a condition of "no significant risk of harm to public safety" exists for the conditions observed at the Site.

Because no nuisance odor condition was found at the Site, and average concentrations of identified compounds did not exceed Upper Concentration Limits, we found that a condition of "no significant risk of harm to public welfare" exists for the conditions observed at the Site.

6.0 Public Notification

Pursuant to the requirements of 40.1403(3)(f), the Mayors' and Health Departments of Boston and Revere have been notified by letter of this RAO submittal. Copies of those letters are included in Appendix E.

7.0 Elimination or Control of Uncontrolled Sources of Release

Of the five release areas identified on the Site, three of the areas appear to be attributed to releases from former petroleum USTs. These are (1) the former 4,000-gallon gasoline UST at the northeast curve of the racetrack; (2) the former 3,000-gallon diesel fuel UST near the northeast corner of the maintenance garage; and (3) the former 1,000-gallon heating oil UST at the south end of the grandstand/clubhouse building. These three tanks were removed in July 1991, and a 7,000-gallon tandem UST to store gasoline and diesel fuel was installed. The new double-walled tank is equipped with an interstitial monitoring system, and we have no evidence that the new UST system has leaked.

There are no other known sources of uncontrolled release on the Site.

8.0 Conclusion

Subsurface investigations at the Site have identified a variety of contaminants in the soil and groundwater. Many of the contaminants (i.e., lead, copper, unknown petroleum hydrocarbons, and some polynuclear aromatic hydrocarbons) have been interpreted to be part of the normal background soil composition for the Site and surrounding areas. The contaminants are interpreted to have been present in the urban fill material deposited at the Site prior to 1935.

Releases were identified at five locations on the Site which are not interpreted to be part of the background conditions. One release location was related to identification of elevated beryllium concentrations in a soil sample from boring RIZ-5; however, that result was not duplicated in subsequent sampling. Another was related to elevated nickel concentration in groundwater samples from MW-206. Three release locations were at former UST locations on the Site.

The data gathered from the entire Site and the data sets from the five release locations were used in a Risk Characterization. The Risk Characterization Report is being submitted to DEP as a separate volume. The Risk Characterization found that a condition of No Significant Risk to human health or the environment exists from the identified releases at the Site. No Significant Risk was identified for both the current uses of the Site and for a future, hypothetical

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residential use of the property. Therefore, no Activity and Use Limitation need be applied to the Site.

The finding of No Significant Risk and the fact that no remedial response actions were undertaken at the Site qualifies the Site for a Class B-1 RAO.



0 2000 Feet



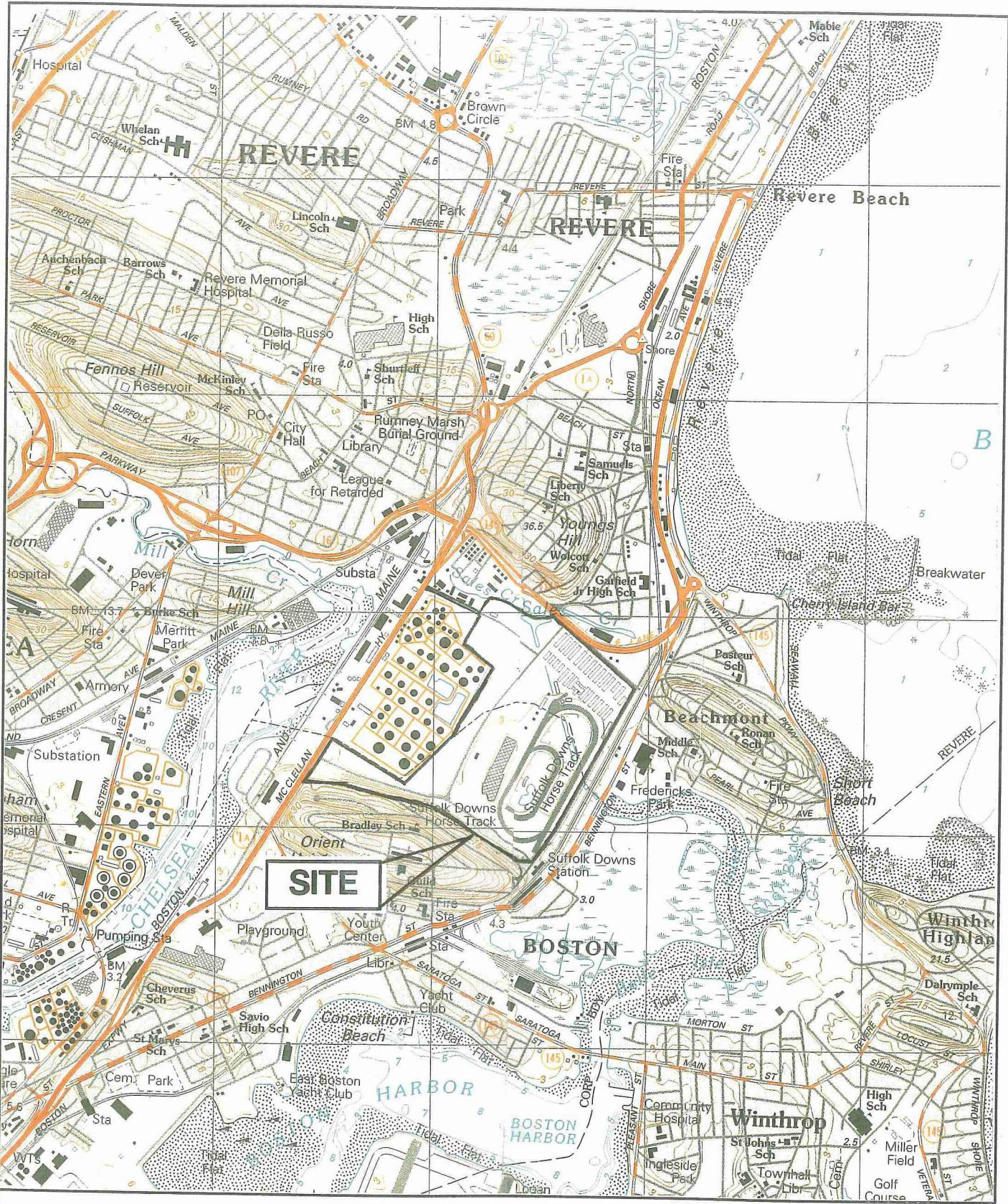
**Suffolk Downs
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Base Map: USGS Topographic Map
Boston North & Lynn, MA Quadrangles
Maps Printed, 1978; Maps Edited, 1985

Project Locus Map

Figure



0 2000 Feet



Suffolk Downs
Boston/Revere, Massachusetts

RIZZO ASSOCIATES, INC.

Base Map: USGS Topographic Map
Boston North & Lynn, MA Quadrangles
Maps Printed, 1978; Maps Edited, 1985

Project Locus Map

Figure

Appendix A

Appendix B

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Appendix E

Appendix A
Limitations

RIZZO ASSOCIATES, INC.

Appendix A: Limitations

1. The observations described in this report were made under the conditions stated therein. The conclusions presented in the report were based solely upon the services described therein, and not on scientific tasks or procedures beyond the scope of described services or the time and budgetary constraints imposed by Client. The work described in this report was carried out in accordance with the Terms and Conditions in our contract.
2. In preparing this report, Rizzo Associates has relied on certain information provided by state and local officials and other parties referenced therein, and on information contained in the files of state and/or local agencies available to Rizzo Associates at the time of the site assessment. Although there may have been some degree of overlap in the information provided by these various sources, Rizzo Associates did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this site assessment.
3. Observations were made of the Site and of structures on the Site as indicated within the report. Where access to portions of the Site or to structures on the Site was unavailable or limited, Rizzo Associates renders no opinion as to the presence of hazardous materials or oil, or to the presence of indirect evidence relating to hazardous material or oil, in that portion of the Site or structure. In addition, Rizzo Associates renders no opinion as to the presence of hazardous material or oil, or the presence of indirect evidence relating to hazardous material or oil, where direct observation of the interior walls, floor, or ceiling of a structure on a Site was obstructed by objects or coverings on or over these surfaces.
4. Rizzo Associates did not perform testing or analyses to determine the presence or concentration of asbestos at the Site or in the environment at the Site.
5. It is ENGINEER's understanding that the purpose of this report is to assess the physical characteristics of the subject Site with respect to the presence on the Site of hazardous material or oil. This stated purpose has been a significant factor in determining the scope and level of services provided for in the Agreement. Should the purpose

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Limitations

for which the Report is to be used or the proposed use of the site(s) change, this Report is no longer valid and use of this Report by CLIENT or others without ENGINEER's review and written authorization shall be at the user's sole risk. Should ENGINEER be required to review the Report after its date of submission, ENGINEER shall be entitled to additional compensation at then existing rates or such other terms as agreed between ENGINEER and the CLIENT.

6. The conclusions and recommendations contained in this report are based in part, where noted, upon the data obtained from a limited number of soil samples obtained from widely spaced subsurface explorations. The nature and extent of variations between these explorations may not become evident until further exploration. If variations or other latent conditions then appear evident, it will be necessary to reevaluate the conclusions and recommendations of this report.
7. Any water level readings made in test pits, borings, and/or observation wells were made at the times and under the conditions stated on the report. However, it must be noted that fluctuations in the level of groundwater may occur due to variations in rainfall and other factors different from those prevailing at the time measurements were made.
8. Except as noted within the text of the report, no quantitative laboratory testing was performed as part of the site assessment. Where such analyses have been conducted by an outside laboratory, Rizzo Associates has relied upon the data provided and has not conducted an independent evaluation of the reliability of these data.
9. The conclusions and recommendations contained in this report are based in part, where noted, upon various types of chemical data and are contingent upon their validity. These data have been reviewed and interpretations made in the report. As indicated within the report, some of these data may be preliminary "screening" level data and should be confirmed with quantitative analyses if more specific information is necessary. Moreover, it should be noted that variations in the types and concentrations of contaminants and variations in their flow paths may occur due to seasonal water table fluctuations, past disposal practices, the passage of time, and other factors. Should additional chemical data become available in the future, these data

should be reviewed, and the conclusions and recommendations presented herein modified accordingly.

10. Chemical analyses have been performed for specific constituents during the course of this site assessment, as described in the text. However, it should be noted that additional chemical constituents not searched for during the current study may be present in soil and/or groundwater at the Site.
11. This Report was prepared for the exclusive use of the CLIENT. No other party is entitled to rely on the conclusions, observations, specifications, or data contained therein without the express written consent of ENGINEER.
12. The observations and conclusions described in this Report are based solely on the Scope of Services provided pursuant to the Agreement. ENGINEER has not performed any additional observations, investigations, studies, or testing not specifically stated therein. ENGINEER shall not be liable for the existence of any condition, the discovery of which required the performance of services not authorized under the Agreement.
13. The passage of time may result in significant changes in technology, economic conditions, or site variations which would render the Report inaccurate. Accordingly, neither the CLIENT, nor any other party, shall rely on the information or conclusions contained in this Report after six months from its date of submission without the express written consent of ENGINEER. Reliance on the Report after such period of time shall be at the user's sole risk. Should ENGINEER be required to review the Report after six months from its date of submission, ENGINEER shall be entitled to additional compensation at then existing rates or such other terms as may be agreed upon between ENGINEER and the CLIENT.
14. ENGINEER has endeavored to perform its services based upon engineering practices accepted at the time they were performed. ENGINEER makes no other representations, express or implied, regarding the information, data, analysis, calculations, and conclusions contained herein.

Appendix F

Appendix B

Appendix C

Appendix D

Appendix E

Appendix B
Standard Operating Protocols

RIZZO ASSOCIATES, INC.

Standard Operating Protocol for Decontaminating Sampling Equipment

Whenever possible, sampling equipment will be dedicated to each sampling location or disposable equipment will be used. When this is not possible, field decontamination of the equipment will occur prior to the collection of samples for chemical analysis. The method of choice for decontamination is that which most fully removes site contaminants from the sampling equipment with the least interference to the ultimate chemical analysis. Do not use fluids that have been stored in plastic bottles to decontaminate field equipment. Deionized water and methanol used for decontamination should be stored in nalgene or teflon bottles.

Equipment used to collect samples for chemical analysis will be decontaminated as follows:

1. Wash equipment with a nonphosphate detergent solution (e.g., Alconox) and a brush.
2. Rinse thoroughly with tap water.
3. Rinse with reagent grade methanol.
4. Rinse the equipment thoroughly with deionized water.
5. Equipment that is stored or transported will be kept in a dedicated plastic bag or wrapped in aluminum foil to prevent contamination prior to use.
6. When collecting water samples, rinse the equipment three times with the media being sampled before collecting the sample.

Steam cleaning is another acceptable technique for field decontamination.

Decontamination procedures will be recorded in the field book or on the field report form. These entries will include the date, time, location, personnel, equipment, and specific procedures used for the decontamination of field equipment and the source of all fluids, including water, used in the procedure. Deviations from the standard protocols will also be noted in the field log.

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Waste water and methanol solutions generated during decontamination procedures will be discharged on-site, provided that the pH is between 2 and 12.

Last updated 4/17/92

Standard Operating Protocol for Completing Soil Borings and Monitoring Well Borings in Unconsolidated Surficial Deposits

1. All drilling is inspected continuously by a staff geologist or inspector. The geologist or inspector is familiar with the particular drilling program, and is responsible for ensuring that established procedures are followed. The geologist or inspector has the authority to modify the program and/or procedures when warranted by unanticipated field conditions.
2. The geologist or inspector is responsible for maintaining field notes and for keeping a well log independent of the driller.
3. All drilling equipment is steam-cleaned prior to each use. Steam cleaning is performed on the augers and/or casing, drilling rods, samplers, auger forks, lifting hooks, and other equipment needed for establishing the well. The working end of the drill rig is steam-cleaned, and the rig is generally inspected by the geologist or inspector for evidence of leaks (i.e., gasoline or diesel fuel and hydraulic fluid). Finally, well construction materials, including casing, screens, protective risers, and/or road boxes, are also steam-cleaned prior to use.
4. Soil samples are collected at five-foot intervals unless otherwise specified, and/or at changes in strata, utilizing a clean split-spoon sampler. These soil samples are used for characterizing the physical nature of the subsurface sediments and may be collected for laboratory analyses. Similarly, spoon samples may be screened in the field for contamination utilizing appropriate field analytical devices.
5. Sediments collected from the sampler or brought to the surface by the drilling process are left on-site, unless there are specific instructions to the contrary. Sediments will be screened using a photoionization detector (PID) or a flame ionization detector (FID), and the results of that screening will be used to determine the disposal method for the soil. Soils exhibiting detector responses of greater than 10 ppm will be placed in drums or will be stockpiled on and covered with polyethylene sheeting. Soils exhibiting responses of less than 10 ppm will be placed in an unlined stockpile on the site.

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6. When installing a groundwater monitoring well, the well screen is set at a depth whereby it intercepts the surface of the water table, unless otherwise specified. The screen is set to extend above the highest anticipated groundwater levels to a maximum of within two feet of the land surface. The annular space between the wall of the bore hole and the screen is then packed with clean silica sand to a level one foot above the screen (to allow for settling), and then with a minimum one-foot bentonite seal. The method of backfilling the bore hole above the bentonite seal will be left to the discretion of the site geologist or inspector. If the bore hole creates the potential for migration of contaminants into previously uncontaminated deposits, the bore hole will be filled with a portland cement and bentonite slurry. If migration of contaminants is not a concern, then the well will be backfilled with the drill cuttings if detector responses are less than 10 ppm, or with clean backfill material if detector responses are greater than 10 ppm. The final one foot is filled with cement, into which is set a protective riser with locking cap or a road box.

Last updated 4/17/92

Standard Operating Protocol for Collecting Surface Water Samples

1. The field technician and the project manager will review the site-specific Health and Safety Plan before work is initiated. Concerns not addressed in the Health and Safety Plan will be brought to the attention of the health and safety officer.
2. When possible, the sample container will be used for sample collection, to eliminate an intermediate step and reduce the potential for cross contamination. When this is not possible, disposable or decontaminated equipment will be used. If equipment is reused for sample collection, it is cleaned according to *Standard Operating Protocol for Decontaminating Sampling Equipment*.
3. To ensure the most representative water sample, collect downgradient samples before collecting upgradient samples and disturb the bottom sediments as little as possible during sample collection. Minimize turbulence when filling the sample container and obtain sediment samples after surface water samples have been collected.
4. Submerge an unpreserved, open sample container upside down so that it is completely under water and air is trapped inside. Return the container to an upright position so that water flows into the container while it is still completely submerged.
5. If preservatives are needed, transfer the sample to appropriately preserved bottles.
6. When the surface water to be sampled is too shallow to be collected according to step 5 above, a disposable or decontaminated bailer will be used.
7. Completely lower the bailer into the water using mono filament line. Remove the bailer and transfer the sample to an appropriate container.
8. Label the bottles and complete the chain of custody and the field log.

Last updated 4/17/92

Standard Operating Protocol for Sampling Monitoring Wells

Discussion

To obtain a representative sample of groundwater, it must be understood that the water within the well casing and in close proximity to the well is generally not representative of the groundwater quality at that sampling site. Therefore, the well will be pumped or bailed until it is thoroughly flushed of standing water and contains water from the aquifer. Wells may be purged and sampled with a pump from the ground surface, with a submersible pump or with a bailer, depending on the specific needs of the sampling program. Bailers are generally preferred for collecting samples where volatile stripping is of concern. Pumps are useful for purging large volumes of water from deep wells or when a sample from a discrete depth below the water surface is desired. Refer to DEP Policy #WSC-310-91 to chose the appropriate method for purging and sampling a well and operate sampling equipment according to manufacturer's directions.

Procedures for Purging and Sampling

1. Using clean, noncontaminating equipment (i.e., an electronic level indicator [avoid indicating paste]), determine and record in the field logbook the water level in the well, then calculate the fluid volume in the casing.

The volume of water in the well can be calculated using the following equation:

$$v = \frac{(\pi r^2 h)}{c}$$

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where:

v = one well volume of water (gallons)

$\pi = 3.14$

r = the radius of the well or one half of the diameter (inches)

h = the height of the water column in the well (inches)

c = 231 cubic inches per gallon; constant to convert cubic inches to gallons

2. Use a pump or bailer to begin flushing the well. Periodically during the purging of the well, measure and record the pH, temperature, and specific conductivity of the water being removed.
3. Avoid contamination and do not allow sampling equipment or the bailer line to contact the ground while sampling.
4. Continue purging the well until the following is achieved:
 - a. a minimum of three casing volumes have been removed from the well, and pH, temperature, and conductivity have stabilized; or
 - b. five well volumes have been removed; or
 - c. the well is evacuated to dryness

Three times the well volume (gallons) in a 2-inch-diameter well is approximately one half the height of the water column measured in feet.

5. After water pH, temperature, and specific conductance have stabilized, allow the water level to return to a sufficient level to collect a complete sample and proceed with the sample collection as described below.
6. Select sample bottles and preservative as required by the analysis. Sample bottles containing preservative may be obtained from the laboratory, or samples may be preserved in the field. Samples for metals analysis that require field filtering will be collected in a transfer vessel and then filtered into a preserved container.
7. When transferring the sample in the bailer to the sample container, tip the bailer to allow a slow discharge from the bailer top to flow gently down the side of the sample bottle with minimum entry turbulence.

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Appendix B
Standard Protocols

8. When collecting a sample with a pump, the flow rate of the pump should be low so as to minimize disturbing the sample.
9. In order to compare analytical data for a given well over time, the same purging and sampling method should be used consistently at a given well.
10. Check that a teflon liner is present in the cap, if required. Secure the cap tightly.
11. Label the sample bottle with an appropriate label and waterproof ink. Record the sample number, location, well purging information, the temperature, pH, specific conductivity, and deviations from protocol and relevant observations, such as colors, odors, or sheens, in the field logbook. Complete the chain of custody. Samples will be stored in a cooler until they are delivered to the laboratory.
12. Discard disposable bailers after use in one well. If reusable bailers are used, clean and store each bailer according to the *Standard Operating Protocol for Decontaminating Sampling Equipment*.
13. Tubing used with a pump may be discarded after each well or cleaned by pumping the decontamination fluids through the tubing according to the Standard Operating Procedure for Decontaminating Field Equipment.

Adapted from:

Standard References for Monitoring Wells, The Massachusetts Department of Environmental Protection #WSC-310-91.

Last updated 4/17/92

Standard Operating Protocol for Jar Headspace Screening

The following procedures will be used to screen soil samples for volatile organic compounds with a portable photoionization detector (PID) or a flame ionization detector (FID).

1. Half-fill a clean glass 8-ounce jar with the sample to be analyzed. Quickly cover the open top with a sheet of clean aluminum foil and apply the screw cap to tightly seal the jar.
2. Vigorously shake the jar for 10 seconds both at the beginning and end of the headspace development period. Allow the jar to stand 10 minutes for headspace development. When ambient temperatures are below 32°F (0°C), allow the samples to stand in a heated vehicle or building.
3. After the headspace development period, remove screw lid to expose the foil seal. Puncture the foil seal with an instrument sampling probe, to a point about one-half of the headspace depth. Do not allow water droplets or soil particulates to touch the instrument probe.
4. Observe the instrument response and record the highest meter response as the jar headspace concentration. The maximum response should occur from two to five seconds after the probe is inserted into the jar. The meter response may be erratic when the concentration of organic vapor is high or if there is excessive moisture in the sample. The experience and judgement of the instrument operator must be used to determine the validity of the headspace measurement.
5. Benzene or an equivalent compound will be used to calibrate the field screening instrument. Jar headspace sample results will be reported as "total organic vapors" in ppm (v/v). Instruments will be operated, maintained, and calibrated in accordance with the manufacturer's specifications. A calibration and maintenance log is kept at Rizzo Associates' office for each instrument. The daily calibration data are transcribed to the field log for each day that the instrument is used. Some samples may be collected and analyzed in duplicate to measure sample variability.

Last updated 4/17/92

Standard Operating Protocol for Collecting Sediment Samples

Sediment samples are collected according to the following procedures:

1. Open scoops (stainless steel spoons and augers) will generally be used to sample in quiescent waters, and closed samplers (shelby tube, split-spoons) will be used in moving waters to prevent the loss of fine particles.
2. Drive a precleaned sample coring device with a straight vertical entry, to ensure collection of a representative cross section, into the water sediments.
3. Remove the sampling device from the sediments, and homogenize the sample using a stainless steel or teflon spoon and a stainless steel bowl. Samples for volatile organic compounds analysis will not be homogenized or mixed.
4. Place the samples into sample containers, label the containers, and complete the field record and the chain of custody.

Last updated 4/17/92

Appendix F

Appendix G

Appendix C

Appendix D

Appendix E

Appendix C
Mass GIS Map

RIZZO ASSOCIATES, INC.

Appendix F

Appendix G

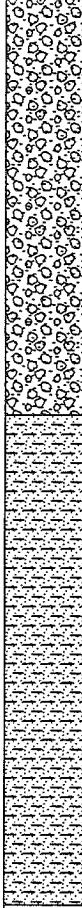
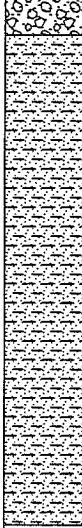
Appendix H

Appendix D

Appendix E

Appendix D
Boring Logs

RIZZO ASSOCIATES, INC.

Comments	Blow Counts	Recoy/Advance	PID (ppm)	Depth (ft)	Sample Interval	Graphic Log	RB-1
							Materials Description
Boring Only - No Well Installed	grab 17 19 14 11	NA 12/24"	0.0 0.3				Brown poorly sorted fine to medium SAND with silt and small angular gravel, plastic fragments, glass, fill, dry Brown/black fine to medium SAND, dry, faint odor Laboratory Sample #SD-SS-RBI-3'
	3 4 77/3"	12/15"	0.3	5			Black PEAT and muck with gravel, decayed wood, glass fragments, wet, strong organic odor
	1/12" 1/12"	24/24"	1.5	10			Grey CLAY with root fragments, wet, strong organic odor
				15			End of Boring at 12 Feet

BORING LOG FOR BORING RB-1

Project: Suffolk Downs

Project Number: 4314-03

Location: Revere & East Boston

Well Location: Northwest portion of Site.

Rizzo Associates, Inc.

*Engineers and Environmental Scientists
235 West Central Street, Natick, MA 01760*

Installation Date: 9/30/96

Depth of Boring: 12

Inspector: K. Jaeger

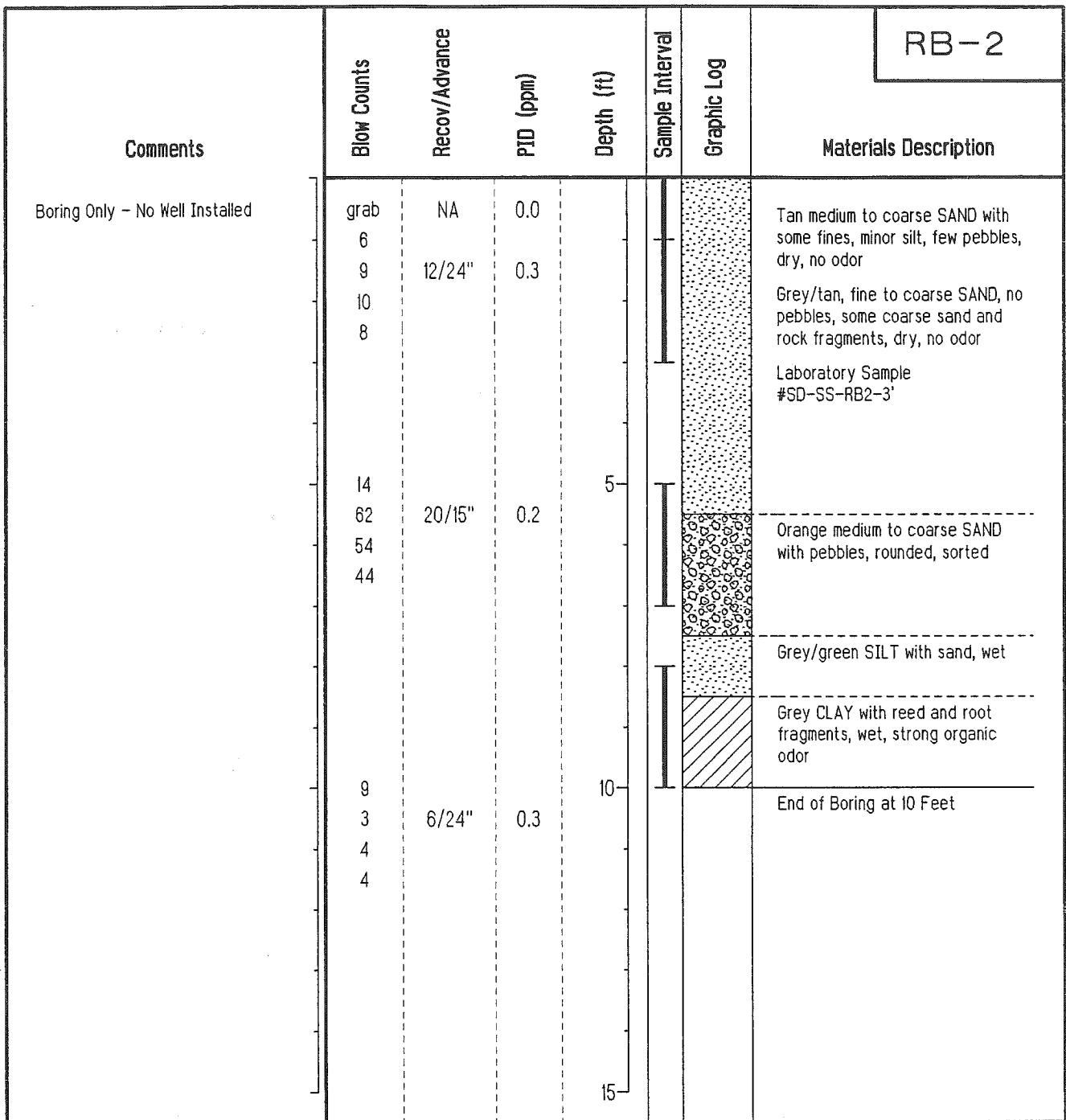
Depth to Water: NA

Contractor: Redwing

Surface Elev.: NA

Drilling Method: HSA

PID used: HNu



BORING LOG FOR BORING RB-2

Project: Suffolk Downs

Project Number: 4314-03

Location: Revere & East Boston

Well Location: Northwest portion of Site.

Rizzo Associates, Inc. <i>Engineers and Environmental Scientists</i> 235 West Central Street, Natick, MA 01760	Installation Date: 9/30/96 Inspector: K. Jaeger Contractor: Redwing Drilling Method: HSA	Depth of Boring: 10 Depth to Water: NA Surface Elev.: NA PID used: HNu
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Comments	Blow Counts	Recov/Advance	PID (ppm)	Depth (ft)	Sample Interval	Graphic Log	RB-3
							Materials Description
Boring Only - No Well Installed	grab	NA	0.5				<p>Black FILL with medium sand and pebbles, dry, no odor</p> <p>Laboratory Sample #SD-SS-RB3-0-3'</p> <p>End of Boring at 3 Feet</p>

BORING LOG FOR BORING RB-3

Project: Suffolk Downs

Project Number: 4314-03

Location: Revere & East Boston

Well Location: Western portion of Site.

Rizzo Associates, Inc.

*Engineers and Environmental Scientists
235 West Central Street, Natick, MA 01760*

Installation Date: 9/30/96

Depth of Boring: 3

Inspector: P. Gentiluomo

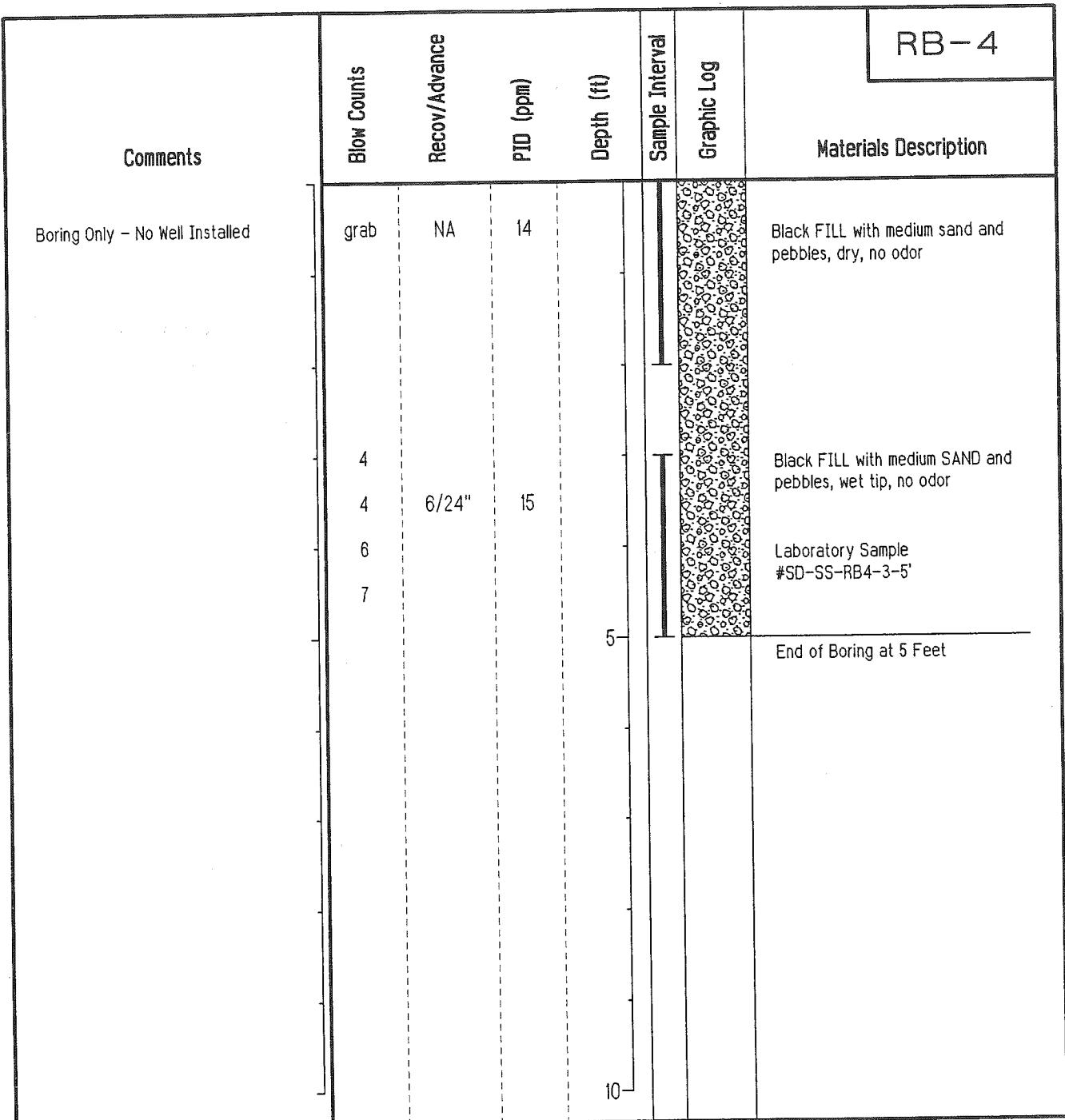
Depth to Water: NA

Contractor: Redwing

Surface Elev.: NA

Drilling Method: HSA

PID used: HNu



BORING LOG FOR BORING RB-4

Project: Suffolk Downs

Project Number: 4314-03

Location: Revere & East Boston

Well Location: Central portion of Site.

Rizzo Associates, Inc.

*Engineers and Environmental Scientists
235 West Central Street, Natick, MA 01760*

Installation Date: 9/30/96

Depth of Boring: 5

Inspector: P. Gentiluomo

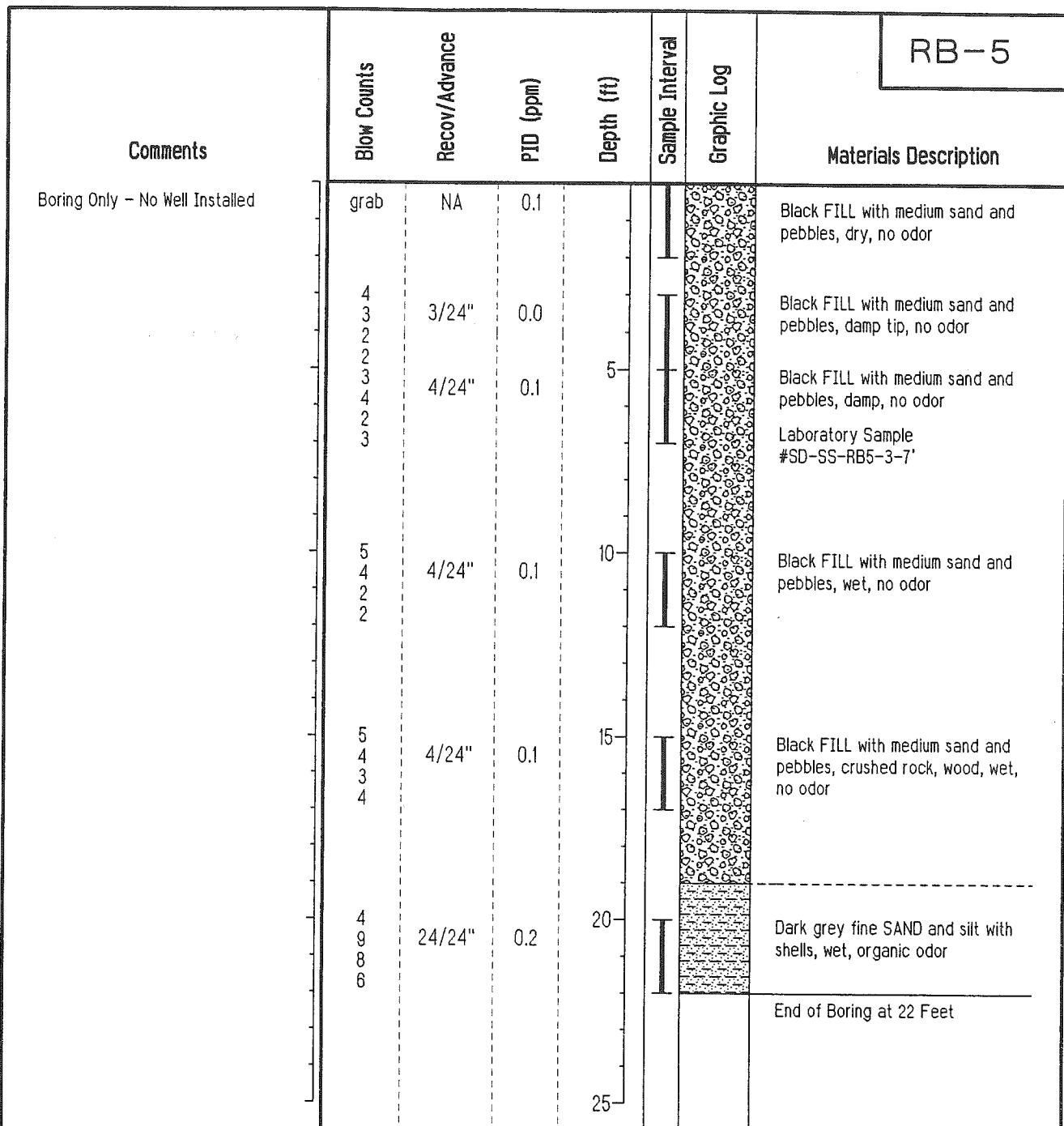
Depth to Water: NA

Contractor: Redwing

Surface Elev.: NA

Drilling Method: HSA

PID used: HNu



BORING LOG FOR BORING RB-5

Project: Suffolk Downs

Project Number: 4314-03

Location: Revere & East Boston

Well Location: Central portion of Site.

Rizzo Associates, Inc.

*Engineers and Environmental Scientists
235 West Central Street, Natick, MA 01760*

Installation Date: 9/30/96

Depth of Boring: 22

Inspector: P. Gentiluomo

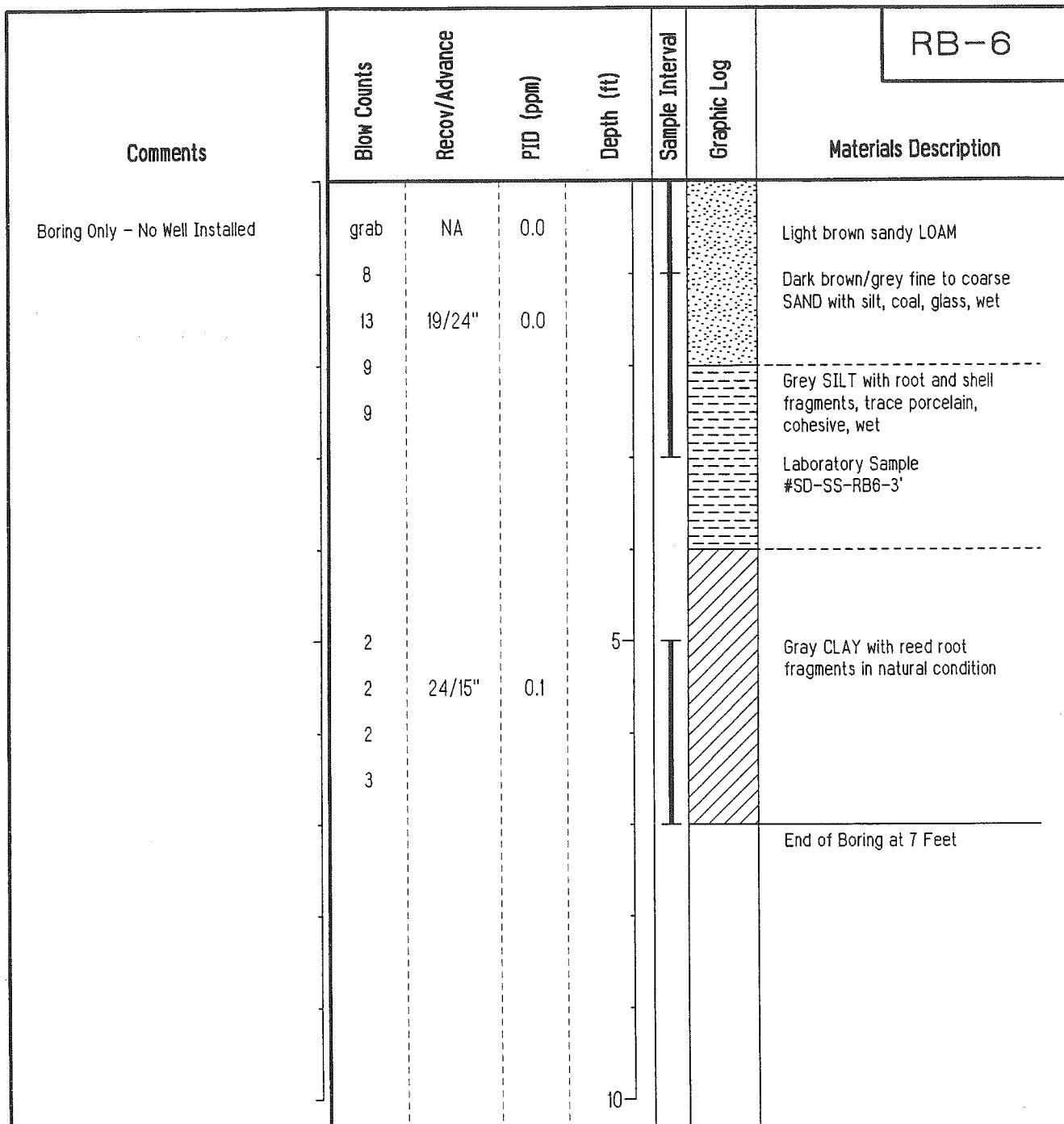
Depth to Water: NA

Contractor: Redwing

Surface Elev.: NA

Drilling Method: HSA

PID used: HNU



BORING LOG FOR BORING RB-6

Project: Suffolk Downs

Project Number: 4314-03

Location: Revere & East Boston

Well Location: Northern portion of Site.

Rizzo Associates, Inc.
Engineers and Environmental Scientists
235 West Central Street, Natick, MA 01760

Installation Date: 9/30/96

Depth of Boring: 7

Inspector: K. Jaeger

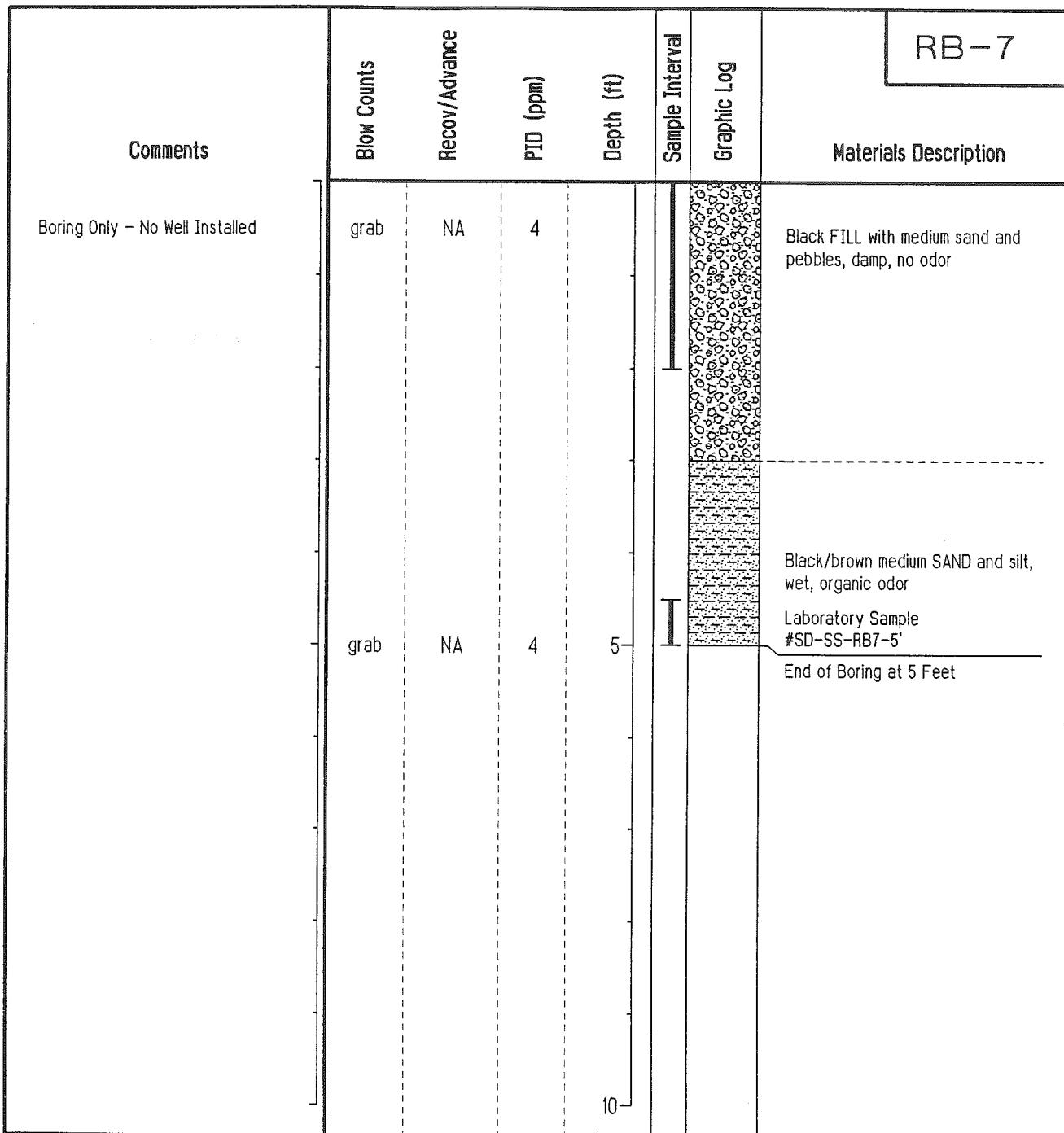
Depth to Water: NA

Contractor: Redwing

Surface Elev.: NA

Drilling Method: HSA

PID used: HNu



BORING LOG FOR BORING RB-7

Project: Suffolk Downs

Project Number: 4314-03

Location: Revere & East Boston

Well Location: Central portion of stable area.

Rizzo Associates, Inc.
Engineers and Environmental Scientists
235 West Central Street, Natick, MA 01760

Installation Date: 9/30/96

Depth of Boring: 5

Inspector: P. Gentiluomo

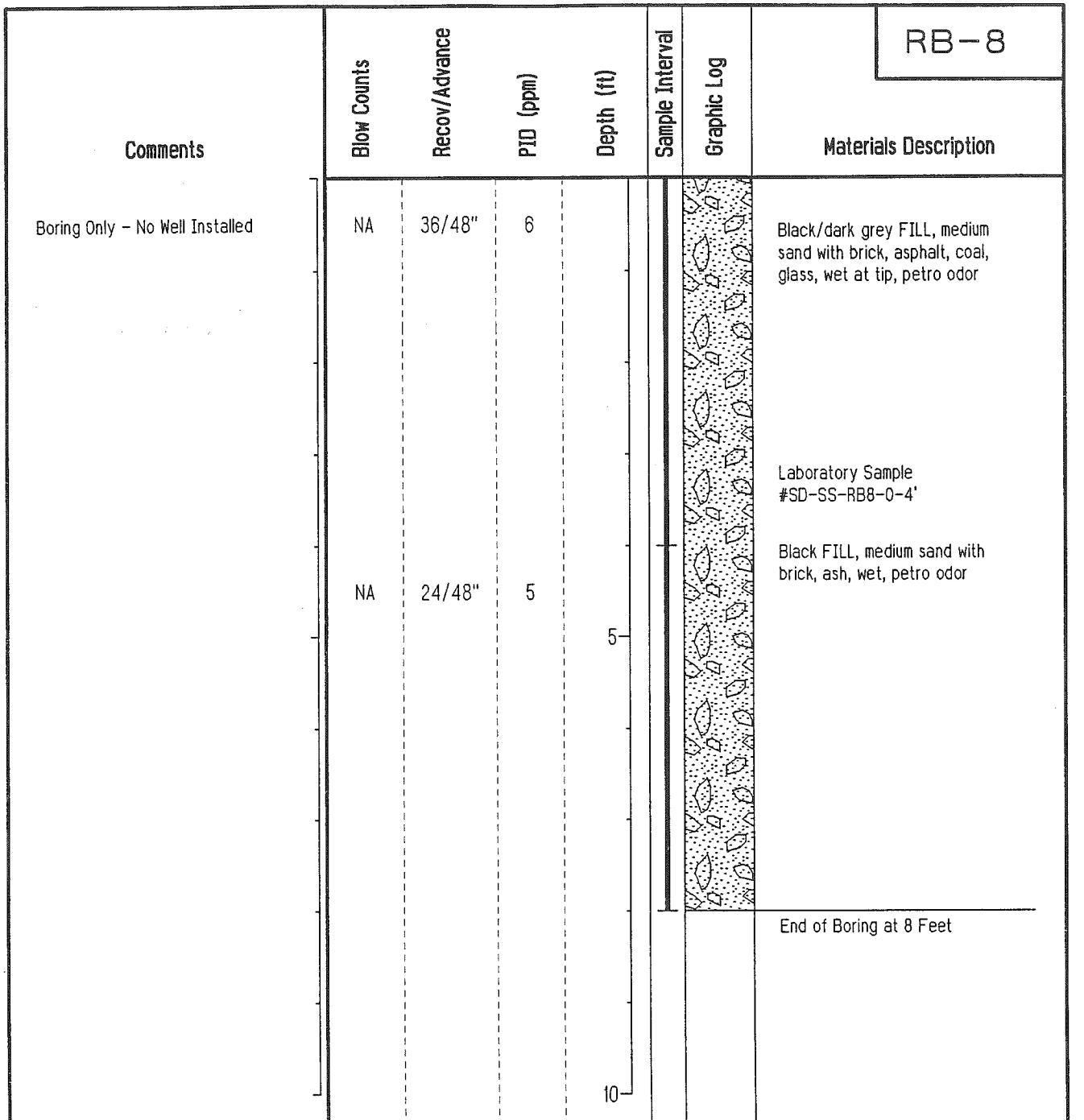
Depth to Water: NA

Contractor: Redwing

Surface Elev.: NA

Drilling Method: HSA

PID used: HNu



BORING LOG FOR BORING RB-8

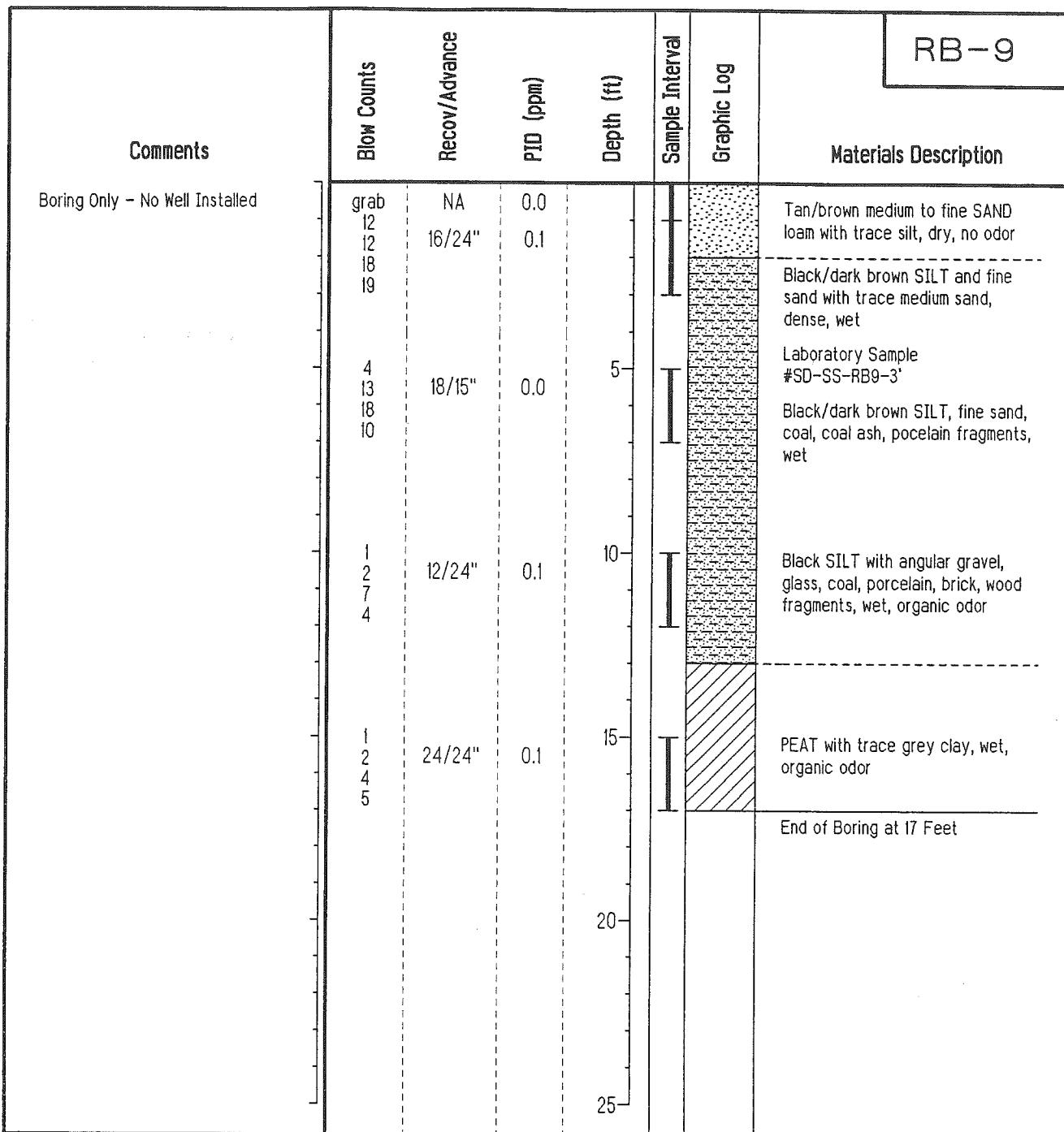
Project: Suffolk Downs

Project Number: 4314-03

Location: Revere & East Boston

Well Location: Off northwest corner of track.

Rizzo Associates, Inc. <i>Engineers and Environmental Scientists</i> 235 West Central Street, Natick, MA 01760	Installation Date: 10/3/96 Inspector: P. Gentiluomo Contractor: TDS Drilling Method: Geoprobe	Depth of Boring: 8 Depth to Water: NA Surface Elev.: NA PID used: HNu
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BORING LOG FOR BORING RB-9

Project: Suffolk Downs

Project Number: 4314-03

Location: Revere & East Boston

Well Location: Three feet west of MW-1

Rizzo Associates, Inc.

*Engineers and Environmental Scientists
235 West Central Street, Natick, MA 01760*

Installation Date: 9/30/96

Inspector: K. Jaeger

Contractor: Redwing

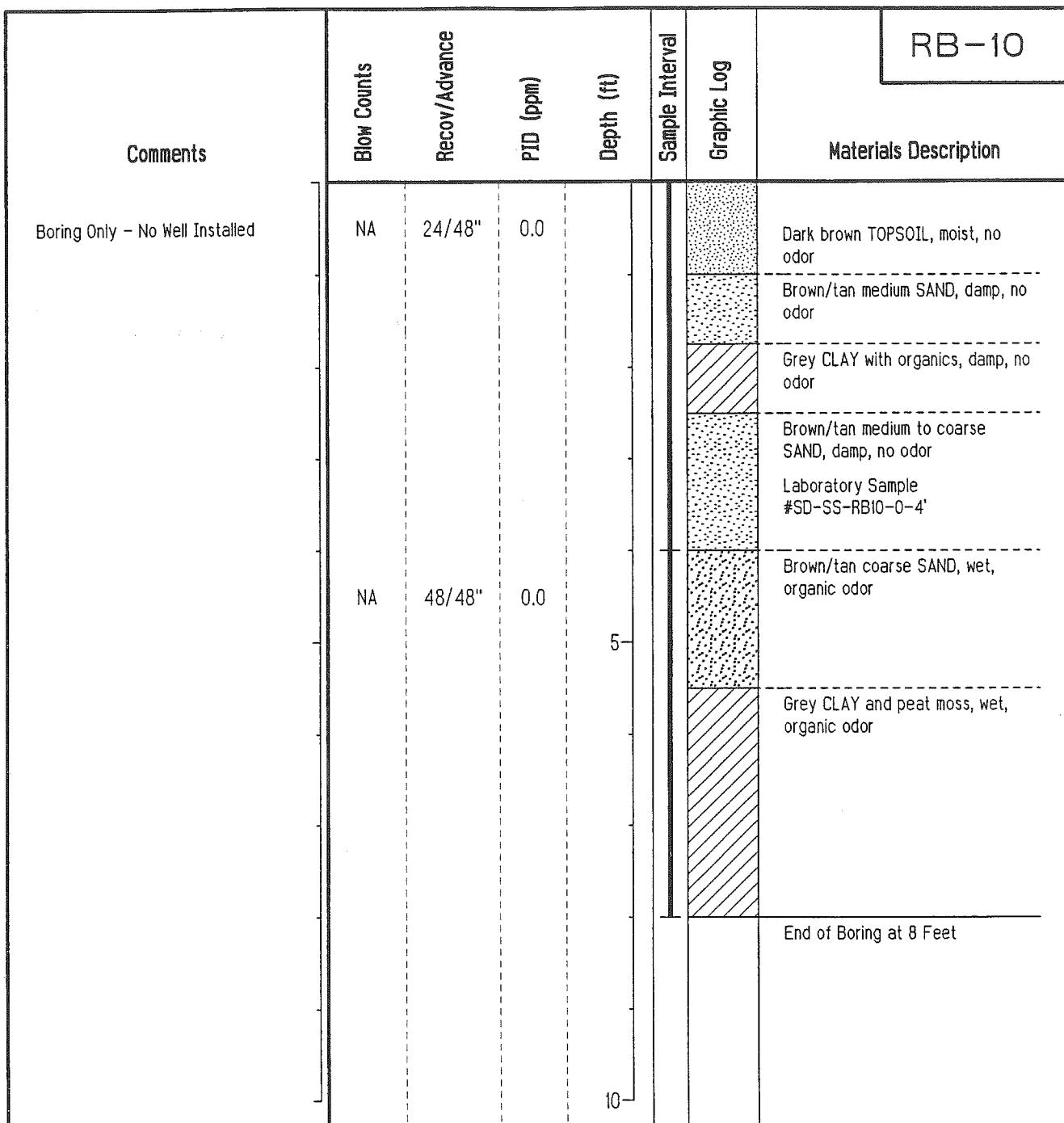
Drilling Method: HSA

Depth of Boring: 17

Depth to Water: NA

Surface Elev.: NA

PID used: HNu



BORING LOG FOR BORING RB-10

Project: Suffolk Downs

Project Number: 4314-03

Location: Revere & East Boston

Well Location: Northern portion of track area.

Rizzo Associates, Inc.

*Engineers and Environmental Scientists
235 West Central Street, Natick, MA 01760*

Installation Date: 10/3/96

Depth of Boring: 8

Inspector: P. Gentiluomo

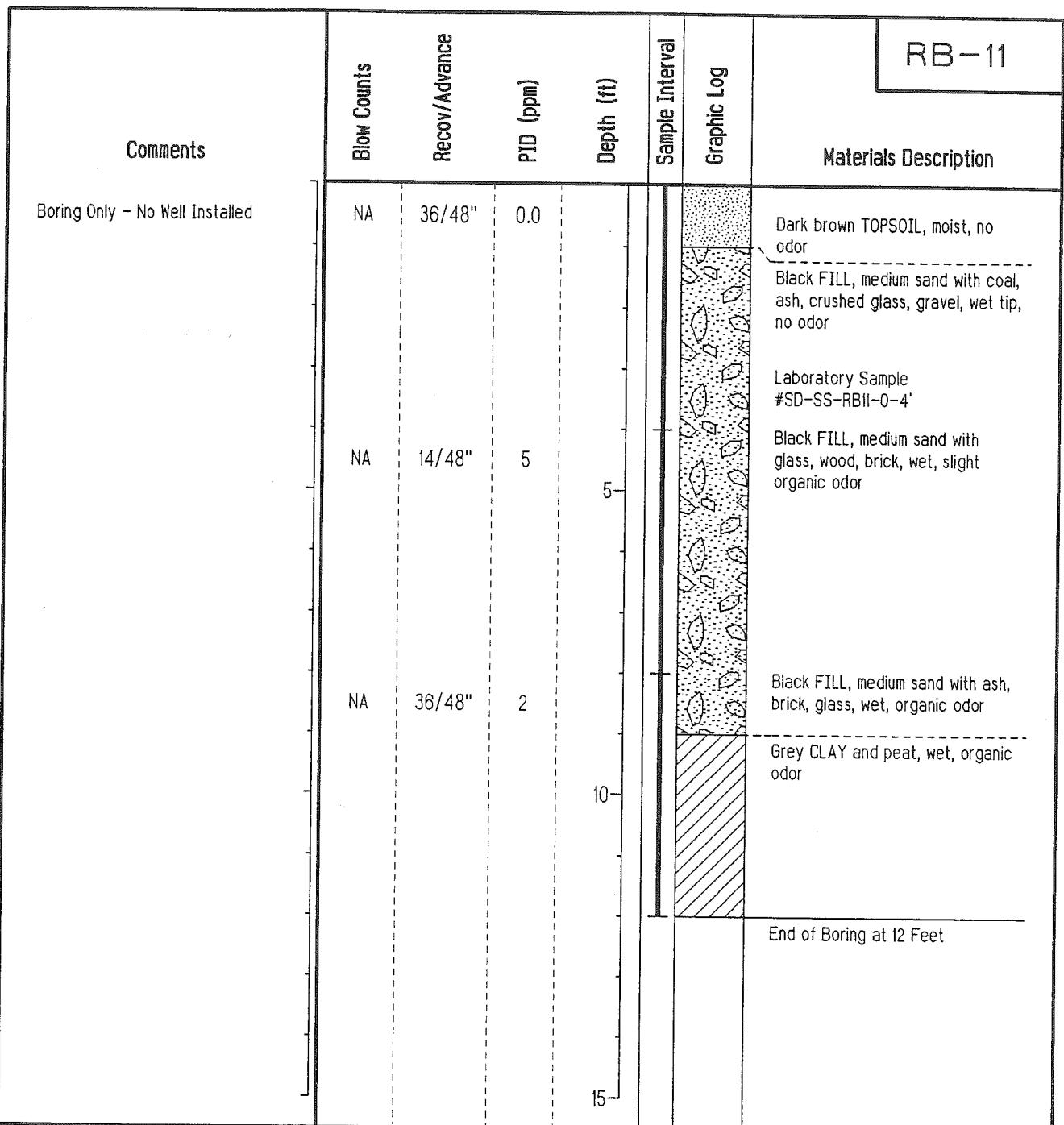
Depth to Water: NA

Contractor: TDS

Surface Elev.: NA

Drilling Method: Geoprobe

PID used: HNu



BORING LOG FOR BORING RB-11

Project: Suffolk Downs

Project Number: 4314-03

Location: Revere & East Boston

Well Location: Southern portion of track area.

Rizzo Associates, Inc.

Engineers and Environmental Scientists
235 West Central Street, Natick, MA 01760

Installation Date: 10/3/96

Depth of Boring: 12

Inspector: P. Gentiluomo

Depth to Water: NA

Contractor: TDS

Surface Elev.: NA

Drilling Method: Geoprobe

PID used: HNU

Comments	Blow Counts	Recov/Advance	PID (ppm)	Depth (ft)	Sample Interval	Graphic Log	RB-12
							Materials Description
Boring Only - No Well Installed	NA	36/48"	0.1				Dark brown TOPSOIL, moist, no odor
	NA	8/48"	7	5			Black FILL, medium sand with ash, crushed glass, brick, wet tip, no odor
	NA	18/48"	2	10			Laboratory Sample #SD-SS-RB12-0-4'
				15			Black FILL, medium sand with ash, brick, wet, slight organic odor
							Grey CLAY and peat, wet, organic odor
							End of Boring at 12 Feet

BORING LOG FOR BORING RB-12

Project: Suffolk Downs

Project Number: 4314-03

Location: Revere & East Boston

Well Location: Southern portion of track area.

Rizzo Associates, Inc. Engineers and Environmental Scientists 235 West Central Street, Natick, MA 01760	Installation Date: 10/3/96 Inspector: P. Gentiluomo Contractor: TDS Drilling Method: Geoprobe	Depth of Boring: 12 Depth to Water: NA Surface Elev.: NA PID used: HNu
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Well Construction	Blow Counts	Recovery/ Advance	PID (ppm)	Depth (ft)	Sample Interval	Graphic Log	RB-13
							Materials Description
No well installed.							
		12/24	0				black to gray unsorted FILL of fine to coarse sand with silt, gravel, and clay lumps. No odor. LAB SAMPLE SD-RB13-3ft
		16/24	0	5			Groundwater encountered at 4 feet. black to gray unsorted FILL of fine to coarse sand with silt, gravel, and clay lumps. No odor. LAB SAMPLE SD-RB13-5ft
				10			End of Boring

BORING LOG FOR RB-13

Project: Suffolk Downs

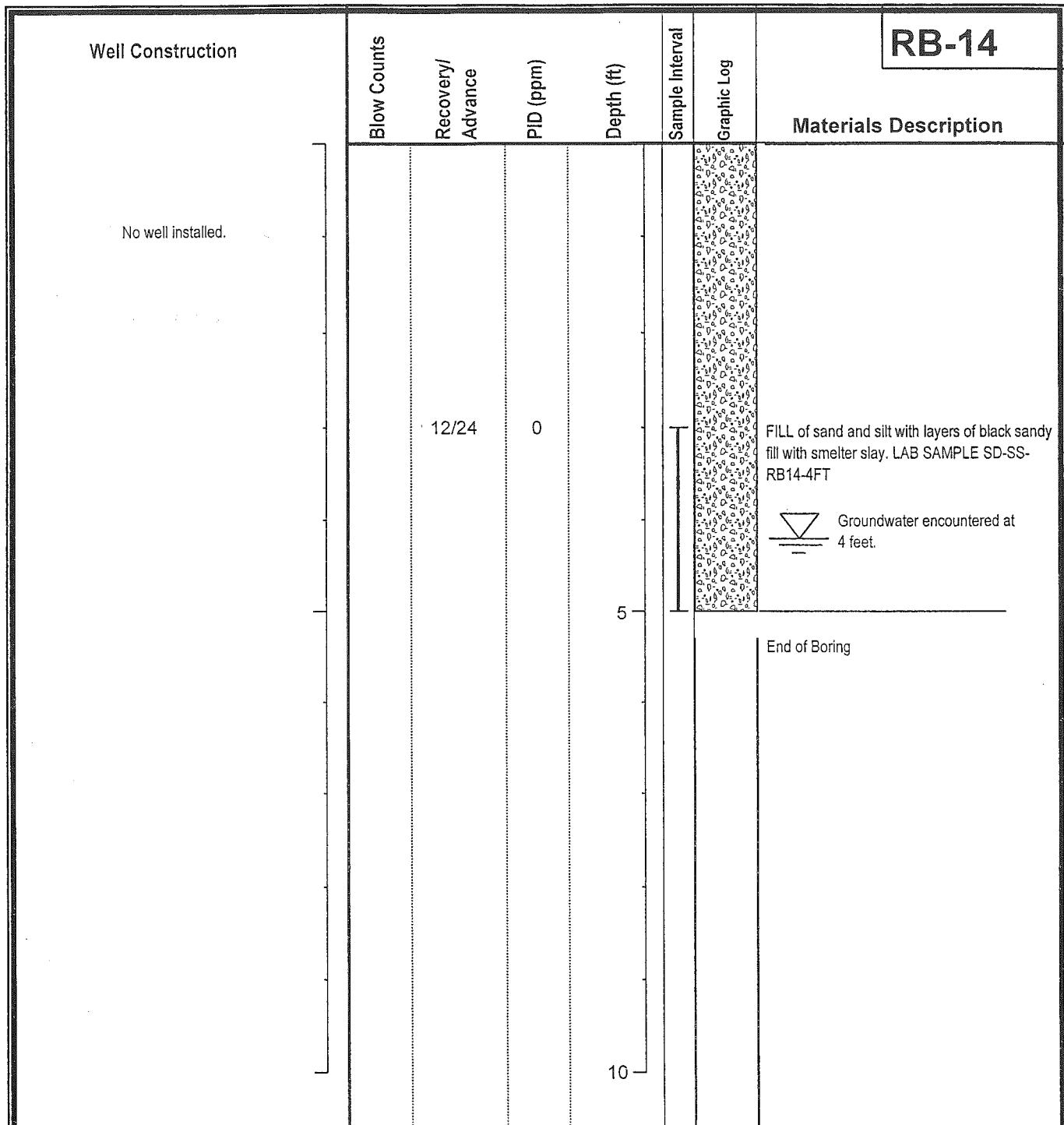
Project Number: 4314-13

Location: East Boston/Revere

Well Location: 16 feet west of RIZ-5, on the northeast edge of the Site

Rizzo Associates, Inc.
Engineers and Environmental Scientists
 235 West Central Street, Natick, MA 01760

Installation Date: 12/4/97 Depth of Boring: 6
 Inspector: Ken Jaeger Depth to Water: 4
 Contractor: Soil Ex PID used: HNU
 Drilling Method: Earth Probe



BORING LOG FOR RB-14

Project: Suffolk Downs

Project Number: 4314-13

Location: East Boston/Revere

Well Location: 10 feet east of RIZ-5, on northeast edge of Site

Rizzo Associates, Inc.
Engineers and Environmental Scientists
 235 West Central Street, Natick, MA 01760

Installation Date: 12/4/97

Depth of Boring: 5

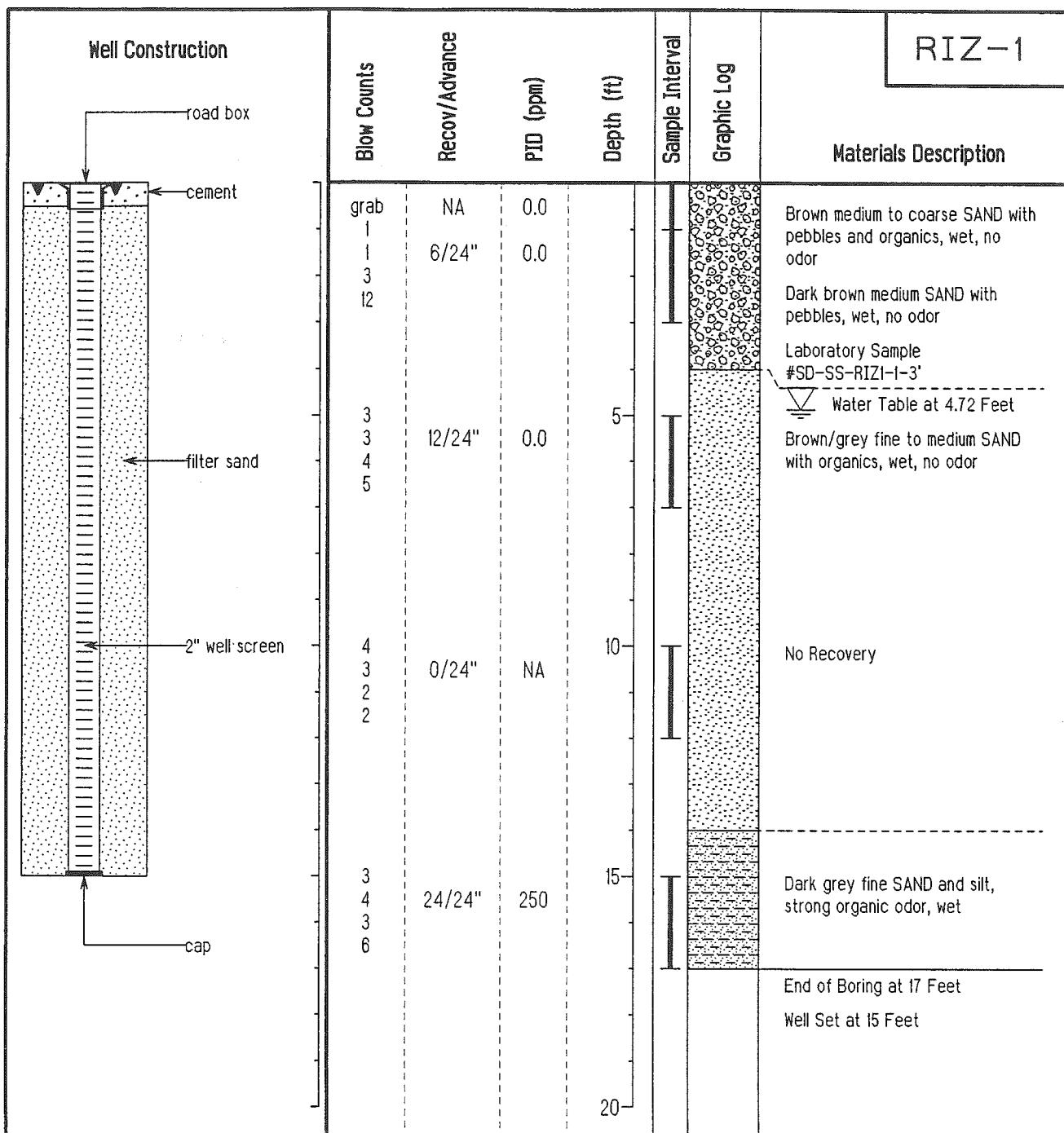
Inspector: Ken Jaeger

Depth to Water: 4

Contractor: Soil Ex

PID used: HNU

Drilling Method: Earth Probe



BORING LOG AND WELL CONSTRUCTION FOR WELL RIZ-1

Project: Suffolk Downs

Project Number: 4314-03

Location: Revere & East Boston

Well Location: Western portion of Site.

Rizzo Associates, Inc.

*Engineers and Environmental Scientists
235 West Central Street, Natick, MA 01760*

Installation Date: 9/30/96

Depth of Boring: 17

Inspector: P. Gentiluomo

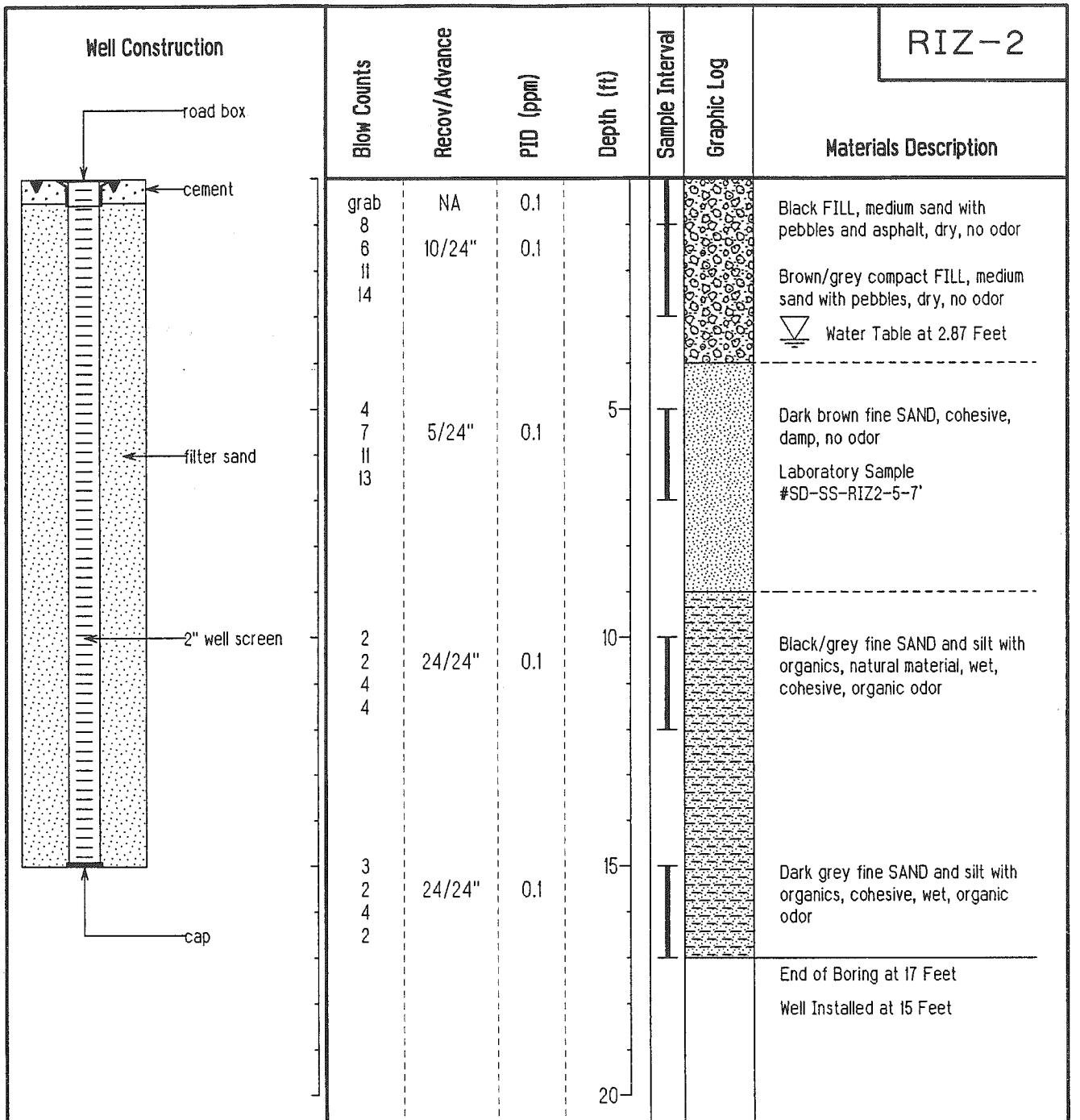
Depth to Water: 4.72

Contractor: Redwing

Surface Elev.: NA

Drilling Method: HSA

PID used: HNu



BORING LOG AND WELL CONSTRUCTION FOR WELL RIZ-2

Project: Suffolk Downs

Project Number: 4314-03

Location: Revere & East Boston

Well Location: Western portion of Site.

Rizzo Associates, Inc.

Engineers and Environmental Scientists
235 West Central Street, Natick, MA 01760

Installation Date: 9/30/96

Depth of Boring: 17

Inspector: P. Gentiluomo

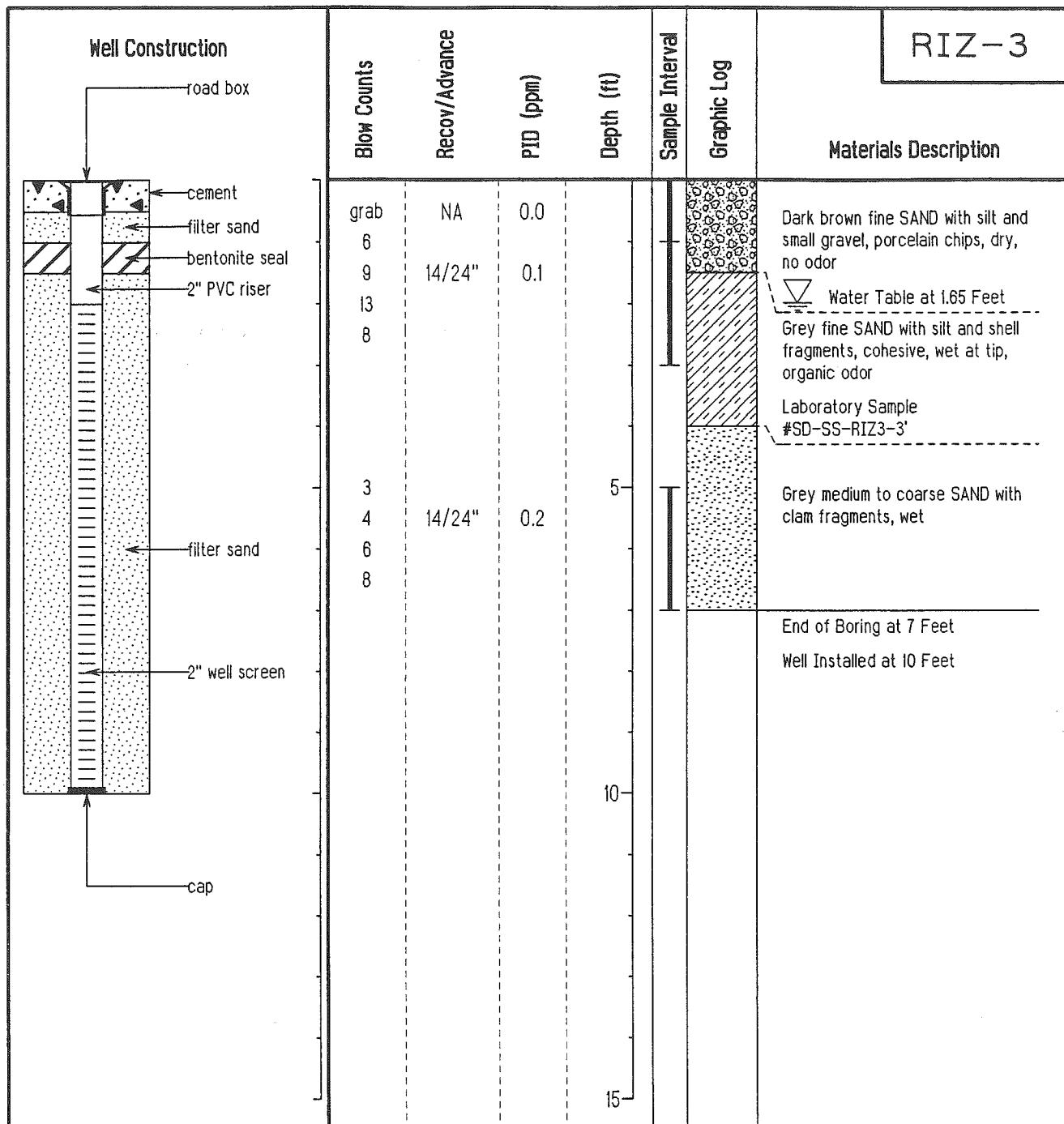
Depth to Water: 2.87

Contractor: Redwing

Surface Elev.: NA

Drilling Method: HSA

PID used: HNu



BORING LOG AND WELL CONSTRUCTION FOR WELL RIZ-3

Project: Suffolk Downs

Project Number: 4314-03

Location: Revere & East Boston

Well Location: Western portion of Site.

Rizzo Associates, Inc.

Engineers and Environmental Scientists
235 West Central Street, Natick, MA 01760

Installation Date: 9/30/96

Depth of Boring: 7

Inspector: K. Jaeger

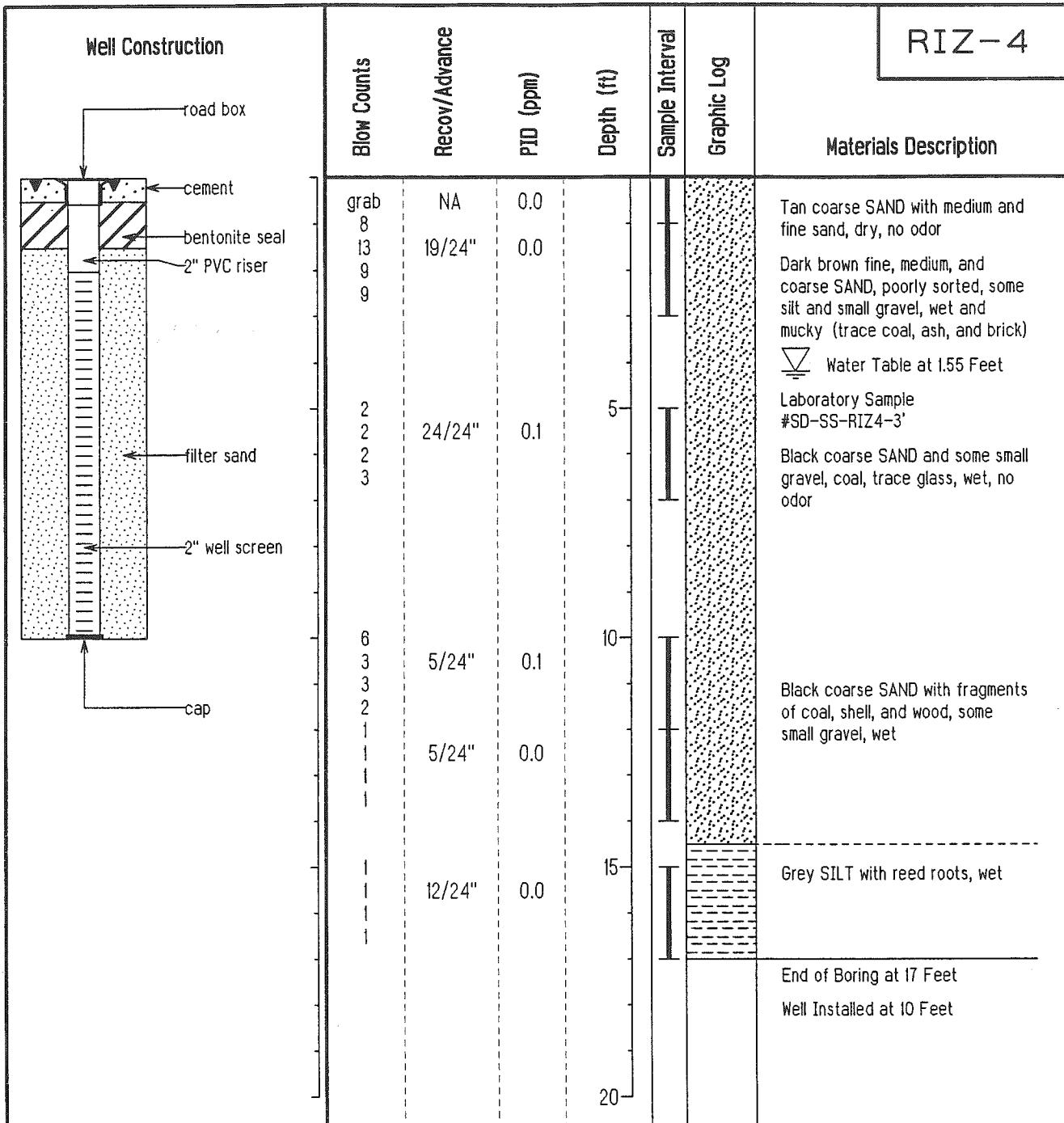
Depth to Water: 1.65

Contractor: Redwing

Surface Elev.: NA

Drilling Method: HSA

PID used: HNu



BORING LOG AND WELL CONSTRUCTION FOR WELL RIZ-4

Project: Suffolk Downs

Project Number: 4314-03

Location: Revere & East Boston

Well Location: Southwestern portion of Site.

Rizzo Associates, Inc.

Engineers and Environmental Scientists
235 West Central Street, Natick, MA 01760

Installation Date: 9/30/96

Depth of Boring: 17

Inspector: K. Jaeger

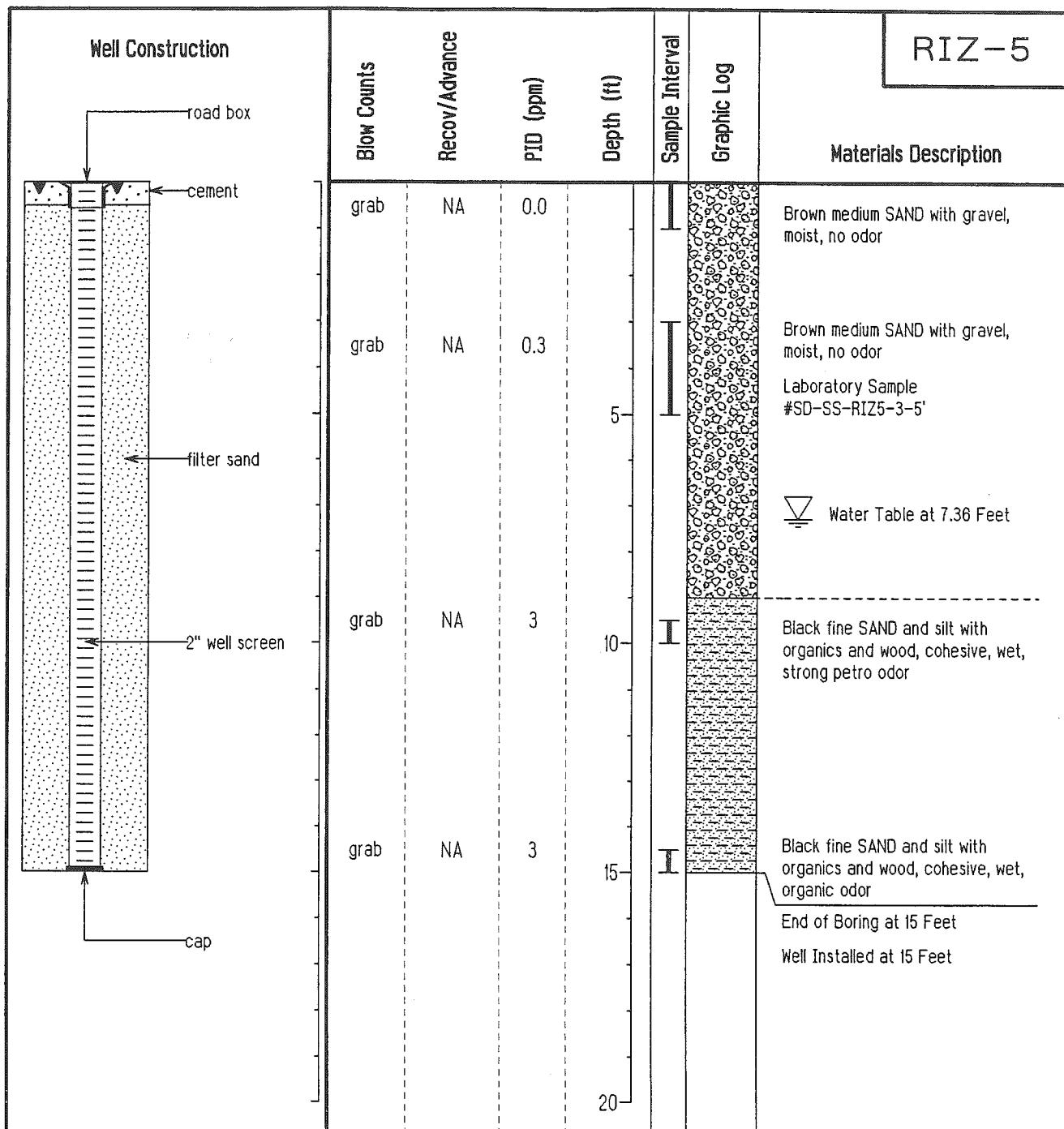
Depth to Water: 1.55

Contractor: Redwing

Surface Elev.: NA

Drilling Method: HSA

PID used: HNu



BORING LOG AND WELL CONSTRUCTION FOR WELL RIZ-5

Project: Suffolk Downs

Project Number: 4314-03

Location: Revere & East Boston

Well Location: Northern portion of stable area.

Rizzo Associates, Inc.

Engineers and Environmental Scientists
235 West Central Street, Natick, MA 01760

Installation Date: 9/30/96

Inspector: P. Gentiliuomo

Contractor: Redwing

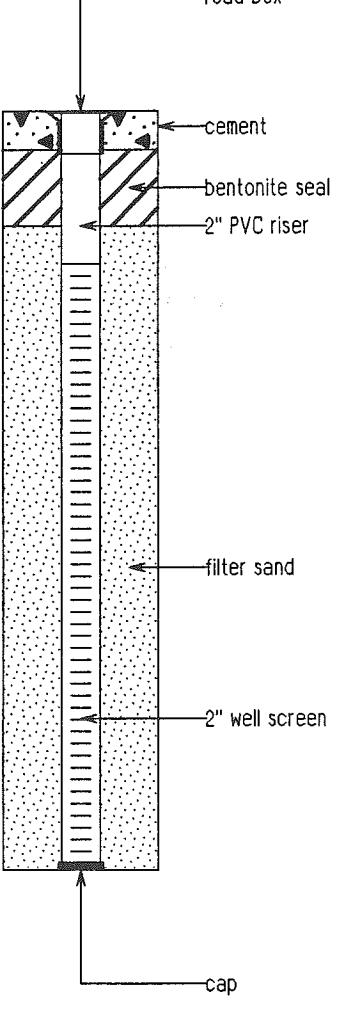
Drilling Method: HSA

Depth of Boring: 15

Depth to Water: 7.36

Surface Elev.: NA

PID used: HNu

Well Construction	Blow Counts	Recov/Advance	PID (ppm)	Depth (ft)	Sample Interval	RIZ-6	
						Graphic Log	Materials Description
	grab 9 11 13 17	NA 14/24"	5.1 45				Brown fine to medium SAND with silt, dry, faint petro odor Dark brown/grey SILT and fine to medium sand with ash and coal, cohesive, moderate petro odor Labroatory Sample #SD-SS-RIZ6-3'
	4 3 4 3	3/24"	8	5			Black medium to coarse SAND, angular, with gravel, porcelain, glass, coal and brick, wet, mild petro odor  Water Table at 5.24 Feet
	2 2 2 2	24/24"	0.5	10 15			Grey CLAY and peat, wet, petro odor End of Boring at 12 Feet Well Installed at 10 Feet

BORING LOG AND WELL CONSTRUCTION FOR WELL RIZ-6

Project: Suffolk Downs

Project Number: 4314-03

Location: Revere & East Boston

Well Location: Located near existing diesel UST.

Rizzo Associates, Inc.

Engineers and Environmental Scientists
235 West Central Street, Natick, MA 01760

Installation Date: 9/30/96

Inspector: K. Jaeger

Contractor: Redwing

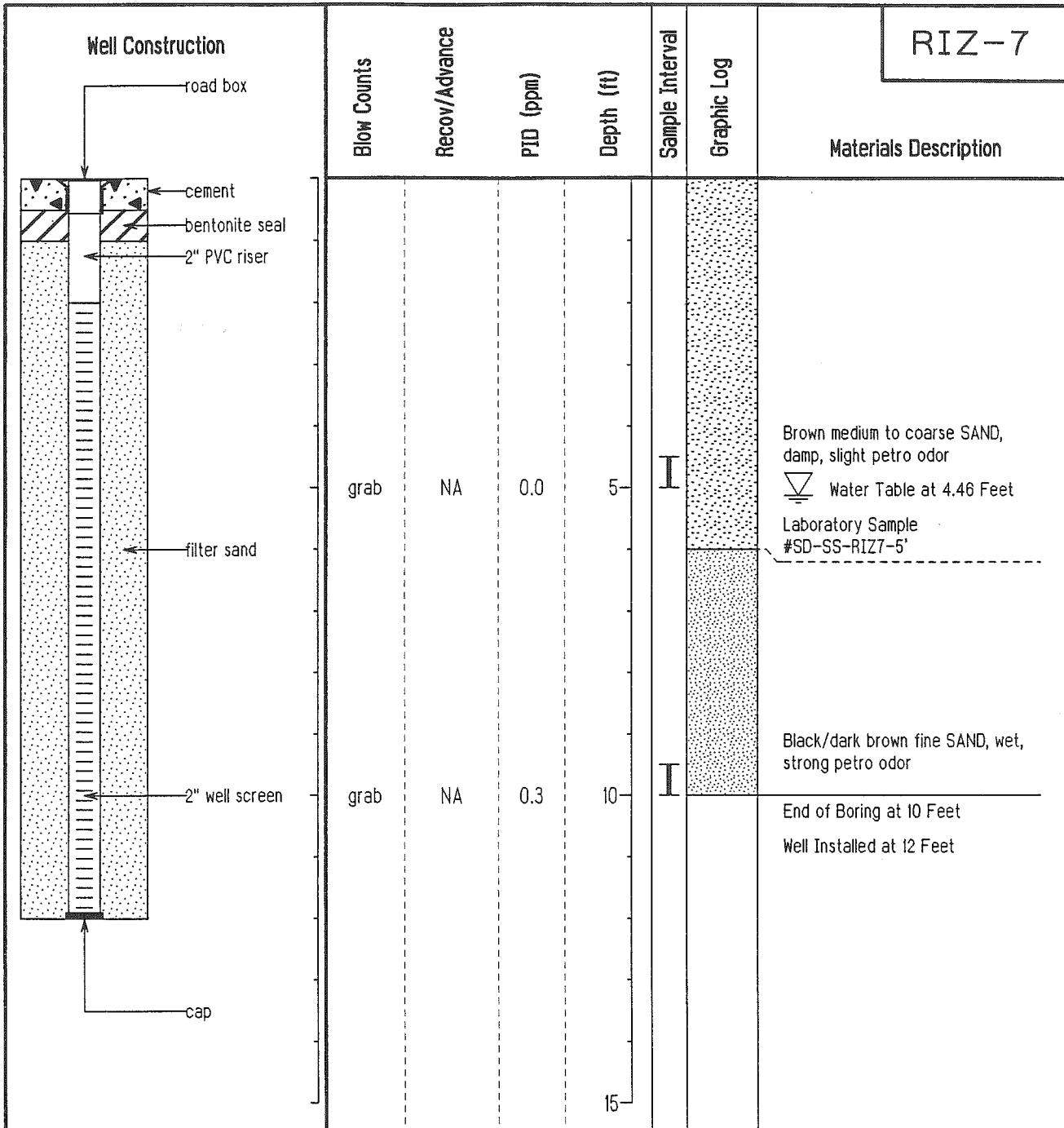
Drilling Method: HSA

Depth of Boring: 12

Depth to Water: 5.24

Surface Elev.: NA

PID used: HNu



BORING LOG AND WELL CONSTRUCTION FOR WELL RIZ-7

Project: Suffolk Downs

Project Number: 4314-03

Location: Revere & East Boston

Well Location: Southeast portion of stable area.

Rizzo Associates, Inc.

*Engineers and Environmental Scientists
235 West Central Street, Natick, MA 01760*

Installation Date: 9/30/96

Inspector: P. Gentiluomo

Contractor: Redwing

Drilling Method: HSA

Depth of Boring: 10

Depth to Water: 4.46

Surface Elev.: NA

PID used: HNu

Well Construction	RIZ-8						
	Blow Counts	Recoy/Advance	PID (ppm)	Depth (ft)	Sample Interval	Graphic Log	Materials Description
	NA	24/48"	0.1				Dark brown/brown medium SAND and gravel, asphalt, damp, no odor
	NA	16/48"	4	5			Dark brown FILL, medium SAND and gravel, asphalt, brick, moist to wet, petro odor
	NA	24/48"	40	10			Black/dark brown FILL, medium SAND and gravel, asphalt, brick, plastic, damp, petro odor
	NA	16/48"	8	15			Laboratory Sample #SD-SS-RIZ8-8-12'
				20			Dark brown FILL, medium SAND and gravel with clay lenses, ash, asphalt, brick, cohesive, wet, slight petro odor Water Table at 13.75 Feet
							End of Boring at 16 Feet Well Installed at 18 Feet

BORING LOG AND WELL CONSTRUCTION FOR WELL RIZ-8

Project: Suffolk Downs

Project Number: 4314-03

Location: Revere & East Boston

Well Location: Southern portion of Site.

Rizzo Associates, Inc.

Engineers and Environmental Scientists
235 West Central Street, Natick, MA 01760

Installation Date: 10/3/96

Inspector: P. Gentiluomo

Contractor: TDS

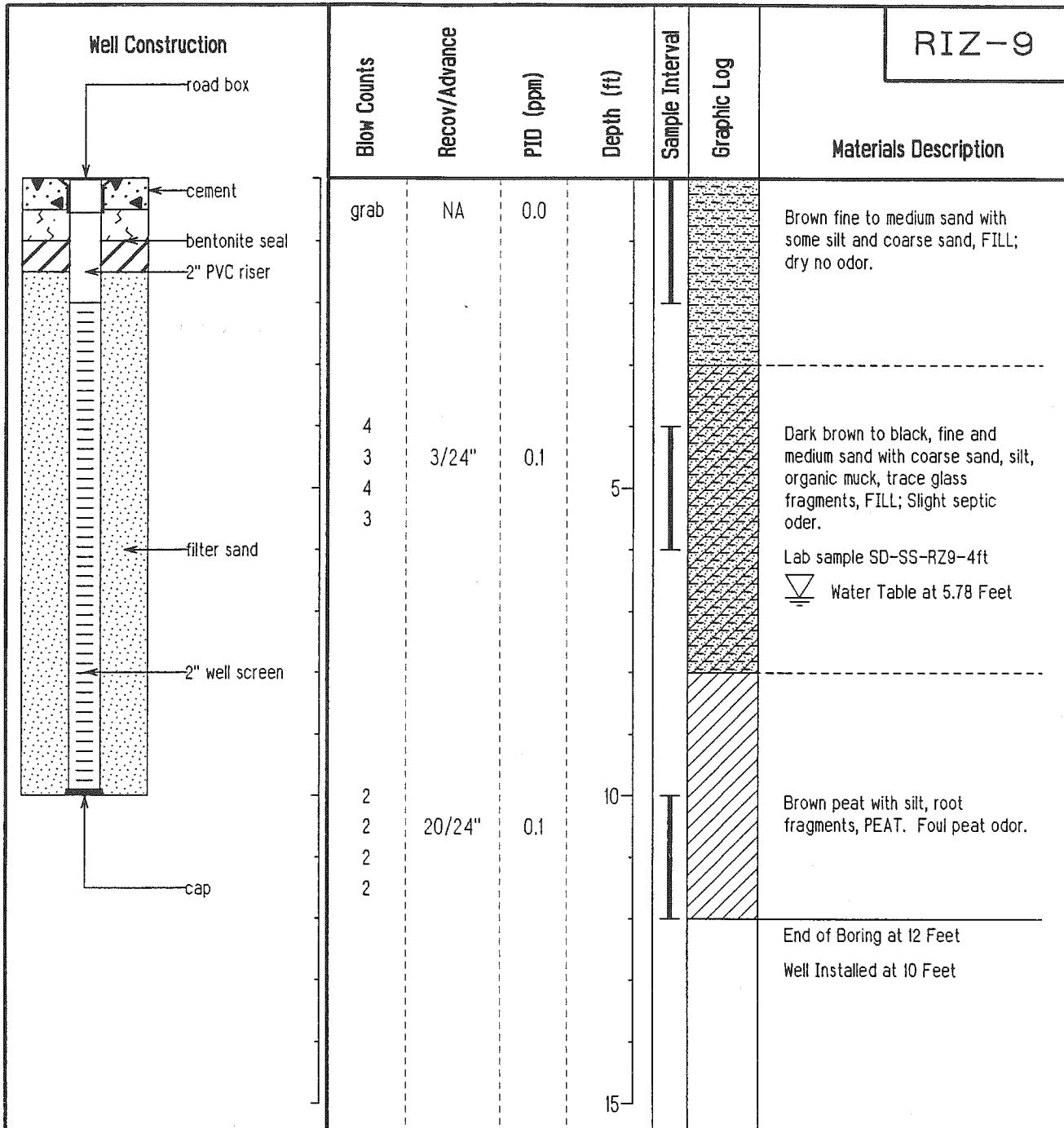
Drilling Method: Geoprobe

Depth of Boring: 16

Depth to Water: 13.75

Surface Elev.: NA

PID used: HNu



BORING LOG AND WELL CONSTRUCTION FOR WELL RIZ-9

Project: Suffolk Downs

Project Number: 4314-03

Location: Revere & East Boston

Well Location: Located 12' east of maintenance garage septic tank

Rizzo Associates, Inc.

*Engineers and Environmental Scientists
235 West Central Street, Natick, MA 01760*

Installation Date: 11/12/96

Depth of Boring: 12

Inspector: K. Jaeger

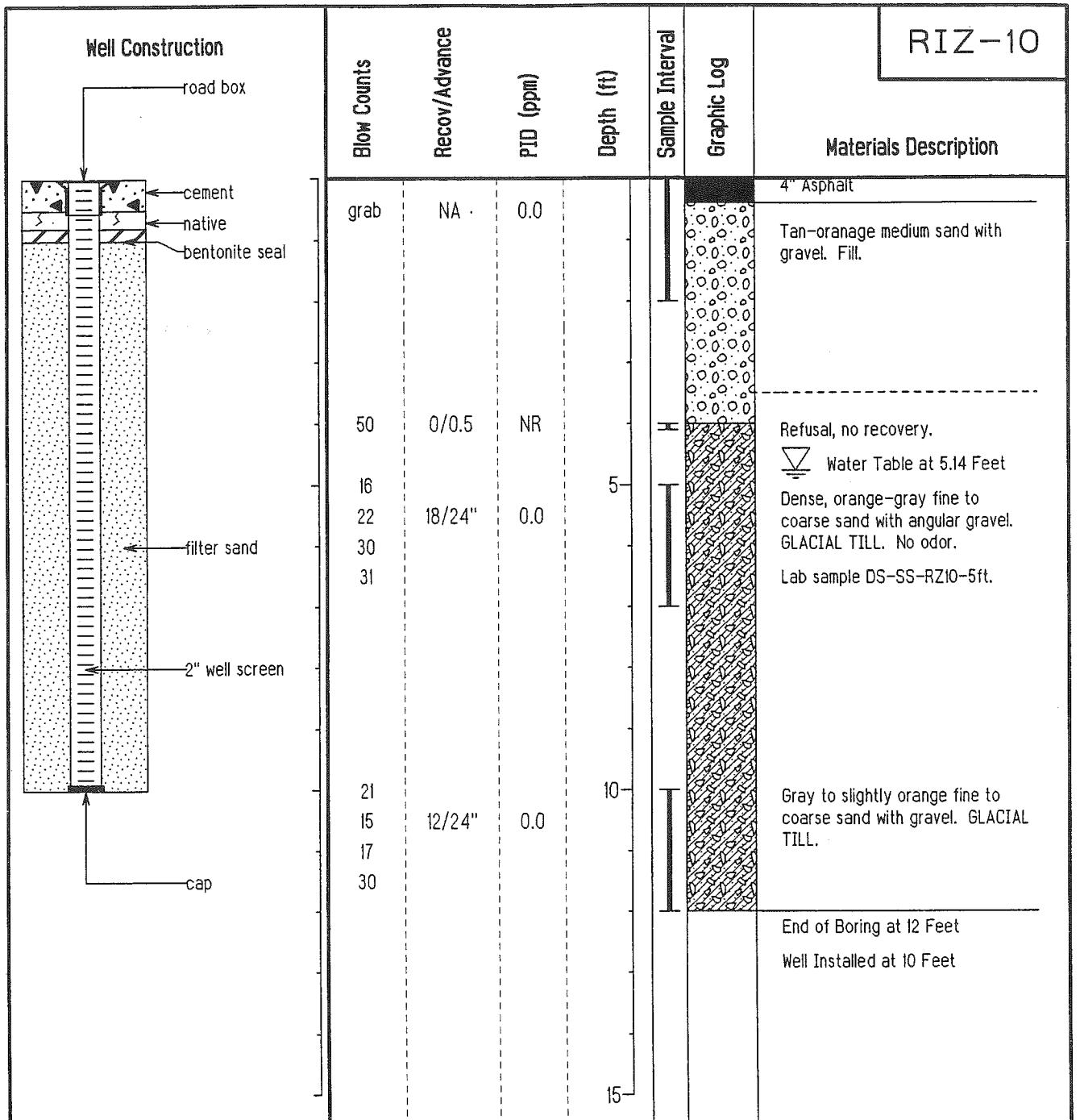
Depth to Water: 5.78

Contractor: Redwing

Surface Elev.: NA

Drilling Method: HSA

PID used: HNu



BORING LOG AND WELL CONSTRUCTION FOR WELL RIZ-10

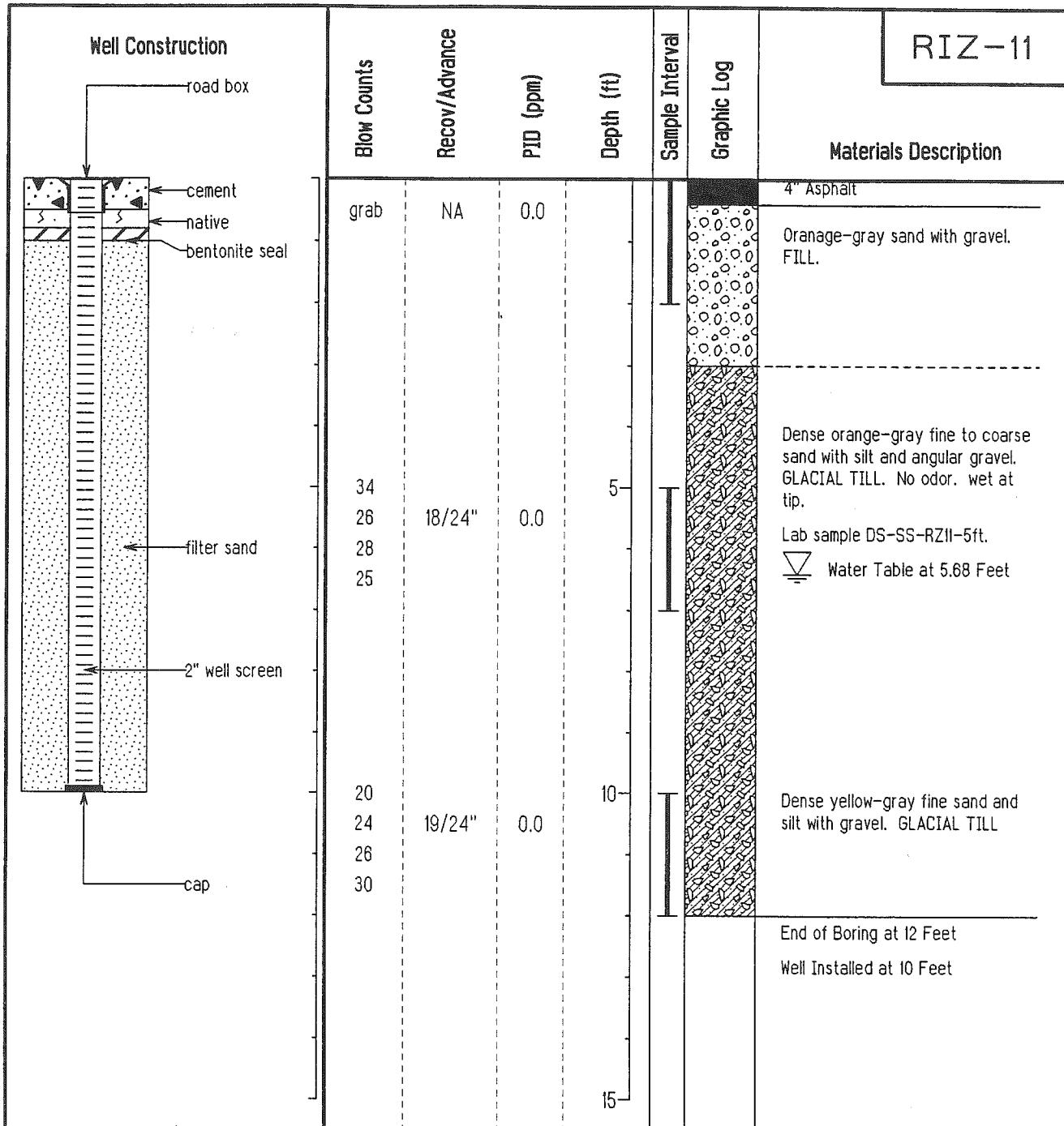
Project: Suffolk Downs

Project Number: 4314-03

Location: Revere & East Boston

Well Location: SW side of Diner Dr., 140' SE of Route 1A, 7' NE 7' NE of edge of pavement

Rizzo Associates, Inc. Engineers and Environmental Scientists 235 West Central Street, Natick, MA 01760	Installation Date: 11/13/96 Inspector: K. Jaeger Contractor: Redwing Drilling Method: HSA	Depth of Boring: 12 Depth to Water: 5.14 Surface Elev.: NA PID used: HNu
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BORING LOG AND WELL CONSTRUCTION FOR WELL RIZ-11

Project: Suffolk Downs

Project Number: 4314-03

Location: Revere & East Boston

Well Location: Located 5.5' west of end of fence between Esco Auto and Suffolk Diner, on NE side of Diner Drive

Rizzo Associates, Inc.

Engineers and Environmental Scientists
235 West Central Street, Natick, MA 01760

Installation Date: 11/13/96

Depth of Boring: 12

Inspector: K. Jaeger

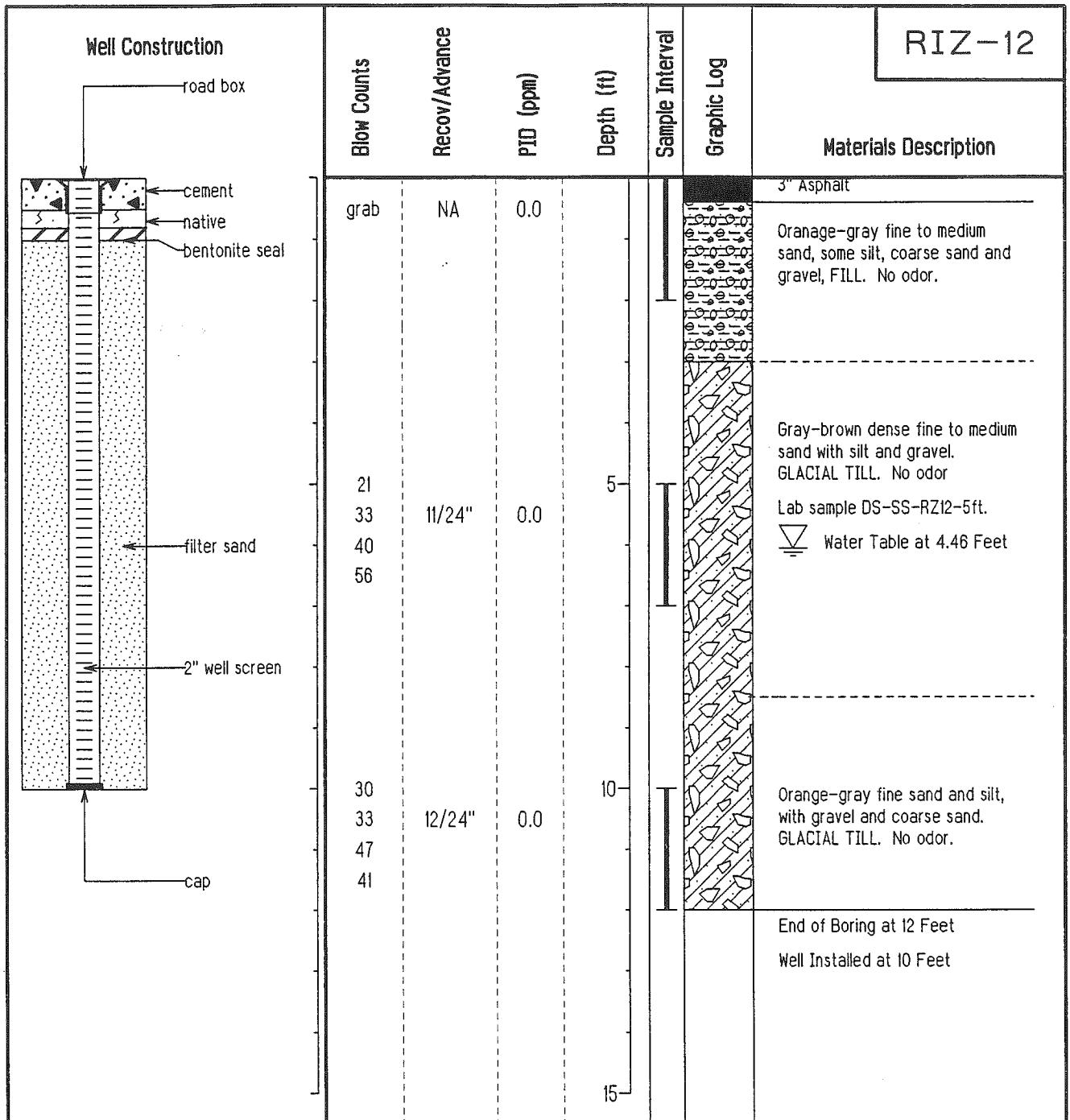
Depth to Water: 5.68

Contractor: Redwing

Surface Elev.: NA

Drilling Method: HSA

PID used: HNu



BORING LOG AND WELL CONSTRUCTION FOR WELL RIZ-12

Project: Suffolk Downs

Project Number: 4314-03

Location: Revere & East Boston

Well Location: Located east edge of Diner Drive, west of the ally between the two Custom Auto Body buildings.

Rizzo Associates, Inc.

Engineers and Environmental Scientists
235 West Central Street, Natick, MA 01760

Installation Date: 11/13/96

Inspector: K. Jaeger

Contractor: Redwing

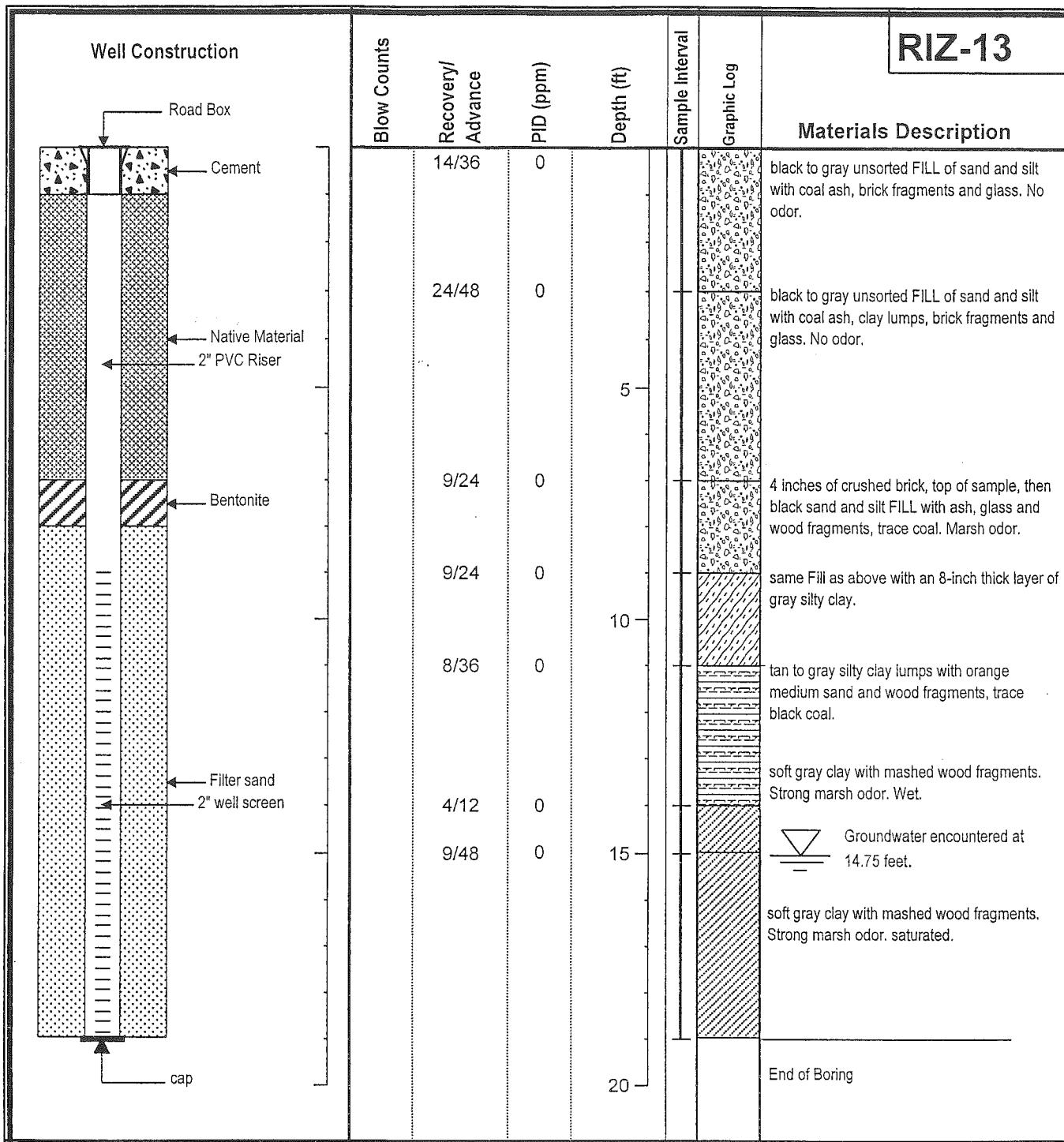
Drilling Method: HSA

Depth of Boring: 12

Depth to Water: 4.33

Surface Elev.: NA

PID used: HNu



BORING LOG AND WELL CONSTRUCTION FOR WELL RIZ-13

Project: Suffolk Downs

Project Number: 4314-13

Location: East Boston/Revere

Well Location: east of former UST location at southwest corner of Clubhouse

Rizzo Associates, Inc.
Engineers and Environmental Scientists
235 West Central Street, Natick, MA 01760

Installation Date: 12/4/97

Depth of Boring: 19

Inspector: Ken Jaeger

Depth to Water: 14.75

Contractor: Soil Ex

PID used: HNU

Drilling Method: Earth Probe

Well Construction		Blow Counts	Recovery/ Advance	PID (ppm)	Depth (ft)	Sample Interval	Graphic Log	RIZ-14
								Materials Description
			18/36	0				black to gray unsorted FILL of sand and silt with coal ash, brick fragments and glass. No odor.
			20/48	0	5			black to gray unsorted FILL of sand and silt with coal ash, clay lumps, brick fragments and glass. No odor.
			18/48	0	10			black sand and silt FILL with ash, glass and wood fragments, trace coal. Marsh odor.
			6/48	0	15			same Fill as above with more coal ash. Wet.
			6/48	0	16			Groundwater encountered at 16.15 feet.
					20			black sand and silt FILL with ash, glass, brick fragments and trace coal. Marsh odor. Saturated.
								End of Boring

BORING LOG AND WELL CONSTRUCTION FOR WELL RIZ-14

Project: Suffolk Downs

Project Number: 4314-13

Location: East Boston/Revere

Well Location: north east of former UST location at southwest corner of Clubhouse

Rizzo Associates, Inc.
Engineers and Environmental Scientists
235 West Central Street, Natick, MA 01760

Installation Date: 12/4/97

Depth of Boring: 19

Inspector: Ken Jaeger

Depth to Water: 16.15

Contractor: Soil Ex

PID used: HNU

Drilling Method: Earth Probe

TEST PIT LOG

PROJECT Suffolk Downs
 LOCATION Revere / East Boston
 CLIENT Lynch, Brewer, Hoffinan & Saito
 CONTRACTOR Environmental Drilling, OPERATOR Dave Morrison
 EQUIPMENT Ford 555 Backhoe
 CAPACITY/REACH ~ 12 ft.
 WEATHER Overcast 30's
 PERFORMED BY K.O'Grady DATE 3-16-97
 CHECKED BY J.Ash DATE 3/26/97

TP-1

PG. 1 OF 1

LOCATION RB-S

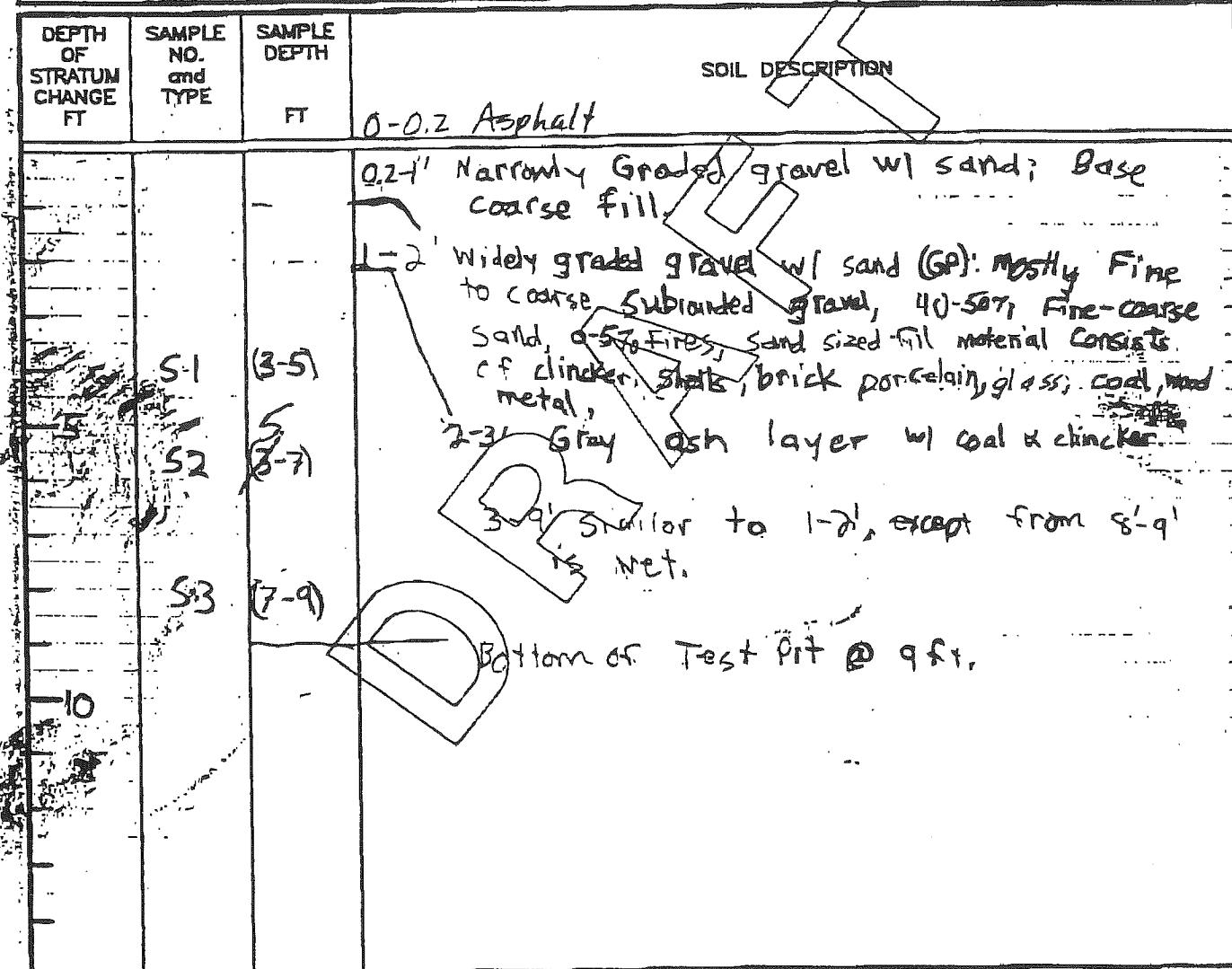
GROUND EL ~ 15 ft.

DATUM NGVD

PROJECT NO. 96337

TIME STARTED 0810

TIME COMPLETED 0900



REMARKS:

$Pb = 1500 \text{ ppm (S1)}$
 $= 1600 \text{ ppm (S2)}$
 $= 2500 \text{ ppm (S3)}$

PIT DIMENSIONS (FT):

LENGTH 11 ft.

WIDTH 3 ft.

DEPTH 9 ft.



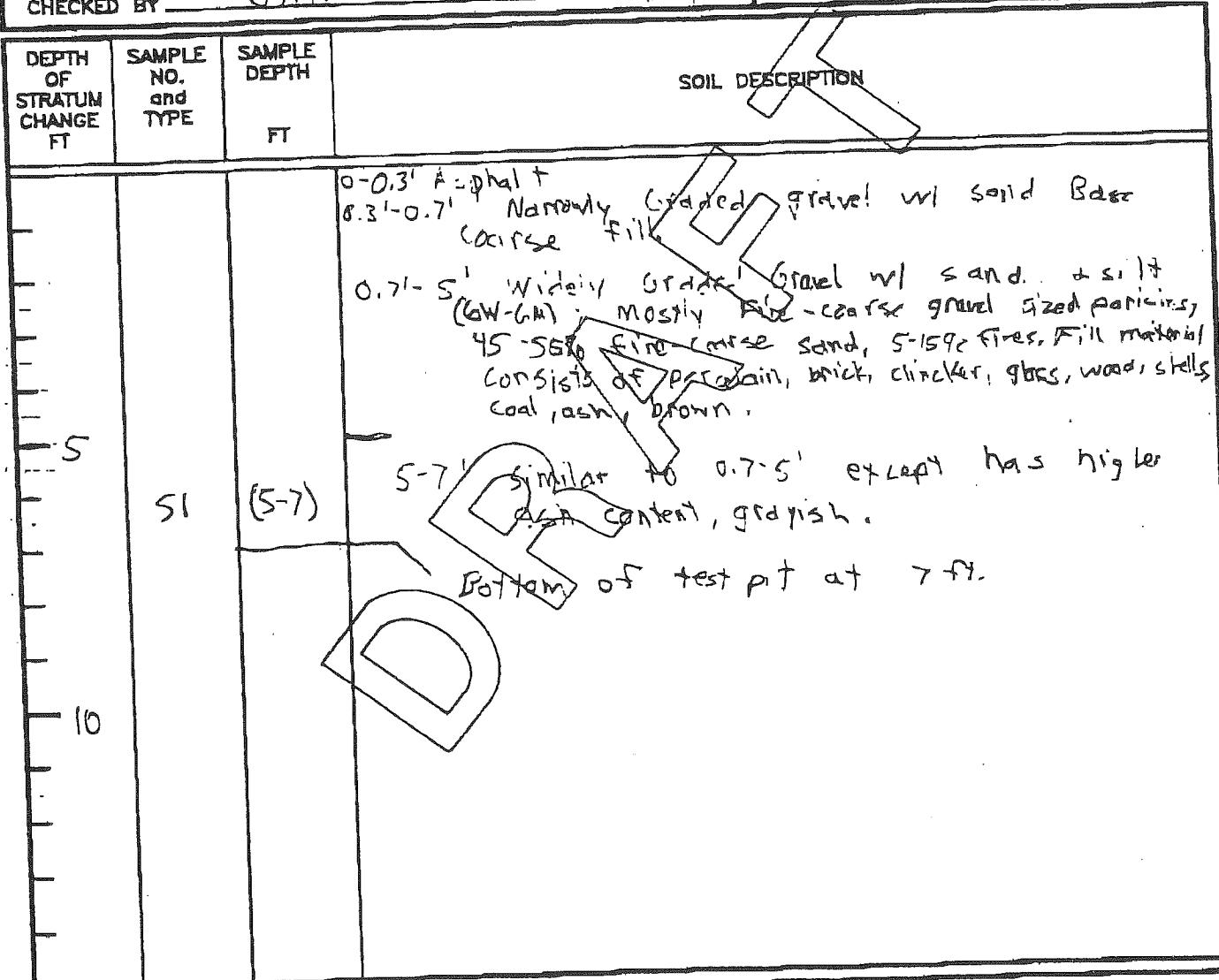
GEI Consultants, Inc.

TEST PIT LOG

PROJECT Suffolk Downs
 LOCATION Revere / East Boston
 CLIENT Lynch, Brewer Hoffman & Son, Inc.
 CONTRACTOR Environmental Dr. OPERATOR Tom Miller
 EQUIPMENT Ford 555 Backhoe
 CAPACITY/REACH ~ 12 ft.
 WEATHER overcast 30's
 PERFORMED BY K O'Brody DATE 3-19-97
 CHECKED BY J. Ash DATE 3/26/97

TP-2

PG. 1 OF 1
 LOCATION ~ 20 ft. South
of RB-5
 GROUND EL ~ 15 ft.
 DATUM NGVD
 PROJECT NO. 96337
 TIME STARTED 0910
 TIME COMPLETED 0940



REMARKS:

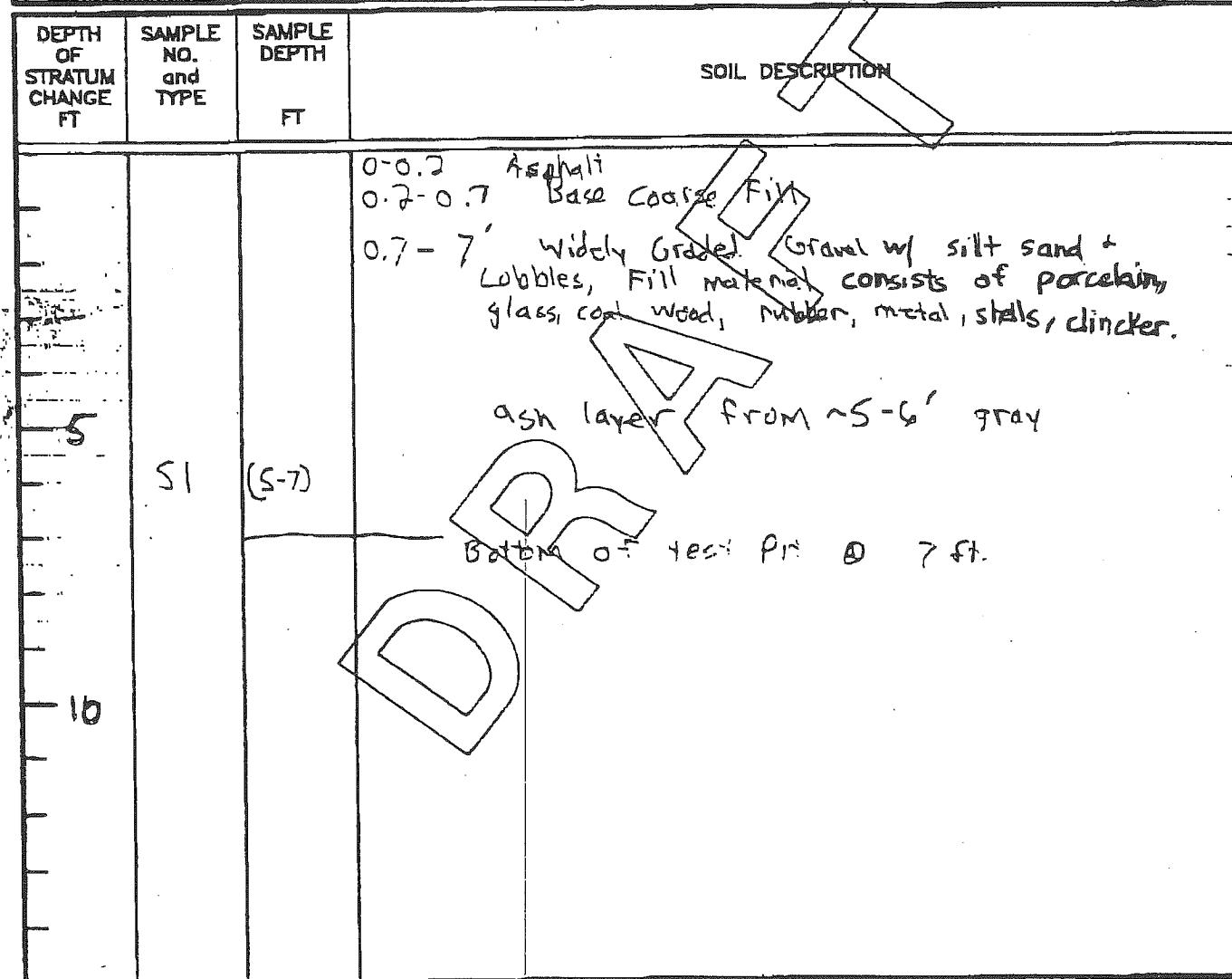
 $Pb = 1100 \text{ ppm}$

PIT DIMENSIONS (FT):
 LENGTH 8 ft.
 WIDTH 5 ft.
 DEPTH 7 ft.



GEI Consultants, Inc.

TEST PIT LOG		TP-3
PROJECT	Suffolk Downs	PG. 1 OF 1
LOCATION	Revere / East Boston	LOCATION ~ 22 ft. West
CLIENT	Lynch, Brewer, Hoffman & Sons	OF RP-S
CONTRACTOR	Environmental Drilling	GROUND EL ~ 15 ft.
OPERATOR	Chris Hartman	DATUM NGVD
EQUIPMENT	Ford 555 Backhoe	PROJECT NO. 96337
CAPACITY/REACH	~ 12 ft.	TIME STARTED 0940
WEATHER	Overscast 30°	TIME COMPLETED 10:00
PERFORMED BY	K. O'Dell	DATE 3-18-97
CHECKED BY	J. Ash	DATE 3/26/97



REMARKS:	tined w/ poly sheeting prior to backfill	PIT DIMENSIONS (FT):
		LENGTH 7
		WIDTH 4
		DEPTH 7 ft.
$Pb = 2700 \text{ ppm}$		 GEI Consultants, Inc.

TEST PIT LOG

PROJECT Suffolk Downs
 LOCATION Revere / East Boston
 CLIENT Lynch, Brewer, Hoffman & Sordi
 CONTRACTOR Environmental Drillers, OPERATOR Dave Harrison
 EQUIPMENT Ford 555 Backhoe
 CAPACITY/REACH ~12 ft.
 WEATHER Overcast 30°
 PERFORMED BY K. O'Grady DATE 3-18-97
 CHECKED BY J. Ash DATE 3/20/97

TP-4

PG. 1 OF 1
 LOCATION ~22 ft. East
of RB-5
 GROUND EL ~15 ft.
 DATUM NGVD
 PROJECT NO. 96333
 TIME STARTED 1005
 TIME COMPLETED 1030

DEPTH " OF STRATUM CHANGE FT	SAMPLE NO. and TYPE	SAMPLE DEPTH FT	SOIL DESCRIPTION
			0-0, 2' Asphalt 0.2-0.6 Base coarse (gravel w/ sand)
5	SI. (5-7)		0.6-7' Widely graded sand w/ silt, gravel and cobbles. Fill material consist of clinker, glass, plastic, brick, porcelain, wood & shells metal, rubber
10			4-5' higher concentration of ash (gray) Bottom of Test pit @ 7'

REMARKS:

Lined w/ poly sheeting
prior to backfill

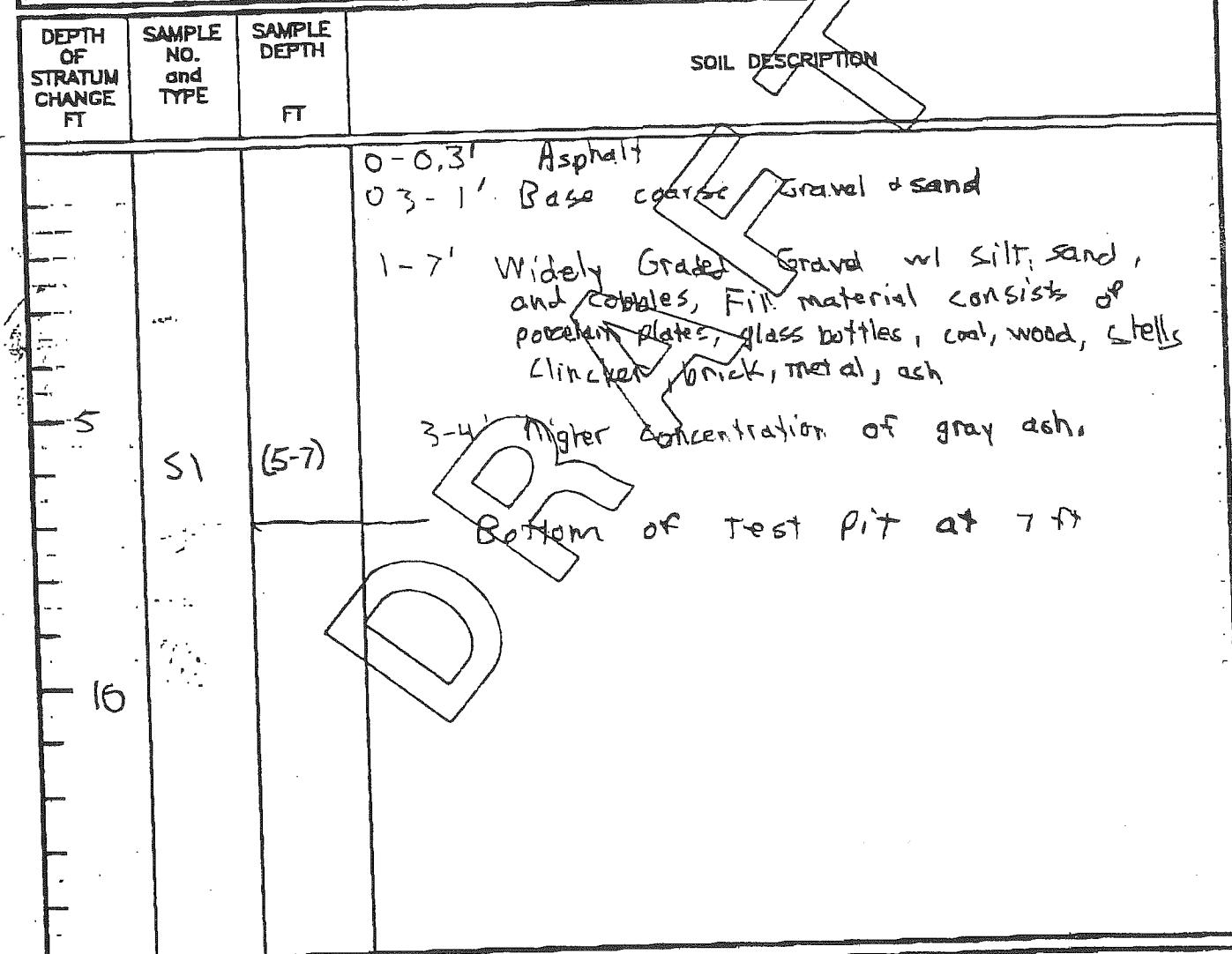
Pb = 790 ppm

PIT DIMENSIONS (FT):

LENGTH 8WIDTH 3DEPTH 7

GEI Consultants, Inc.

TEST PIT LOG		TP-5
PROJECT	Suffolk Downs	PG. 1 OF 1
LOCATION	Revere / East Boston	LOCATION ~ 27 ft North
CLIENT	Lynch, Brewer, Hoffman & Saitle	of RB-5
CONTRACTOR	Environmental Drilling	GROUND EL ~ 15 ft.
EQUIPMENT	Operator Dave Harrison	DATUM N.G.D
CAPACITY/REACH	Ford 555 Backhoe ~ 12 ft.	PROJECT NO. 96337
WEATHER	Overcast 30's	TIME STARTED 1030
PERFORMED BY	K. O'Grody	TIME COMPLETED 1100
CHECKED BY	J. Ash	



REMARKS:	Lined w/ poly. prior to back fill $Pb = 2000 \text{ ppm}$	PIT DIMENSIONS (FT): LENGTH 7 ft WIDTH 3.5 ft DEPTH 7 ft
		Φ GEI Consultants, Inc.

Appendix F

Appendix G

Appendix H

Appendix D

Appendix E

Appendix E
Public Notification Letters

RIZZO ASSOCIATES, INC.

RIZZO ASSOCIATES, INC.

COPY

ENGINEERS AND ENVIRONMENTAL SCIENTISTS
AN EMPLOYEE-OWNED COMPANY

235 West Central Street, Natick, MA 01760-3755 (508) 651-3401 FAX (508) 651-1189

February 12, 1998

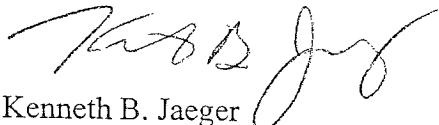
Office of the Mayor
City of Boston
1 City Hall Square
Boston, MA 02201

**Re: Response Action Outcome
Suffolk Downs, East Boston
DEP Site #3-0014857**

Dear Mayor Menino:

This letter is intended to inform that a Response Action Outcome (RAO) Statement for the Suffolk Downs Race Track has been filed with the Massachusetts Department of Environmental Protection, Northeast Regional Office in Woburn. The RAO statement and accompanying report describe environmental site investigation activities conducted at the Site pursuant to the Massachusetts Contingency Plan (MCP)(310 CMR 40.0000). During the environmental investigations we found that a condition of no significant risk to human health or the environment at the Site. This notification is being sent to you to fulfill the public notification requirements of the MCP. The complete RAO filing is available for review at the DEP Northeast Regional Office in Woburn. If you have any questions about this matter, please feel free to call.

Very truly yours,



Kenneth B. Jaeger
Senior Project Geologist

C: DEP Northeast Regional Office, Woburn

COPY

RIZZO ASSOCIATES, INC.

ENGINEERS AND ENVIRONMENTAL SCIENTISTS
AN EMPLOYEE-OWNED COMPANY

235 West Central Street, Natick, MA 01760-3755 (508) 651-3401 FAX (508) 651-1189

February 12, 1998

Health Department
City of Revere
57 Winthrop Ave.
Revere, MA 02151

**Re: Response Action Outcome
Suffolk Downs, Revere/East Boston
DEP Site #3-0014857**

Dear Sir/Madam:

This letter is intended to inform you that a Response Action Outcome (RAO) Statement for the Suffolk Downs Race Track has been filed with the Massachusetts Department of Environmental Protection, Northeast Regional Office in Woburn. The RAO statement and accompanying report describe environmental site investigation activities conducted at the Site pursuant to the Massachusetts Contingency Plan (MCP)(310 CMR 40.0000). During the environmental investigations we found that a condition of no significant risk to human health or the environment at the Site. This notification is being sent to you to fulfill the public notification requirements of the MCP. The complete RAO filing is available for review at the DEP Northeast Regional Office in Woburn. If you have any questions about this matter, please feel free to call.

Very truly yours,



Kenneth B. Jaeger
Senior Project Geologist

C: DEP Northeast Regional Office, Woburn

COPY

RIZZO ASSOCIATES, INC.

ENGINEERS AND ENVIRONMENTAL SCIENTISTS
AN EMPLOYEE-OWNED COMPANY

235 West Central Street, Natick, MA 01760-3755 (508) 651-3401 FAX (508) 651-1189

February 12, 1998

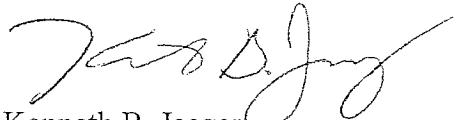
Office of the Mayor
City of Revere
281 Broadway
Revere, MA 02151

**Re: Response Action Outcome
Suffolk Downs, Revere/East Boston
DEP Site #3-0014857**

Dear Mayor Haas:

This letter is intended to inform you that a Response Action Outcome (RAO) Statement for the Suffolk Downs Race Track has been filed with the Massachusetts Department of Environmental Protection, Northeast Regional Office in Woburn. The RAO statement and accompanying report describe environmental site investigation activities conducted at the Site pursuant to the Massachusetts Contingency Plan (MCP)(310 CMR 40.0000). During the environmental investigations we found that a condition of no significant risk to human health or the environment at the Site. This notification is being sent to you to fulfill the public notification requirements of the MCP. The complete RAO filing is available for review at the DEP Northeast Regional Office in Woburn. If you have any questions about this matter, please feel free to call.

Very truly yours,



Kenneth B. Jaeger
Senior Project Geologist

C: DEP Northeast Regional Office, Woburn

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RIZZO ASSOCIATES, INC.

COPY

ENGINEERS AND ENVIRONMENTAL SCIENTISTS
AN EMPLOYEE-OWNED COMPANY

235 West Central Street, Natick, MA 01760-3755 (508) 651-3401 FAX (508) 651-1189

February 12, 1998

Health and Hospitals Department
818 Harrison Avenue
Boston, MA 02118

**Re: Response Action Outcome
Suffolk Downs, East Boston
DEP Site #3-0014857**

Dear Sir/Madam:

This letter is intended to inform you that a Response Action Outcome (RAO) Statement for the Suffolk Downs Race Track has been filed with the Massachusetts Department of Environmental Protection, Northeast Regional Office in Woburn. The RAO statement and accompanying report describe environmental site investigation activities conducted at the Site pursuant to the Massachusetts Contingency Plan (MCP)(310 CMR 40.0000). During the environmental investigations we found that a condition of no significant risk to human health or the environment at the Site. This notification is being sent to you to fulfill the public notification requirements of the MCP. The complete RAO filing is available for review at the DEP Northeast Regional Office in Woburn. If you have any questions about this matter, please feel free to call.

Very truly yours,



Kenneth B. Jaeger
Senior Project Geologist

C: DEP Northeast Regional Office, Woburn

G:\project\4314\4314-13\RAOpublicnotification\bostonhealth.doc

Appendix F

Appendix F
RAO Transmittal Form (copy)

RIZZO ASSOCIATES, INC.



Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

RESPONSE ACTION OUTCOME (RAO) STATEMENT &
DOWNGRADIENT PROPERTY STATUS TRANSMITTAL FORM
Pursuant to 310 CMR 40.0180 (Subpart B), 40.0580 (Subpart E) & 40.1056 (Subpart J)

BWSC-104
COPY
Release Tracking Number
3 - 0014857

A. SITE OR DOWNGRADIENT PROPERTY LOCATION:

Site Name: (optional) Suffolk Downs

Street: 111 Waldemar Avenue

Location Aid: Route 1A

City/Town: East Boston and Revere

ZIP Code: 02182

Check here if this Site location is Tier Classified. If a Tier I Permit has been issued, state the Permit Number: _____

Related Release Tracking Numbers that this Form Addresses: _____

If submitting an RAO Statement, you must document the location of the Site or the location and boundaries of the Disposal Site subject to this Statement. If submitting an RAO Statement for a PORTION of a Disposal Site, you must document the location and boundaries for both the portion subject to this submittal and, to the extent defined, the entire Disposal Site. If submitting a Downgradient Property Status Submittal, you must provide a site plan of the property subject to the submittal and, to the extent defined, the Disposal Site.

B. THIS FORM IS BEING USED TO: (check all that apply)

- Submit a Response Action Outcome (RAO) Statement (complete Sections A, B, C, D, E, F, H, I, J and L).
 Check here if this is a revised RAO Statement. Date of Prior Submittal: _____
 Check here if any Response Actions remain to be taken to address conditions associated with any of the Releases whose Release Tracking Numbers are listed above. This RAO Statement will record only an RAO-Partial Statement for those Release Tracking Numbers.
Specify Affected Release Tracking Numbers: _____
 Submit an optional Phase I Completion Statement supporting an RAO Statement or Downgradient Property Status Submittal (complete Sections A, B, H, I, J, and L).
 Submit a Downgradient Property Status Submittal (complete Sections A, B, G, H, I, J and K).
 Check here if this is a revised Downgradient Property Status Submittal. Date of Prior Submittal: _____
 Submit a Termination of a Downgradient Property Status Submittal (complete Sections A, B, I, J and L).
 Submit a Periodic Review Opinion evaluating the status of a Temporary Solution (complete Sections A, B, H, I, J and L).
Specify one: For a Class C RAO For a Waiver Completion Statement indicating a Temporary Solution

Provide Submittal Date of RAO Statement or Waiver Completion Statement: _____

You must attach all supporting documentation required for each use of form indicated, including copies of any Legal Notices and Notices to Public Officials required by 310 CMR 40.1400.

C. DESCRIPTION OF RESPONSE ACTIONS: (check all that apply)

- Assessment and/or Monitoring Only
 Removal of Contaminated Soils
 Re-use, Recycling or Treatment
 On Site Off Site Est. Vol.: _____ cubic yards
 Describe: _____
 Landfill Cover Disposal Est. Vol.: _____ cubic yards
 Removal of Drums, Tanks or Containers
 Describe: _____
 Removal of Other Contaminated Media
 Specify Type and Volume: _____
 Other Response Actions
 Describe: _____
- Deployment of Absorbant or Contaminant Materials
 Temporary Covers or Caps
 Bioremediation
 Soil Vapor Extraction
 Structure Venting System
 Product or NAPL Recovery
 Groundwater Treatment Systems
 Air Sparging
 Temporary Water Supplies
 Temporary Evacuation or Relocation of Residents
 Fencing and Sign Posting

SECTION C IS CONTINUED ON THE NEXT PAGE.



Release Tracking Number
3 - 0014857

**RESPONSE ACTION OUTCOME (RAO) STATEMENT &
DOWNGRADIENT PROPERTY STATUS TRANSMITTAL FORM**
Pursuant to 310 CMR 40.0180 (Subpart B), 40.0580 (Subpart E) & 40.1056 (Subpart J)

C. DESCRIPTION OF RESPONSE ACTIONS: (continued)

- Check here if any Response Action(s) that serve as the basis for this RAO Statement involve the use of Innovative Technologies. (DEP is interested in using this information to create an Innovative Technologies Clearinghouse.)

Describe Technologies: _____

D. TRANSPORT OF REMEDIATION WASTE: (If Remediation Waste was sent to an off-site facility, answer the following questions)

Name of Facility: N/A

Town and State: _____

Quantity of Remediation Waste Transported to Date: _____

E. RESPONSE ACTION OUTCOME CLASS:

Specify the Class of Response Action Outcome that applies to the Site or Disposal Site. Select ONLY one Class:

- Class A-1 RAO: Specify one of the following:

Contamination has been reduced to background levels. A Threat of Release has been eliminated.

- Class A-2 RAO: You MUST provide justification that reducing contamination to background levels is Infeasible.

- Class A-3 RAO: You MUST provide both an Implemented Activity and Use Limitation (AUL) and justification that reducing contamination to background levels is Infeasible.

If applicable, provide the earlier of the AUL expiration date or date the design life of the remedy will end: _____

- Class B-1 RAO: Specify one of the following:

Contamination is consistent with background levels Contamination is NOT consistent with background levels.

- Class B-2 RAO: You MUST provide an implemented AUL.

If applicable, provide the AUL expiration date: _____

- Class C RAO: Check here if you will conduct post-RAO Operation, Maintenance and Monitoring at the Site.

Specify One: Passive Operation and Maintenance Monitoring Only

Active Operation and Maintenance (defined at 310 CMR 40.0006)

F. RESPONSE ACTION OUTCOME INFORMATION:

- If an RAO Compliance Fee is required, check here to certify that the fee has been submitted. You MUST attach a photocopy of the payment.

- Check here if submitting one or more AULs. You must attach an AUL Transmittal Form (BWSC-113) and a copy of each implemented AUL related to this RAO Statement. Specify the type of AUL(s) below: (required for all Class A-3 RAOs and Class B-2 RAOs)

Notice of Activity and Use Limitation

Grant of Environmental Restriction

Number of AULs attached: _____

Specify the Risk Characterization Method(s) used to achieve the RAO described above and all Soil and Groundwater Categories applicable to the Site.

More than one Soil Category and more than one Groundwater Category may apply at a Site.
Be sure to check off all APPLICABLE categories, even if more stringent soil and groundwater standards were met.

Risk Characterization Method(s) Used:

Method 1

Method 2

Method 3

Soil Category(ies) Applicable:

S-1

S-2

S-3

Groundwater Category(ies) Applicable:

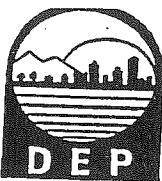
GW-1

GW-2

GW-3

> When submitting any Class A-1 RAO or a Class B-1 RAO where contamination is consistent with background levels, do NOT specify a Risk Characterization Method.

> When submitting any Class A-2 RAO or a Class B-1 RAO where contamination is NOT consistent with background levels, you cannot use an AUL to maintain a level of no significant risk. Therefore, you must meet S-1 Soil Standards, if using Risk Characterization



Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC-104

Release Tracking Number

3 - 0014857

**RESPONSE ACTION OUTCOME (RAO) STATEMENT &
DOWNGRADIENT PROPERTY STATUS TRANSMITTAL FORM**
Pursuant to 310 CMR 40.0180 (Subpart B), 40.0580 (Subpart E) & 40.1056 (Subpart J)

G. DOWNGRADIENT PROPERTY STATUS SUBMITTAL:

- If a Downgradient Property Status Submittal Compliance Fee is required, check here to certify that the fee has been submitted. You MUST attach a photocopy of the payment.
- Check here if a Release(s) of Oil or Hazardous Material(s), other than that which is the subject of this submittal, has occurred at this property.

Release Tracking Number(s): _____

- Check here if the Releases identified above require further Response Actions pursuant to 310 CMR 40.0000.

Required documentation for a Downgradient Property Status Submittal includes, but is not limited to, copies of notices provided to owners and operators of both upgradient and downgradient abutting properties and of any known or suspected source properties.

H. LSP OPINION:

I attest under the pains and penalties of perjury that I have personally examined and am familiar with this transmittal form, including any and all documents accompanying this submittal. In my professional opinion and judgment based upon application of (i) the standard of care in 309 CMR 4.02(1), (ii) the applicable provisions of 309 CMR 4.02(2) and (3), and (iii) the provisions of 309 CMR 4.03(5), to the best of my knowledge, information and belief,

> If Section B indicates that a Downgradient Property Status Submittal is being provided, the response action(s) that is (are) the subject of this submittal (i) has (have) been developed and implemented in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in 310 CMR 40.0183(2)(b), and (iii) complies(y) with the identified provisions of all orders, permits, and approvals identified in this submittal;

> If Section B indicates that either an RAO Statement, Phase I Completion Statement and/or Periodic Review Opinion is being provided, the response action(s) that is (are) the subject of this submittal (i) has (have) been developed and implemented in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, and (iii) complies(y) with the identified provisions of all orders, permits, and approvals identified in this submittal.

I am aware that significant penalties may result, including, but not limited to, possible fines and imprisonment, if I submit information which I know to be false, inaccurate or materially incomplete.

- Check here if the Response Action(s) on which this opinion is based, if any, are (were) subject to any order(s), permit(s) and/or approval(s) issued by DEP or EPA. If the box is checked, you MUST attach a statement identifying the applicable provisions thereof.

LSP Name: Richard J. Hughto

LSP #: 2261

Stamp: _____

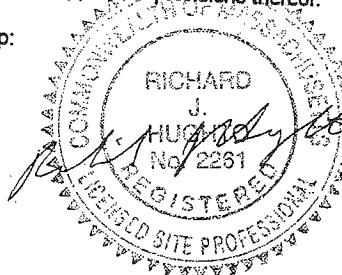
Telephone: (508) 651-3401

Ext.: _____

FAX: (optional) (508) 651-1189

Signature: Richard J. Hughto

Date: 12 February 1998



COPY

PERSON MAKING SUBMITTAL:

Name of Organization: Sterling Suffolk Racecourse, LLC

Name of Contact: Mr. Robert O'Malley

Title: Chief Operating Officer

Street: 111 Waldermar Avenue

State: MA ZIP Code: 02182

City/Town: East Boston

Telephone: (617) 567-3900

Ext.: _____

FAX: (optional) _____

RELATIONSHIP TO SITE OF PERSON MAKING SUBMITTAL:

(check one)

RP or PRP Specify: Owner Operator Generator Transporter Other RP or PRP: _____

Fiduciary, Secured Lender or Municipality with Exempt Status (as defined by M.G.L. c. 21E, s. 2)

Agency or Public Utility on a Right of Way (as defined by M.G.L. c. 21E, s. 5(j))

Any Other Person Submitting This Form Specify Relationship: _____



Release Tracking Number
 -

**RESPONSE ACTION OUTCOME (RAO) STATEMENT &
DOWNGRADIENT PROPERTY STATUS TRANSMITTAL FORM**
Pursuant to 310 CMR 40.0180 (Subpart B), 40.0580 (Subpart E) & 40.1056 (Subpart J)

K. CERTIFICATION OF PERSON SUBMITTING DOWNGRADIENT PROPERTY STATUS SUBMITTAL:

I, _____, attest under the pains and penalties of perjury (i) that I have personally examined and am familiar with the information contained in this submittal, including any and all documents accompanying this transmittal form; (ii) that, based on my inquiry of those individual(s) immediately responsible for obtaining the information, the material information contained herein is, to the best of my knowledge, information and belief, true, accurate and complete; (iii) that, to the best of my knowledge, information and belief, I/the person(s) or entity(ies) on whose behalf this submittal is made satisfy(ies) the criteria in 310 CMR 40.0183(2); (iv) that I/the person(s) or entity(ies) on whose behalf this submittal is made have provided notice in accordance with 310 CMR 40.0183(5); and (v) that I am fully authorized to make this attestation on behalf of the person(s) or entity(ies) legally responsible for this submittal. I/the person(s) or entity(ies) on whose behalf this submittal is made is/are aware that there are significant penalties, including, but not limited to, possible fines and imprisonment, for willfully submitting false, inaccurate, or incomplete information.

By: _____ Title: _____
(signature)

For: _____ Date: _____
(print name of person or entity recorded in Section I)

Enter address of the person providing certification, if different from address recorded in Section I:

Street: _____

City/Town: _____ State: _____ ZIP Code: _____

Telephone: _____ Ext.: _____ FAX: (optional) _____

L. CERTIFICATION OF PERSON MAKING SUBMITTAL:

If you are completing only a Downgradient Property Status Submittal, you do not need to complete this section of the form.

I, Robert O'Malley, attest under the pains and penalties of perjury (i) that I have personally examined and am familiar with the information contained in this submittal, including any and all documents accompanying this transmittal form, (ii) that, based on my inquiry of those individuals immediately responsible for obtaining the information, the material information contained in this submittal is, to the best of my knowledge and belief, true, accurate and complete, and (iii) that I am fully authorized to make this attestation on behalf of the entity legally responsible for this submittal. I/the person or entity on whose behalf this submittal is made am/is aware that there are significant penalties, including, but not limited to, possible fines and imprisonment, for willfully submitting false, inaccurate, or incomplete information.

By: Robert O'Malley Title: Chief Operating Officer
(signature)

For: Sterling Suffolk Racecourse, LLC Date: 2/10/97
(print name of person or entity recorded in Section I)

Enter address of the person providing certification, if different from address recorded in Section I:

Street: _____

City/Town: _____ State: _____ ZIP Code: _____

Telephone: _____ Ext.: _____ FAX: (optional) _____

COPY

YOU MUST COMPLETE ALL RELEVANT SECTIONS OF THIS FORM OR DEP MAY RETURN THE DOCUMENT AS INCOMPLETE. IF YOU SUBMIT AN INCOMPLETE FORM, YOU MAY BE PENALIZED FOR MISSING A REQUIRED DEADLINE, AND YOU MAY INCUR ADDITIONAL COMPLIANCE FEES.

Statement of Limitations and Conditions

Attachment to Opinion of Massachusetts Licensed Site Professional

Rizzo Associates, Inc.

Name of Licensed Site Professional	Richard J. Hughto
LSP Registration Number:	2261
Date of Opinion	February 12, 1998
Client to Whom Opinion was Rendered	Sterling Suffolk Racecourse, LLC
Date of Agreement between Rizzo Associates and Client pursuant to which Opinion was Rendered:	September 30, 1997
Response Tracking No./Site No.:	3-0014857

This Statement of Limitations and Conditions is an integral part of, and is incorporated by reference into, the Opinion of Massachusetts Licensed Site Professional referenced above.

Limitations

I. Purpose of Opinion

- A. This Opinion is being provided in compliance with the requirements set forth in the Massachusetts Contingency Plan ("MCP"), 310 CMR 40.0000 et seq. Specifically, the LSP has prepared this Opinion at the request of the Client identified above as part of an Response Action Outcome Statement Opinion. This stated purpose has been a significant factor in determining the scope and level of services required to render this Opinion.
- B. Should the purpose for which this Opinion is to be used change, this Opinion shall no longer be valid.

2. General

- A. This Opinion was prepared for the sole and exclusive use of the Client, subject to the provisions of the MCP. No other party is entitled to rely in any way on the conclusions, observations, specifications, or data contained herein without the express

written consent of Rizzo Associates, Inc. and the LSP who rendered this opinion. Any use of this Opinion by anyone other than Client, or any use of this Opinion by Client or others for any purpose other than the stated purpose set forth above, without the LSP's review and the written authorization of Rizzo Associates, Inc. and the LSP, shall be at the user's sole risk, and neither Rizzo Associates, Inc. nor the LSP shall have any liability or responsibility therefor.

- B. This Opinion was prepared pursuant to an Agreement between Rizzo Associates, Inc. and the Client referenced above which defines the scope of work and sets out agreements regarding waivers of consequential damages, limitations on liability, and other important conditions and restrictions pursuant to which the Opinion is rendered. All uses of the Opinion are subject to and deemed acceptance of the conditions and restrictions contained in such Agreement. A copy of the Agreement or relevant excerpts from the Agreement will be made available upon requests to any authorized person seeking to use the Opinion.

3. Scope of Services

The observations and conclusions described in this Opinion are based solely on the Services provided pursuant to the Agreement with the Client and any approved additional services authorized by Client. Without limitation of any other applicable limitations or conditions, neither Rizzo Associates, Inc. nor the LSP shall be liable for the existence of any condition, the discovery of which would have required the performance of services not authorized under the Agreement. To the best of the knowledge and belief of Rizzo Associates, Inc. and the LSP who signed this Opinion, no inquiry of an attorney-at-law having been made, no laws, regulations, orders, permits or approvals are applicable to the response actions to which this opinion relates except, if and to the extent applicable, M.G.L.c. 21A, Sections 19-19J, 309 CMR, M.G.L.c. 21E and 310 CMR 40.0000. Accordingly, this opinion is not intended to and does not address compliance with any other laws, regulation, orders, permits or approvals.

4. Changed Circumstances

The passage of time may result in changes in technology, economic conditions or regulatory standards, manifestations of latent conditions, or the occurrence of future events which would render this Opinion inaccurate or otherwise inapplicable. Neither Rizzo Associates, Inc. nor the LSP shall be liable or responsible for the consequences of any such changed circumstances or conditions on the accuracy of this Opinion. In addition, under no circumstances shall the Client nor any other person or entity rely on the information or conclusions contained in this Opinion after six months from its date of submission without the express written consent of Rizzo Associates, Inc. and the LSP. Reliance on the Opinion after such period of time shall be at the user's sole risk.

5. Should Rizzo Associates, Inc. or the LSP be required or requested to review or authorize others to use this Opinion after its date of submission, Rizzo Associates, Inc. shall be entitled to additional compensation at then existing rates or such other terms as may be agreed upon between Rizzo Associates, Inc. and the Client. Nothing herein contained shall be deemed to require Rizzo Associates, Inc. or the LSP to undertake any such review or authorize others to use this Opinion.

6. The conclusions stated in this Opinion are based upon:

- Visual inspection of existing physical conditions;
- Review and interpretation of site history and site usage information which was made available or obtained within the scope of work authorized by the Client;
- Information provided by the Client;
- Information and/or analyses for designated substances or parameters provided by an independent testing service or laboratory on a limited number of samples;
- A limited number of subsurface explorations made on dates indicated in documentation supporting this Opinion;
- Previous Site investigation reports: *21E Assessment, Suffolk Downs, Boston, Massachusetts*, Geotechnical Engineers, Inc., January 31, 1986; *Phase I Limited Site Investigation, Suffolk Downs, East Boston and Revere, Massachusetts*, Geotechnical Engineers, Inc., October 31, 1991; *Level I Environmental Site Assessment Report*, Rizzo Associates, Inc., November 18, 1996; *Subsurface Investigation*, Rizzo Associates, Inc., November 18, 1996.

upon which the LSP has relied and presumed accurate, and upon which the LSP is entitled to reasonably rely. The LSP was not authorized and did not attempt to independently verify the accuracy or completeness of information or materials received from the Client and/or from laboratories and other third parties during the performance of its services. Neither Rizzo Associates, Inc. nor the LSP shall be liable for any condition, information, or conclusion, the discovery of which required information not available to the LSP or for independent investigation of information provided to the LSP by the Client and/or independent third parties.

7. This Opinion is rendered for the limited purpose stated above, and is not and should not be deemed to be an opinion concerning the compliance of any past or present owner or operator of the site with any federal, state or local law or regulation. **No warranty or guarantee, whether express or implied, is made by this opinion, and any implied**

warranties of merchantability or fitness for a particular purpose are expressly disclaimed. Without limiting the generality of the foregoing, no warranty or guarantee is made that all contamination at a site or sources or contamination has been detected or identified, that any action or recommended action will achieve all of its objectives, or that this Opinion or any action as to which this Opinion relates will be upheld by any audit conducted by the DEP or any other party.

Appendix G

Appendix G
Soil Analytical Data Table

RIZZO ASSOCIATES, INC.

Appendix G Soil Analytical Data Table (mg/kg)																		
Location:	RB-1	RB-2	RB-3	RB-4	RB-5	RB-5	RB-5	RB-5	RB-5	RB-5	RB-5	RB-5						
Sample Name:	SD-SS-RB1-3'	SD-SS-RB2-3'	SD-SS-RB3-0-3'	SD-SS-RB4-3-5'	SD-SS-RB5-3-7'	TP-I-SI	TP-I-S2	TP-I-S3	TP-2-SI	TP-3-SI	TP-4-SI	TP-5-SI						
Sample Depth:	3'	3'	0.3'	3.5'	3.7'													
Laboratory:	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	Inchcape												
Laboratory I.D.:	L9607142-01	L9607142-02	L9607142-03	L9607142-04	L9607142-05	37401-1	37401-2	37401-3	37401-4	37401-5	37401-6	37401-7						
Sample Date:	30-Sep-96	30-Sep-96	30-Sep-96	30-Sep-96	30-Sep-96	18-Mar-97												
Consultant:	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	GEI												
Butylbenzene, sec-	<0.025	<0.025	<0.025	<0.025	<0.034													
Isopropylbenzene	<0.025	<0.025	<0.025	<0.025	<0.034													
Isopropyltoluene, p-	<0.025	<0.025	<0.025	<0.025	<0.034													
Naphthalene	<0.025	<0.025	<0.025	<0.025	<0.034													
Trimethylbenzene, 1,2,4-	<0.025	<0.025	<0.025	<0.025	<0.034													
Trimethylbenzene, 1,3,5-	<0.025	<0.025	<0.025	<0.025	<0.034													
Xylene (total)	<0.005	<0.005	<0.005	<0.005	<0.0068													
Acenaphthene	<0.270	<0.270	<0.280	<0.550	<0.380													
Acenaphthylene	<0.250	<0.250	<0.260	<0.510	<0.360													
Anthracene	<0.230	<0.240	<0.240	0.570	0.300													
Benz(a)anthracene	0.540	<0.310	<0.320	1.50	1.10													
Benz(a)pyrene	0.390	<0.370	<0.380	1.30	0.98													
Benz(b)fluoranthene	0.460	<0.350	<0.360	1.50	0.95													
Benz(g,h)perylene	0.350	<0.490	<0.500	1.10	0.600													
Benz(k)fluoranthene	0.430	<0.350	<0.360	1.30	0.980													
Chrysene	0.600	<0.310	<0.320	1.90	1.30													
Dibenz(a,h)anthracene	<0.470	<0.470	<0.480	<0.950	<0.660													
Fluoranthene	1.10	<0.270	<0.280	2.50	1.90													
Fluorene	<0.270	<0.270	<0.280	<0.550	<0.380													
Indeno(1,2,3-cd)pyrene	0.340	<0.470	<0.480	1.10	0.550													
Methylnaphthalene, 1-	<0.680	<0.690	<0.700	<1.400	<0.960													
Methylnaphthalene, 2-	0.740	<0.180	<0.180	0.670	0.390													
Naphthalene	0.260	<0.220	<0.220	0.520	0.910													
Phenanthrene	0.830	<0.250	<0.260	2.50	1.50													
Pyrene	1.00	<0.270	<0.280	2.40	1.90													
Dibenzofuran	<0.200	<0.200	<0.200	<0.390	<0.270													
Dichlorobenzene, 1,4-	<0.230	<0.240	<0.240	<0.470	<0.330													
p,p'-DDT	<0.05	<0.05	<0.05	<0.05	<0.068													
Arsenic, Total	1.5	3.1	1.9	11	12													
Barium, Total	50	22	32	170	150													
Beryllium, Total	<0.4	<0.4	0.44	<0.4	0.55													
Cadmium, Total	<0.4	<0.4	<0.4	1.9	<0.55													
Chromium, Total	7.2	7.0	9.7	29	17													
Copper, Total	30	16	20	960	540													
Lead, Total	190	13	31	580	14,000	1,500	1,600	2,500	1,100	2,700	790	2,000	3,274					
Mercury, Total	0.52	<0.25	<0.25	1.4	4.7													
Nickel, Total	8.9	7.0	12	78	48													
Silver, Total	<0.4	<0.4	<0.4	<0.4	<0.55													
Zinc, Total	120	32	37	1,400	400													
Fuel Oil #2/Diesel																		
Unknown Hydrocarbon	<100	<100	900	1,900	<140													
C9-C18 Aliphatics	<100	<100	900	1,900	<140													
C11-C22 Aromatics																		
Cyanide, Total	<0.25	<0.25	<0.25	<0.25	<0.34													

Appendix G **Soil Analytical Data Table (mg/kg)**

Location:	RB-6	RIZ-1	RIZ-2	RIZ-3	RIZ-4	RIZ-5	RB-13	RB-13	RB-14	RIZ-6
Sample Name:	SD-SS-RB6-3'	SD-SS-RIZ1-I-3'	SD-SS-RIZ2-5'	SD-SS-RIZ3-3'	SD-SS-RIZ4-3'	SD-SS-RIZ5-3-5'	SD-SS-RB13-3 FT	SD-SS-RB13-5 FT	SD-SS-RB14-4 FT	SD-SS-RIZ6-3'
Sample Depth:	3'	1-3'	5-7'	3'	3'	3-5'	3'	5'	4'	3'
Laboratory:	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA
Laboratory I.D.:	L9607142-06	L9607142-07	L9607142-08	L9607142-09	L9607142-10	L9607207-01	L9709607-01	L9709607-02	L9709607-03	L9607207-02
Sample Date:	30-Sep-96	30-Sep-96	30-Sep-96	30-Sep-96	30-Sep-96	I-Oct-96	4-Dec-97	4-Dec-97	4-Dec-97	I-Oct-96
Consultant:	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo
Butylbenzene, sec-	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025				0.350
Isopropylbenzene	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025				0.087
Isopropyltoluene, p-	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025				1.10
Naphthalene	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025				0.200
Trimethylbenzene, 1,2,4-	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025				1.80
Trimethylbenzene, 1,3,5-	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025				1.40
Xylene (total)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.090
Acenaphthene	<0.140	<0.270	<0.270	<0.550	0.400	<0.280				0.490
Acenaphthylene	<0.130	<0.250	<0.250	<0.510	<0.250	<0.260				<0.310
Anthracene	0.570	<0.230	<0.230	0.800	2.10	<0.240				0.790
Benz(a)anthracene	1.10	<0.310	<0.310	2.40	3.60	<0.200				1.40
Benz(s)pyrene	0.930	<0.370	<0.360	1.90	2.90	<0.380				1.40
Benz(b)fluoranthene	1.10	<0.350	<0.340	1.80	2.50	<0.360				1.10
Benz(g,h,i)perylene	<0.250	<0.480	<0.480	1.10	1.50	<0.500				0.860
Benz(k)fluoranthene	0.930	<0.350	<0.340	1.90	2.60	<0.360				1.20
Chrysene	1.40	<0.310	<0.310	2.60	3.50	<0.200				1.70
Dibenzo(a,h)anthracene	<0.240	<0.460	<0.460	<0.940	0.350	<0.480				<0.580
Fluoranthene	2.10	<0.270	<0.270	4.90	6.90	0.510				3.30
Fluorene	<0.140	<0.270	<0.270	<0.550	0.650	<0.280				1.50
Indeno(1,2,3-cd)pyrene	<0.240	<0.460	<0.460	1.10	1.500	<0.480				0.690
Methylnaphthalene, 1-	<0.350	<0.680	<0.670	<1.400	<0.670	<0.700				3.40
Methylnaphthalene, 2-	<0.090	<0.170	<0.170	<0.350	0.250	<0.180				5.30
Naphthalene	<0.110	<0.210	<0.210	<0.430	0.350	<0.220				1.60
Phenanthrene	1.70	<0.250	<0.250	3.90	6.30	0.330				4.10
Pyrene	2.00	<0.270	<0.270	4.60	6.00	0.470				3.10
Dibenzofuran	<0.100	<0.190	<0.190	<0.390	0.410	<0.200				0.730
Dichlorobenzene, 1,4-	<0.120	<0.230	<0.230	<0.470	0.800	<0.240				<0.290
p,p'-DDT	<0.050	<0.05	<0.05	<0.05	<0.05	0.130				<0.063
Arsenic, Total	7.3	4.8	2.9	5.7	3.3	18				29
Barium, Total	46	25	21	100	89	140				270
Beryllium, Total	<0.40	<0.40	<0.40	<0.40	<0.40	1.7	0.44	0.48	<0.40	<0.51
Cadmium, Total	<0.40	<0.40	<0.40	0.95	0.50	0.79				1.00
Chromium, Total	21	12	10	8.1	9.0	4.9				28
Copper, Total	67	17	13	120	100	24				490
Lead, Total	120	41	14	350	360	66				1,200
Mercury, Total	0.40	<0.25	<0.25	0.74	1.8	<0.25				2.2
Nickel, Total	13	8.2	7.0	10	43	6.3				14
Silver, Total	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40				<0.51
Zinc, Total	120	48	33	620	250	94				400
Fuel Oil #2/Diesel										2,500
Unknown Hydrocarbon	1,200	1,000	170	460	<100	480				1,400
C9-C18 Aliphatics										750
C11-C22 Aromatics	1,200	1,000	170	460	<100	480				3,150
Cyanide, Total	<0.25	<0.25	<0.25	<0.25	<0.25	0.44				<0.32

Soil Analytical Data Table (mg/kg)														
Location:	RB-7	RIZ-7	RB-9	RIZ-8	RB-10	RB-II	RB-I2	RB-8	RIZ-9	RIZ-10	SD-SS-RZ10-SFT	RIZ-II	RIZ-12	
Sample Name:	SD-SS-RB7-5'	SD-SS-RIZ7-5'	SD-SS-RB9-3'	SD-SS-RIZ8-8-12'	SD-SS-RB10-0-4'	SD-SS-RB11-O-4'	SD-SS-RB12-0-4'	SD-SS-RB8-0-4'	SD-SS-RZ9-4FT	SD-SS-RZ10-5FT	SD-SS-RZ11-SFT	SD-SS-RZ12-SFT		
Sample Depth:	5'	5'	3'	8-12'	0-4'	0-4'	0-4'	0-4'	4'	5'	5'	5'		
Laboratory:	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA		
Laboratory I.D.:	L9607207-03	L9607207-04	L9607207-05	L9607268-15	L9607268-16	L9607268-17	L9607268-18	L9607268-19	L9608473-01	L9608473-03	L9608473-05	L9608473-07		
Sample Date:	1-Oct-96	1-Oct-96	1-Oct-96	3-Oct-96	3-Oct-96	3-Oct-96	3-Oct-96	3-Oct-96	12-Nov-96	13-Nov-96	13-Nov-96	13-Nov-96		
Consultant:	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	
Butylbenzene, sec-	<0.025	<0.025	<0.025	0.067	<0.0066	<0.037	<0.037	<0.025	<0.032	<0.025	<0.025	<0.025	<0.025	
Isopropylbenzene	<0.025	<0.025	<0.025	<0.033	<0.0066	<0.037	<0.037	<0.025	<0.032	<0.025	<0.025	<0.025	<0.025	
Isopropyltoluene, p-	<0.025	<0.025	<0.025	0.049	<0.0066	<0.037	<0.037	<0.025	<0.032	<0.025	<0.025	<0.025	<0.025	
Naphthalene	<0.025	<0.025	<0.025	<0.033	<0.0066	<0.037	<0.037	<0.025	<0.032	<0.025	<0.025	<0.025	<0.025	
Trimethylbenzene, 1,2,4-	<0.025	<0.025	<0.025	<0.033	<0.0066	<0.037	<0.037	<0.025	<0.032	<0.025	<0.025	<0.025	<0.025	
Trimethylbenzene, 1,3,5-	<0.025	<0.025	<0.025	0.035	<0.0066	<0.037	<0.037	<0.025	<0.032	<0.025	<0.025	<0.025	<0.025	
Xylene (total)	<0.005	<0.005	<0.005	<0.0067	<0.0013	<0.0074	<0.0074	<0.005	<0.0065	<0.005	<0.005	<0.005	<0.005	
Acenaphthene	<0.270	<0.670	<0.280	0.380	<0.360	<0.400	<0.400	<0.540	<0.360	<0.280	<0.260	<0.660		
Acenaphthylene	<0.250	<0.630	<0.260	0.830	<0.340	<0.370	<0.370	<0.500	<0.340	<0.260	<0.240	<0.610		
Anthracene	<0.240	<0.580	<0.240	<0.320	<0.310	<0.340	<0.340	<0.460	0.340	<0.240	<0.220	<0.560		
Benz(a)anthracene	0.680	<0.770	<0.320	3.10	0.290	4.80	0.910	<0.620	1.00	<0.320	<0.300	<0.750		
Benz(a)pyrene	0.620	<0.920	<0.380	2.60	<0.490	5.20	1.10	<0.390	0.810	<0.380	<0.360	<0.890		
Benz(b)fluoranthene	0.560	<0.870	<0.360	2.50	<0.470	6.00	1.30	<0.390	0.790	<0.360	<0.340	<0.850		
Benz(g,h,i)perylene	<0.490	<1.200	<0.500	1.60	<0.650	3.90	1.10	<0.970	0.620	<0.500	<0.470	<1.200		
Benz(k)fluoranthene	0.580	<0.870	<0.360	1.70	<0.470	4.50	0.900	<0.390	0.640	<0.360	<0.340	<0.850		
Chrysene	0.770	<0.770	<0.320	3.30	0.330	5.40	1.00	<0.620	1.00	<0.320	<0.300	<0.750		
Dibenzo(a,h)anthracene	<0.470	<1.200	<0.480	<0.640	<0.620	<0.680	<0.680	<0.920	<0.620	<0.480	<0.450	<1.100		
Fluoranthene	1.10	<0.670	<0.280	5.20	0.480	5.60	1.10	0.740	1.90	<0.280	<0.260	<0.660		
Fluorene	<0.270	<0.670	<0.280	0.430	<0.360	<0.400	<0.400	<0.540	<0.360	<0.280	<0.260	<0.660		
Indeno(1,2,3-cd)pyrene	<0.200	<1.200	<0.480	1.50	<0.620	3.70	<0.680	<0.930	0.540	<0.480	<0.450	<1.100		
Methylnaphthalene, 1-	<0.690	<1.700	<0.700	<0.930	<0.910	<1.000	<1.000	<1.400	<0.910	<0.700	<0.650	<1.600		
Methylnaphthalene, 2-	<0.180	<0.430	<0.180	0.900	<0.230	<0.260	<0.260	<0.350	<0.230	<0.180	<0.170	<0.420		
Naphthalene	<0.220	<0.530	<0.220	0.700	0.290	0.410	<0.310	<0.430	<0.290	<0.220	<0.210	<0.520		
Phenanthrene	0.970	<0.630	<0.260	3.70	<0.340	0.570	0.650	<0.500	1.30	<0.260	<0.240	<0.610		
Pyrene	1.10	<0.670	<0.280	6.10	0.480	11.0	1.20	0.680	1.80	<0.280	<0.260	<0.660		
Dibenzofuran	<0.200	<0.480	<0.200	0.360	<0.260	<0.290	<0.290	<0.390	<0.260	<0.200	<0.190	<0.470		
Dichlorobenzene, 1,4-	<0.240	<0.580	<0.240	<0.320	<0.310	<0.340	<0.340	<0.460	<0.310	<0.240	<0.220	<0.560		
p,p'-DDT	<0.050	<0.05	<0.50	<0.067	<0.066	<0.074	<0.074	<0.05	<0.065	<0.050	<0.050	<0.050		
Arsenic, Total	7.4	2.2	2.5	15	7.4	12	8.2	3.1	13	6.8	4.1	3.2		
Barium, Total	230	26	21	260	46	190	210	55	200	19	29	26		
Beryllium, Total	<0.40	<0.40	<0.40	0.53	<0.53	0.59	<0.59	<0.40	<0.52	0.43	0.43	0.43		
Cadmium, Total	2.10	<0.40	<0.40	5.3	<0.53	<0.59	<0.59	<0.40	1.0	<0.40	<0.40	<0.40		
Chromium, Total	16	7.0	7.9	27	19	11	16	9.9	41	15	16	11		
Copper, Total	120	18	16	260	54	110	350	87	1,200	25	22	29		
Lead, Total	760	44	17	890	140	700	2,700	210	1,200	7.2	18	68		
Mercury, Total	1.3	<0.25	<0.25	1.7	0.57	0.93	7.4	1.2	2.5	<0.25	<0.25	<0.25		
Nickel, Total	20	7.0	7.0	31	6.8	19	17	9.4	21	14	14	35		
Silver, Total	<0.40	<2.0	<0.40	<0.53	<0.53	<0.59	<0.59	<0.40	0.52	<0.40	<0.40	<0.40		
Zinc, Total	590	64	30	2,000	72	380	460	200	540	47	66	90		
Fuel Oil #2/Diesel				360				570		<100				
Unknown Hydrocarbon	460	240	<100	150	<130	190	780	190	740	<100	240	1,200		
C9-C18 Aliphatics				108				171		<30				
C11-C22 Aromatics	460	240	<100	402	<130	190	780	589	740	<170	240	1,200		
Cyanide, Total	<0.25	<0.25	<0.25	0.47	<0.33	2.0	1.3	<0.25	<0.32	<0.25	<0.25	<0.25		

Bold denotes exceedance of reportable concentration.

Appendix H

Appendix H
Groundwater Analytical Data Table

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Groundwater Analytical Data Table (µg/L)													
Location:	MW-17	MW-4	MW-201	RIZ-3	MW-2	MW-202	MW-203	MW-204	RIZ-I	RIZ-2	RIZ-4	RIZ-4	RIZ-4-GW-401
Sample Name:	MW-17	MW-4	MW-201	RIZ-3	MW-2	MW-202	MW-203	MW-204	RIZ-I	RIZ-2	RIZ-4	RIZ-4	
Laboratory:	ALPHA												
Laboratory I.D.:	L9607190-01	L9607190-02	L9607190-04	L9607190-05	L9607190-06	L9607190-07	L9607258-02	L9607258-01	L9607258-03	L9607258-04	L9607258-05	L9608024-09	
Sample Date:	1-Oct-96	1-Oct-96	1-Oct-96	1-Oct-96	1-Oct-96	1-Oct-96	2-Oct-96	2-Oct-96	2-Oct-96	2-Oct-96	2-Oct-96	29-Oct-96	
Consultant:	Rizzo												
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.3	<1.0		
Butylbenzene, n-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Ethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Isopropylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Methyl tert-butyl ether	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	
Methylene chloride	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	
Naphthalene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Propylbenzene, n-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Toluene	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	
Trimethylbenzene, 1,2,4-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Trimethylbenzenes, 1,3,5-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Xylene (total)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Acenaphthene	4.8	<2.6								<0.44	<0.32	<0.29	
Anthracene	2.3	<2.2								<0.38	<0.28	<0.25	
Fluoranthene	5.3	<2.6								<0.44	<0.32	0.19	
Fluorene	4.6	<2.4								<0.41	<0.30	<0.27	
Methylnaphthalene, 1-	<12	<6.2								<1.1	<0.77	<0.70	
Methylnaphthalene, 2-	<3.0	<1.6								<0.27	<0.20	0.23	
Naphthalene	<3.7	<1.9								<0.33	<0.24	0.23	
Phenanthrene	12	<2.3								<0.39	<0.29	<0.26	
Pyrene	4.8	<2.5								<0.42	<0.31	0.22	
Cresol, Total	<3.3	<1.8								<0.30	3.1	<0.20	
Dibenzofuran	<3.3	<1.8								<0.30	<0.22	<0.20	
Dimethylphenol, 2,4-	<3.8	<2.0								<0.35	<0.25	<0.23	
Phenol	<3.3	<1.8								<0.30	<0.22	<0.20	
Antimony, Dissolved	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	
Arsenic, Dissolved	7.0	75	<5.0	20	<5.0	6.0	11	6.0	8.0	7.0	17		
Barium, Dissolved	2,200	790	170	370	220	790	890	1,300	200	340	670		
Nickel, Dissolved	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	
Zinc, Dissolved	<10	<10	<10	20	<10	<10	<10	<10	<10	<10	<10	10	
Gasoline	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	
Unknown Hydrocarbon													
C9-C10 Aromatics	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	
C10-C22 Aromatics	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	
Cyanide, Dissolved	<5.0	9.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	29*	115	

Note: * - samples were unfiltered and were resampled. Unfiltered data is presented here but not used in EPC calculations. See text for details.

Appendix H

Groundwater Analytical Data Table (µg/L)

Location:	WE(OW)-4	MW-15	RIZ-6	MW-11	MW-1	MW-208	MW-209	MW-205	MW-206	MW-206-GW-201	MW-206-GW-301	MW-206	RIZ-7	RIZ-7	RIZ-7
Sample Name:	WE(OW)-4	MW-15	RIZ-6	MW-11	MW-1	MW-208	MW-209	MW-205	MW-206	MW-206-GW-201	MW-206-GW-301	MW-206	RIZ-7	RIZ-7	RIZ-7
Laboratory:	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA									
Laboratory I.D.:	L9607258-06	L9607259-07	L9607268-01	L9607268-02	L9607268-03	L9607268-04	L9607268-05	L9607268-06	L9607268-07	L9608024-10	L9709108-01	L9607268-08	L9608024-06		
Sample Date:	2-Oct-96	2-Oct-96	3-Oct-96	29-Oct-96	18-Nov-97	3-Oct-96									
Consultant:	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo									
Benzene	<1.0	<1.0	1.9	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	51		
Butylbenzene, n-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	17		
Ethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	280		
Isopropylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	40		
Methyl tert-butyl ether	<10	<10	100	<10	<10	<10	<10	<10	<10	<10	<10	<10	<100		
Methylene chloride	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<50		
Naphthalene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	360		
Propylbenzene, n-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	62		
Toluene	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	26		
Trimethylbenzene, 1,2,4-	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	640		
Trimethylbenzene, 1,3,5-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	180		
Xylene (total)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	510		
Acenaphthene	1.6	<0.32	<3.5	<2.7	<2.3					<2.9			11		
Anthracene	0.30	<0.28	<3.0	<2.3	<2.0					<2.5			<10		
Fluoranthene	0.45	<0.32	<3.5	<2.7	<2.3					<2.9			<12		
Fluorene	0.97	<0.30	<3.2	<2.5	<2.2					<2.7			8.3		
Methylnaphthalene, 1-	<0.70	<0.77	<8.4	<6.4	<5.6					<7.0			31		
Methylnaphthalene, 2-	<0.18	<0.20	<2.2	<1.7	<1.4					<1.8			62		
Naphthalene	<0.22	<0.24	<2.6	<2.0	<1.8					<2.2			360		
Phenanthrene	2.0	<0.29	<3.1	<2.4	<2.1					<2.6			16		
Pyrene	0.37	<0.31	<3.4	<2.6	<2.2					<2.8			<11		
Cresol, Total	<0.20	<0.22	<2.4	<1.7	<1.6					<2.0			250		
Dibenzofuran	<0.20	<0.22	<2.4	<1.8	<1.6					<2.0			9.5		
Dimethylphenol, 2,4-	<0.23	<0.25	<2.8	<2.1	<1.8					<2.3			72		
Phenol	<0.20	<0.22	<2.4	<1.8	<1.6					<2.0			120		
Antimony, Dissolved	<10	<10	<10	<10	<10					<10			<10		
Arsenic, Dissolved	7.0	<5.0	<5.0	<5.0	<5.0					<5.0			6.0		
Barium, Dissolved	450	570	780	1,100	280	1,100	950	<10	100				1,200		
Nickel, Dissolved	<25	<25	<25	<25	<25					<25	89	84	160	<25	
Zinc, Dissolved	<10	<10	10	10	20	<10	10	<10	40				70		
Gasoline	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	6,700		
Unknown Hydrocarbon															
C9-C10 Aromatics	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	6,700		
C10-C22 Aromatics	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000			
Cyanide, Dissolved	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	31*	8.0	

Note: * - samples were unfiltered and were resampled. Unfiltered data is presented here but not used in EPC calculations. See text for details.

Groundwater Analytical Data Table (µg/L)																
Location:	MW-12	MW-14	MW-10	RIZ-5	RIZ-8	RIZ-8	RIZ-8	RIZ-9	RIZ-10	RIZ-11	RIZ-12	RIZ-13	RIZ-14			
Sample Name:	MW-12	MW-14	MW-10	RIZ-5	RIZ-8	RIZ-8-GW-101	SD-GW-RZ8-303	SD-GW-RZ9-201	SD-GW-RZ10-202	SD-GW-RZ11-203	SD-GW-RZ12-204	SD-GW-RZ13-301	SD-GW-RZ14-302			
Laboratory:	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA	ALPHA
Laboratory I.D.:	L9607268-09	L9607268-10	L9607268-11	L9607268-12	L9607268-13	L9608024-03	L9800090-01	L9608473-02	L9608473-04	L9608473-06	L9608473-08	L9709724-01	L9709724-02			
Sample Date:	3-Oct-96	3-Oct-96	3-Oct-96	3-Oct-96	3-Oct-96	29-Oct-96	7-Jan-98	12-Nov-96	13-Nov-96	13-Nov-96	13-Nov-96	9-Dec-97	9-Dec-97			
Consultant:	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo	Rizzo
Benzene	<1.0	<1.0	<5.0	<1.0	<1.0			<1.0	<10	<10	<10			<1.0		
Butylbenzene, n-	<1.0	<1.0	<5.0	<1.0	<1.0			<1.0	<10	<10	<10			<1.0		
Ethylbenzene	<1.0	<1.0	<5.0	<1.0	<1.0			<1.0	<10	<10	<10			<1.0		
Isopropylbenzene	<1.0	<1.0	<5.0	<1.0	<1.0			<1.0	<10	<10	<10			<1.0		
Methyl tert-butyl ether	34	<10	1,000	<10	<10			120	1,600	1,400	1,400			<10		
Methylene chloride	<5.0	<5.0	<25	<5.0	<5.0			<5.0	78	<50	<50			<5.0		
Naphthalene	1.4	1.2	<5.0	<1.0	<1.0			<1.0	<10	<10	<10			<1.0		
Propylbenzene, n-	<1.0	<1.0	<7.5	<1.0	<1.0			<1.0	<10	<10	<10			<1.0		
Toluene	<1.5	<1.5	<5.0	<1.5	<1.5			<1.5	<15	<15	<15			<1.5		
Trimethylbenzene, 1,2,4-	3.2	<1.0	<5.0	2.3	<1.0			<1.0	<10	<10	<10			<1.0		
Trimethylbenzene, 1,3,5-	1.0	2.3	<5.0	<1.0	<1.0			<1.0	<10	<10	<10			<1.0		
Xylene (total)	1.4	<1.0	<5.0	<1.0	<1.0			<1.0	<10	<10	<10			<1.0		
Acenaphthene	<2.4		<2.4	<6.4				<4.6		<5.2	<2.4					
Anthracene	<2.1		<2.1	<5.5				<4.0		<4.5	<2.1					
Fluoranthene	<2.4		<2.4	<6.4				2.8		<5.2	<2.4					
Fluorene	<2.2		<2.2	<5.9				<4.3		<4.8	<2.1					
Methylnaphthalene, 1-	<5.8		<5.8	<15				<11		<12	<5.8					
Methylnaphthalene, 2-	<1.5		<1.5	<4.0				<2.9		<3.2	<1.5					
Naphthalene	<1.8		<1.8	<4.8				<3.5		<3.9	<1.8					
Phenanthrene	<2.2		<2.2	<5.7				2.5		<4.6	<2.2					
Pyrene	<2.3		<2.3	<6.2				2.5		<5.0	<2.3					
Cresol, Total	<1.7		<1.7	<4.4				<3.2		<3.6	<1.7					
Dibenzofuran	<1.7		<1.7	<4.4				<3.2		<3.6	<1.7					
Dimethylphenol, 2,4-	<1.9		<1.9	<5.1				<3.7		<4.1	<1.9					
Phenol	<1.7		<1.7	<4.4				<3.2		<3.6	<1.7					
Antimony, Dissolved	<10	<10	<10	10	<10			<10	<10	<10	<10			<10		
Arsenic, Dissolved	<5.0	<5.0	<5.0	26	20			<5.0	8.0	<5.0	<5.0			<5.0		
Barium, Dissolved	1,100	1,200	810	140	880			200	100	50	30					
Nickel, Dissolved	<25	<25	<25	<25	<25			<25	<25	<25	<25			<25		
Zinc, Dissolved	<10	<10	10	<10	10			50	50	100	30					
Gasoline	<1,000	<1,000	<1,000	<1,000				<1,000	<1,000	<1,000	<1,000			<1,000		
Unknown Hydrocarbon					44,000											
C9-C10 Aromatics	<1,000	<1,000	<1,000	<1,000				<1,000	<1,000	<1,000	<1,000			<1,000		37
C10-C22 Aromatics	<1,000	<1,000	<1,000	<1,000	44,000		<20	<1,000	<1,000	<1,000	<1,000			<1,000		45
Cyanide, Dissolved	<5.0	<5.0	<5.0	<5.0	636*	11		8.0	<5.0	<5.0	<5.0			<5.0		

Note: * - samples were unfiltered and were resampled. Unfiltered data is presented here but not used in EPC calculations. See text for details.