US Army Corps of Engineers®
Alaska District

NORTHEAST CAPE HTRW REMEDIAL ACTIONS

Northeast Cape, Saint Lawrence Island, Alaska

Contract No. W911KB-10-C-0002

FINAL REPORT
JULY 2011

Submitted by:

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ACRONYMS AND ABBREVIATIONS

′	minutes
°	degrees
°F	degrees Fahrenheit
μg/kg	micrograms per kilogram
μg/L	micrograms per liter
AAC	Alaska Administrative Code
AC&WS	Aircraft Control and Warning Station
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
AHA	Activity Hazard Analysis
AK	Alaska Method
ANCSA	Alaska Native Claims Settlement Act
Bering Air	Bering Air, Inc.
bgs	below ground surface
Bristol	Bristol Environmental Remediation Services, LLC
BTEX	benzene, toluene, ethylbenzene, and xylenes
C.I.H.	Certified Industrial Hygienist
CDQR	Chemical Data Quality Report
CFR	Code of Federal Regulations
CLIN	Contract Line Item Number
CQC	contractor quality control
CQCP	Contractor Quality Control Plan
CQCSM	Contractor Quality Control System Manager
DO	dissolved oxygen
DQCRs	Daily Quality Control Reports
DRO	diesel range organics
DTI	Dakota Technologies, Inc.
Eco-Land	ECO-LAND, LLC
EMT	emergency medical technician
EPA	U.S. Environmental Protection Agency

FUDS	formerly used defense sites
GC	gas chromatograph
Global	Global Services, Inc.
GPS	Global Positioning System
GRO	gasoline range organics
HTRW	hazardous, toxic, and radioactive waste
ID	identification
IDW	Inverse Distance Weighted
ISCO	in-situ chemical oxidation
LDU	lower decision unit
LIF	Laser-Induced Fluorescence
MDU	middle decision unit
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MOC	Main Operations Complex
NE Cape	Northeast Cape White Alice Site
MNA	monitored natural attenuation
NOM	naturally occurring material
NSI	Northland Services, Inc.
ORP	oxidation reduction potential
PAHs	polynuclear aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PID	photoionization detector
PLO	Public Land Order
PM	Project Manager
POL	petroleum, oil, and lubricants
PPE	personal protective equipment
ppm	parts per million
QA	quality assurance
QAR	Quality Assurance Representative
QC	quality control

ACRONYMS AND ABBREVIATIONS (continued)

RA	removal action
RCRA	Resource Conservation and Recovery Act
RE	relative emittance
RI	remedial investigation
RRO	residual range organics
SAP	Sampling and Analysis Plan
SOW	Scope of Work
SS	Site Superintendent
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
SWPPP	Storm Water Pollution Prevention Plan
TAH	Total Aromatic Hydrocarbons
TAqH	Total Aqueous Hydrocarbons
TestAmerica	TestAmerica Laboratories, Inc.
TOC	total organic carbon
TSCA	Toxic Substances Control Act
UDU	upper decision unit
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
UVOST™	UltraViolet Optical Screening Tool
VOC	volatile organic compound
WACS	White Alice Communications System
WP	Work Plan

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EXECUTIVE SUMMARY

This Removal Action (RA) Report presents the results of an RA performed at the Northeast Cape (NE Cape) Formerly Used Defense Site, on Saint Lawrence Island, Alaska. Bristol Environmental Remediation Services, LLC (Bristol), and its team of subcontractors, performed the work for the U.S. Army Corps of Engineers (USACE), Alaska District, under Contract No. W911KB-10-C-0002.

The Scope of Work (SOW) for the 2010 contract period included:

- Preparing plans and reports;
- Mobilizing/demobilizing to and from the NE Cape site;
- Designing and constructing a landfill cap at Site 9 to cover buried debris and collecting surface water samples from the stream flowing toward the Suqitughneq River before, during, and after landfill cap construction;
- Excavating, processing, and disposing of approximately 2,725 tons of petroleum-contaminated soils. The sites and the estimated soil weights are as follows:
  - Site 1, 100 tons;
  - Site 3, 100 tons;
  - Site 6, 2,500 tons; and
  - Site 32, 25 tons.
- Excavating, processing, and disposing of approximately 430 tons of polychlorinated biphenyl (PCB)-contaminated soils. The sites and the estimated soil weights are as follows:
  - Site 13, 225 tons;
  - Site 16, 15 tons;
  - Site 21, 15 tons; and
  - Site 31, 175 tons.
- Excavating, processing, and disposing of 15 tons of arsenic-contaminated soils from Site 21;
- Cleaning, removing, and/or plugging a manhole and culvert located in the western and middle drainages of Site 28 to prevent direct outflows of upgradient residual sources of contamination;
- Removing approximately 2.5 tons of submerged debris and drums from streams and ponds in the vicinity of two sites. The sites and the estimated soil weights are as follows:

  - Site 9, 2 tons; and
  - Site 29, 0.5 ton.
- Removing approximately 25 poles, 0.5 ton of wires, and other miscellaneous debris from tundra areas where clearly identified sitewide;
- Developing and implementing a Sampling and Analysis Plan for monitored natural attenuation of petroleum-contaminated soil at Site 8 and collecting two surface water samples from the stream that drains into the Suqitughneq River from Site 8;
- Sampling tundra/soil locations for petroleum hydrocarbons at Site 3, following the rationale in the Alaska Department of Environmental Conservation (ADEC) Technical Memorandum 06-001: Biogenic Interference and Silica Gel Cleanup (ADEC, 2006) and excavating, if necessary, as an optional task;
- Conducting an Ultraviolet Optical Screening Tool (UVOST™) investigation to delineate the extent of diesel range organics-contaminated soil at the Main Operations Complex (MOC);
- Sampling nine groundwater monitoring wells at the MOC;
- Revegetating or stabilizing disturbed site areas, as detailed in the approved Stormwater Pollution Prevention Plan, before demobilization or in a timely manner; and
- Preparing a final RA report, which includes survey and as-built drawings of Site 9 and discussion of all remedial action work performed, including soil excavation, soil processing, soil sampling, waste disposal documentation, sample results, debris removal, UVOST investigation results, and other relevant project details.

Bristol successfully completed all contract line items and was able to handle additional soil removal tasks when PCB-contaminated soil volumes were discovered in excess of the original SOW.

Bristol received the USACE's Notice to Proceed on November 30, 2009. Draft planning documents were submitted on April 5, 2010. Freight was loaded onto two Northland Services, Inc., barges at the Port of Anchorage between May 7 and May 16, 2010. The barges departed Anchorage in late May and arrived near Nome, Alaska, in mid-June 2010. The first landing craft arrived at Kitnagak Bay and landed at Cargo Beach on July 5, 2010. Logistical operations and on-site mobilization activities began July 5, 2010, and continued until the temporary construction camp was completed on July 15, 2010.

Bristol used a combined field scientific team and craft labor crew, which included local residents, at the project site from July 14, 2010, through September 22, 2010. During this period, Bristol and its subcontractors:

- Upgraded and repaired access roads to work sites;
- Constructed and maintained temporary camp facilities capable of housing approximately 35 people;
- Removed approximately 95 feet of culvert and capped an existing culvert at Site 28;
- Cleaned and removed a manhole from Site 28, the contents of which were containerized and sampled for waste characterization purposes;
- Successfully rerouted the flow of water away from the Site 9 landfill via diversion trenching;
- Advanced 43 test pits across Site 9 to determine the extent of the landfill;
- Capped, graded, and seeded the Site 9 Housing and Operations Landfill, an area encompassing approximately 1.6 acres, with 2 feet of cap material requiring 415 truckloads of material;
- Removed 12.2 tons of wire, 5.1 tons of wood, 7 tons of miscellaneous metal, and 43 poles from various sites;
- Removed 300 pounds of broken batteries and 14 tires from Site 9;
- Excavated, characterized, and disposed of 2,513.1 tons of petroleum, oil, and lubricants (POL)-contaminated soil from Site 6;
- Excavated, characterized, and disposed of 20 tons of soil from Site 32;
- Excavated, characterized, and disposed of 197.1 tons of POL-contaminated soil from Site 3;
- Determined that no POL-contaminated soil above the NE Cape site cleanup level existed at Site 1 or the area designated to be excavated at Site 3 in the SOW;
- Excavated, characterized, and disposed of 638 tons of PCB-contaminated soil from Site 31;
- Excavated three bulk bags of additional PCB-contaminated soil from Site 31 that are currently staged on site at the former Building 98 concrete foundation at the MOC;
- Excavated, characterized, and disposed of 592 tons of PCB-contaminated soil from Site 13;
- Excavated 18 bulk bags of additional PCB-contaminated soil from Site 13 that are currently staged on site at the former Building 98 concrete foundation at the MOC;
- Excavated, characterized, and disposed of approximately 5 tons of PCB-contaminated soil from Site 16;

- Excavated, characterized, and disposed of 10.4 tons of PCB-contaminated soil and 16.7 tons of arsenic-contaminated soil from Site 21;
- Advanced 197 UVOST probes, logged 20 soil cores, dug 5 test pits, and sampled nine monitoring wells across the MOC;
- Collected baseline samples for monitoring natural attenuation at Site 8 and the MOC;
- Collected analytical confirmation samples from Sites 1, 3, 6, 13, 16, 21, 31, and 32;
- Collected surface water samples from a stream adjacent to Site 9 prior to, during and after landfill cap construction to monitor for potential effluent releases;
- Collected 311 samples, comprising 39 laboratory composites, from Sites 13 and 31 to delineate remaining contamination;
- Collected and analyzed more than 800 POL- and PCB-contaminated soil samples in the on-site field laboratory;
- Hauled 153 truckloads (approximately 3,792 cubic yards) of material used to backfill a total of 10 excavations from Sites 6, 13, 16, 21, 31, and 32. Site 13 had three excavations; Site 21 had two excavations and Site 32 had two excavations;
- Successfully characterized, manifested, and disposed of 397 bulk bags and two Conex containers loaded with contaminated soil;
- Reseeded disturbed areas; and
- Successfully demobilized personnel and equipment off-island without incident.

Bristol maintained a close working relationship with its subcontractors and the USACE to successfully fulfill all contract specifications.

1.0 INTRODUCTION

This Removal Action (RA) Report presents the results of work performed in 2010 at Northeast Cape (NE Cape), on Saint Lawrence Island, Alaska. Bristol Environmental Remediation Services, LLC (Bristol), and its team of subcontractors performed the work for the U.S. Army Corps of Engineers (USACE), Alaska District, under Contract No. W911KB-10-C-0002.

Saint Lawrence Island is located in the Bering Sea, approximately 135 air miles southwest of Nome, Alaska, at 63 degrees (°) 20 minutes (′) north latitude and 168° 59′ west longitude. A U.S. Air Force (USAF) Aircraft Control and Warning Station (AC&WS) was constructed at the NE Cape site during 1950 and 1951, and was activated in 1952. In 1954, the USAF constructed a White Alice Communications System (WACS) station, composed of four large parabolic antennas and a building housing the electronic equipment. The facility functioned as a surveillance station, providing radar coverage for the Alaskan Air Command and, later, for the North American Air Defense Command. It was part of an Alaska-wide early warning system constructed to reduce potential vulnerability to bomber attacks across the polar region.

The AC&WS and WACS operations were terminated in 1969 and 1972, respectively. The majority of the military personnel were removed from the NE Cape site by the end of 1969. The NE Cape buildings, and the majority of furnishings and equipment, were abandoned in place because of the high cost of off-island transport. In 2000, the White Alice Station was reclassified as a formerly used defense sites (FUDS)-eligible property, and the USACE included the area in the ongoing cleanup program for NE Cape.

Building demolition, debris removals, and containerized hazardous and toxic waste RAs were conducted at the NE Cape site between the 2000 and 2005 field seasons. Remedial actions, which included a drum removal, landfill cap, and chemical oxidation study, were conducted in 2009 by Bristol and its team of subcontractors. Bristol was again awarded a contract by the USACE for remedial work during 2010.

The 2010 contract was awarded to Bristol on November 30, 2009. Draft planning documents were submitted to the USACE on April 5, 2010, and final planning documents were submitted on July 16, 2010. Bristol personnel began mobilization activities at NE Cape on July 5, 2010.

The mobilization was completed and field activities began July 15, 2010. All fieldwork was completed, and demobilization from NE Cape was completed on October 9, 2010.

1.1 Summary of Work Performed in 2010

The most significant work effort of 2010 involved the excavation of soils contaminated by petroleum, oil, and lubricants (POL); polychlorinated biphenyls (PCBs); and arsenic from eight sites across the project area. Sites 1, 3, 6, and 32 contained locations historically shown to have POL contamination; Sites 13, 16, 21 and 31 contained areas with PCB-contaminated soils; and Site 21 contained areas with high arsenic concentrations in the soil.

At Site 9, construction of a landfill cap required a diversion trench to redirect water flow away from the surface of the landfill. Additionally, miscellaneous debris was collected and hauled off-island from areas in and around Site 9. Surface water samples were collected in a stream downgradient of the landfill before, during, and after the construction of the landfill cap at four locations.

Soil and surface water samples were collected from Site 8 in an effort to establish the baseline for a study monitoring the effectiveness of natural attenuation as a remediation option for petroleum compounds.

A concrete manhole and sections of culvert were removed from Site 28. The interior of the manhole contained contaminated sludge that was placed into a drum and hauled off-island. The sludge contained the following contaminants: diesel range organics (DRO), PCBs, arsenic, barium, cadmium, chromium, lead, selenium, silver, and mercury. The segments of culvert were loaded into a Conex, along with other metal debris that was removed from the project site.

An Ultraviolet Optical Screening Tool (UVOST™) investigation was conducted to delineate the POL contamination at the Main Operations Complex (MOC), and nine groundwater monitoring wells were sampled for fuel compounds and monitored natural attenuation (MNA) parameters.

Poles, wire, and miscellaneous debris were collected from various locations across the NE Cape site and hauled off the island for disposal.

2.0 SITE DESCRIPTION

2.1 PHYSICAL DESCRIPTION AND HISTORY

2.1.1 Location

Saint Lawrence Island is located in the Bering Sea, near the territorial waters of Russia, near NE Cape approximately 135 air miles southwest of Nome, Alaska (Figure 1). The project site, which originally encompassed 4,800 acres, falls between Kitnagak Bay to the northeast, Kangighsak Point to the northwest, and the Kinipaghulghat Mountains to the south (Figure 2). The site is located at 63° 20′ north latitude and 168° 59′ west longitude, in Township 25 South, Range 54 West, Kateel River Meridian.

2.1.2 History

Saint Lawrence Island was established as a reindeer reserve by Executive Order on January 7, 1903. The present project site was acquired by the USAF on January 16, 1952, under Public Land Order (PLO) 970, which removed 21,013 acres from the reserve. In 1952, the USAF AC&WS was formally activated by assignment of the 712th AC&WS Squadron and the 698th Security Squadron. The original site was designed to support 212 men. The NE Cape facility served as a surveillance station, providing radar coverage for the Alaskan Air Command and, later, for the North American Air Defense Command, as part of an Alaska-wide system constructed to reduce potential vulnerability to bomber attacks across the polar regions.

The White Alice Station area remained in operation with minimal military staff until 1972. All lands were then withdrawn from the military under PLO 5187 for classification under Section 17(d)(1) of the Alaska Native Claims Settlement Act (ANCSA) of 1971, which entitled local community village corporations to select and receive specific tracts of federal land. Interim Conveyance No. 203 (June 1979) conveyed unsurveyed lands of Saint Lawrence Island to Sivuqaq, Inc., and Savoonga Native Corporation, known today as Kukulget, Inc. Surveyed land, easements, and land-use permits effective before conveyance were excluded from the transfer.

In 1982, transfer of the White Alice Station area, south of the MOC, to the U.S. Department of the Navy was initiated. However, this transaction was not formally completed and was superseded by ANCSA. The Navy conducted an RA under its Comprehensive Long-Term Environmental Action, Navy program. The action included removal of specified hazardous items and containerized hazardous and toxic waste.

In 2000, the White Alice Station was reclassified as a FUDS-eligible property. In response, the USACE included the area in the ongoing cleanup program for NE Cape (USACE, 2002).

2.2 PHYSICAL ENVIRONMENT

The following information is a summary of information provided in government-furnished material (e.g., USACE 2002 and the Decision Document 2009).

2.2.1 Climate

Saint Lawrence Island has a cool, moist, subarctic maritime climate with some continental influences during winter when much of the Bering Sea is capped with ice pack. Winds and fog are common, and precipitation occurs approximately 300 days per year as light rain, mist, or snow. Annual snowfall is approximately 80 inches per year. Total annual precipitation is about 16 inches per year, and more than half falls as light rain between June and September. Summer temperatures average between 34 degrees Fahrenheit (°F) and 48°F, with a record high of 65°F. Winter temperatures range from -2°F to 10°F, with an extreme low of -30°F. Freeze-up normally occurs in October or November, and breakup normally occurs in June.

Winds are generally in a northerly to northeasterly direction from September to June, and southwesterly in July and August. Winds exceeding 11 miles per hour occur 70 percent of the time. In the winter, winds average 23 miles per hour. The average wind speed is 18 miles per hour. Gusts in the NE Cape area have measured as high as 110 miles per hour (USACE, 2002).

2.2.1.1 <u>Weather Conditions During Project Field Season</u>

Weather conditions during the July through October 2010 field season were typical of a summer subarctic maritime climate. Low-to-moderate variable winds, light precipitation or fog, and temperatures ranging from the high 30s to the high 50s were typical of the daily weather in lowland and lower mountain areas. Periodic violent storms with high, sustained, winds in excess of 50 miles per hour and high precipitation, as well as periods of clear, calm conditions, were encountered. Wind was often the most significant factor affecting work conditions during the 2010 field season and, at times, was responsible for knocking out the satellite communications system.

2.2.2 Topography

The lower mountain area consists mainly of flat coastal plains that gradually turn into rolling tundra toward the base of the Kinipaghulghat Mountains. The mountains rise abruptly to a maximum elevation of more than 1,850 feet above mean sea level. Elevations across the work area range from sea level to approximately 200 feet above mean sea level.

2.2.3 Geology

Saint Lawrence Island consists of isolated bedrock highlands of igneous, metamorphic, and older sedimentary rocks surrounded by unconsolidated surficial deposits overlying a relatively shallow erosional bedrock surface. In the immediate vicinity of the lower mountain area, shallow, unconsolidated surficial materials overlie quartz monzonitic rocks of the Kinipaghulghat Pluton. The pluton forms the mountainous work area south of the MOC, including Kangukhsam Mountain. The Suqitughneq River drainage at the work area in the Kinipaghulghat Pluton has created an erosional valley and alluvial fan of unconsolidated sediments. Granitic bedrock materials are exposed at the coast north of the site at Kitnagak Bay, suggesting that quartz monzonitic bedrock underlies the unconsolidated materials at a relatively shallow depth on a wave-cut erosional platform.

The unconsolidated materials exhibit an alluvial soil profile in areas that have not been disturbed by man. In general, silts near the surface overlying more sand-dominated soils at depth characterize native soil stratigraphy at the site. The silt may contain varying quantities of clay, sand, and gravel, and may vary from zero to 10 feet in thickness. The silt is dark brown to dark green and sometimes exhibits a mottled texture. In some areas, the silt exhibits an aqua green or blue color. Dark brown silts are observed in outcrop. The sand at depth contains varying degrees of silt, gravel, and cobbles, and varies from 2 feet to more than 20 feet in thickness. These deeper, coarse-grained materials are generally unsorted and are likely to be of glaciofluvial origin. The depth to bedrock at the lower elevation areas of the site is unknown.

Beach material is primarily cobble (1-inch stones) with some sand. Some areas have large boulders and rocks (USACE, 2002).

2.2.4 Surface Water and Groundwater

Because of the relatively remote and undeveloped nature of Saint Lawrence Island, little data about regional groundwater are available. Bedrock materials south of the site (and underlying the unconsolidated deposits) are not expected to store and transmit significant quantities of groundwater. Typically, these types of granitic rocks are generally impermeable and transmit groundwater only through localized fractures and weathered soil zones at the surface.

The primary potential aquifer at the NE Cape site is the unconsolidated alluvial material that underlies the area, although a deeper, confined aquifer may also exist. The mountainous area to the south provides an ideal recharge area for the unconsolidated materials, providing runoff from rain and snowmelt during the summer. Based on the topography and geology of the site, the regional groundwater flow direction is expected to be from the mountainous recharge area south of the site, flowing north and eventually discharging to the Bering Sea.

Key factors influencing the flow of groundwater at the site are the permafrost and frozen soils, which render the unconsolidated materials effectively impermeable in areas. The U.S. Geological Survey has classified Saint Lawrence Island as an area of “moderately thick to thin permafrost.” Although the depth of permafrost at Saint Lawrence Island is unknown, the base of permafrost on the mainland at Nome (135 air miles to the northeast) is estimated to be at a depth of 120 feet. The deeper unconsolidated deposits at the site are probably permanently frozen, and the shallow soils represent the active layer, where soils are thawed only during portions of the year. Frozen soils have a profound effect in retarding groundwater flow during most of the year.

In addition to the Bering Sea north of the NE Cape facility, surface water in the vicinity of the work area consists of small streams, small- to moderate-sized lakes, and marshy areas. Surface water generally flows northward from the highland area to the south. Small surface water bodies are common throughout the area. The primary stream drainage, the Suqitughneq River, in the area is fed by runoff from the prominent drainage of the Kinipaghulghat Mountain valley in the lower mountain area. Several smaller tributaries feed this stream drainage as it flows north to Kitnagak Point. This stream was affected by a diesel fuel spill in the 1960s. The smaller tributaries originate from two small, unnamed lakes (USACE, 2002).

2.2.5 Air Quality

Air quality in the area is good. There are minimal sources of air emissions at the site because of its remote nature. The occasional boat motor, vehicle engine, or fire has a negligible effect. Air emissions at the site increase during remedial action work because more equipment and vehicles are at the site. Winds typical of the area disperse emissions (USACE, 2002).

2.3 SOCIOECONOMIC CONDITIONS

2.3.1 Community Profile

The nearest community to the project site is the Village of Savoonga on Saint Lawrence Island, approximately 60 miles northwest of the site, with a population of approximately 800 people, according to elders from Savoonga. There are no permanent residents at the NE Cape site, but there is a small subsistence hunting and fishing camp in the area that is infrequently inhabited in the summer by residents of Savoonga and Gambell. The island is accessible by boat, regularly scheduled airlines (to Gambell and Savoonga), and chartered air flights out of Nome. There is no regularly scheduled commercial access to the project site (USACE, 2002).

2.3.2 Subsistence Activities

Savoonga is a traditional Siberian Yup'ik village, with a subsistence lifestyle. Whale, seal, walrus, and reindeer comprise 80 percent of islanders' diets. The economy is largely based on subsistence hunting of walrus, seal, fish, and whale, with some cash income. Berries and edible plants are also harvested. Subsistence fishing for halibut takes place in the vicinity of NE Cape.

2.4 BIOLOGICAL ENVIRONMENT

2.4.1 Vegetation

The NE Cape area has several major habitat types, including moist tundra dominated by heaths, grasses, sedges, mosses, and lichens, with shrubs that include bearberry, dwarf birch, narrow-leaf Labrador tea, and willow. These plants typically grow in 1 to 3 feet of undecayed organic mat over saturated and frozen soil. Alpine tundra plants (dwarf, prostrate plants that include heaths and tundra species adapted to dry, thin soil conditions) grow on the slopes and exposed ridges of the nearby mountains. The NE Cape area has many low-lying areas with lakes, bogs, and poorly drained soils (USACE, 2002).

2.4.2 Fish and Wildlife

Large mammals are generally not abundant on Saint Lawrence Island. Polar bears may be on the island anytime during the year, but are most often present when the ice pack is near shore. Some years, polar bears are stranded on the island throughout the summer when the ice pack moves out earlier than usual. More than 1,000 reindeer can also be found on the island. Arctic foxes, cross foxes, red foxes (less common), wolves (rarely), and several small mammals (tundra shrews, arctic ground squirrels, Greenland collared lemmings, red-backed voles, and tundra voles) also inhabit the island. Animals usually seen in or around the work sites are small mammals such as ground squirrels and foxes.

Marine mammals are present in the vicinity of the NE Cape area as seasonal migrants in the offshore and nearshore marine waters, at haul-out sites, and in association with the advancing and retreating ice pack. No haul-out sites are within the work area. During the summer, walrus, sea lions, and spotted seals may be present in offshore waters. During the ice season, ringed seals, bearded seals, walrus, and spotted seals can be found in nearshore and offshore leads and open water. Bowhead, gray, minke, killer, right, humpback, blue, and beluga whales inhabit offshore waters.

The only breeding seabird colonies known to exist at the NE Cape facility consists of about 60 glaucous gulls and 60 herring gulls at Seevookhan Mountain, about 5 miles southeast of the NE Cape site. Several other species of birds have been sighted in the vicinity of the NE Cape site, including common ravens, snow buntings, whistling swans, Lapland longspurs, and gulls.

Eleven species of fish reside in the streams and tundra ponds of Saint Lawrence Island. These include blackfish, nine-spined stickleback, grayling, whitefish, Arctic char, and Dolly Varden trout. Five of the six species of Pacific salmon occur around the island and rear in many of the larger drainages.

2.5 PREVIOUS STUDIES AND ACTIONS

Environmental investigations and cleanup activities at NE Cape began in the mid-1980s with the goal of locating and identifying areas of contamination and gathering enough information to develop a cleanup plan. Remedial investigations (RIs) were initiated at NE Cape during the summer of 1994. Additional sampling was performed during subsequent investigations: Phase II RI [Montgomery Watson, 1996 and 1999]; Phase III RI [Montgomery Watson Harza, 2003]; and Phase IV RI [Shannon &Wilson, Inc., 2005]. The studies divided the concerns among 34 separate sites. The results of the RIs showed that contaminants were present at some but not all sites. Bristol Environmental & Engineering Services Corporation performed RAs in both 2003 and 2005. In 2009, Bristol returned to the island to construct a landfill cap, remove drums containing POL, and perform a chemical oxidation study.

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3.0 SCOPE OF WORK FOR 2010

3.1 SCOPE OF WORK

The contract Scope of Work (SOW) for 2010 consisted of the following activities:

- Preparing plans and reports;
- Mobilizing/demobilizing to and from the NE Cape site;
- Designing and constructing a landfill cap at Site 9 to cover buried debris and collecting surface water samples from the stream flowing toward the Suqitughneq River before, during, and after completion of the landfill cap;
- Excavating, processing, and disposing of approximately 2,725 tons of petroleum-contaminated soils. The sites and the estimated soil weights are as follows:
  - Site 1, 100 tons;
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- Excavating, processing, and disposing of approximately 430 tons of PCB-contaminated soils The sites and the estimated soil weights are as follows:
  - Site 13, 225 tons;
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  - Site 21, 15 tons; and
  - Site 31, 175 tons.
- Excavating, processing, and disposing of 15 tons of arsenic-contaminated soils from Site 21;
- Cleaning, removing and/or plugging a manhole and culvert located at the western and middle drainages of Site 28 to prevent direct outflows of upgradient residual sources of contamination;
- Removing approximately 2.5 tons of submerged debris and drums from streams and ponds in the vicinity of two sites. The sites and the estimated soil weights are as follows:
  - Site 9, 2 tons; and
  - Site 29, 0.5 ton.
- Removing approximately 25 poles, 0.5 ton of wires, and other miscellaneous debris from tundra areas where clearly identified site wide;

- Developing and implementing a Sampling and Analysis Plan (SAP) for MNA of petroleum-contaminated soil at Site 8 and collecting two surface water samples from the stream that drains into the Suqitughneq River from Site 8;
- Sampling tundra/soil locations for petroleum hydrocarbons at Site 3, following the rationale of the Alaska Department of Environmental Conservation (ADEC) Technical Memorandum 06-001: Biogenic Interference and Silica Gel Cleanup (ADEC, 2006) and excavating, if necessary, as an optional task;
- Conducting an investigation using a UVOST to help design the future excavation for DRO-contaminated soil at the MOC;
- Sampling 10 monitoring wells at the MOC;
- Revegetating or stabilizing disturbed site areas, as detailed in the approved Storm Water Pollution Prevention Plan (SWPPP), before demobilization or in a timely manner; and
- Preparing a final RA report, which includes survey and as-built drawings of Site 9 and discussion of all remedial action work performed, including soil excavation, soil processing, sediment sampling, waste disposal documentation, sample results, debris removal, UVOST investigation results, and other relevant project details.

Descriptions of field activities are included in Section 5.0. Sampling procedures, analytical methods, and results are presented in Section 6.0. A photograph log of 2010 field activities is provided in Appendix A. The Response to Comment Forms from the Draft Final Report are included in Appendix B. Permits are included in Appendix C, the UVOST investigation report is included in Appendix D. The as-built survey of the Site 9 landfill is included in Appendix E, analytical results are provided in Appendix F and the Chemical Data Quality Report is Appendix G.

Figures 1 and 2 show the location of the project site, Figure 3 is the project organization chart, Figures 4 is a sketch of the project work sites, and Figures 5 and 6 show the landfill and surface water locations for Site 9. The POL-contaminated sites are shown on Figures 7-10 and Figures 11-15 illustrate the PCB and arsenic contaminated sites. Site 28 is shown on Figure 16, Site 8 is illustrated on Figure 17, the UVOST investigation area is shown on Figure 18, the MOC well locations on Figure 19, and the poles that were removed are shown on Figure 20.

3.2 CONTRACT LINE ITEMS

The USACE identified the work to be conducted as a series of Base and Optional Contract Line Item Numbers (CLINs). Optional CLINs identified unit priced work performed in addition to that identified in the Base CLINs. The USACE awarded the Base and Optional CLINs to Bristol on November 30, 2009. The Base CLINs are summarized in Table 3-1, and Optional CLINs are summarized in Table 3-2.

The actual quantities of work performed are also summarized in Tables 3-1 and 3-2. Five contract modifications have been made throughout the course of work and are described in Section 3.3.

Table 3-1 Base CLINs

Base CLINs	Description	Awarded	Actual
0001AA	Project Planning and Management	1 lump sum	1 lump sum
0001AB	Work Plans and Planning Documents	1 lump sum	1 lump sum
0001AC	Mobilization/Demobilization	1 lump sum	1 lump sum
0001AD	Site 9 Housing and Operations Landfill Cap	1 lump sum	1 lump sum
0001AE	POL Soils Removal (Sites 1, 3, 6, and 32)	2,725 tons	2,725 tons
0001AF	PCB Soils Removal (Sites 13, 16, 21, and 31)	430 tons	430 tons
0001AG	Arsenic Soil Removal (Site 21)	15 tons	16.7 tons
0001AH	Manhole/Culvert Cleanout/Removal (Site 28)	1 lump sum	1 lump sum
0001AK	Miscellaneous Metal Debris, Wires, and Drums Site-Wide	3 tons	25.1 tons
0001AL	Poles (Sitewide)	25	43
0001AM	Soil Characterization (Site 3) and Monitored Natural Attenuation Sampling (Site 8)	1 lump sum	1 lump sum
0001AN	Reporting	1 lump sum	1 lump sum
0001AX	Soil Excavation/Processing/Screening – Soil/Sediment Characterization	1 lump sum	1 lump sum
0001AY	Soil Excavations – Investigating/Locating/Screening/Confirmation Sampling	1 lump sum	1 lump sum

Notes:
CLIN = Contract Line Item Number
PCB = polychlorinated biphenyl
POL = petroleum, oil, and lubricants

Table 3-2 Optional CLINs

Option/Item	Description	Quantity per Option	Number of Options Available	Options Exercised
Option Task 1/ 0001AP	Additional PCB-Contaminated Soil	1 ton	20	0
Option Task 2/ 0001AR	POL Liquids	10 gallons	20	0
Option Task 3/ 0001AS	Batteries	10 pounds	20	20
Option Task 4/ 0001AT	Transformers/Light Ballasts	50 pounds	10	0
Option Task 5/ 0001AU	Additional Metal Debris	1 ton	5	5
Option Task 6/ 0001AV	Additional Wooden Poles	1	10	10
Option Task 7/ 0001AW	Groundwater Monitoring	1 lump sum	1	1
Option Task 8/ 0001AZ	Additional POL-Contaminated Soil	20 tons	10	1

Notes:
CLIN = Contract Line Item Number
PCB = polychlorinated biphenyl
POL = petroleum, oil, and lubricants

3.3 CONTRACT MODIFICATIONS

The following modifications were made to the contract:

- P00001: Updated the following required publication: *The Quality Systems Manual for Environmental Laboratories*, U.S. Department of Defense Final Version 4.1, April 2009;
- P00002: Incorporated the SOW entitled "Northeast Cape HTRW Remedial Actions, Northeast Cape, Alaska," dated March 11, 2010. The contract amount was increased, and all optional CLINS were changed from funded to not funded. SUBCLIN 0001UV was added for UVOST investigation activities;
- P00003: Added groundwater monitoring in the MOC to the SOW;

- P00004: Incorporated the SOW, dated June 29, 2010, increasing the contract amount, and added surface water sampling at Sites 6, 8, and 9, under SUBCLIN 0001AW;
- P00005: Added an additional 800 tons of PCB-contaminated soil to be excavated and disposed of, and increased analytical laboratory samples to be collected at Sites 13 and 31.

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4.0 PROJECT PLANNING, KEY PERSONNEL, AND SUBCONTRACTORS

4.1 PROJECT PLANNING

Project planning began on November 30, 2009, when Bristol received the USACE's Notice to Proceed for the project. The following sections describe the planning documents prepared for this project (Section 4.1.1) and the deviations from the planning documents (Section 4.1.2) that occurred in the field.

4.1.1 Planning Documents

The following planning documents were prepared by Bristol and approved by the USACE:

- Work Plan (WP);
- SAP;
- Contractor Quality Control Plan (CQCP);
- SWPPP;
- Site Safety and Health Plan (SSHP); and
- Waste Management Plan.

Revision 0 (draft) planning documents were submitted to the USACE on April 5, 2010. Revision 1 documents (final) were submitted on July 16, 2010. Comment sheets for the planning documents are provided in Appendix B. A Kickoff Meeting was held in the USACE, Alaska District, office on April 26, 2010.

4.1.2 Deviations from the Planning Documents

Differing site conditions necessitated some deviation from the work stated to be performed in the planning documents. Descriptions of the significant deviations from the planning documents follow:

- **PCB Soil Removal at Sites 13 and 31 –** PCB contamination at Sites 13 and 31 was significantly more extensive than originally anticipated. As a result, the numbers of field laboratory screening samples and fixed-base laboratory analytical samples were increased, the volume of removed soil increased, and a modification was added to the contract to account for additional soil volumes. The price proposal associated with the contract modification (P0005) for the additional 800 tons of PCB soil included an analytical cost for composite fixed-based analytical samples and not for discrete sample analyses. The PCB field-screening samples were analyzed discretely, as opposed to being lumped into composite groups, thus requiring the analysis of greater numbers of samples from within an excavation. Additional bulk bags had to be ordered and flown to the NE Cape site to account for increased volumes of soils to be removed at Sites 13 and 31. Twenty-one bulk bags were left on site at the former Building 98 concrete pad and will be transported off-island at a later date. The USACE requested and received approval from ADEC to stockpile the PCB-contaminated soil at the former Building 98 concrete pad. ADEC stipulated that the storage bags must be placarded, labeled, and stored in a consolidated manner that minimized exposure surfaces of the bags and accidental release. ADEC also stipulated that the USACE inform and request approval from the landowner and provide ADEC with written confirmation of the landowner's approval. The USACE met ADEC's requests, and the letters of correspondence pertaining to this issue are provided in Appendix C.

- **Soil Processing and Screening** – The WP stated that PCB soils would be processed through the screen plant during excavation activities. Instead, excavated PCB soils were loaded directly into bulk bags. Arsenic-contaminated soils from Site 21 were also loaded directly into bulk bags rather than being processed through the screen plant. It was also stated in the WP that the soil from areas in which the screen plant would be located would undergo sampling before and after soil processing. The screen plant was operated at Site 6 and at an area adjacent to the borrow pit. The soils from the borrow pit were not sampled before screening operations, but were sampled following completion of screening activities.
- **POL Soil Removal at Sites 1 and 3** – No POL-contaminated soil was excavated and removed from Site 1 because sample results indicate contaminated soils are not present above cleanup levels. The allotment of 100 tons of soil for Site 1 was transferred to Site 3 to accommodate the additional contaminated soils that were discovered at Site 3. Approximately 200 tons of soil were excavated and removed from a gravel pile at Site 3.
- **Laboratory Analysis** – Site 9 surface water samples were collected and sent to TestAmerica for analyses, which included volatile organic compounds (VOCs). The VOC analyses were not analyzed because of laboratory oversight. The laboratory did analyze the volatile samples for benzene, toluene, ethylbenzene, and xylenes (BTEX) with holding times.
- **MOC Groundwater Sampling** – The scope of work had stated 10 wells would be sampled at the MOC; however, because of the frost jacking of some wells, only 9 wells were sampled.

4.1.3 Permits and Regulatory Notifications

The federal and state permits that were required for this project were included in the WP. Copies of the permits and letters are provided in Appendix C. The following permits and regulatory notifications apply to the 2010 activities on Saint Lawrence Island for the NE Cape Hazardous, Toxic, and Radioactive Waste (HTRW) RA project:

- On July 7, 2010, the ADEC sent a letter to the USACE approving the 2010 NE Cape HTRW Remedial Actions WP and SAP.
- State of Alaska, Division of Mining, Land and Water, Water Resources Section provided an amendment to fish habitat permit FH09-III-0103 on June 5, 2009, to authorize withdrawal of up to 3,000 gallons of water a day from the Suqitughneq River.
- The Alaska Department of Natural Resources (ADNR), Division of Mining, Land and Water, “Letter of Entry” granted the USACE authorization to enter upon state tidelands for the express purpose of conducting barge landings for the continued assessment and cleanup of the NE Cape.
- ADNR, Division of Coastal and Ocean Management, ID2010-0505AA, provided a letter dated May 17, 2010, stating that the NE Cape project has previously been reviewed and found consistent with the Alaska Coastal Management Program. The state identification number for the prior review is AK0203-17AA.
- The Alaska Department of Fish & Game (ADF&G) Fish Habitat FH09-III-0102 permit was issued on April 22, 2009, for allowing equipment to cross streams, Northeast Cape White Alice Site Removal Action (Saint Lawrence Island), Township 25 South, Range 54 West, Quangeghsaq River.
- The ADF&G Fish Habitat FH09-III-0103 permit was issued on April 22, 2009, and Amendment 1, was issued on June 5, 2009, for placing of riprap in, performance of maintenance activities in, and water withdrawal from the Suqitughneq River, Northeast Cape White Alice Site Removal Action (Saint Lawrence Island), T25S, R54W.
- The Department of the Army U.S. Army Engineer District, Alaska, Regulatory Division, issued the Nationwide Permit (NWP) No. 38, Cleanup of Hazardous and Toxic Waste, File Number POA-2010-209, on May 19, 2010.
- U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, issued a clearance letter, dated June 29, 2009, concurring with Bristol’s findings that project activities would not interfere with endangered species in the project area.
- Department of the Army Right of Entry for Environmental Assessment and Response for Saint Lawrence Island, Alaska Property Identification Number DACA85-8-08-0134, was issued between the USACE, Kukulget Incorporated, and Sivuqaq Incorporated, dated June 17, 2008.
- ADNR, Division of Parks and Outdoor Recreation, Office of History and Archaeology, issued a clearance letter (File No.: 3130-1R COE/Environmental 3330-6N XSL-060) on July 2, 2009 concurring with Bristol’s findings that no historic properties would be adversely affected by the NE Cape project.
- The U.S. Department of the Interior Fish and Wildlife Service issued a clearance letter on May 13, 2009, concurring with Bristol’s findings that the proposed action at NE

Cape is not likely to adversely affect listed species, or adversely modify critical habitat.

4.2 KEY PERSONNEL

Bristol's organization chart for the project is shown on Figure 3. The project duties assigned to key home office and field management personnel are described in the following sections.

4.2.1 Key Home Office Personnel

Project Manager, Ms. Molly Welker

Ms. Molly Welker, the Project Manager (PM), was responsible for ensuring project tasks were completed on schedule and within budget, recommending and justifying project modifications, implementing methods of tracking materials and resources, coordinating work with subcontractors, and complying with normal safety procedures and regulatory requirements.

Health and Safety Manager, Mr. Clark Roberts, C.I.H.

Mr. Clark Roberts, Certified Industrial Hygienist (C.I.H.), reviewed the Safety and Health Program for this project. He worked with Bristol's Site Safety and Health Officer (SSHO) to monitor project compliance with Bristol's Corporate Safety and Health Program and the SSHP.

Regulatory Compliance Manager and Transportation and Disposal Coordinator, Mr. Tyler Ellingboe

Mr. Tyler Ellingboe was responsible for overseeing regulatory compliance for identifying, handling, packaging, manifesting, transporting, and disposing of wastes generated on the project. He worked with the Site Superintendent (SS) and the PM to track waste shipments.

Chemical Quality Control Officer and Project Chemist, Mr. Marty Hannah

Mr. Marty Hannah was responsible for quality control (QC) aspects of the project related to the collection and chemical analysis of all samples, as delegated by the PM. His primary role in the office was to provide oversight to the data development and review process and all subcontracting laboratories. In the field, Mr. Hannah set up and operated the field-screening laboratory. Mr. Hannah was assisted in the laboratory by Bristol intern Charlie Stark.

4.2.2 Key Field Personnel

SS/SSHO, Mr. Charles (Chuck) Croley

Mr. Chuck Croley was responsible for managing, scheduling, coordinating, and executing all of Bristol's on-site activities. He reported directly to the PM. Mr. Croley was also responsible for overseeing the activities of Bristol's subcontractors on site.

Contractor Quality Control Systems Manager (CQCSM), Mr. Russell James

Mr. Russell James was responsible for management of Contractor Quality Control (CQC) and had the authority to act in all CQC matters for the project. He worked with the SS and the PM to implement the CQCP. Mr. James was Bristol's liaison with the USACE's Quality Assurance Representative (QAR). Copies of all daily QC reports are provided electronically in the Supplemental Data.

Environmental Samplers, Mr. Eric Barnhill and Ms. Lyndsey Kleppin

Mr. Eric Barnhill and Ms. Lyndsey Kleppin were the ADEC-Certified Environmental Samplers for collection and processing of environmental samples. Copies of field notes are provided electronically in the Supplemental Data.

4.3 SUBCONTRACTOR SUMMARY

Bristol's major subcontractors for the project are listed in Table 4-1.

Table 4-1 Major Subcontractors for 2010 HTRW Remedial Actions Project

Subcontractor	Assignment
Bering Air, Inc.	Aircraft charters
ECO-LAND, LLC	Surveying
Emerald Alaska, Inc.	Hazardous waste management and disposal
Fairweather, Inc.	Infirmary and emergency medical services
Global Services, Inc.	Camp services
Hammer Environmental	Drilling and UVOST™ services

Table 4-1 Major Subcontractors for 2010 HTRW Remedial Actions Project (continued)

Subcontractor	Assignment
Northland Services, Inc.	Marine transportation
Security Aviation	Aircraft charters
TestAmerica Laboratories, Inc.	Fixed-based analytical testing laboratory
Waste Management, Inc.	Solid, RCRA and TSCA soil disposal

Notes:
RCRA = Resource Conservation and Recovery Act
TSCA = Toxic Substances Control Act
UVOST = Ultraviolet Optical Screening Tool

5.0 FIELD ACTIVITIES

5.1 PROJECT LOGISTICS

5.1.1 Mobilization/Demobilization

Mobilization began in May 2010 with the staging of specialized equipment, material, and shipping containers (Conexes) in Alaska, and in the continental United States. Items purchased outside of Alaska were consolidated in Seattle, Washington, and transported by Northland Services, Inc. (NSI), to Anchorage, Alaska, in May 2010. These items were consolidated with the heavy construction equipment, the construction camp, fuel, and other items assembled by Bristol in Anchorage. More than 800 tons of freight was loaded onto two NSI barges at the Port of Anchorage in early May 2010. The barges departed Anchorage in mid-May for Nome, Alaska.

Bering Air, Inc. (Bering Air), made reconnaissance flights to NE Cape on June 21 and 26, 2010. The purpose of the flights was to assess whether the sea ice in Kitnagak Bay would allow the landing craft to land at Cargo Beach, and to assess the condition of the airstrip. Based on the observations made during these flights, Bristol, in consultation with NSI, decided to move the landing craft to Kitnagak Bay and land on Cargo Beach on July 5, 2010.

Landing craft were used for hauling between Nome and Cargo Beach for final delivery of freight. The first landing craft arrived at Cargo Beach on the evening of July 4, 2010. The Cargo Beach landing location is marked on Figure 4, along with all other NE Cape work sites utilized during the project.

Five Bristol personnel arrived on July 5, 2010, to rendezvous with the landing craft and begin off-loading. A total of five landing craft hauled equipment to NE Cape. Off-loading of all freight was completed on July 8, 2010.

Global Services, Inc. (Global), arrived on July 8, 2010, to begin construction of the camp. The temporary construction camp was assembled and operational by July 17, 2010.

Additional personnel and subcontractors arrived from July 14 through July 20, 2010. By July 17, 2010, Bristol had completed improvements to the roads and set up of the NE Cape infrastructure.

Removal work began on July 15, 2010. At that time, approximately 18 personnel were in camp working on the project.

Demobilization began on September 2, 2010, and worker numbers gradually declined between September 3 and September 8, 2010. Additional crew members from Global arrived on September 8, 2010, and began deconstructing the camp. Field activities were completed and the temporary construction camp was shut down on September 15, 2010.

Several landing crafts arrived throughout the project to transport bulk bags off the island, the first of which arrived on August 14, 2010. Six additional landing craft arrived at NE Cape between August 25 and September 12, 2010. As part of the demobilization activities, nearly all of the equipment, camp units, and 10 containers were staged at Site 6 for demobilization. Some non-hazardous waste containers were also staged on flats at Cargo Beach for barge loading by September 15, 2010. The final landing craft arrived and all freight was loaded and off the island by October 10, 2010.

Because of weather delays and the high number of landing craft required for transportation of all equipment, supplies, and waste, scheduling of landing craft proved to be difficult during the final days of demobilization. A five-man crew remained on the island during the demobilization process to assist with loading the landing craft. During a period in late September 2010, when there was a stretch of time during which no landing craft were scheduled to arrive, the crew left the island and returned to Anchorage. The crew returned on October 1, 2010, to help load the final landing craft.

5.1.2 Air Support

Security Aviation, of Anchorage, Alaska, and Bering Air, of Nome, Alaska, provided air support services during the 2010 summer season. A Cessna Conquest, owned and operated by Security Aviation, was used to transport USACE personnel to comply with Public Law 99-661 and Department of Defense Directive 5500.53. Passenger flights for non-USACE personnel were typically made using King Air, Beechcraft, or Navajo aircraft, owned and operated by Bering Air. More than 40 round-trip flights were chartered during the 2010 summer season.

5.1.3 Equipment Used

The major equipment used by Bristol and its subcontractors is presented in Table 5-1. The equipment was serviced, maintained, and repaired on site by a heavy equipment mechanic.

Table 5-1 Major Equipment List

No. of Units	Description	No. of Units	Description
1	White GMC crew cab	2	Arctic Caterpillar side by side
1	White Chevrolet extended cab with ladder rack	1	Caterpillar 320C excavator
1	White Chevrolet crew cab, diesel	2	IR Light Tower
1	White Chevrolet 2500, extended cab, gas	1	Frost fighter heater
1	Red Chevrolet crew cab, diesel with service tank	1	IR 60KW generator
1	White Chevrolet pickup	1	Volvo L330E loader/forklift
1	Gray Chevrolet crew cab, diesel	2	Volvo A35 rock truck
1	Ottawa yard goat, fifth-wheel tractor	2	287B skid steer
1	International S4700 fuel/lube truck	2	Compressor with engine
1	Ford F700 mechanic truck with compressor, welder, hydraulic boom	1	Welder
1	Kaiser Jeep® 6X6 cargo truck with water tank	1	Wash shack with pressure washer
1	Caterpillar 988B loader	1	DeWalt compressor with engine
1	Caterpillar 160H motor grader	2	DeWalt electric compressor
1	Caterpillar TH580B extended boom forklift	2	DeWalt generator
1	Caterpillar D6T XL bulldozer	1	6KW Generac generator
	Caterpillar D5K LPG bulldozer	1	Caterpillar 930H loader
1	Caterpillar D8N bulldozer	1	Caterpillar 312D excavator
1	White Chevrolet van	1	Caterpillar CS-323 roller
1	Nodwell tracked vehicle	1	Tracked trailer with hydraulic boom

Notes:
ATV = all-terrain vehicle kW = kilowatt

5.1.4 Temporary Construction Camp

The temporary construction camp was set up on an existing gravel pad adjacent to the airstrip, and was designed to house approximately 35 people. It consisted of 12 individual Weatherport® tents, each capable of housing four people.

Camp facilities included shared sleeping quarters; a medical dispensary; a recreation room; a dining facility; shower, laundry, and toilet facilities; a food storage Conex; satellite telephone and television system; and offices for Bristol, subcontractors, and USACE personnel. A medic/Emergency Medical Technician (EMT) III was on site at all times in order to provide emergency medical services. The camp was operated between July 7 and September 15, 2010.

5.1.5 Borrow Area

Borrow material used at the project site was obtained at the borrow area located approximately 2,000 feet south-southeast of the former White Alice antenna array. A total of 13,752 cubic yards of material was removed during the project. The material was used primarily as landfill cap material at Site 9 and backfill, and minimal amounts were used for road repair. No sampling or analysis of borrow material was performed.

5.1.6 Access Improvements

Approximately 4 miles of gravel road connect the various work areas at the NE Cape site. There are four stream crossings, consisting of three culverts and one bridge, within the work areas at NE Cape. Access improvements along the road system were initiated upon arrival and continued as needed during the project. The roads were generally in good condition and, in most cases, only required grading and minor backfilling to reestablish and maintain their usability. Bristol used a water truck on site to periodically suppress dust. The water withdrawal area is labeled on Figure 4.

A culvert was installed on a section of the road that lies between the MOC and Site 24. The culvert was removed following pole removal activities. Repairs were made to this road to assist with access to the wooden poles that were removed from the tundra. To assist with landfill capping operations at Site 9, a road was constructed between the main road and the landfill. Culvert was installed at the intersection of Cargo Beach Road and this landfill access road and remains on site. This road aided rock trucks during hauling operations and facilitated access for pickup trucks and other equipment.

5.2 HEALTH AND SAFETY

Bristol personnel arrived on the island on July 5, 2010. The safety and health management system and the communications system for NE Cape were established immediately upon arrival. The medic/EMT III arrived on site by July 15, 2010.

Regular and continual communication about safety issues was provided and maintained with the USACE QAR, the Bristol SS/SSHO, CQCSM, and PM.

Field personnel, subcontractors, government personnel, and visitors were provided a briefing by the SSHO or administrative assistant immediately upon arrival, and safety meetings were held on a daily basis. Part of Bristol's safety routine involved the daily Safety Toolbox Meeting, which was held each morning before starting work. These meetings were about project-related work to be performed each day at the NE Cape site. Minimum safety gear for all personnel included hard hat, reflective vest, steel-toe boots, safety glasses, and work gloves.

The level of subcontractor involvement at NE Cape was high. Bristol, Hammer Environmental, ECO-LAND, LLC (Eco-Land) and Global closely coordinated operations in all areas. Key subcontractor involvement with all parties included complying with one SSHP that covered all workers. All workers, including subcontractor workers, attended the mandatory daily Safety Toolbox Meeting. This participation included subcontractor employees assigned to NE Cape for short-term or overnight durations, such as surveyors, communication technicians, and laborers.

The Bristol SSHO performed safety and health "walk-through" inspections each day at the project site. The purpose of these inspections was to keep abreast of current site activities and conditions, look for existing or potential site safety issues and concerns, ensure appropriate use of personal protective equipment (PPE), and reinforce safe work practices. The daily safety inspections also provided topics and information for incorporation into the daily Safety

Toolbox Meeting to keep the subject matter relevant to NE Cape conditions. In particular, issues such as high wind conditions, slippery step conditions, and equipment safety were duly noted and presented at the morning safety meetings.

In all, Bristol developed seven Activity Hazard Analyses (AHAs) for specific tasks and operations at NE Cape. The following AHAs were presented in the SSHP:

- Debris Removal and Staging,
- Grass Seeding and Site Restoration,
- POL and PCB Soil Removal and Disposal,
- Barge Loading and Unloading Operations,
- Fueling of Vehicles and Equipment,
- Sampling, and
- Excavation Activities.

Bristol invested more than 13,370 man-hours during this project without a lost-time or recordable accident under OSHA reporting guidelines.

5.3 SITE IDENTIFICATION AND SURVEYING

Bristol subcontracted Eco-Land for all survey needs. The survey crew mobilized to NE Cape twice during the 2010 field season, once at the start of the project and again near completion. Bristol furnished Eco-Land with USACE-supplied survey coordinates that had the locations of historical samples where contaminant concentrations exceeded cleanup levels. The on-site surveyors located and marked each position during their initial mobilization between July 18 and July 20, 2010. Bristol field personnel were supplied with figures from the WP (Bristol, 2010) showing each sample location for use as reference in the field. The locations marked by the survey team appeared to correspond with the figures associated with each site. The other primary objective during the initial round of surveying was to capture the pre-construction topographical surface of the Site 9 Housing and Operations Landfill.

When Eco-Land returned to NE Cape in September, 2010, the subcontractor captured the positions of all confirmation sample locations, excavation boundaries, and wooden pole removal areas and performed a post-construction topographical survey of the Site 9 landfill cap. All survey data are provided electronically in the Supplemental Data.

5.4 SOIL PROCESSING AND SCREENING

The screen plant was staged at Site 6 during excavation activities, except for the short amount of time when it was staged at the borrow site while processing soils from Site 3 (Photo 52, Appendix A). The screening plant was moved directly west from its initial Site 6 location to process contaminated soil under the first location at Site 6. Figure 9 shows the screen plant and sample locations at Site 6.

All excavated POL soils were processed through the screening plant before containerization. At PCB-contaminated sites, excavated soils were not processed through the screening plant, instead they were placed directly into bulk bags. Soil samples were collected at both screening plant locations to confirm that the areas met cleanup levels for the NE Cape site. Table 9 of Appendix F (Analytical Results Tables) shows the DRO/residual range organics (RRO) results for samples collected after the screen plant had been removed from Site 6.

All Site 6 confirmation results are provided in Table 9 (Appendix F) and the borrow area field screen sample results are included in Table S11 of the Supplemental Data (provided electronically).

5.5 SITE 9 HOUSING AND OPERATIONS LANDFILL

Activities at Site 9 represented a significant work effort during the 2010 field season. The original SOW included design of the landfill cap, pre- and post-construction surveys of the landfill cap area, construction of a landfill cap, and removal of debris from surrounding water bodies. Bristol's work efforts included water diversion trenching, surface water sampling, landfill delineation, cap construction, debris removal, and seeding. Bristol's specific field procedures are described in the subsections below.

5.5.1 Diversion Trench

A pond was present on the southeast side of the Site 9 landfill. The outflow from this pond travelled north-northwest across the surface of the landfill into an adjacent pond located to the north. To reroute the flow of water away from the landfill, Bristol constructed a diversion trench to drain the southeast pond.

The purpose of the diversion trench was to create a preferential pathway that would eliminate or minimize flow through the landfill. Before mobilization, Bristol used its best available resources to plan the location of the diversion trench and proposed three different locations during its application for work to be authorized by Nationwide Permit No. 38. The final location of the diversion trench most closely resembles option B presented in Bristol's permit application and is shown on Figure 5.

Construction of the diversion trench was performed with a track hoe, working from northeast to southwest (from lowest to highest elevations). The trench, with approximate dimensions of 15 feet wide by 160 feet long, was lined with rocks larger than 2 inches in diameter. The rock used to line the trench was clean borrow pit material processed through the screening plant. The trench ended in a relatively level area of the tundra adjacent to a stream channel. As an erosion control measure, straw wattles were placed at the end of the trench to help slow the flow of water. The end of the trench was approximately 25 feet from the nearest stream channel into which the diverted water would flow, thus requiring the diverted water to flow over land before connecting with the main stream channel. Construction of the trench continued until the last piece of earth between the trench and the pond was removed. The diversion trench successfully prevented water from flowing across the surface of the landfill by lowering the water level in the pond by approximately 1 foot.

5.5.2 Landfill Delineation

To make the most efficient use of borrow material, Bristol employed some investigation techniques to determine the boundary of the historical landfill. Test pits or "potholes" were advanced across Site 9 in areas containing visible debris to determine whether additional trash was present underground. If the surface debris was not accompanied by additional debris, it was considered a surface anomaly and was transferred to a more central location within the landfill boundaries. Bristol inspected more than 30 potholes and was able to successfully delineate the landfill boundary. All visible debris outside the landfill boundary at Site 9 was either moved to an area within the boundaries or transferred to a Conex container. Bristol worked closely with the on-site QAR during boundary delineation to ensure client satisfaction. The boundary was marked with fluorescent paint throughout cap construction, so that it was easily identified by equipment operators.

5.5.3 Material Hauling and Cap Construction

Material hauling and capping activities occurred between July 17 and August 6, 2010. During this time, Bristol hauled 415 truckloads of material to Site 9 for a combined total of 9,960 cubic yards. The completed landfill cap covered an area comprising approximately 1.6 acres.

The progression of the basic procedures for the landfill cap construction was as follows: Rock trucks were loaded at the borrow area with clean material using a Volvo L330 loader. The trucks then traveled approximately 1 mile to the Site 9 Housing and Operations Landfill to stockpile the material, which was then spread and graded using a Caterpillar D5K bulldozer. This general procedure was followed day-after-day until a minimum of 24 inches of material covered the entire extent of the landfill. The site foreman, with oversight from the SS and on-site QAR, set the grade to promote surface runoff with minimal risk of erosion from impoundment or percolation.

Approximately 90 linear feet of fill on the northern edge and 250 feet on the eastern edge of the landfill cap were placed into adjacent water bodies. This action was performed in accordance with Nationwide Permit No. 38, Cleanup of Hazardous and Toxic Waste.

Bristol kept the on-site QAR informed of capping progress throughout the course of construction. As cap completion approached, QC measures were performed to ensure both grade and thickness, were achieved. With the QAR present, Bristol advanced test pits across the face of the landfill cap to ensure that the fill was at least 24 inches thick. Additional fill was added in areas that were found to be deficient. Two rounds of advancing test pits were conducted in this manner to ensure appropriate thickness of the landfill cap. Final seeding and cap completion were achieved by August 31, 2010.

Pre- and post-construction surveys were conducted at Site 9 by Eco-Land to show site conditions before and after installation of the landfill cap. The Site 9 post-construction as-built is provided in Appendix E, and electronic survey files are included in the Supplemental Data.

5.5.4 Site 9 Debris and Waste Removal

Significant quantities of miscellaneous debris littered the landscape in the vicinity of Site 9. Tires and broken pieces of batteries were also visible throughout areas of the landfill and were removed before cap construction. Bristol was originally scoped to remove 2.5 tons of submerged debris and drums from streams and ponds near Sites 9 and 29. At project completion, however, Bristol had removed approximately 12.1 tons of debris from these areas. Additionally, Bristol removed and disposed of 14 tires, weighing 0.8 ton, and battery pieces, totaling 300 pounds. Nonhazardous surface debris that resided close to, but outside of the landfill boundary was hand-picked or dug up with an excavator and placed within the landfill cap area and buried under the 2-foot cap.

5.6 WIRE AND WOODEN POLE REMOVAL

Bristol was scoped to remove 0.5 ton of wire and other miscellaneous debris, as well as 25 wooden poles, from the tundra. Final total weights of debris and wire and the number of wooden poles exceeded the contract amounts, and additional debris, wire, and poles remain at the NE Cape project site.

The first step in this removal process was to identify the locations of all visible debris and poles in the project area. The locations were identified by using a side-by-side utility vehicle to traverse across the site and mark the locations of debris and poles. Any small debris that could be managed by hand was picked up and thrown into the back of the vehicle for eventual disposal.

Work was performed on a daily basis, and trash/debris was placed inside a Conex container. When a piece of equipment was available, such as the Nodwell tracked vehicle or one of the tracked excavators, it was mobilized to flagged debris-containing areas to facilitate in the removal process. Debris was loaded onto the trailer of the Nodwell vehicle or into the back of a rock truck for transportation to the Conex staging area, which at the time was situated approximately 500 feet east of the MOC in a pull-out area directly adjacent to Cargo Beach

Road. Approximately 5.1 tons of wooden debris and 7 tons of metal debris were collected and containerized for disposal.

Wire was prevalent across the project site and often measured 1.5 inches in diameter. The size and weight of the wire enabled the field crew to cut much of it into easily manageable pieces before the wire was removed from the tundra and loaded into a container. Bristol removed a total of 12.2 tons of wire from the tundra during the 2010 field season. Wire was loaded into one Conex, and wooden debris and metal debris were placed into two additional Conexes.

Wooden poles were situated near the MOC and were identified to the north and northwest of the complex. The diameters of the poles varied, but often exceeded 1.5 feet. Attempts were made to remove the poles with a hydraulic boom that was mounted to a trailer attached to the Nodwell vehicle. Because this removal approach proved difficult, the tracked excavator was used instead. In some cases, the frozen ground surrounding the pole had to be thawed using the Hotsy® pressure washer. The poles were often buried greater than 10 feet underground, making their removal difficult at times. During the 2010 field season, Bristol removed 43 poles, for a combined weight of 14.2 tons. The locations of the poles that were removed were surveyed by Eco-Land and are shown on Figure 20.

Additional poles remain in the NE Cape project area. Bristol's preliminary counts revealed at least 50 more poles that were easily visible from sections of the road that connect the MOC to Sites 24 and 25.

5.7 SITE 28 MANHOLE AND CULVERT REMOVAL AND SAMPLING PROCEDURES

The work associated with the remedial tasks at Site 28 was performed shortly following mobilization to NE Cape. Bristol was scoped to clean, remove, and/or plug a manhole and culverts located in the middle and western drainages at Site 28. Bristol successfully accomplished these tasks without incident.

Bristol began by installing silt fencing in the western and middle drainages to protect against sediment pollution. The eastern culvert, consisting of 12-inch corrugated metal piping and measuring approximately 32 feet in length, was located and removed from the ground using heavy equipment. The culvert was situated underneath the MOC perimeter road, which required removal of a small section of the road. The ends of the culvert were surveyed with a Trimble® GeoXH™ Global Positioning System (GPS) unit and are shown on Figure 16 along with other relevant features from Site 28. The metal culvert pieces were placed inside a Conex container for disposal.

The manhole in the western drainage was clearly visible and easily removed using the Caterpillar 320C excavator. A 12-inch corrugated metal pipe was attached to the southern end of the manhole and continued in a south-southwest direction toward the MOC. A smaller 2-inch pipe ran adjacent to the 12-inch pipe and was likely a steam pipe used to the thaw the main pipe. Bristol's objective was to plug the two pipes, thus eliminating any preferential pathways for contaminant migration from the MOC. Because the ends of the pipes were situated in an area that was flooded with water, Bristol traced the pipes approximately 63 feet toward the MOC until an acceptable work area could be accessed. The origin of the pipes was not determined, but the pipes likely came from the Site 13 Heat and Power Plant. Bristol personnel used a circular saw to cut off and remove the 63-foot section of pipe that had been attached to the manhole. The pipe was placed inside a Conex container for disposal. The open end of the pipe that extended from the MOC was filled with bentonite and welded shut. A very small amount of sludge-soil was cleaned out of the pipe/culvert and bagged for disposal along with the manhole sludge contents. Disturbed areas were backfilled and graded to conditions as they existed before construction.

Less than 55 gallons of sludge was contained inside the manhole. Using scoops and shovels, Bristol personnel donned appropriate PPE, including Tyvek® coveralls and nitrile gloves, and transferred this material from the concrete manhole to an open-top 55-gallon drum for disposal. Sludge and concrete samples were collected from the manhole and sent to TestAmerica for analysis. Sample results are discussed in Section 6.20.

The manhole was strapped inside the Conex that also contained Bristol's hazardous waste drums. In total, approximately 95 feet of culvert, one drum of sludge, and one 6,600-pound concrete manhole were containerized and transported off the island for disposal.

5.8 SITE STABILIZATION AND REVEGETATION

Most disturbed areas were returned to preconstruction conditions as much as possible following field activities. Sites 3, 16, 21, and 32 and the landfill caps at Sites 7 and 9 were seeded with the seed mixture identified in Table 5-2.

Table 5-2 Seed Mixture

Common Name	Mixture % by Weight
Tufted Hairgrass	70
Red Fescue	30

Seeding operations were conducted on August 25 and August 31, 2010, and fertilizer was spread across all seeded areas. The seed mixture was also applied at Site 7, which was initially seeded during field operations conducted in 2009. An agronomist from the Alaska Plants Material Center visited the site on August 10, 2010 and made recommendations for additional seeding at Site 7 with seed mixtures shown in Table 5-2. A letter from the Plants Material Center is included in Appendix C. The on-site QAR was present for seeding operations to ensure client satisfaction.

5.9 MOC SUBSURFACE INVESTIGATION

Hammer Environmental was subcontracted to perform a subsurface investigation of the MOC and Site 28 drainage areas with the intent of determining the extent of POL soil contamination. A total of 198 UVOST points were advanced between July 21 and August 8, 2010. Only 197 points provided information; one probe hit refusal at 1 foot bgs and was abandoned. Each point was advanced to the anticipated water table or refusal, and a response log recording depth versus percent Laser-Induced Fluorescence (LIF) was generated. Correlation samples were taken on July 29 and August 8 and consisted of 23 different soil samples from 20 soil boring locations. Correlation samples were taken over a range of LIF response intensities within the MOC UVOST study area. Discrete soil samples from the direct-push probe were homogenized in a Ziploc® bag and analyzed by the UVOST ex situ. The remainder of each homogenized sample was submitted to the on-site field laboratory for DRO analysis. All borings were backfilled with bentonite and marked with survey stakes.

The UVOST investigation report produced by Hammer Environmental is presented in Appendix D.

In general, the UVOST probe locations that yielded LIF responses produced elevated analytical results. Unfortunately, the correlation between the ex-situ UVOST screening and the analytical results for field gas chromatography did not follow a typical linear progression. Correlation ranged from 86 parts per million (ppm) to 16,320 ppm per 1% relative emittance (RE), with an average range between 500 ppm and 1,500 ppm. These results are well outside the optimal range. To be conservative and reasonable, a value of 1% RE per 1,000 ppm was used to represent in-situ LIF readings. Thus, 9.2% RE represents the targeted 9,200 ppm.

Compression effects of the direct-push probe may not accurately represent in-situ thickness of strata, especially spongy organic material and areas of poor recovery, and probe samples may also bias clast sizes low for gravels. As a verification technique, five test pits were advanced to groundwater using an excavator to investigate stratigraphy in the MOC. Test pits 1 through 3 were excavated August 6 and were located at Site 10 on the former tank pad and lower elevations north of the tank pad. Test pits 4 and 5 were excavated August 7 at Site 13 and Site 16, respectively. All excavations were advanced to groundwater or below, with depths ranging from 12 to approximately 21 feet bgs. Excavations were backfilled after logging. Boring logs from the test pits can be found in Attachment 2 of Appendix D, a report on the UVOST Investigation. The UVOST probe and MOC test pit locations are shown on Figure 18. Table 23 (Appendix F) contains the area and estimated volumes of contaminated soil at the MOC. This table will be used as guidance for future removal activities at the MOC.

5.9.1 MOC Site Stratigraphy

The former tank pad contains brown gravel fill, with predominantly silty fines. The UVOST signatures indicate that the silt contains organic materials. The fill material is weathered and oxidized monzonite talus, derived from the Kinipaghulghat pluton immediately south of the MOC. Gray clayey gravel occurs at depth and appears to be the product of weathered unconsolidated monzonite clasts. It is important to note that boring logs generated during correlation sampling represent soil fractions containing less than 2-inch clasts. Coarser gravels are not detected in the GeoProbe borings but were visible in test pits 1 through 5. Figure 18 shows UVOST, GeoProbe and test pit locations.

Topographic highs in the drainage basin, outside the extent of the gravel pad, are primarily composed of peat and organic silt layers with variable amounts of gravel. Topographic lows typically contain a thin (less than 1.0 foot) layer of active organic surface material or peat with gray clayey gravel and lenses of fat clay at depth. Discontinuous permafrost lenses are present at depths between 0 and 10 feet bgs. The permafrost occurs primarily within peat and organic silts in the topographic lows north of the 2009 in-situ chemical oxidation (ISCO) wells located at the center of the UVOST study area near MW 88-5.

5.9.2 Hydrogeology

The groundwater table broadly mimics surface topography, sloping northeast toward the Suqitughneq River within the UVOST investigation area. The groundwater table is typically encountered within the gray clayey gravel. Surface water, present in ponds and as runoff, occurs in the low-lying areas north of the MOC. The hydraulic gradient at the MOC, as measured from the south-central portion of the study area (MW 88-1) to the Site 28 drainage (MW 88-5) is 0.02. The gradient was calculated using groundwater elevation data taken August 3, 2010. The water table fluctuates seasonally, and water levels taken before and after one rainfall event varied by 2 feet at MW 88-1.

5.9.3 UVOST Contaminant Characterization

The UVOST investigation area can be divided into three regions: Western, Central, and Eastern. The Western Region is located southwest of the Site 28 drainage. The region is characterized by contamination occurring below 8 feet, with the highest LIF responses between 12 and 16 feet bgs at the presumed water table. Test pits 4 and 5 indicate very coarse gravel in the area. Correlation sample logs 10NC27UV95, 10NC27UV99, 10NC27UV103, and 10NC27UV136 indicate that the water table occurs in gray clayey gravels with low organic content. Log 10NC27UV30 represents the highest LIF response at 266 percent.

The Central Region consists of the Site 28 drainage, the ISCO study area, and peripheral topographic lows. The area contains topographic highs consisting of peat and silty organic material, with gray clayey gravel at depth. Contamination occurs from the ground surface (in the case of topographic lows) to approximately 17 feet bgs. Empty fuel drums were observed in the area. Probes 10NC27UV58 and 10NC27UV63 represent the highest contaminant concentration, with a maximum LIF response of 310 percent. Permafrost occurs in probes 10NC27UV58 and 10NC27UV09.

The Eastern Region consists of the former tank pad and a low-lying marsh area to the north and northeast. The tank pad has approximately 3 feet of gravel fill material, overlaying a peat layer and clayey gravel at depth. Test pit 3 was excavated on the pad and reveals coarse gravel with clasts up to 2 feet in length. UVOST investigation results from this area indicate that the eastern edge of the former tank pad area is contaminated with DRO above the ADEC cleanup level applicable for the project site. Contamination above the cleanup level for DRO was only encountered on the eastern edge of the former tank pad area. The marsh area has an active organic mat at the surface and gray clayey gravel at depth. The gravel in the marsh area contains a higher percentage of fines than the other regions and is moist or saturated. Lenses of high- and low-plasticity clay occur in low areas and are evident in test pits 1 and 2. Contamination is present at the surface and to a depth of approximately 15 feet bgs. The LIF highs occur in probes 10NC11UV31 and 10NC11UV35, with a maximum LIF response of 348 percent.

The three-dimensional plume model created by Dakota Technologies, Inc. (DTI), was used as a reference to guide the examination of individual UVOST logs. Figures within the UVOST report (Appendix D) were created by DTI, the developer of the UVOST system. All two-dimensional and three-dimensional plume maps are generated by the Environmental Visualization Systems (EVS) program developed by C Tech Development Corporation. The interpolation method used is called the Inverse Distance Weighted (IDW) Interpolation, which uses the Shepard’s Method of statistical interpolation of the scatter points (sometimes referred to as the Franke and Nielson Equation). The IDW method is based on the assumption that the interpolation should be most influenced by the nearby points and less by the more distant points. Thus, the interpolation is a weighted average of the scatter points, and the weight assigned to each scatter point diminishes as the distance from the interpolation point to the scatter point increases. This interpolation approach is considered to be the most common and most basic statistical method for two-dimensional and three-dimensional geostatistical analysis.

Plan view plume boundaries were drawn to be inclusive of UVOST probe points containing LIF response values of more than 9.2% occurring at any depth above 15 feet bgs. The 9.2% cutoff value is a conservative estimate based on a correlation of 1,000 milligrams per kilogram (mg/kg) to 1% LIF and is not based on site-specific correlation data because of poor correlation for the 23 samples collected at the MOC. Figure 3 of the UVOST Investigation at the MOC (Appendix D) shows areas with LIF responses greater that 9.2% RE.

The volume and weight estimates for excavated soil at the MOC were developed with the goal that all subsurface that contained LIF responses greater than the 9.2% cutoff would be hauled off site. The estimates account for operational feasibility and variable topography by assuming an excavation resolution of 2 to 3 feet. Plume boundaries and excavation units were developed taking groundwater flow direction and topography into consideration.

Adjacent logs demonstrating an exceedance at similar depths bgs were grouped in the same excavation unit. Often the exceedance peaks were present at slightly different elevations and depths bgs. The area of soil to be captured was determined by taking the most conservative approach; collecting 2 feet above the shallowest exceedance and 2 feet below the deepest exceedance. If more than 4 feet of material between two exceedances peaks in adjacent logs was below the 9.2% cutoff, the material would be stockpiled, as in excavation units D2 and J3. The volume was calculated by taking the plan view square footage of the excavation unit multiplied by the thickness of the layer (or layers) of material to be excavated and hauled off the island. Cubic yards were converted to tons by a factor of 1.6.

Table 23 (Appendix F) contains area, depth, volume, and weight estimates for each proposed excavation unit in the MOC. Volume and weight estimates were calculated for two water table conditions. The low water table estimate of approximately 41,000 tons was calculated using a depth to water 2 feet below the lowest site-specific water level data available from test pits, UVOST correlation sampling logs, and monitoring wells as observed in summer 2009 and 2010. The high water table estimate of approximately 27,000 tons was calculated based on the highest water table data for a specific area.

In the case of contamination at depth, soil which contains LIF responses below the 9.2% cutoff for a of thickness of greater than 2 feet will be stockpiled as overburden. This material must be excavated and stockpiled to access contaminated material below. The estimated overburden for the low water table scenario is 33,000 tons.

5.10 WASTE HANDLING AND DISPOSAL

Bristol transported and disposed of 397 bulk bags loaded with PCB- and POL-contaminated soil. Fifteen bulk bags were manifested as hazardous waste because the soils had PCB concentrations that exceeded 50 ppm. Additionally, three bulk bags were manifested and disposed of as hazardous waste because of high concentrations of arsenic.

In addition to wastes directly related to POL and PCB soil excavations, Bristol was responsible for a number of other wastes associated with the camp and mobile laboratory, as well as unexpected wastes discovered during the course of fieldwork. One such unexpected waste included a bulb containing mercury that was unearthed during excavation activities at Site 13. The glass bulb was intact, and the mercury was contained within the glass. The amount of mercury was visible through the glass bulb and was approximately a 1-centimeter circumference sphere. Bristol wrapped the bulb in bubble wrap and containerized the bulb in a small, 1-gallon United Nations-rated plastic bucket.

The field screening laboratory wastes included hexane, acetone, methylene chloride, and sulfuric acid. All laboratory wastes were loaded into plastic, bung-top drums and were loaded into overpack containers. The hexane and acetone were combined into one container, and the other laboratory wastes were stored in separate drums. The overpack containers were loaded into a Conex that also contained the Site 28 sludge, lead acid batteries, and the concrete manhole removed from Site 28.

Wastes were classified in accordance with Title 40 Code of Federal Regulations, Part 261 (40 CFR 261); 40 CFR 761; and 40 CFR 61, Subpart M. Each hazardous waste was evaluated to identify all applicable treatment standards in 40 CFR 268, Land Disposal Restrictions. Wastes shipped off the island were placarded in accordance with 49 CFR 172, Subpart F. Labels and placards were affixed to all sides of the following disposal containers, as regulated by the Toxic Substances Control Act (TSCA): bulk bags for PCB- and arsenic-contaminated soils and the Conex container holding the waste drums. Waste manifests, waste profiles, bills of lading, certificates of weight, and certificates of disposal are submitted electronically in the Supplemental Data.

During the 2010 field season, Bristol transported and disposed of the wastes identified in Table 5-3.

Table 5-3 Waste Disposal Summary

Waste Type	Final Treatment/Disposal	Disposal Facility	Approximate Disposal Quantity
Miscellaneous Wire	Disposal in Subtitle D Landfill	Columbia Ridge Recycling & Landfill – Arlington, Oregon	12.2 tons
Wooden Debris	Disposal in Subtitle D Landfill	Columbia Ridge Recycling & Landfill – Arlington, Oregon	5.1 tons
Metal Debris	Recycling/ Reclamation	Emerald Services, Inc. – Tacoma, Washington	7 tons
Tires	Disposal in Subtitle D Landfill – Direct Landfill	Columbia Ridge Recycling & Landfill – Arlington, Oregon	0.8 tons
Lead Acid Batteries, Non-RCRA	Disposal in Subtitle C Landfill	Chemical Waste Management of the Northwest – Arlington, Oregon	300 pounds
Wooden Poles	Disposal in Subtitle D Landfill	Columbia Ridge Recycling & Landfill – Arlington, Oregon	14.2 tons
PCB-Contaminated Soil, <50 ppm PCBs	Disposal in Subtitle D Landfill	Columbia Ridge Recycling & Landfill – Arlington, Oregon	1084.2 tons
POL-Contaminated Soil, Non-RCRA	Disposal in Subtitle D Landfill	Columbia Ridge Recycling & Landfill – Arlington, Oregon	2730.2 tons
PCB-Contaminated Soil, TSCA, >50 ppm	Disposal in Subtitle C Landfill	Chemical Waste Management of the Northwest – Arlington, Oregon	156.2 tons
Arsenic-Contaminated Soil, RCRA	Disposal in Subtitle C Landfill	Chemical Waste Management of the Northwest – Arlington, Oregon	16.7 tons

Table 5-3 Waste Disposal Summary (continued)

Waste Type	Final Treatment/Disposal	Disposal Facility	Approximate Disposal Quantity
Sludge	Disposal in Subtitle C Landfill	U.S. Ecology Idaho, Inc. – Grand View, Idaho	300 pounds
Used Acetone and Hexane Solvent	Fuel Blending	U.S. Ecology Idaho, Inc. – Grand View, Idaho	1 – 30 gallon poly drum
Used Sulfuric Acid	Disposal in Subtitle C Landfill	U.S. Ecology Idaho, Inc. – Grand View, Idaho	1 – 30-gallon poly drum
Methylene Chloride	Recycling/Incineration	U.S. Ecology Idaho, Inc. – Grand View, Idaho	1 – 30-gallon poly drum
Mercury Thermostat[1]	Recycling Reclamation	Total Reclaim, Inc. Anchorage, Alaska	3 kilograms
Ash	Disposal in Subtitle C Landfill	U.S. Ecology Idaho, Inc. – Grand View, Idaho	4 drums

[1] Mercury thermostat disposal weight includes the weight of the thermostat, mercury, bucket and absorbent

Notes:

<	=	less than	ppm	=	parts per million
>	=	greater than	RCRA	=	Resource Conservation and Recovery Act
PCB	=	polychlorinated biphenyl	TSCA	=	Toxic Substances Control Act
POL	=	petroleum, oil, and lubricants			

5.11 Miscellaneous Sites and Tasks

Three sites were discovered at the NE Cape project site during the 2010 field season that may warrant further investigation. All three sites, referred to here as the tar area, shooting range, and cesspit, were brought to Bristol’s attention by the on-site QAR. Bristol photographed the sites and recorded the GPS location of each site.

The tar was discovered approximately 700 feet south of the MOC Perimeter Road in an area situated between the old borrow site and the MOC. The tar comprises an area of approximately 3,500 square feet and is easily visible upon approach.

The cesspit was found approximately 660 feet east of the intersections of the MOC Perimeter Road and Cargo Beach Road. The approximately 100-square-foot pit contained wooden cribbing that had filled with water. At the USACE’s request, Bristol loaded the pit with a truckload of gravel. The gravel was spread and compacted using the Caterpillar D-5 dozer.

The final site appeared to be an old shooting range or target practice area. This site contained a concrete box with a small-diameter hole on its northeastern side. Spent ammunition, which appeared to have been burnt, was visible near the concrete box.

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6.0 SAMPLE PROCEDURES, ANALYTICAL METHODS AND RESULTS

6.1 ANALYTICAL METHODS FOR SOIL AND SEDIMENT

A number of soil and sediment samples were collected from different sites for various reasons. Confirmation soil samples were collected from each excavation site when it was believed that all contamination had been removed or when contract amounts had been achieved. Soil samples were collected from Site 3 to gauge biogenic interference in samples collected from the tundra. Soil samples were collected from Site 8 to establish baseline parameters in an ongoing study to monitor natural attenuation. Sediment samples were collected from Site 6 to further characterize site conditions. Sample types and their corresponding analytical methods are listed in Table 6-1. Sample results from each site will be discussed in detail in the sections that follow.

Table 6-1 Analytical Methods for Soil and Sediment

Sample	Parameter	Analytical Method
Confirmation Samples for POL Soil Removal Areas (Sites 1, 3, 6, & 32)	DRO/RRO	AK 102/103
Confirmation Samples for PCB Soil Removal Areas (Sites 13, 16, 21, and 31)	PCBs	EPA 8082
Confirmation Samples for Site 21	Arsenic	EPA 6020
Site 3 (Soil)	DRO/RRO, TOC	AK 102/103, EPA 9060
Site 6 (Sediment)	BTEX, PAHs, GRO, DRO/RRO	EPA 8260B, EPA 8270C SIM, AK 101, AK 102/103
Site 8 (Soil)	DRO/RRO, PAHs, TOC	AK 102/103, EPA 8270C SIM, EPA 9060

Notes:

AK	=	Alaska Method	PCB	=	polychlorinated biphenyl
BTEX	=	benzene, toluene, ethylbenzene, and xylenes	POL	=	petroleum, oil, and lubricants
DRO	=	diesel range organics	RRO	=	residual range organics
EPA	=	U.S. Environmental Protection Agency	SIM	=	selective ion monitoring
GRO	=	gasoline range organics	TOC	=	total organic carbon
PAH	=	polynuclear aromatic hydrocarbon			

6.1.1 Soil Sampling Procedure

The procedures outlined below were used to collect field screen and confirmation soil samples. Field-screening samples were collected in resealable plastic bags (Ziplocs®) that were analyzed by an on-site, field-screening laboratory. Confirmation samples were collected in clean glass containers provided by TestAmerica and were shipped to the TestAmerica laboratory in Tacoma, Washington.

The POL excavations were sampled according to the Draft DEC Field Sampling Guidance (ADEC, 2010), which directs the collection of two primary grab samples for the first 250 square feet of floor or sidewall and one sample for each additional 250 square feet. PCB excavations were sampled according to TSCA regulation 40 CFR Part 761, which directs the collection of one primary grab sample for every 25 square feet of floor or sidewall Soil samples for field screening and confirmation samples were collected from the excavated areas using sample grids. Soil for field-screening and laboratory confirmation samples were collected from the floor and sidewalls of the excavations from all sites. The number of samples collected at each site was dependent on the size of the excavation and the contaminant of concern. The field sampling crew established 25-foot by 25-foot sampling grids in the DRO/RRO and arsenic work areas and 5-foot by 5-foot grids in the PCB work areas.

Discrete soil samples were collected with a clean, stainless-steel spoon; clean trowel; or a clean, nitrile-gloved hand. The following sampling procedures were used for discrete soil sample collection:

1. The surface area of the excavation was determined.
2. For PCB samples, a maximum of nine discrete samples were composited. Composited samples were from contiguous sample points from adjacent grids at the same level (depth bgs). Floor and sidewall samples were not composited in the same sample. Primary confirmation samples were composited by the laboratory, and individual samples selected for each composite were clearly identified on the chain-of-custody (CoC) form.
3. At times, the field samplers may have collected a PCB composite sample made up of less than nine discrete samples to keep the samples contiguous and at the same level.
4. Samples were labeled following a standard system to identify the year, location, site, matrix, and chronological order in which they were collected.

5. If the excavation depth was less than 4 feet and the sidewalls were deemed stable, discrete samples were collected directly from native soils exposed on the floor and sidewalls of the excavation. Samples collected for DRO/RRO analyses came from freshly exposed surface locations or from subsurface locations if the area had been exposed for more than 6 hours. Samples collected for PCB or arsenic analyses were collected from the excavations or surface with no time limit because of the lack of volatility of PCBs and arsenic.
6. If the excavation depth was greater than 4 feet or the sidewalls were deemed unstable, the excavator bucket was used to collect native soils from the desired locations as described in the WP. .
7. Soils were placed directly into sampling containers with a disposable sample spoon or gloved hand.
8. Sample grids were recorded, along with the sample depth and location, date, time, and analysis to be conducted, in the field logbook.

6.1.2 Sampling from an Excavator Bucket

If any excavation depth was greater than 4 feet or the sidewalls were deemed unstable, the excavator bucket was used to collect native soils from desired locations for either field screening or confirmation samples. The following procedures were used for collecting a sample from the bucket:

1. Samples were collected from material in the center of the bucket.
2. Before samples were collected from soil in the excavator bucket, the surface was "dressed" with a stainless-steel shovel, spatula, knife, or spoon to remove at least 6 inches of the soil surface layer, which may have been smeared across the trench wall as the bucket passed.
3. Soil samples were collected with a stainless-steel spoon or gloved hand. Large rocks or foreign material were excluded.
4. Sample identification (ID), location (LocID), date, time, and requested analyses for the sample were recorded in a field logbook

6.1.3 Sampling Soil from Bulk Bags

Only bulk bags approved by the U.S. Department of Transportation were used. A sub-sample was collected from each bulk bag and composited with as many as seven other grab samples to make one composite sample. The sub-sample consisted of soil collected from each end of the container (two total per bulk bag). Approximately 8 ounces of soil were collected from the two locations using a clean stainless steel trowel, and then were placed into a stainless-steel bowl for compositing. The samples were collected from a depth of approximately 1 foot below the top soil layer in the bag. Once the soil was thoroughly mixed, the sample containers were filled and labeled. The sample number and its associated containers were immediately logged in the field book.

Sample composites of bulk PCB and POL wastes were submitted to the field-screening laboratory for waste characterization. The disposal facility accepted field-screening results for disposal purposes.

6.2 SAMPLING PROCEDURES AND ANALYTICAL METHODS FOR GROUNDWATER AND SURFACE WATER

Surface water samples were collected from Sites 6, 8, and 9 during the 2010 field season. Groundwater samples were collected from monitoring wells located in the MOC. Site-specific parameters and analytical methods are displayed in Table 6-2.

Table 6-2 Analytical Methods for Water

Sample	Parameter	Analytical Method
MOC Groundwater	Metals/Mercury, PCBs, BTEX, PAHs, GRO, DRO/RRO, Methane	EPA 6020/7470A, EPA 8082, EPA 8260B, EPA 8270C SIM, AK 101, AK 102/103, RSK-175
Site 6	BTEX, PAHs, GRO, DRO/RRO	EPA 8260B, EPA 8270C SIM, AK 101, AK 102/103
Site 8	PAHs, DRO/RRO, Methane	EPA 8270C SIM, AK 102/103, RSK-175
Site 9	Metals/Mercury, PCBs, BTEX, PAHs, GRO, DRO/RRO	EPA 6020/7470A, EPA 8082, EPA 8260B, EPA 8270C SIM, AK 101, AK 102/103

Notes:

AK	=	Alaska Method	MOC	=	Main Operations Complex
BTEX	=	benzene, toluene, ethylbenzene, and xylenes	PAH	=	polynuclear aromatic hydrocarbon
DRO	=	diesel range organics	PCB	=	polychlorinated biphenyl
EPA	=	U.S. Environmental Protection Agency	RRO	=	residual range organics
GRO	=	gasoline range organics	SIM	=	selective ion monitoring

6.2.1 Surface Water Sampling Procedures

Water samples were collected using a clean, non-preserved, 2-liter amber jar, which was slowly dipped into the water source and then used to fill the sample containers, some of which contained preservatives. Volatile organic analysis bottles were filled first to the greatest extent possible to prevent bubbles from forming in sample containers. Water for total metals analysis was collected directly into a preserved 500-milliliter poly bottle. Water for dissolved metals analysis was filtered through a 0.45-micron filter on site before being containerized in the preserved sample container.

The specific procedures for sample collection at Site 8 are described n Section 6.19.1

Surface water collection at Site 9 was performed at the outfall creek from the Site 9 landfill. The sampling was divided into three events coinciding with three landfill construction phases: pre-construction, construction, and post-construction. Site 9 samples were collected for analysis of VOCs, gasoline range organics (GRO), polynuclear aromatic hydrocarbons (PAHs), PCBs, DRO/RRO, total metals, and dissolved metals and are discussed in Section 6.10. Site 6 samples were collected for analysis of BTEX, GRO, PAHs, and DRO/RRO and are discussed in Section 6.13.3.

6.2.2 MOC Groundwater Sampling

The MOC wells were evaluated on July 20, 2010, for viability in groundwater sampling. Information gathered from the evaluation was sent to USACE for selection of wells to be sampled. Nine wells were selected for sampling by the USACE based on a combination of factors, including the physical condition of the well, location relative to the anticipated excavation area, and presence of groundwater in the well. In the initial SOW, 10 wells were selected, but because of frost jacking or lack of water, only nine wells were selected and sampled, as concurred by the QAR. The wells chosen for groundwater sampling were 88-4, 88-1, 20MW-1, 17MW1, 22MW2, MW10-1, 88-5, 88-10, and 26MW1. Monitoring well locations are shown on Figure 19. Sample results are discussed in Section 6.9.

Wells at the MOC were sampled using a peristaltic pump with low-flow sampling protocol. Parameters were gathered with a YSI water quality meter with flow-through cell. Well 26MW1 was sampled using a submersible Typhoon pump because of the approximately 40-foot depth of the well. Samples were analyzed for BTEX, PCBs, GRO, DRO, total and dissolved metals, PAHs, and methane, and were shipped under chain of custody to TestAmerica in Tacoma, Washington, for analysis.

6.3 ANALYTICAL METHODS FOR WASTES

Waste characterization samples were collected from all wastes that were shipped off island. Soil samples were collected from the bulk bags that were loaded with POL-, PCB-, or arsenic-contaminated soils. Waste characterization samples collected from bulk bags containing POL and PCB soils were analyzed in the on-site mobile laboratory, and arsenic samples were sent to TestAmerica in Tacoma, Washington, for analysis. Waste characterization samples were also collected from the sludge and concrete associated with the manhole at Site 28 and were sent to TestAmerica for analysis. Waste characterization matrices and analytical methods are listed in Table 6-3.

Table 6-3 Analytical Methods for Waste

Sample	Parameter	Analytical Method
POL Soils	DRO/RRO	AK 102/103
PCB Soils	PCBs	EPA 8082
Site 28 Sludge	Metals/Mercury, PCBs, DRO	EPA 6020/7471A, EPA 8082, AK 102
Site 28 Concrete	TCLP Metals/Mercury, PCBs	EPA 6010B/7470A, EPA 8082

Notes:
AK = Alaska Method
DRO = diesel range organics
EPA = U.S. Environmental Protection Agency
PCB = polychlorinated biphenyl
POL = petroleum, oil, and lubricants
RRO = residual range organics
TCLP = Toxicity Characteristic Leaching Procedure

6.4 PRIMARY AND QUALITY ASSURANCE LABORATORIES

TestAmerica was Bristol's primary analytical laboratory for the project, and analyzed the majority of the project samples. Ms. Terri Torres, the Client Service Manager, acted as the program Laboratory Quality Assurance (QA) Officer for the project.

6.5 CHEMICAL DATA QUALITY REVIEW

The laboratory data presented in Appendix F have been flagged in accordance with the recommendations presented in the Chemical Data Quality Review (CDQR) (Appendix G).

AECOM® evaluated the project and QA laboratory data, and prepared the CDQR, which is included in Appendix G. The CDQR found all reported sample results by the analytical laboratory usable. Some data required qualification because of the results of field QA/QC, laboratory QA/QC, or failure to adhere to method criteria. These have been flagged appropriately. No data were rejected. The ADEC Contaminated Sites Laboratory Approval Letter is included in Appendix G. ADEC checklists are provided electronically in the Supplemental Data.

6.6 Soil and Wastewater Criteria

Table 6-4 lists laboratory criteria for soil analyses.

(Intentionally blank)

Table 6-4 Practical Quantitation Limits and QC Acceptance Criteria for Soil

Analyte	LOQ (µg/kg)	Criteria (µg/kg)	Surr. %R	LCS/LCSD Control Limits	LCS/LCSD RPD Limit	MS/MSD Control Limits	MS/MSD RPD Limit
AK 102/AK 103							
Diesel range Organics	20,000	9,200,000	--	75-125	20	50-150	20
Residual range Organics	50,000	11,000,000	--	60-120	20	60-120	21
Surrogates							
o-Terphenyl	--	--	50-150	60-120	--	--	--
n-Triacontane-D62	--	--	50-150	60-120	--	--	--
RCRA Metals – 6010B/6020							
Arsenic	3,000	3,900	--	80-120	35	75-125	35
Barium	500	1,100,000	--	80-120	35	75-125	35
Cadmium	500	5,000	--	80-120	35	75-125	35
Chromium	1,300	25,000	--	80-120	35	75-125	35
Lead	1,500	400,000	--	80-120	35	75-125	35
Silver	1,000	11,200	--	80-120	35	75-125	35
EPA 8082							
Aroclor® 1016	10	1,000	--	40-140	20	40-140	20
Aroclor1221	10	1,000	--	--	--	--	--
Aroclor 1232	10	1,000	--	---	--	--	--
Aroclor 1242	10	1,000	--	--	--	--	--
Aroclor 1248	10	1,000	--	--	--	--	--

Table 6-4 PQLs and QC Acceptance Criteria for Soil (continued)

Analyte	LOQ (µg/kg)	Criteria (µg/kg)	Surr. %R	LCS/LCSD Control Limits	LCS/LCSD RPD Limit	MS/MSD Control Limits	MS/MSD RPD Limit
EPA 8082							
Aroclor 1254	10	1,000	--	--	--	--	--
Aroclor 1260	10	1,000	--	60-130	20	60-130	20
Surrogates							
Tetrachloro-m-xylene	--	--	45-155	--	--	--	--
Decachlorobiphenyl	--	--	60-125	--	--	--	--

Notes:

Acceptance criteria from TestAmerica, Tacoma, Washington

--	=	not applicable	MS	=	matrix spike
%R	=	percent recovery	MSD	=	matrix spike duplicate
µg/kg	=	micrograms per kilogram	PQL	=	practical quantitation limit
AK	=	Alaska Method	QC	=	quality control
EPA	=	U.S. Environmental Protection Agency	RCRA	=	Resource Conservation and Recovery Act
LCS	=	laboratory control sample	RPD	=	relative percent difference
LCSD	=	laboratory control sample duplicate	surr.	=	surrogate
LOQ	=	limit of quantitation			

6.7 WASTE AND CLEANUP CRITERIA

Waste criteria were based on the following regulations:

- Title 18 of the Alaska Administrative Code, Chapters 60, 61, 62, 75, and 78 (18 AAC 60, 61, 62, 75, and 78) – Solid and Hazardous Waste Management, Oil and Hazardous Substance Control, and Underground Storage Tank Regulations;
- 29 CFR 1910 and 1926 – Health and Safety for General Industry and Construction;
- 33 CFR 130 – Financial Responsibility for Water Pollution;
- 40 CFR 60, 61, 260-270, 279, 300-303, and 761 – U.S. Environmental Protection Agency (EPA) – Resource Conservation and Recovery Act (RCRA); Comprehensive Environmental Response, Compensation, and Liability Act; and TSCA;
- 46 CFR 150, 151, and 153 – U.S. Coast Guard, U.S. Department of Transportation; and
- 49 CFR 171-178 – Hazardous Materials Transportation.

Cleanup criteria referenced in this document for soil, sediments, surface water, and groundwater are derived from the following sources and regulations:

- The document titled *Scope of Work, Northeast Cape HTRW Remedial Actions, Northeast Cape, Alaska, Revision 2*, dated October 7, 2009. This document was furnished to Bristol by the USACE and contained in a table in Section 1.3.2 that listed various cleanup levels within different media.
- Cleanup levels for soil and sediment not listed in the SOW were obtained from 18 AAC 75.341, Table B1, Method 2, Soil Cleanup Levels Table. The most stringent pathway is referenced.
- Cleanup levels for groundwater and surface water were obtained from 18 AAC 75.345, Table C.

6.8 MOBILE FIELD LABORATORY

Bristol utilized an on-site field laboratory for screening soils to aid in excavation activities. The laboratory was capable of analyzing soils for DRO/RRO using Alaska Method AK102/103 and for PCBs using a modified EPA Method 8082.

Bristol utilized the field laboratory to the maximum extent possible, especially as PCB soil excavations increased in size. Bristol originally planned to process approximately 375 samples, but at completion of the project had analyzed 506 PCB samples and 305 POL samples.

Field-screening results from the on-site laboratory were used to direct the excavation of contaminated soil, but were not used to determine whether cleanup levels for the NE Cape site had been met. If mobile laboratory concentrations were within approximately 20 percent of DRO, RRO, or PCB cleanup levels, the excavation was expanded and additional field-screening samples were collected. Once the excavation was believed to be complete based on the field-screening results, confirmation samples were collected and submitted to TestAmerica in Tacoma, Washington, an Environmental Laboratory Accreditation Program-approved laboratory, to confirm that the remaining soil was below site cleanup levels. The field-screening laboratory was not certified for any analyses.

If the concentrations of field-screening samples collected from an area of excavation were less than 0.8 mg/kg of PCB or 7,500 mg/kg of DRO/RRO, discrete grid-based confirmation samples were collected and sent to the TestAmerica, Tacoma, laboratory. Discrete PCB samples were composited by TestAmerica before extraction and analysis.

Initially, field-screened PCB samples were composited by the field-screening laboratory, but it was determined that more useful information was obtained by extracting and analyzing discrete samples to better define where the contamination was at the respective sites. All POL samples were analyzed as discrete samples, with the exception of bulk waste samples, which were composited by environmental personnel in the field before samples were submitted to the laboratory. The off-site disposal facilities accepted field-screening results for waste disposal purposes.

6.8.1 POL Screening Analysis

The POL screening samples were analyzed for DRO and RRO using a gas chromatograph (GC) equipped with dual flame-ionization detectors and procedures outlined in Appendix D of the *ADEC Underground Storage Tank Procedures Manual* (ADEC, 2002) for AK102 and AK103. The POL screening results are listed in Tables S1 through S4 of the Supplemental Data (provided electronically). Screening results were used to indicate site locations that either required further excavation or where cleanup goals were believed to possibly have been met. Confirmation samples were collected at locations where screening had indicated that cleanup goals had been met. The confirmation samples were submitted to TestAmerica in Tacoma, Washington, for analysis.

6.8.2 PCB Screening Analysis

The PCB screening samples were analyzed as Aroclors using a GC equipped with dual electron capture detectors and procedures outlined in EPA Method 8082. Samples were extracted using a rapid extraction method outlined in the *Standard Operating Procedure for PCB Field Testing for Soil and Sediment Samples* (EPA, 2002). The screening method used in the field was slightly modified from the EPA field testing method; a 1:1 hexane acetone solvent mixture was used instead of a 10:8:2 mixture of hexane, methanol, and water. Water was added after sonication to facilitate the separation of the hexane from the acetone. When water was added to the initial extract, the solvents physically separated, leaving the hexane as the top layer, which contained the PCBs. The method was also modified in the field because organic materials were present at the sites. The addition of both diatomaceous earth and sodium sulfate to the samples produced emulsions in the sample extracts; therefore, samples were air dried in weigh dishes after the initial sample weight was recorded to minimize potential for the emulsions. The field laboratory-screening results are listed in Tables S5 through S10 of the Supplemental Data (provided electronically). All other extraction and analysis steps followed the Standard Operating Procedure prepared for NE Cape and provided in the 2010 Work Plan.

6.8.3 UVOST Sample Analysis for POL

The main objective of the soil sampling and field-screening analysis associated with the UVOST investigation was to use the mobile field laboratory to correlate the UVOST signal strength and spectra with the soil concentrations of POL. The results were also expected to permit assessment of the potential for false negative results produced by the UVOST investigation. The UVOST correlation samples were collected from soil intervals showing highly contaminated, moderately contaminated, slightly contaminated, and uncontaminated readings based on signal strength and spectra.

6.8.3.1 UVOST Correlation Sampling and Evaluation

Twenty-four soil samples were collected in the field and screened using the UVOST/LIF equipment. The samples were also analyzed for DRO and RRO on site using a field GC unit. The POL concentrations in the soil were correlated with the percent fluorescence readings obtained during UVOST/LIF soil screening. Sample locations were chosen based on UVOST results. For correlation, a range of low, medium, and high LIF responses were collected to enable comparison of a range of POL concentrations. Table 1 in Appendix D presents correlation data.

Soil for the sample was homogenized in a plastic bag and then screened using the UVOST/LIF to determine ex-situ fluorescence. These screening data were used to correlate fluorescence with the field GC-measured DRO concentration. Variability in concentration exists within the sample jar. Similarly, variability also exists within the homogenized soil. In an attempt to counter this variability, three to four different volumes of soil from the same bag were screened to determine an average response from each sample. The results indicate that correlation between LIF response and analytical laboratory concentration was poor in samples with LIF responses greater than 25% RE or DRO concentrations greater than 2,500 ppm.

6.8.3.2 Summary of UVOST Correlation Results

Results from the UVOST/LIF probes indicated the existence of high levels of POL contamination adjacent to the former fuel storage tanks and other associated former buildings at NE Cape. The LIF probe logs are located in Attachment 2 of Appendix D, which describes the UVOST investigation. In a homogeneous sand matrix, 1% RE corresponds to approximately 100 ppm of diesel. A site-specific correlation of LIF response and soil analytical concentrations should be used when making contaminant concentration estimates.

The correlation of in-situ soil data to ex-situ soil data is challenging for both traditional soil sampling and the UVOST. When soil is removed from the subsurface, many of its properties change, including density, matrix definition, and pore-space/void ratios. Because of the altered properties that occur, the conclusions discussed below are made from knowledge of traditional fuel degradation properties and past experience using LIF data at “older” sites.

The UVOST sample chromatograms indicated that the main POL contaminant was likely arctic diesel because of the early elution of the chromatogram; however, no arctic diesel standard was available for comparison. The DRO continuing calibration standard is No. 2 diesel. The continuing calibration standard also contains 30- and 40-weight motor oil, which is used as the continuing calibration standard for RRO.

6.9 MOC GROUNDWATER RESULTS

Sample results from the nine MOC monitoring wells are presented in Table 4 (Appendix F). Hach kits were used in the field laboratory to collect the natural attenuation parameters for manganese, ferrous iron, sulfate, nitrate, and alkalinity. The natural attenuation parameters are presented in Table 5 (Appendix F).

Three wells contain contaminant concentrations exceeding cleanup levels: MW 88-4, MW 88-5, and MW 88-10. Concentrations from all three wells exceed cleanup levels for DRO at 3.3 milligrams per liter (mg/L), 12 mg/L, and 1.6 mg/L, respectively. Well 88-5 also contains concentrations of benzene (9.3 micrograms per liter [µg/L]) and RRO (1.6 mg/L), exceeding cleanup criteria.

Wells MW 88-4, MW 88-5, and MW 88-10 have historically contained contaminant concentrations exceeding cleanup levels. The 2004 sample results for these wells are presented in Table 6-5. Concentrations of contaminants were typically lower than those from the 2004 sampling event, with the exception of concentrations from well MW 88-5, for which DRO increased slightly from 9.8 mg/kg in 2001 to 12 mg/kg in 2010.

Table 6-5 Historical Sample Results

Well ID			88-4				88-10			88-5		
Analyte	**Cleanup Level**	**Unit**	**2001**	**2004**	**2010**	**2010**	**2001**	**2004**	**2010**	**2001**	**2004**	**2010**
GRO (C6-C10)	1.3	mg/L	1.2	1.25	0.24	0.23	0.12	0.0357 J	(0.044) U	1.3	**1.5**	0.19
DRO (nC10-<nC25)	1.5	mg/L	72	**3.89**	**3.3**	**3.2**	**55**	**1.38**	**1.6**	**9.8**	**11.3**	**12**
RRO (nC25-nC36)	1.1	mg/L	**1.9**	**1.46**	0.43M	0.38M	**1.3**	(0.549) U	0.036 J	**2.3**	**2.28**	**1.6**
Benzene	5	µg/L	**30**	**33.7**	2.4	2.2	2.7	(0.4) U	(0.15) U	**19**	**9.3**	**9.3**
Ethylbenzene	700	µg/L	NA	33.7	11	11	NA	(1) U	(0.15) U	NA	47	2.7
Total Xylenes	10,000	µg/L	NA	147.9	11.7	12.8	NA	(1) U	(0.5) U	NA	253	10.2
Toluene	1,000	µg/L	NA	98	2	1.9	NA	(1) U	(0.2) U	NA	40.5	2.1
Chromium-Total	100	µg/L	NA	4.4	3.0 J Q	3.0 J Q	NA	25	4.6 Q	NA	4.58	6.5 Q
Lead-Total	15	µg/L	NA	5.02	2.66	2.5 J	NA	**37.6**	**2.22 J**	NA	12	4.0 J
Zinc-Total	5,000	µg/L	NA	47.4	NA	NA	NA	(94.5) U	NA	NA	9.64 J	NA
Mercury-Total	2	µg/L	NA	0.08 J	(0.1) U	(0.1) U	NA	0.1 J	(0.1) U	NA	0.076 J	(0.1) U

Notes:

(###) U-Result is non-detect, the practical quantitation limit is in parentheses

BOLD = Analytical result exceeded ADEC Cleanup Level

2001 results from Montgomery Watson, 2003

2004 Results from Shannon and Wilson, 2005

Clean up levels for groundwater from 18 AAC 75, ADEC 2008

µg/L = micrograms per liter
AK = Alaska Test Method
DRO = diesel range organics
GRO = gasoline range organics
J = result is an estimate
M = a matrix effect was present
mg/L = milligrams per liter
NA = not analyzed
Q = One or more quality control criteria failed
RRO = residual range organics

6.9.1 Natural Attenuation Results

Microbial degradation of petroleum products occurs through several types of microbial respiration. Respiration is the transfer of electrons from an electron donor to an electron receptor within an organism. In petroleum degradation, petroleum acts as the electron donor and many different chemical species may act as the electron receptor. Aerobic respiration utilizes oxygen as the electron receptor, works rapidly, and is the preferred method of microbial respiration. Anaerobic respiration occurs in the absence of oxygen. The principal electron receptors in anaerobic respiration are nitrate, manganese, ferric iron, sulfate, and carbon dioxide. The respective metabolic byproducts of these types of anaerobic respiration are nitrogen, manganese, ferrous iron, hydrogen sulfide, and methane. The presence of any of these metabolic byproducts may indicate that anaerobic degradation is occurring. Methane is the byproduct of methanogenic petroleum degradation and is the least preferred method of microbial respiration.

Wells MW 88-4, 88-5, and 88-10 had the lowest dissolved oxygen (DO) concentrations. Of these, the two wells with the highest concentrations of DRO, MWs 88-4 and 88-5, contained the highest concentrations of ferrous iron (21.4 mg/L and 45.5 mg/L), alkalinity (120 mg/L and 80 mg/L), and methane (2,100 µg/L and 99 µg/L), which are metabolic byproducts of microbial respiration. The wells with the highest contaminant concentrations had comparatively low DO, suggesting that aerobic microbial respiration and degradation of DRO has occurred, depleting DO concentrations. The high ferrous iron, alkalinity, and methane suggest that degradation of DRO is occurring through anaerobic degradation, which is much slower than aerobic degradation. The high concentrations of methane in monitoring wells 88-4 and 88-5 indicate that in the absence of oxygen, methanogenic respiration has become energetically favorable and anaerobic degradation of DRO by methanogenic microbes may be occurring.

6.10 SITE 9 SURFACE WATER RESULTS

Four locations were sampled during three sampling events and are shown on Figure 6. None of the Site 9 surface water samples collected during the 2010 field season contained contaminant concentrations above cleanup levels. Tables 1 through 3 (Appendix F) present the turbidity and analytical sample results for all three rounds of surface water sampling performed at Site 9.

6.11 Site 1 Petroleum-Contaminated Soil Removal, Sampling Procedures, and Results

Two historical sample locations at Site 1 contained RRO contamination above cleanup levels. These locations were identified by the survey team and marked with pin flags. Field samples were hand-collected by Bristol environmental personnel into Ziploc bags and submitted to the mobile laboratory for DRO/RRO analysis. Twenty-one field samples were collected in a grid centering on, and including, the historical sample spots. The Bristol environmental sampling crew used an excavator to dig test pits in and around these sites, to the historical sample depths of between 0.5 and 0.7 foot bgs. Each sample received a unique identifier. Field-screening investigations at Site 1 indicated that contamination was not present above cleanup levels. Confirmation samples were submitted to the laboratory, all of which resulted in RRO concentrations below cleanup levels (Table 6, Appendix F). Confirmation sample locations are shown on Figure 7. The highest concentration of RRO from any sample collected at Site 1 was 4,200 mg/kg, well below the NE Cape site cleanup level of 9,200 mg/kg. The elevated levels of the confirmation samples indicate that the appropriate area was investigated and that contamination levels have decreased since initial discovery. The site 1 had several test pits, but no continuous excavation. The on-site QAR and the environmental sampling crew consulted and determined that, for purposes of confirmation sample collection, an area should be delineated around the test pits at each of the two sites, and square footage of each shape would be determined. Once the area was determined, the corresponding confirmation samples were collected according to ADEC field-sampling guidance (ADEC, 2010).

Confirmation samples were collected by hand, and QA/QC samples were collected according to project protocol. All samples were marked with pin flags, and confirmation sample locations were captured using a Trimble GeoXH GPS unit. The SOW called for the removal of 100 tons of RRO-contaminated soils from Site 1; however, because no contamination was found above cleanup levels, no soil was excavated. The 100 tons of soil that was scoped for Site 1 was transferred to Site 3 when it became apparent that higher quantities of contaminated soils would be removed from Site 3 than originally planned.

6.12 SITE 3 PETROLEUM-CONTAMINATED SOIL REMOVAL, SAMPLING PROCEDURES, AND RESULTS

Two historical sample locations (04NE03SB105 and 106) at Site 3 (Figure 8) previously contained DRO in concentrations above site-specific cleanup levels. The locations of these samples were marked by a surveyor and investigated by environmental personnel.

Soil samples were tested using a photoionization detector (PID). Four of the 11 PID soil samples produced readings greater than 20 ppm, with two exceeding 60 ppm, thus indicating fuel presence. Soil samples were hand-collected and submitted to the field laboratory to determine DRO concentrations in the soil. The field laboratory sample results were below cleanup levels for most samples, except sample 03FL13. The field laboratory results for sample 03FL13 were above site cleanup level for DRO; therefore, the sample extract was subjected to silica gel cleanup to evaluate biogenic interference from natural organic material (NOM) in the field laboratory. The silica gel analyses were done according to the ADEC Technical Memorandum 06:001: Biogenic Interference and Silica Gel Cleanup (ADEC, 2006). Sample chromatograms indicated a non-fuel pattern that resembled NOM. (See field laboratory results in the Supplemental Data for chromatograms.) Field laboratory analysis following the silica gel cleanup resulted in concentrations of DRO that were reduced by more than 80 percent and RRO concentrations reduced by more than 60 percent. Table S2 (Site 3 screening results) of the Supplemental Data (provided electronically) identifies the reduced concentrations in sample 03FL13 following silica gel cleanup.

Four test pits measuring approximately 5 feet by 5 feet were excavated by the Bristol crew at the locations of the historical samples, but no continuous excavation was deemed necessary. The on-site QAR and environmental sampling crew consulted and determined that one floor and one sidewall sample would be collected from each of the four test pits. Results for confirmation samples collected on August 17, 2010, are presented in Table 7 (Appendix F).

Directly adjacent to the historical sample locations was a stockpile believed to contain POL contamination. Mobile field laboratory results indicated that the stockpile did contain DRO concentrations exceeding cleanup levels. The on-site QAR was notified of the field laboratory results, and the decision was made to focus excavation activities on the stockpile to mitigate DRO contamination. Soils from the stockpile were loaded into the back of a rock truck and transferred to the mechanical screen plant, which at this time was situated at the borrow site. The soils from Site 3 were screened and loaded into Conex containers and bulk bags. The soil beneath the former stockpiles was sampled on August 22, 2010, to ensure no soil remained above site cleanup levels. The results are presented in Table 7 (Appendix F). In total, 197 tons of soil was loaded into two Conexes and 17 bulk bags. The original SOW for Site 3 included 100 tons of contaminated soil removal, but the final weight was closer to 200 tons. Because no soil was excavated from Site 1, the 100 tons of soil allotted for that site was transferred to Site 3. Site 3 sample locations are shown on Figure 8.

The composition of the excavated soils from Site 3 complicated the mechanical sorting process. The soils contained highly organic, frozen material that, during initial sorting, was being incorporated into the reject pile. As a precaution, Bristol processed the soils from Site 3 through the screening plant multiple times before final containerization. All soil staging areas at the borrow site that had contact with DRO-contaminated soils from Site 3 were over-excavated to eliminate cross contamination. Fifteen soil samples were initially collected from these locations for the field laboratory. Following field laboratory results, the locations of samples one through five were excavated further and re-sampled. Field laboratory results from the corresponding re-sampled areas were all below cleanup levels. The borrow pit results are presented in Table S11 of the Supplemental Data (provided electronically).

Two soil samples, 04NE03SD107 and 04NE03SD108, were collected in 2004 from areas northeast and southeast of the former fuel pump house at Site 3 (Figure 8). The sample results indicated RRO concentrations exceeding site cleanup levels. Because of the highly organic nature of the sample locations, the USACE was interested in determining whether the sample results were biased high because of biogenic interference.

Bristol's environmental personnel returned to the locations of the two soil samples, which had been identified by the survey crew, and collected additional samples. Three samples (10NC03SB01, 10NC03SB02 and 10NC03SB03) were collected, with the aid of a stainless-steel auger, in the tundra from these two locations. The two locations correspond to the historical samples and were analyzed for DRO/RRO using a silica gel cleanup method. The auger was used to bore through a vegetative mat to collect a sample in the area where the historical samples were collected. At the time of this sampling event, no water was present. Results from all analyses indicated DRO and RRO concentrations below site-specific soil cleanup levels of 9,200 mg/kg. One soil sample, 10NC03SB02, contained RRO concentrations of 5,000 mg/kg. The concentrations of RRO for this same sample following silica gel cleanup was 880 mg/kg, suggesting biogenic interference in the sample analyzed without the silica gel treatment. Following silica gel treatment, RRO concentrations in samples collected at Site 3 were reduced by approximately 60 percent. Analytical results from the soil samples collected at Site 3 are presented in Table 8 (Appendix F). Figure 8 shows the locations of the analytical laboratory samples and the extents of the stockpile excavation. Sample IDs were accidentally duplicated for 10NC03SB01, 10NC03SB02 and 10NC03SB03. Samples were collected on July 31, 2010, and again on August 17, 2010, from different locations. The sample collection date of July 31, 2010, was added to Figure 8 to help differentiate the samples.

6.13 SITE 6 PETROLEUM-CONTAMINATED SOIL AND SURFACE WATER RESULTS

Nine historical soil samples from Site 6 indicated DRO contamination exceeding site-specific cleanup levels. The locations of these nine samples were located and marked by Eco-Land. Bristol began the investigation process by excavating trenches and test pits to attempt to delineate the outermost extents of contamination. Field-screening samples submitted to the mobile field laboratory indicated that RRO was the primary contaminant of concern at this site. Field-screening results are presented in Table S3 of the Supplemental Data (provided electronically). Bristol proceeded with soil removal based on RRO sample concentrations exceeding cleanup levels.

In concert with sampling from the historical sample locations, initial trenching, and test pitting, a PID was used to test-grab samples from the sidewalls and floors of the excavations. PID screening samples were placed into Ziploc bags, and then placed in a warm vehicle to volatilize. After samples volatilized in the vehicle, readings were taken using a PID. The PID readings were discussed with the on-site chemist and the SS. It was concluded that given the weathered nature and low volatility of the petroleum, the PID may not be a very useful screening method at this site.

The excavation continued to expand, and as it grew, additional samples were collected and submitted to the mobile field laboratory. Samples were hand-collected by Bristol environmental personnel until field laboratory results indicated that contaminant concentrations were below cleanup levels or until groundwater was encountered. Confirmation samples were collected from soil that was above the groundwater table.

6.13.1 Site 6 Soil Confirmation Results

Two confirmation samples (10NC06SB26 and 10NC06SB41) contained RRO concentrations above cleanup levels. These locations were further excavated, and additional confirmation samples were collected from the freshly exposed subsurface. Subsequent confirmation samples indicated concentrations from all remaining locations were below site-specific cleanup levels. A total of 252 bulk bags were filled with soil from Site 6 for a combined total weight of 2,513 tons. Excavation extents and confirmation sample locations are shown on Figure 9. Confirmation sample results are presented in Table 9 (Appendix F). The excavation was backfilled with clean fill from the borrow area and graded using the Caterpillar D5K bulldozer.

6.13.2 Site 6 Sediment Sample Results

Two sediment samples (10NC06SB53 and 10NC06SB54) from one location at Site 6 were collected and analyzed for GRO by AK101, DRO/RRO by AK102/103, BTEX by EPA Method 8260B, and PAHs by EPA 8270C selective ion monitoring. The sample ID for these sediment samples was incorrectly labeled as soil (SB) and should have been labeled as sediment (SD). Contaminant concentrations were below cleanup levels for all analyses. Analytical results for the Site 6 sediment samples are presented in Table 10 (Appendix F).

6.13.3 Site 6 Surface Water Sample Results

Two surface water samples were collected as described in Section 6.2.1 from one location that corresponds to sediment samples 10NC06SB53 and 10NC06SB54 at Site 6. Water samples were collected using a clean, non-preserved, 2-liter amber jar, which was dipped into the water source and then used to fill the sample containers. The surface water showed no indications of sheen. The samples were analyzed for GRO, DRO/RRO, BTEX, and PAHs. The surface water concentrations of BTEX and PAHs for both samples did not exceed the total aromatic hydrocarbon (TAH) surface water cleanup standards of 10 µg/L or the total aqueous hydrocarbon (TAqH) standards of 15µg/L. Sample 10NC06WA01 contained DRO and RRO concentrations of 1.5 mg/L and 1.2 mg/L, respectively. Sample 10NC06WA02 contained DRO and RRO concentrations of 1.5 mg/L and 1.3 mg/L, respectively. Analytical results for Site 6 water samples are presented in Table 11 (Appendix F).

6.14 SITE 32 PETROLEUM-CONTAMINATED SOIL REMOVAL, SAMPLING PROCEDURES, AND RESULTS

Previous samples collected in 2001 and 2003 indicated three locations where DRO concentrations were above site-specific cleanup levels in soils at Site 32. Bristol was scoped to identify these locations, excavate, and remove 25 tons of contaminated soil.

The historical sample locations were located and marked by the survey team. Bristol excavated approximately 20 tons of soil from two excavations (Figure 10) and proceeded with field screening. All field-screening samples collected from the excavation floor and sidewalls indicated that DRO contamination did not exist above site-specific cleanup levels; therefore, confirmation sampling was initiated. Field-screening results from the mobile field laboratory are presented in Table S4 in the Supplemental Data (provided electronically). Figure 10 shows the historical sample locations, 2010 confirmation sample locations, and the extent of excavation in 2010.

Sixteen confirmation samples were collected from the excavations at Site 32 and sent to TestAmerica for DRO/RRO analyses. Confirmation sample results from Site 32 were all below cleanup levels and are presented in Table 12 (Appendix F). The excavation extents and sample locations were surveyed, and the excavation was backfilled with clean borrow material.

6.15 SITE 13 PCB-CONTAMINATED SOIL REMOVAL, SAMPLING PROCEDURES, AND RESULTS

Concentrations from four historical sample locations were above cleanup levels for PCBs at Site 13. Bristol began by investigating historical sample locations 05NECAFSL062 and 05NECAFSL064, for which sample results indicated PCB contamination above cleanup levels at 1.5 feet bgs. Approximately 1 foot of soil was removed, and field-screening samples were collected, which confirmed the presence of PCBs in the soil. The two other locations of interest for this site, where samples 03NECAFSB192 and 03NECAFSB522 had been collected at 5 feet and 4 feet bgs, corresponded to where utilidors had been removed and their excavations backfilled in 2003. Field-screening samples analyzed for PCB concentrations in the mobile laboratory indicated that soils in the vicinity of all historical samples at Site 13 exceeded site cleanup levels. Soils removed from depths shallower than the historical sample locations were stockpiled on site.

Field samples were hand-collected from locations or excavator buckets, placed in Ziploc bags, and submitted to the field laboratory. Extensive field-screening samples were collected at Site 13 during excavation activities, with more than 200 samples analyzed by the mobile field laboratory. Of these 200 samples, 89 samples were at or above the field laboratory screening value of 0.8 mg/kg. A total of 12 composite samples were collected from Site 13 for field-screening purposes, 7 of which contained PCB concentrations in excess of cleanup levels. Table S5 contains the discrete field screening results from Site 13, and Table S6 contains the composite field screening results. Both tables are provided electronically in the Supplemental Data.

Excavated volumes of soil were tracked daily during field operations. Bristol updated the Daily Quality Control Reports (DQCRs) to reflect the most up-to-date excavated soil volumes and submitted the reports to the USACE. Upon realizing that the initially scoped volumes of soil would have to be increased to remove the remaining PCB contamination, the QAR was notified and the Bristol PM began negotiations to increase the amount of soil to be removed from PCB-contaminated Sites 13 and 31. Contract modifications were enacted to increase the total volume of PCB-contaminated soils by 800 tons. Confirmation samples associated with this additional 800 tons of PCB-contaminated soil would only be run as composite samples by the analytical laboratory and not as discrete samples according to the price proposal associated with this contract modification.

Bristol split time between Sites 13, 16, 21, and 31 during PCB excavation activities. While field-screening samples were being analyzed from one site, the field crew moved to another to continue operations. Of all the PCB areas of concern, Sites 13 and 31 demanded the most attention. Field-screening results from Site 13 showed PCB contamination remaining in situ that exceeded contract amounts and Bristol's capacity for the 2010 field season. The decision was made to focus efforts on Site 31 in an attempt to remove all remaining contamination from that site, leaving Site 13 for future remediation efforts.

A total of 153 discrete confirmation samples were combined by TestAmerica to comprise 20 PCB composite samples. The PCB concentrations range from 0.35 mg/kg to 80 mg/kg among the 20 composite samples analyzed from Site 13. PCB confirmation results from Site 13 are presented in Table 13 (Appendix F). Excavation extents and confirmation sample locations are shown on Figure 11.

Composite samples consist of a maximum of nine discrete samples. Fourteen composite samples (and one duplicate sample) from Site 13 contained concentrations above the cleanup level of 1.0 ppm of PCB. Composite group 5 contained a PCB concentration of 80 mg/kg, indicating the presence of TSCA-regulated waste. The remaining three composite sample locations, corresponding to groups 1 (with duplicate group 20), 6, and 8 were above 1/n ppm total PCBs (where n is the number of discrete samples making up the composite), allowing for the possibility that a discrete sample from one location could contain PCB concentrations in excess of cleanup levels. Discrete results from sample locations analyzed in the on-site laboratory correlating to final composite samples 1 and 20 were all reported below the 1-mg/kg cleanup level. Field screening results from locations corresponding to Composite group 6 indicated only one location with a PCB concentration exceeding 1 mg/kg. The one location that had exceeded cleanup goals was re-excavated, but no field screening was performed following re-excavation. Field laboratory screening locations that contained PCB concentrations in excess of 1 mg/kg that correspond to a composite sample analyzed at TestAmerica are shown on Figure 11. It is recommended that additional discrete samples be analyzed from the areas that make up Composite groups 1, 6, and 8 to determine the true extent of PCB contamination in these areas, if any. Future sampling and analysis protocols should include the analysis of all discrete samples that are part of a composite sample that exceeds the 1/n threshold.

6.16 SITE 16 PCB-CONTAMINATED SOILS REMOVAL, SAMPLING PROCEDURES, AND RESULTS

Bristol was scoped to remove 15 tons of PCB-contaminated soil from Site 16, Paint and Dope Storage Building, based on historical sample location 94NE16163SS taken at a depth of 6 inches bgs.

This area was excavated to near the depth of the historical samples, and field screening samples were collected for the mobile laboratory after the initial excavation. Field samples were hand-collected in Ziploc bags and were provided a unique identifier. Field-screening results did not show PCB contamination above cleanup levels and are presented in Table S7 of the Supplemental Data (provided electronically).

Fourteen confirmation samples were hand-collected from the open excavation and sent to TestAmerica for PCB analysis. One sample, 10NC16SB09, contained Aroclor-1254 (PCBs) at a concentration of 1.2 mg/kg. Additional soil was removed from this location, and confirmation samples were collected from the expanded excavation area. Soil from this location was excavated and loaded into a bulk bag container. The amount of soil excavated from this area was not sufficient to fill an entire bulk bag; therefore, the remaining space was filled with soil from Site 13. Approximately 5 tons of soil was removed from Site 16. Confirmation samples were collected from the freshly excavated area and were submitted to the fixed-base laboratory. All results were below cleanup levels. Confirmation sample results are presented in Table 14 (Appendix F).

The excavation was marked with liner and backfilled with clean material from the borrow area. Excavation extents and sample locations are shown on Figure 12.

6.17 SITE 21 CONTAMINATED SOILS REMOVAL, SAMPLING PROCEDURES, AND RESULTS

Remediation activities at the Site 21 Wastewater Treatment Facility were focused on two contaminants of concern: PCBs and arsenic. Section 6.17.1 discusses the PCB removal, and Section 6.17.2 discusses the arsenic soil removal.

6.17.1 PCB Soil Removal, Sampling Procedures, and Results

Two historical sample locations had reported results containing PCBs above cleanup levels. The locations of these samples were identified by the surveyors, and Bristol investigated the locations. Sample 03NEC21SB01 and sample 94NE21168SS were previously collected at depths 5 feet and 0.5 foot bgs. Bristol exposed soils at these depths and proceeded with the collection of field-screening samples. Field-screening samples from the excavation in the vicinity of 03NEC21SB01 did not show PCBs present in the soil above site cleanup levels. Field-screening samples collected from the excavation associated with historical sample 94NE21168SS indicated that PCBs were present above cleanup levels. Soil from these field-screening locations was removed and placed into bulk bags for disposal. Approximately 10.4 tons of PCB-contaminated soil was containerized within two bulk bags. Subsequent field-screening samples were collected, and the field-screening results indicated that the PCB contamination had been removed. PCB field-screening results for Site 21 are presented in Table S8 of the Supplemental Data (provided electronically).

Confirmation samples were hand-collected by Bristol qualified samplers from the PCB excavations at Site 21. Thirty-three discrete confirmation samples were collected from the in-situ soils at Site 21, and none of the samples contained PCB concentrations that exceeded cleanup levels. It was noted in the sample chain-of-custody documentation that the confirmation samples were to be composited; however, the laboratory analyzed the samples as discrete samples. (Data quality was not affected.) Confirmation sample results are presented in Table 15 (Appendix F). Confirmation sample locations and excavation extents are shown on Figure 13.

6.17.2 Arsenic Soil Removal, Sampling Procedures and Results

Previous investigations have indicated that arsenic contamination is present at Site 21. The location of historical sample 94NE21167SS was furnished to Bristol before 2010 field activities. Bristol utilized a survey crew to identify and mark the location of this sample in the field at Site 21. The SOW for Site 21 included the removal of 15 tons of arsenic-contaminated soils.

Bristol centered its excavation on the historical sample location and excavated an area roughly 17 feet wide, 17 feet long, and 2 feet deep. No field- testing procedure for assessing arsenic concentrations in soil was used on the NE Cape project. After the prescribed amount of soil was removed, eight confirmation samples were hand-collected by Bristol qualified samplers from the open excavation. Soil was loaded into two bags for a combined weight of approximately 16.7 tons. The excavation was not backfilled because of the presence of groundwater up to the top edge of the excavation.

Five of the eight confirmation samples, 10NC21SB01, 10NC21SB02, 10NC21SB05, 10NC21SB06, and 10NC21SB07, contained arsenic concentrations above the cleanup level of 11 mg/kg, with concentrations ranging from 12 mg/kg to 180 mg/kg. An additional two samples, 10NC21SB42 and 10NC21SB43, were collected and sent to TestAmerica for analysis. These samples, 10NC21SB42 and 10NC21SB43, contained arsenic concentrations of 11 mg/kg and 17 mg/kg, respectively. Analytical results for arsenic samples at Site 21 are presented n Table 16 (Appendix F). Confirmation sample locations and excavation extents for the arsenic excavation area is shown on Figure 14.

6.18 SITE 31 PCB-CONTAMINATED SOILS REMOVAL, SAMPLING PROCEDURES, AND RESULTS

The Site 31 White Alice Communications Station contained three historical sample locations where samples with concentrations above site cleanup levels were collected in 2005 after an RA. The samples were collected at approximately 2 feet bgs. These locations were identified by the survey team, and Bristol’s field investigation followed. At the end of the 2005 RA, a plastic liner had been placed in the excavation where the historical samples had been collected and the excavation was backfilled over the liner. This liner was used as a guide to begin the 2010 excavation. Bristol environmental crew directed an excavator to remove and stockpile the soil above the liner to reach the depth of the historical samples. The original 2010 SOW for this site called for the removal of 175 tons of contaminated soil.

After the liner was removed, field samples were hand-collected in Ziploc bags and submitted to the field laboratory for analysis. A total of 221 field-screening samples were analyzed from Site 31 during the course of PCB-contaminated soil removal activities. Forty-seven field-screening samples contained PCB concentrations above cleanup levels, necessitating excavation expansion. The initial field-screening samples were composited, but the results were frequently positive for PCBs above cleanup levels throughout Site 31. As a result, the field laboratory changed to analyzing discrete samples in order to better identify areas of contamination. Field-screening sample results are presented in Tables S9 and S10 of the Supplemental Data (provided electronically). Field screening results from the excavation continued to show results above cleanup levels; therefore, additional soil was excavated and sampled. This process continued until the allotted soil amounts were nearly reached. The results continued to show that concentrations exceeded cleanup levels. Similar to the situation at Site 13, it became apparent that the scoped volume of soil would need to be increased to permit removal of all existing PCB-contaminated soils on site. The USACE was notified, and a contract modification that increased the volume of PCB-contaminated soil to be removed by 800 tons was added. This additional allotment for soil removal was split between Sites 13 and 31.

During the latter part of excavation activities at Site 31, the majority of PCB contamination was concentrated in the northeast section of the excavation, an area also occupied by a 12-inch corrugated metal pipe containing some electrical wiring. Bristol's final removal efforts focused on this area. The culvert is oriented in a northeasterly direction from the nearest excavation edge and daylights on a descending slope approximately 65 feet away. Confirmation samples were collected following excavation activities. Analytical results of these confirmation samples continued to indicate the presence of PCB contamination on site in concentrations exceeding cleanup levels.

A total of 158 discrete confirmation samples were collected at 5-foot intervals and submitted to TestAmerica. The laboratory composited the samples into 19 composite sample groups. Composite groups 10, 12, 14, 15, 17, 18, and 19 all contained PCB concentrations above cleanup levels, with PCB concentrations ranging from 1.3 mg/kg to 5 mg/kg. Composite groups 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, and 13 all exceeded the 1/n threshold, suggesting that some of the discrete sample locations comprising these groups may be above the cleanup level for PCBs. Only composite group 16 from Site 31 contained PCB concentrations that confirmed all discrete samples were below the cleanup level of 1 mg/kg. Composite group 16 was composed of nine discrete samples and contained a PCB concentration of 0.08 mg/kg. A composite group made up of nine discrete samples with a minimum PCB concentration of 0.11 mg/kg would allow for the possibility that a discrete sample contained PCB concentrations in excess of 1 mg/kg. The analytical results from Site 31 are presented in Table 17 (Appendix F). Analytical composite sample results and field laboratory results indicate that remaining contamination at Site 31 is concentrated in the northeastern portion of the excavated area. Field laboratory results for samples 31FLA-4, 31FLA-9, 31FLA-7, and 31FLA-16 all contained PCB concentrations in excess of 1 mg/kg, the locations of which correspond to confirmation samples 10NC31SB127, 10NC31SB132, 10NC31SB130, and 10NC31SB147, respectively, and are situated in the northeast portions of the excavation in the vicinity of the culvert. Figure 15 shows the discrete sample locations, composite group configurations, and excavation extents at Site 31.

Excavation extents, as well as all fixed-base analytical laboratory samples, were surveyed by Eco-Land. Before backfilling, Bristol placed 30-mil black plastic liner over the floor and sidewalls of the excavation as a visual marker for future remediation efforts.

Bristol removed a total of 638 tons of PCB-contaminated soil from Site 31, extracted and analyzed more than 220 field laboratory samples, and filled 59 bulk bags for soil disposal.

Given the prevalence of PCB contamination at Site 31, the field crew suspected that the stockpiled soils that were removed from the upper 1.5 feet of soil might also be contaminated. Field-screening results confirmed that the stockpiled soils did contain PCB concentrations above cleanup levels. The stockpiled soils were loaded into bulk bags for disposal, three of which remain at NE Cape on the former Building 98 concrete foundation.

6.19 SITE 8 NATURAL ATTENUATION MONITORING

Site 8 is a wetland with dense, grassy surface vegetation, containing little soil or peat development that slopes southward and narrows toward the Suqitughneq River. A spring is located at the lower end of the site near the Suqitughneq River.

Two soil samples were collected at Site 8 in 2004. The first sample was located approximately 50 feet below the pipeline break, and the second sample was located 100 feet below the break. Figure 17 shows the location of the pipeline break. Historical results indicated DRO was present at concentrations of 6,700 and 19,500 mg/kg in samples 04NE08SD103 and 04NE08SD102, respectively. Surface water samples were also collected near the spring and outfall in 2004, but contaminants were not detected.

6.19.1 MNA Water Sampling Procedure

Three decision units were created for soil and MNA sampling based on field observations and the approximate location of the pipeline break: an upper decision unit (UDU), which is up-gradient of the source area, a middle decision unit (MDU) encompassing the source area, and a lower decision unit (LDU) located downgradient of the source area. A sample grid was developed for each decision unit. Figure 17 displays the sample grids. Each grid was divided into areas 4 sections wide by 10 sections long for 40 possible sample points and grid squares measuring approximately 10 feet by 10 feet. A random number generator was used to select eight water and soil sample points for each decision unit grid. If a randomly selected sample point did not contain surface water, the next sample point on the list was used. MNA water samples were collected first using a peristaltic pump and water quality parameters were simultaneously collected using a YSI 556 multi-parameter meter. Surface water samples were analyzed on site with a Hach portable spectrometer for natural attenuation parameters, except methane. Methane in water samples were shipped under chain of custody to TestAmerica in Tacoma, Washington, for analysis. The measured natural attenuation and water quality parameters are presented in Table 18 (Appendix F).

The LDU was sampled July 25, 2010, followed by the MDU on July 26, 2010. A large rainfall event occurred the evening of July 26, which caused the level of the Suqitughneq River to rise substantially. Water levels in the UDU appeared unchanged by the rain event, and the UDU was sampled on July 27, 2010.

6.19.2 Site 8 Soil Sampling Procedure

Eight discrete soil samples were collected and composited from the same grid locations as the MNA parameters for each of the three decision units. A duplicate composite sample also was collected after collection of the MNA parameters. Soil samples were collected using a hand auger. The upper vegetative mat was removed to the soil layer and was augured down to a depth of approximately 12 inches. The soil sample from each of the eight grid sections was taken from the bottom of the auger using a gloved hand, and was placed into a stainless-steel bowl. The eight samples were then composited by hand, and a sample was taken from the mixture, jarred, and labeled. A field duplicate was collected from the MDU composite after homogenization.

6.19.3 Site 8 MNA and Soil Sample Results and Discussion

The UDU is located upgradient of the source area and was intended as a background unit for MNA parameters. Average DO and oxidation-reduction potential (ORP) values were highest in this decision unit. The average DO concentration was 6.55 mg/L, and the DO results ranged from 4.46 to 8.9 mg/L. The average ORP was 109.8, and the ORP results ranged from 46.3 to 194.9. The large influx of meteoric water on the evening of the July 27, 2010, may have contributed to the comparatively high DO and ORP values observed in the UDU. Methane was detected in more than half the water samples, with concentrations ranging from 0.48 to 5.9 µg/L. The presence of methane is slightly contradictory to the high oxygen concentrations, which may suggest more than one degradation process is occurring.

Soil sample 10NC08SB04, collected in the UDU, was below cleanup levels for all analyses. The DRO concentration was 660 mg/kg, and the RRO concentration was 6,300 mg/kg. Following silica gel cleanup, the DRO concentration was reduced to 310 mg/kg and the RRO concentration decreased to 3,000 mg/kg, a finding that suggests biogenics are contributing to the DRO and RRO results. Seven PAHs were also detected in the UDU, but at concentrations up to three orders of magnitude lower than those from the MDU and LDU. Total organic carbon (TOC) was reported at 100,000 mg/kg, or 10 percent of the total soil mass for the UDU, which is similar to the TOC results for the LDU and MDU. The UDU TOC result is expected, based on the high amount of vegetation and seasonal deposition into the wetland area. The analytical results for Site 8 soils are presented in Table 19 (Appendix F).

The MDU is situated directly below the approximate location of the pipeline break. It is believed the pipeline broke on the shoulder of the adjacent road and the contents emptied into the wetland area. There is little documentation about the release. The affected area was confirmed during sampling based on fuel odor being detected when soil samples were being collected. DO concentrations from the MDU averaged 3.39 mg/L and ranged from 1.87 to 4.7

mg/L. ORP values averaged 8.4 and ranged from -31 to 42.8. Methane was detected in half the water samples collected in the MDU, which again suggests that more than one degradation process may be occurring.

Soil concentrations of 2-Methylnaphthalene exceeded ADEC soil cleanup levels for the NE Cape site in field duplicate samples 10NC08SB02 and 10NC08SB03, with concentrations of 7,500 µg/kg and 7,600 µg/kg, respectively. Sample 10NC08SBO03 had a reportable concentration of fluorene at 820 µg/kg, which exceeded the applicable 800-µg/kg cleanup level. Sample 10NC08SB03had a fluorene concentration of 630 µg/kg. Sample 10NC08SB03 had a reported DRO concentration of 9,300 mg/kg, which exceeded site-specific soil cleanup levels of 9,200 mg/kg. The duplicate result from the same composite (10NC08SB02) was 7,100 mg/kg, which is below the specific cleanup level for the NE Cape site. Following silica gel cleanup, the DRO concentrations in these two duplicate samples were decreased by less than 10 percent to concentrations that are below site-specific cleanup levels. This reduction in concentrations also suggests that the DRO result is likely due to the presence of fuel in the soil. Samples 10NC08SB02 and 10NC08SB03 also had reported RRO concentrations of 3,300 mg/kg and 5,300 mg/kg, respectively, which are below site cleanup levels. Following a silica gel cleanup, the RRO concentrations in these two samples were reduced by greater than 50 percent, to concentrations of 1,300 mg/kg in sample 10NC08SB02 and 2,100 mg/kg, in sample 10NC08SB03, suggesting that biogenics may be heavily contributing to the RRO fraction.

The LDU had the lowest average values for ORP and DO. The ORP values averaged -39.4 units and ranged from 38.9 to -204 units, which suggests a reduced environment. The average concentration of DO was 2.2 mg/L, and DO results ranged from 3.27 to 0.72 mg/L. The DO concentrations are still sufficient for aerobic degradation of petroleum hydrocarbons and NOMs. The LDU had reportable concentrations for alkalinity in two primary MNA samples and in a duplicate at 80 and 180 mg/L. Sample 10NC08SB01, collected in the LDU, contained a 2-Methylnaphthalene concentration of 1,200 µg/kg, which is less than the ADEC soil cleanup level of 6,100 µg/kg.

With the exception of DO and ORP, none of the natural attenuation parameters analyzed at Site 8 varied significantly among the three decision units. Field results for manganese, ferrous iron, sulfate, and nitrate were near or less than the method detection limits stated by the manufacturer; therefore, the results for these parameters are not definitive for assessing MNA. The DO and ORP levels indicate that conditions are amenable for oxidative degradation of hydrocarbons as well as NOMs that are present at Site 8. TOC results in all decisions units support the presence of NOM at concentrations far exceeding DRO concentrations. No petrogenic sheen or stressed vegetation was noted in any locations throughout Site 8. Plated biogenic sheen, which broke up when disturbed, was observed in all decision units. Fluorene and 2-Methylnaphthalene exceeded site-specific soil cleanup levels by less than 20 percent, and DRO exceeded site-specific cleanup levels by less than 10 percent before silica gel cleanup. Following silica gel cleanup, the same sample had reported results less than cleanup levels. The most useful evaluation of MNA as a selected remedy is the reduction of contaminants of concern. The 2010 sample results indicate that Site 8 has some affected soil with concentrations slightly above cleanup level. Continued sampling using the same grid design and evaluation techniques will help establish site trends and possibly degradation rates in order to assess MNA as the selected remedy.

6.19.4 Site 8 Surface Water Sampling

Three surface water samples were collected from two locations in a spring-generated stream that flowed into the Suqitughneq River (Figure 17). The samples were submitted to TestAmerica and analyzed for DRO/RRO and PAHs. Samples 10NC08WA29 and 10NC08WA30 were collected on the eastern edge of the MDU and had detected concentrations of benzo(a) anthracene, benzo(a)pyrene, benzo(b) fluoranthene, and chrysene below the limit of quantitation and below ADEC surface water standard criteria. DRO and RRO were also detected in these samples. Concentrations for all analyses were below surface water cleanup standards, and no petrogenic sheen was observed. Sample 10NC08WA028 was collected below the spring near the confluence with the Suitughneq River. No PAHs were detected in the sample, and concentrations of DRO and RRO were detected below the limit of quantitation (LOQ). Surface water sample results are presented in Table 20 (Appendix F).

6.20 WASTE CHARACTERIZATION SAMPLING PROCEDURES AND RESULTS

Two field duplicate samples, 10NC28BW01 and 10NC28BW02, were collected from the drummed sludge that was removed from the Site 28 manhole. These waste characterization samples were submitted to TestAmerica for DRO, PCBs, and metals analyses. The results of these analyses are presented in Table 21 (Appendix F).

Samples 10NC28BW01 and 10NC28BW02 contained concentrations of lead at 5,000 mg/kg and 1,900 mg/kg, respectively; and mercury at 15 mg/kg and 6.4 mg/kg, respectively. These concentrations exceed the limit at which the waste is considered hazardous. As a result of these high lead and mercury concentrations, the drum containing the sludge from Site 28 was manifested and disposed of as hazardous waste. Also for samples 10NC28BW01 and 10NC28BW02, arsenic was detected in the sludge at 41 mg/kg and 40 mg/kg, respectively; barium at 820 mg/kg and 410 mg/kg, respectively; cadmium at 18 mg/kg in both samples; silver at 16 mg/kg and 9.6 mg/kg, respectively; Aroclor 1254 at 20 mg/kg and 23 mg/kg, respectively; and DRO at 100,000 mg/kg and 68,000 mg/kg, respectively. The PCB Aroclor that exceeded cleanup levels was Aroclor 1254, not Aroclor 1260, which is prevalent at Sites 13 and 31. The source of Aroclor 1254 is not known, but PCB samples from Site 16 also had Aroclor 1254 present in analytical samples.

Concrete samples were chipped out of the bottom of the Site 28 manhole and submitted to TestAmerica for metals and PCB analyses using a Toxicity Characteristic Leaching Procedure extraction method. Results for all analytes were below hazardous waste criteria. Site 28 concrete sample results are presented in Table 22 (Appendix F).

A composite sample was collected from the three bulk bags that contained arsenic-contaminated soils from Site 21. The sample was submitted to TestAmerica for arsenic analysis by EPA Method 6020. Sample 10NC21BW01 contained an arsenic concentration of 43 mg/kg. Consequently, the bulk bags containing these soils were handled, manifested, and disposed of as hazardous waste. All hazardous and non-hazardous waste manifests are presented electronically in the Supplemental Data.

Sampling procedures for characterization of bulk bag waste were conducted as described in the WP (Bristol, 2010). Soil collected from seven bags was combined to make one composite sample. Samples were analyzed in the field laboratory for either DRO/RRO or PCBs, depending on the contaminant of concern. Twenty-seven waste characterization samples were analyzed from bulk bags containing PCB-contaminated soils, and 47 waste characterization samples were analyzed from bulk bags containing POL-contaminated soils. POL waste characterization results are presented in Table S12 and PCB results are presented in Table S13. Both tables are in the Supplemental Data (provided electronically).

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FIGURES

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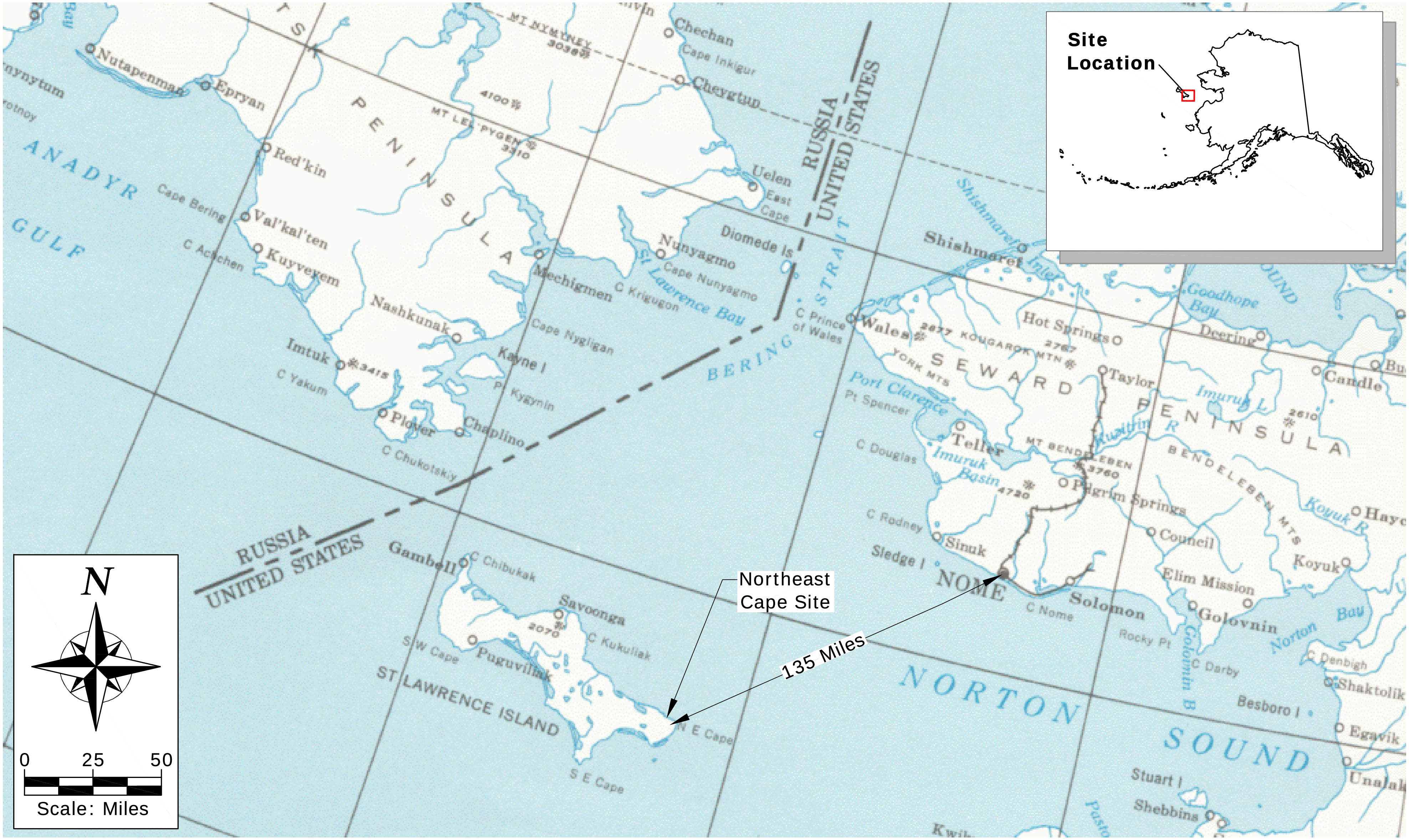

Source: USGS National Atlas Sheet Number 42-43

FIGURE 1
NORTHEAST CAPE, ST. LAWRENCE ISLAND, ALASKA
NORTHEAST CAPE HTRW REMEDIAL ACTIONS
VICINITY MAP

Bristol
ENVIRONMENTAL
REMEDIATION SERVICES, LLC
Phone (907) 563-0013 Fax (907) 563-6713

DATUM: NA		DATE	03/08/10
PROJECTION: NA		DWN.	MTG
PROJECT NO. 410026		SCALE	SHOWN
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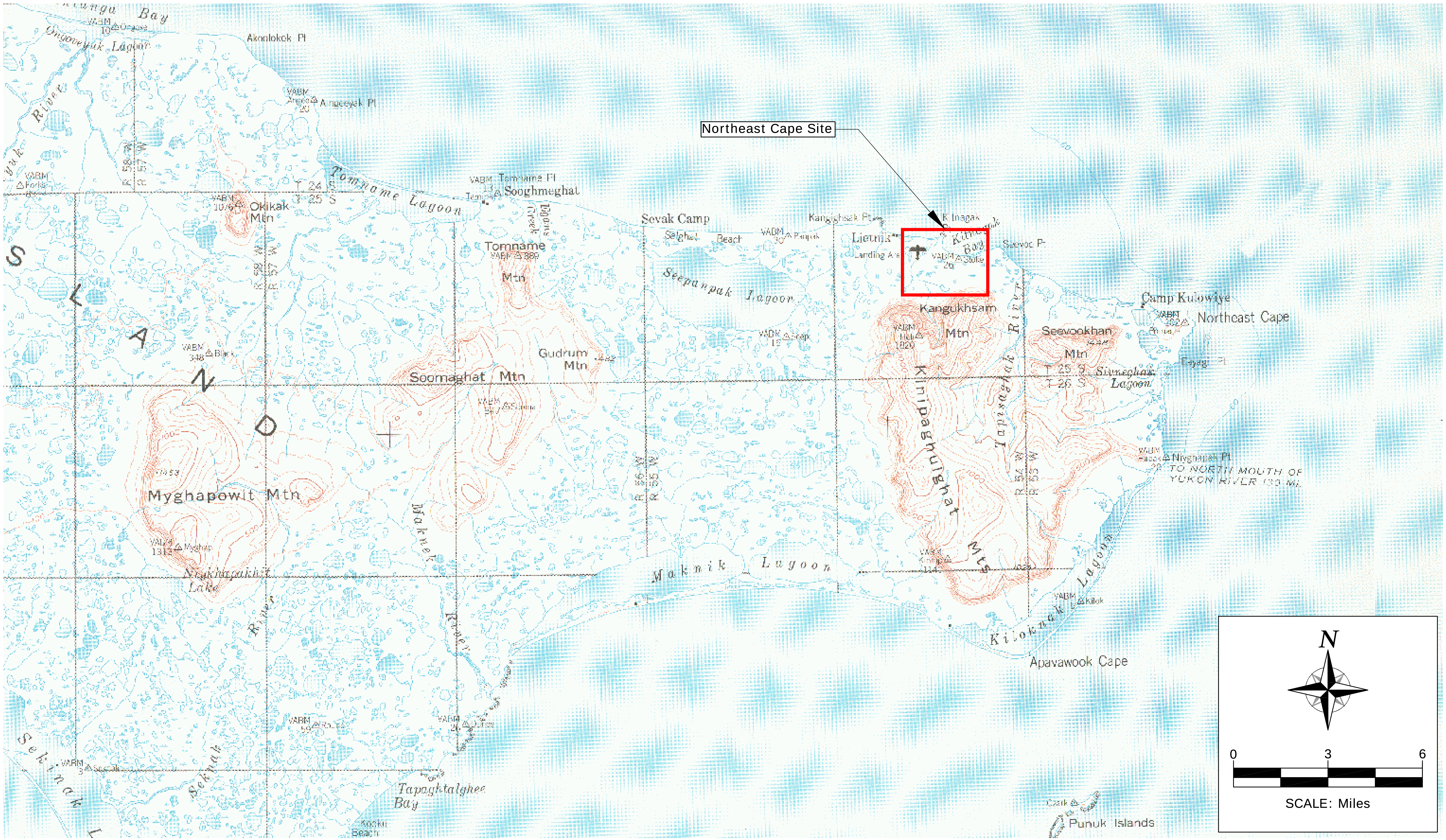

FIGURE 2
NORTHEAST CAPE, ST. LAWRENCE ISLAND, ALASKA
NORTHEAST CAPE HTRW REMEDIAL ACTIONS
LOCATION MAP

Bristol
ENVIRONMENTAL
REMEDIATION SERVICES, LLC
Phone (907) 563-0013 Fax (907) 563-6713

DATUM: NA		DATE	03/08/10
PROJECTION: NA		DWN.	MTG
PROJECT NO. 410026		SCALE	SHOWN
		APPRVD.	MW

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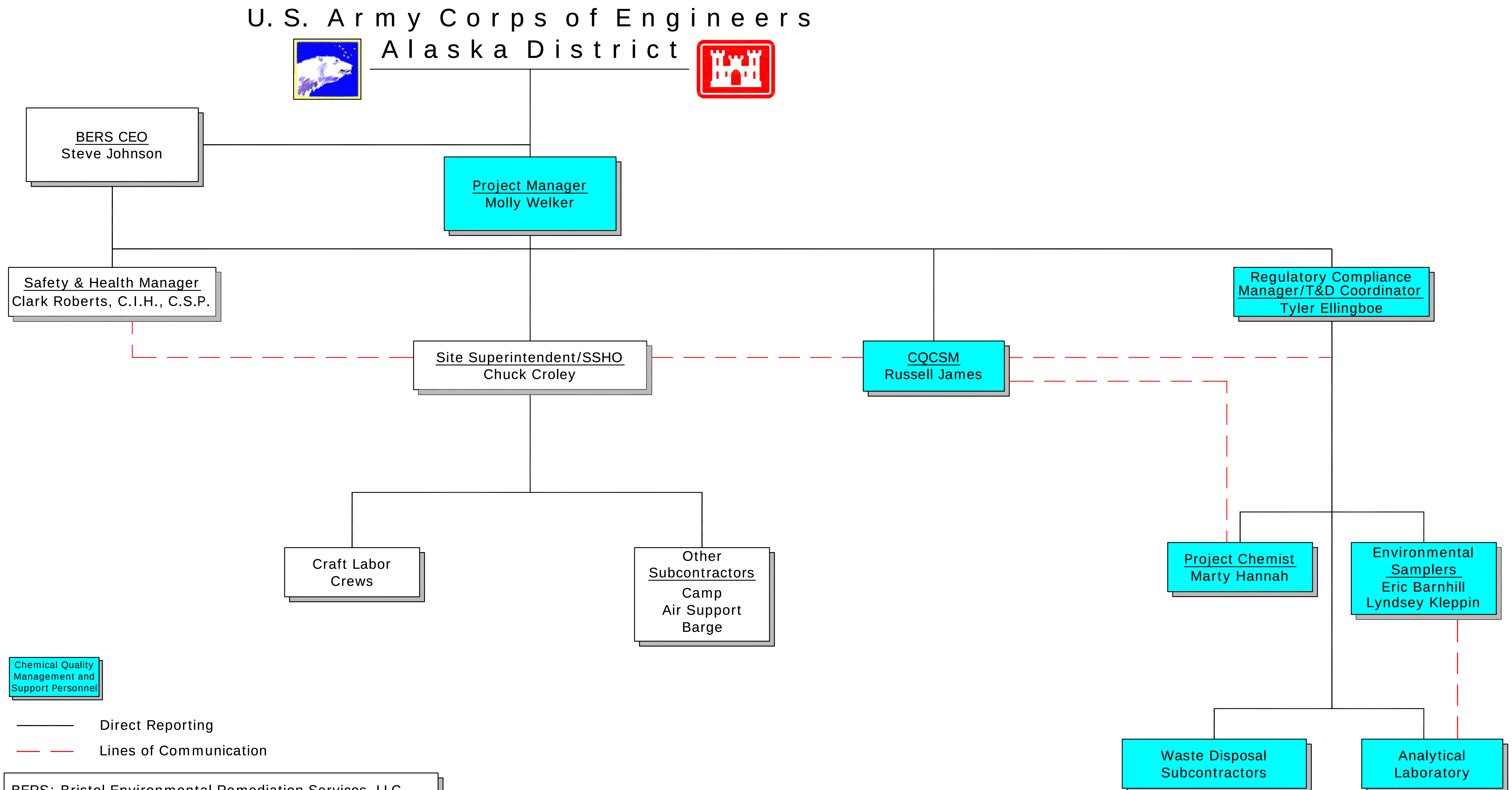

BERS: Bristol Environmental Remediation Services, LLC
CEO: Chief Executive Officer
C.I.H.: Certified Industrial Hygienist
C.S.P.: Certified Safety Professional
CQCSM: Contractor Quality Control System Manager
SSHO: Site Safety & Health Officer
T&D: Transportation & Disposal

FIGURE 3
NORTHEAST CAPE, ST. LAWRENCE ISLAND, ALASKA
NORTHEAST CAPE HTRW REMOVAL ACTIONS
MANAGEMENT AND SUPPORT ORGANIZATION

Bristol
ENVIRONMENTAL
REMEDIATION SERVICES, LLC
Phone (907) 563-0013 Fax (907) 563-6713

DATUM: NA		DATE	03/09/10
PROJECTION: NA		DWN.	MTG
PROJECT NO. 410026		SCALE	SHOWN
		APPRVD.	MW

Drawing: O:\JOBS\410026 NE CAPE HTRW\ACAD-ENVIRO\WP-FIGURES-JULY10\DWG\410026-FIG3-WP-NOV10.DWG - Layout: 410026-FIG3-WP-CQCP-NOV10
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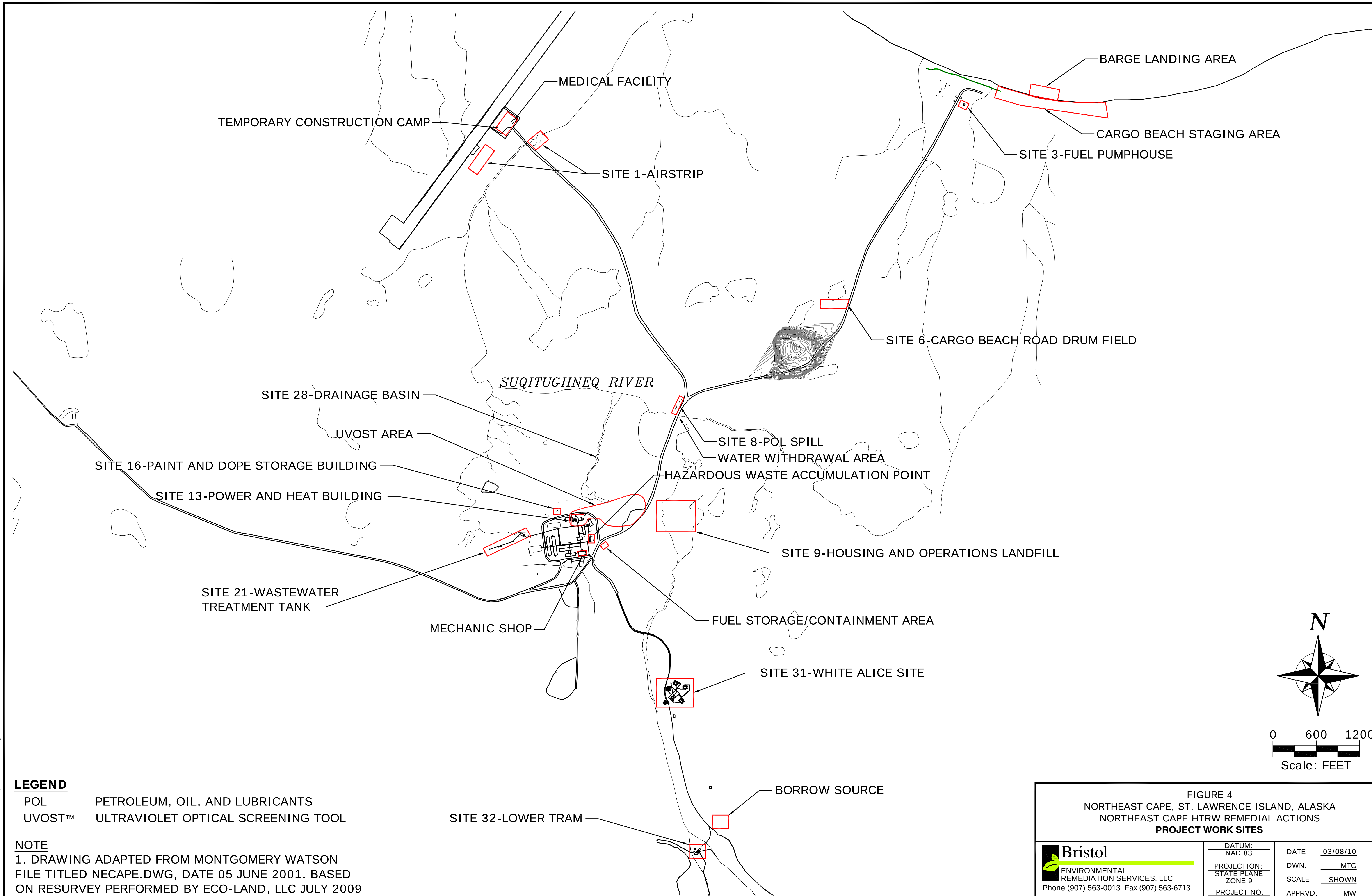
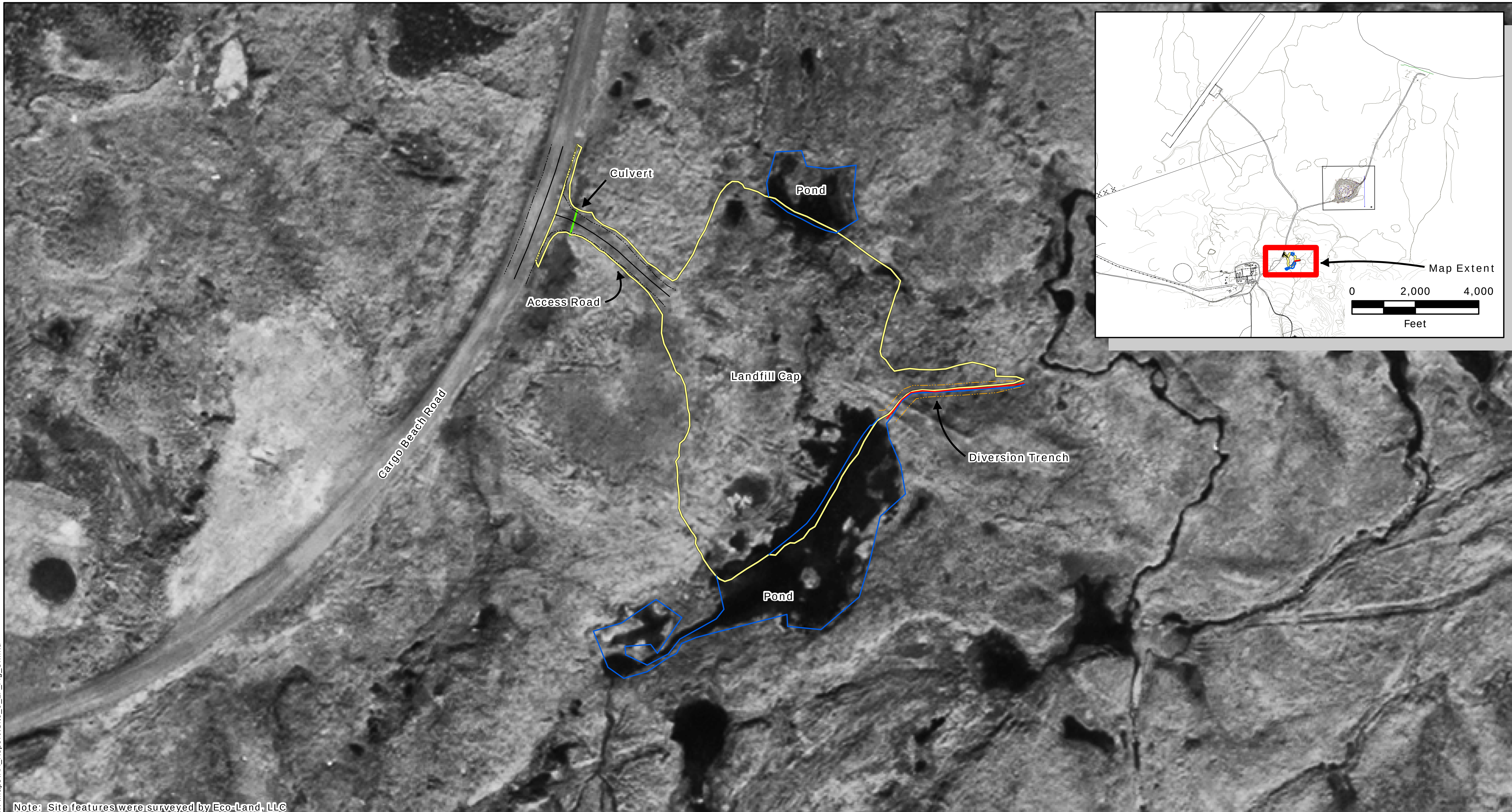

BARGE LANDING AREA
MEDICAL FACILITY
TEMPORARY CONSTRUCTION CAMP
CARGO BEACH STAGING AREA
SITE 3-FUEL PUMPHOUSE
SITE 1-AIRSTRIP
SITE 6-CARGO BEACH ROAD DRUM FIELD
SUQITUGHNEQ RIVER
SITE 28-DRAINAGE BASIN
UVOST AREA
SITE 8-POL SPILL
WATER WITHDRAWAL AREA
SITE 16-PAINT AND DOPE STORAGE BUILDING
HAZARDOUS WASTE ACCUMULATION POINT
SITE 13-POWER AND HEAT BUILDING
SITE 9-HOUSING AND OPERATIONS LANDFILL
SITE 21-WASTEWATER TREATMENT TANK
FUEL STORAGE/CONTAINMENT AREA
MECHANIC SHOP
SITE 31-WHITE ALICE SITE
N
0 600 1200
Scale: FEET
BORROW SOURCE
SITE 32-LOWER TRAM
LEGEND
POL PETROLEUM, OIL, AND LUBRICANTS
UVOST™ ULTRAVIOLET OPTICAL SCREENING TOOL
NOTE
1. DRAWING ADAPTED FROM MONTGOMERY WATSON FILE TITLED NECAPE.DWG, DATE 05 JUNE 2001. BASED ON RESURVEY PERFORMED BY ECO-LAND, LLC JULY 2009
FIGURE 4
NORTHEAST CAPE, ST. LAWRENCE ISLAND, ALASKA
NORTHEAST CAPE HTRW REMEDIAL ACTIONS
PROJECT WORK SITES
Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC
Phone (907) 563-0013 Fax (907) 563-6713
DATUM: NAD 83
PROJECTION: STATE PLANE ZONE 9
PROJECT NO. 410026
DATE 03/08/10
DWN. MTG
SCALE SHOWN
APPRVD. MW



Legend

- Cap Boundary
- Culvert
- Pond
- Road Centerline
- Road Edge
- Trench Centerline
- Trench Edge

N
W E
S

0 100 200
Feet

Figure 5
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Remedial Actions
Site 9 Housing and Operations Landfill

Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC
Phone (907)563-0013 Fax (907)563-6713

Project No. 410026

DATUM: NAD 83	DATE 01-13-10	SHEET	1
PROJECTION: Alaska State Plane Zone 9	DWN. BERS-RJ	of	
	SCALE 1:1,200		1
	APPRVD. BERS-MW		

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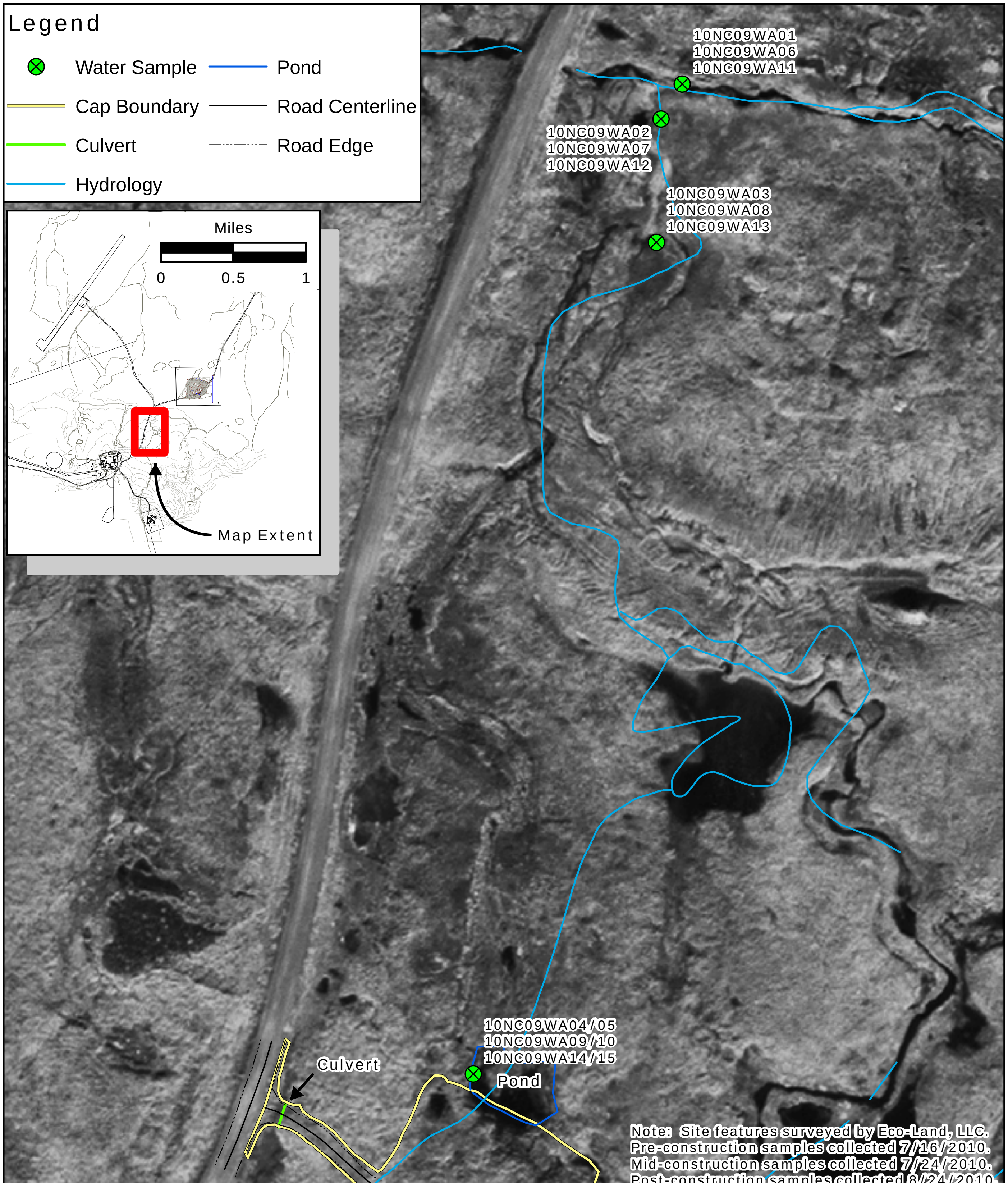

N
W E
S

0 50 100 200
Feet

Figure 6
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Removal Actions
Site 9 Surface Water Sample Locations

Bristol
ENVIRONMENTAL
REMEDIATION SERVICES, LLC

Phone (907)563-0013 Fax (907)563-6713

Project No. 410026

DATUM: NAD 83	DATE 01-13-11	SHEET
PROJECTION: Alaska State Plane Zone 9	DWN. BERS-RJ	1
	SCALE 1:1,800	of
	APPRVD. BERS-MW	1

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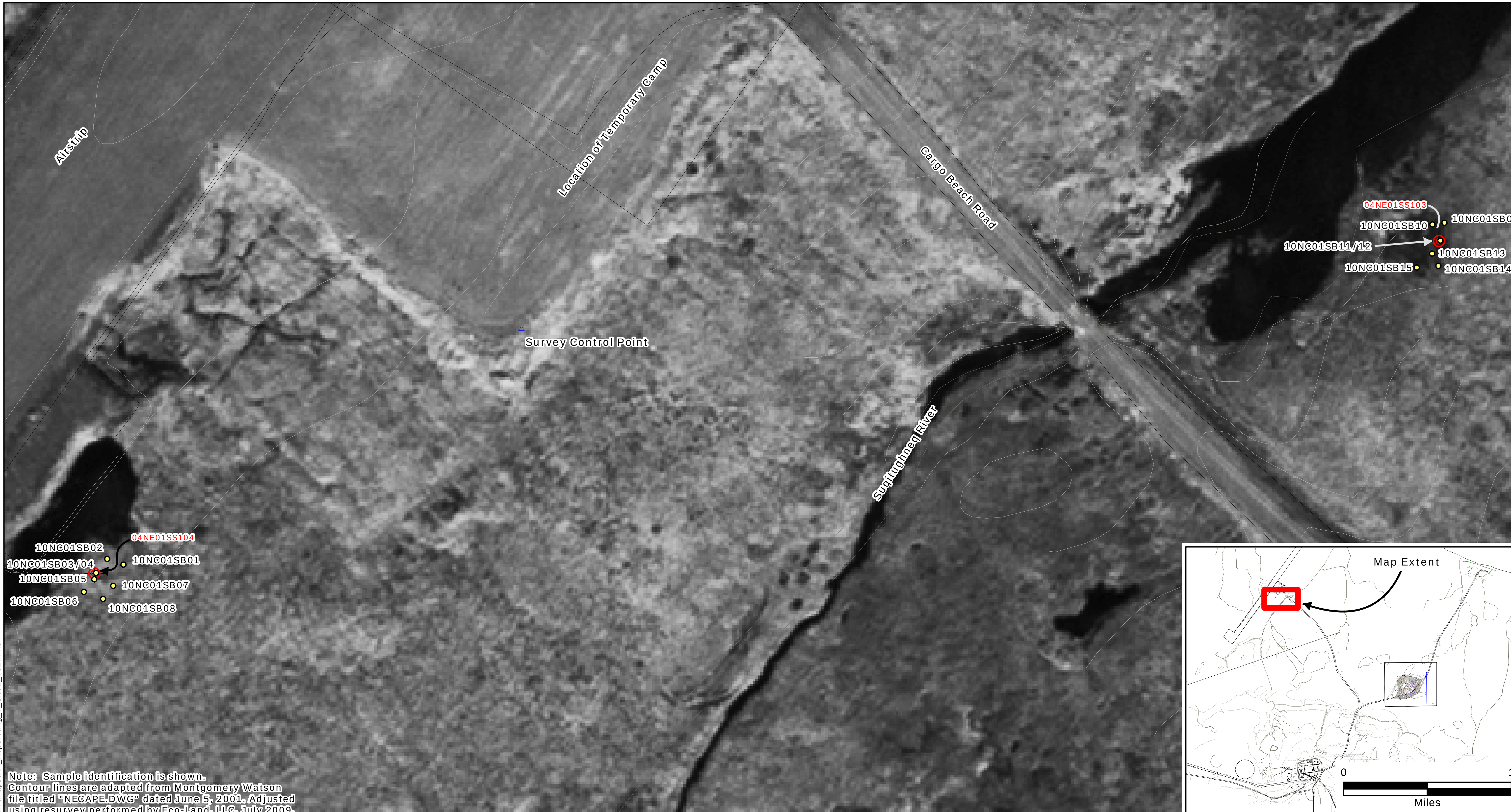


File: G:\Jobs\410026_NECape_HTRW\Maps\RA_Report\Fig_7_Site1_v02.mxd

Legend

- Site 1 Confirmation Samples
- Previous Sample Locations

N
W E
S

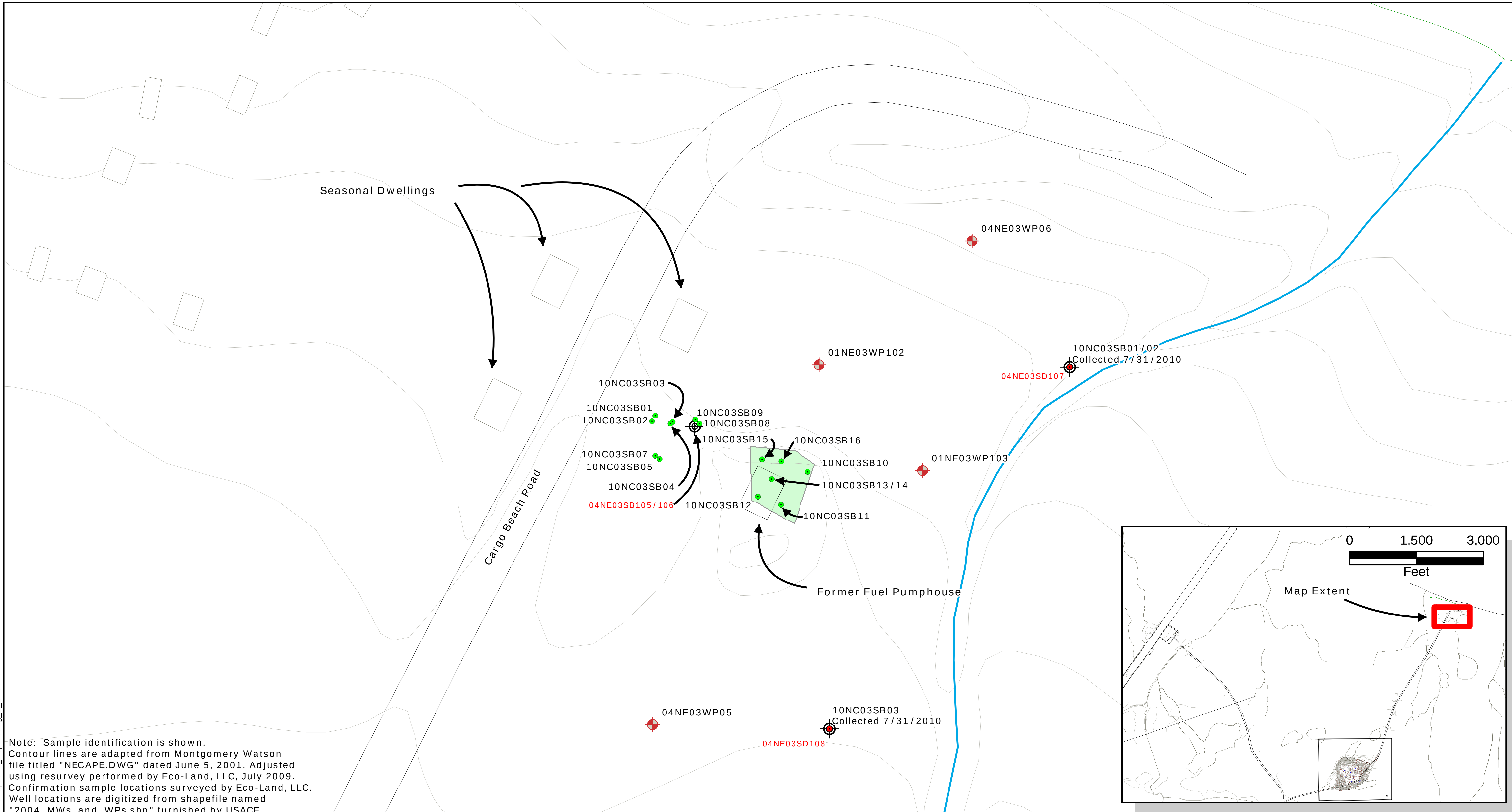
0 100 200
Feet

Figure 7
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Remedial Actions
Site 1 Confirmation Sample Locations

Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC
Phone (907)563-0013 Fax (907)563-6713
Project No. 410026

DATUM: NAD 83
PROJECTION: Alaska State Plane Zone 9

DATE	03-15-11	SHEET	
DWN.	BERS-RJ	1	
SCALE	1:800	of	
APPRVD.	BERS-MW	1	



Note: Sample identification is shown.
Contour lines are adapted from Montgomery Watson file titled "NECAPE.DWG" dated June 5, 2001. Adjusted using resurvey performed by Eco-Land, LLC, July 2009.
Confirmation sample locations surveyed by Eco-Land, LLC.
Well locations are digitized from shapefile named "2004_MWs_and_WPs.shp" furnished by USACE.

Legend

- Monitoring Well
- Site 3 Silica Gel Sample Locations
- Site 3 Confirmation Sample Locations
- Previous Sample Locations
- Hydrology
- Stockpile Excavation Extent

N S E W

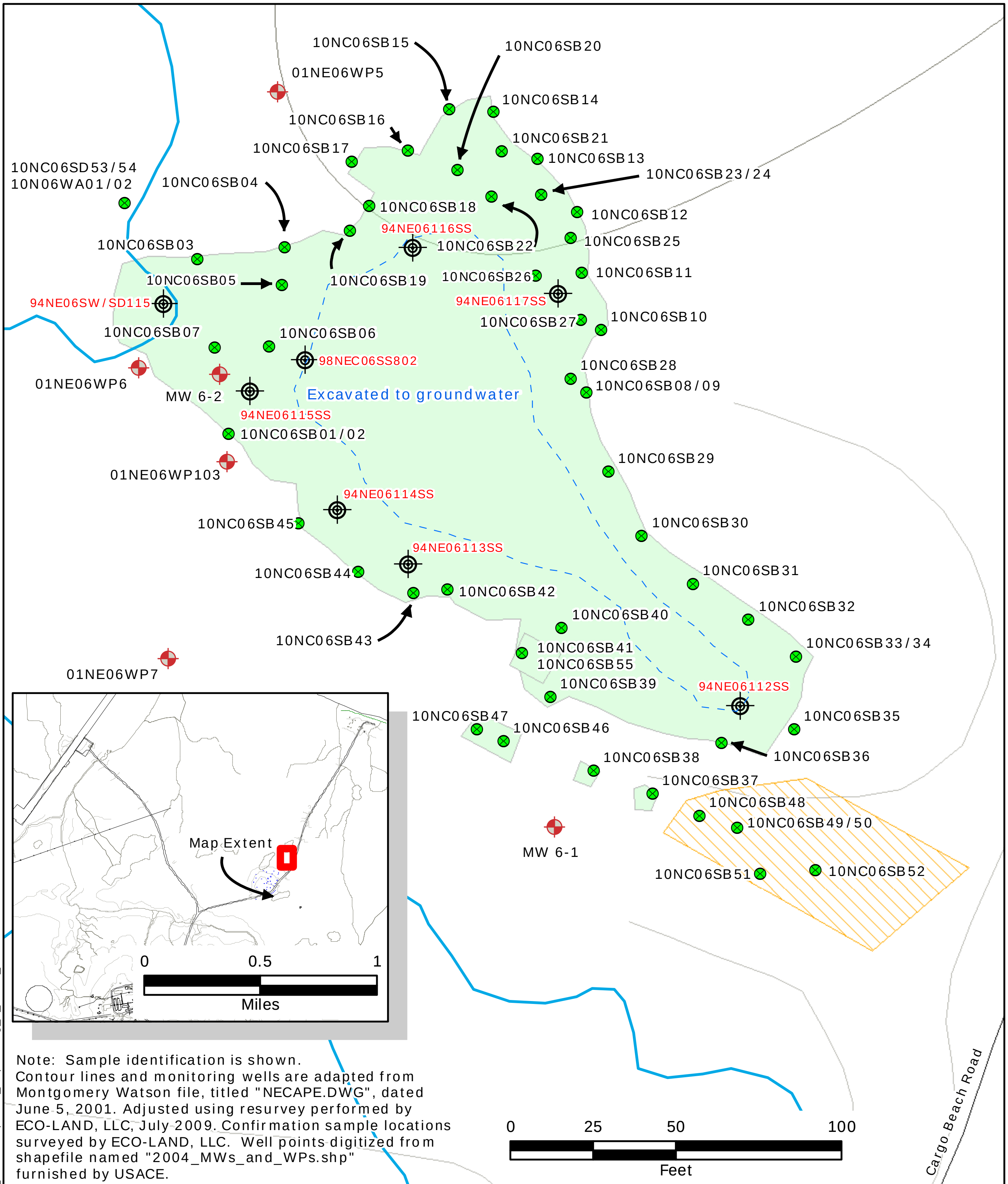
0 100 200
Feet

Figure 8
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Remedial Actions
Site 3 Confirmation Samples and Excavation Extents

Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC
Phone (907)563-0013 Fax (907)563-6713
Project No. 410026

DATUM: NAD 83	DATE	03-14-11	SHEET
PROJECTION: Alaska State Plane Zone 9	DWN.	BERS-RJ	1
	SCALE	1:600	of
	APPRVD.	BERS-MW	1

File: G:\Jobs\410026_NECape_HTRW\Maps\RA_Report\Fig_8_Site3v02.mxd



Note: Sample identification is shown.
Contour lines and monitoring wells are adapted from Montgomery Watson file, titled "NECAPE.DWG", dated June 5, 2001. Adjusted using resurvey performed by ECO-LAND, LLC, July 2009. Confirmation sample locations surveyed by ECO-LAND, LLC. Well points digitized from shapefile named "2004_MWs_and_WPs.shp" furnished by USACE.

Legend

- Previous Sample Locations
- Site 6 Confirmation Sample
- Monitoring Well
- Hydrology
- Excavation Extent
- Plant Screen Location/Confirmation Samples

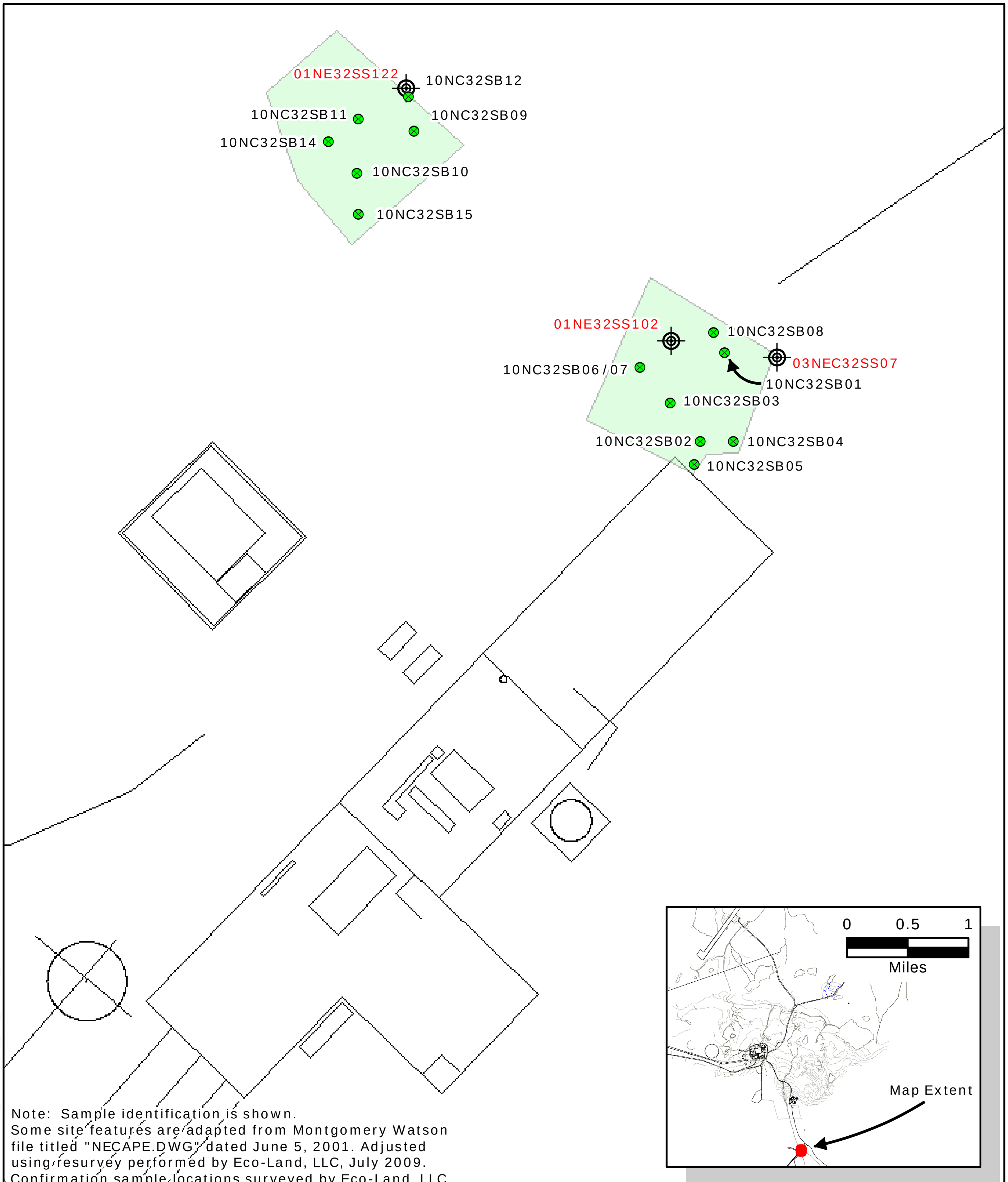
N
W E
S

Figure 9
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Removal Actions
Site 6 Confirmation Samples and Excavation Extents

Bristol
ENVIRONMENTAL
REMEDIATION SERVICES, LLC
Phone (907)563-0013 Fax (907)563-6713
Project No. 34110008

DATUM: NAD83	DATE	05-04-11	SHEET
PROJECTION:	DWN.	BI-ME	1
Alaska State Plane Zone 9 FIPS 5009 Feet	SCALE	1:500	of
	APPRVD.	BERS-MW	1

File: G:\Jobs\34110008_NE_Cape_2011\Maps\RA_Report\Fig_9_Site6_v04.mxd



Legend

Confirmation Sample

Previous Sample Locations

Excavation Extent

0 12.5 25 50

Feet

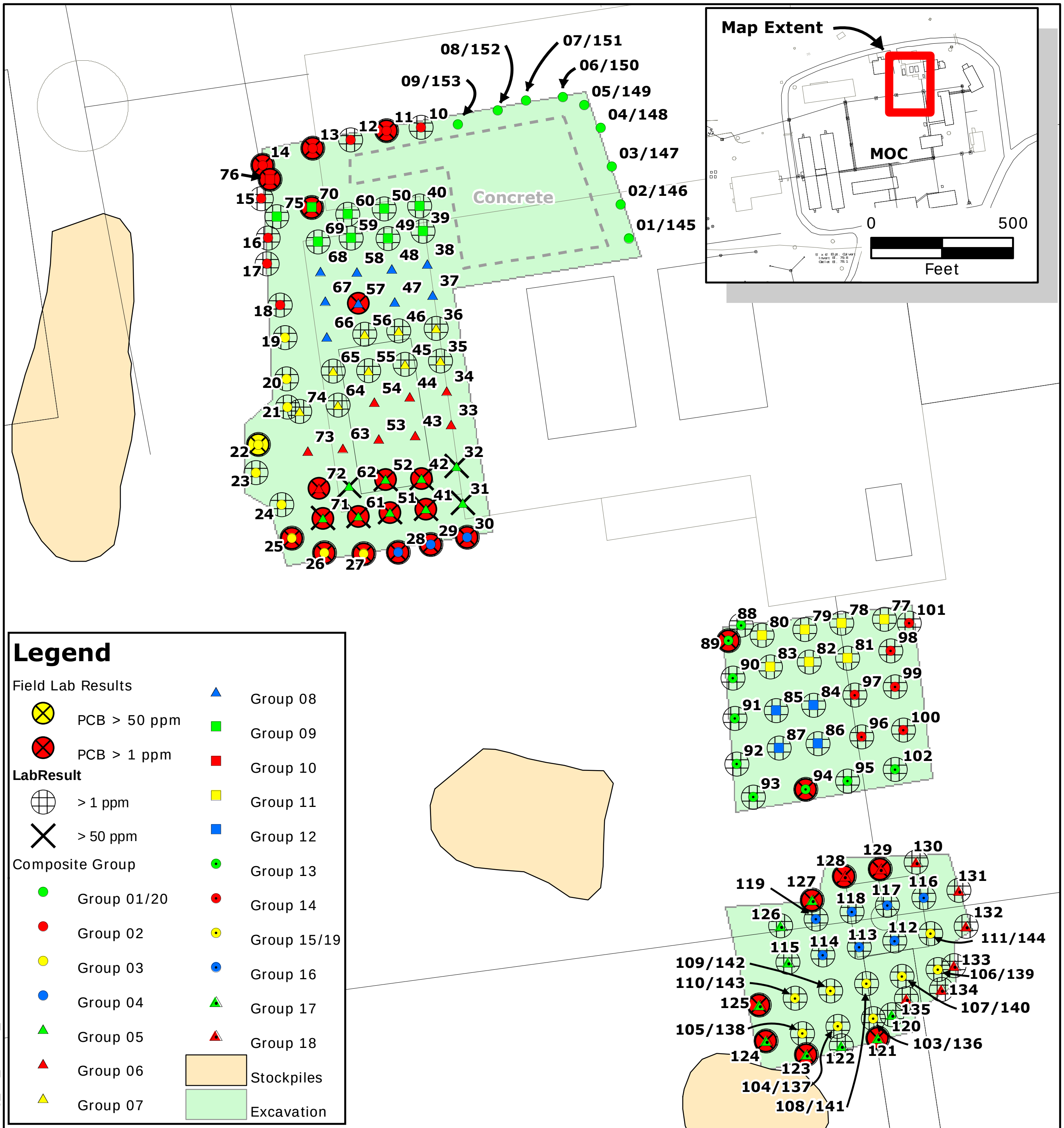
N W E S

Figure 10
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Removal Actions
Site 32 Confirmation Samples and Excavation Extents

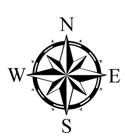
Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC
Phone (907)563-0013 Fax (907)563-6713
Project No. 410026

DATUM: NAD83	DATE	03-15-11	SHEET
PROJECTION: Alaska State Plane Zone 9	DWN.	BERS-RJ	1
	SCALE	1:240	of
	APPRVD.	BERS-MW	1

File: G:\Jobs\410026_NECape_HTRW\Maps\RA_Report\Fig_10_Site32_v02.mxd



Note: Sample identification shown is preceded by "10NC13SB".
Sample results for all composites indicate that discrete samples may contain PCB contamination above site cleanup levels.
Contour lines are adapted from Montgomery Watson file titled "NECAPE.DWG" dated June 5, 2001. Adjusted using resurvey performed by Eco-Land, LLC, July 2009. Confirmation sample locations surveyed by Eco-Land, LLC and Trimble® GeoXH™.



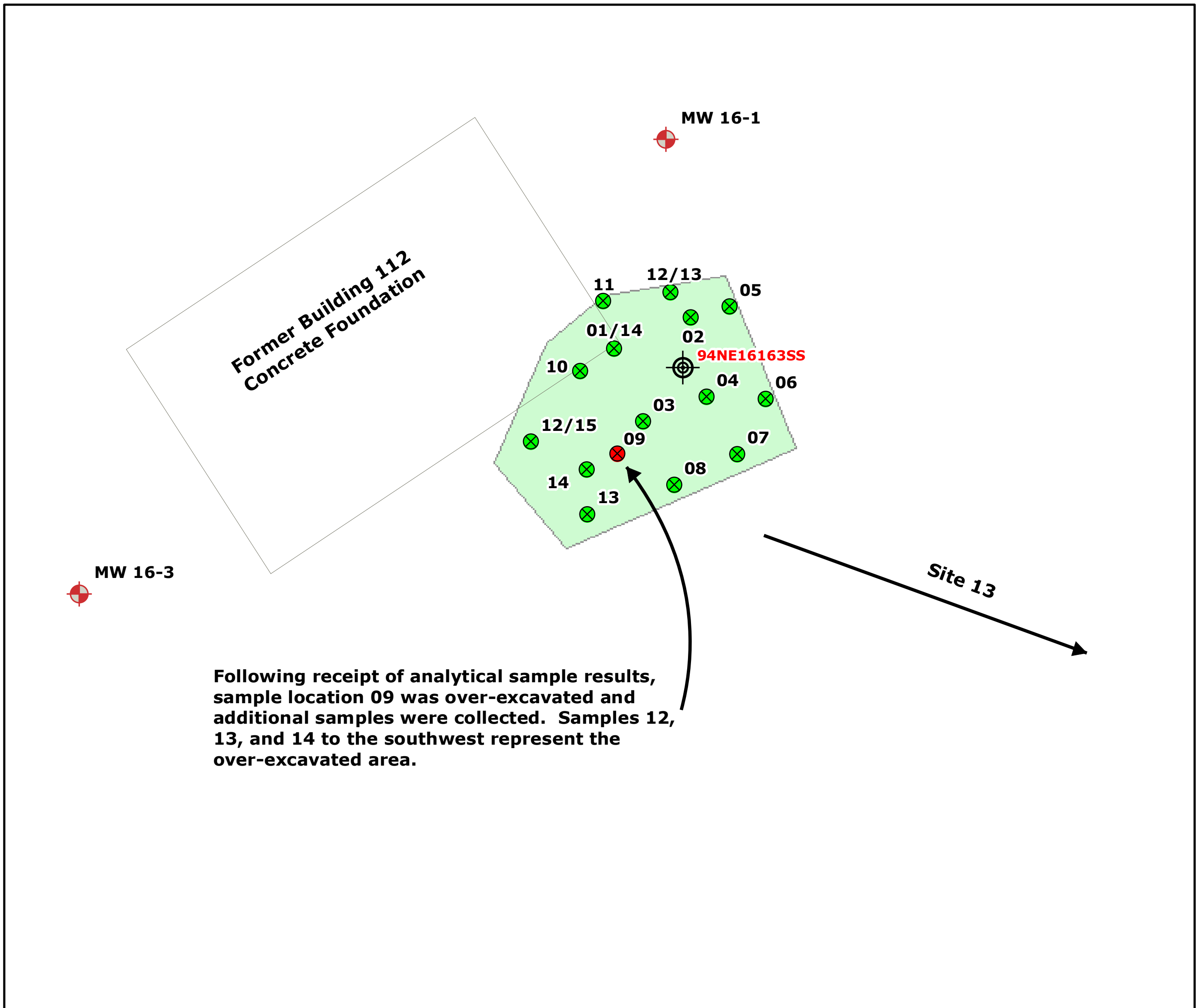
0 12.5 25 50
Feet

Figure 11
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Removal Actions
Site 13 Confirmation Samples and Excavation Extents

Bristol
ENVIRONMENTAL
REMEDIATION SERVICES, LLC
Phone (907)563-0013 Fax (907)563-6713
Project No. 410026

DATUM: NAD83	DATE	03-15-11	SHEET	
PROJECTION:	DWN.	BERS-RJ	1	
Alaska State Plane Zone 9	SCALE	1:240	of	
	APPRVD.	BERS-MW	1	

File: G:\Jobs\410026_NECape_HTRW\Maps\RA_Report\Fig_11_Site13_v02.mxd



Legend

Monitoring Well

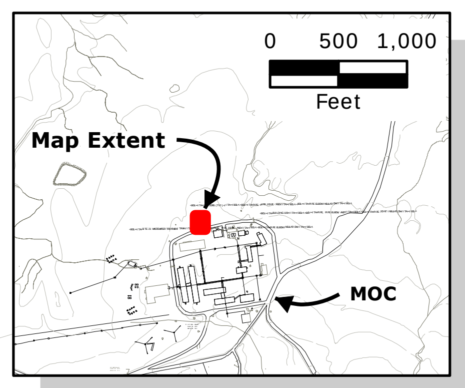
Site 16 Confirmation Samples

Result was below cleanup level

Result was above cleanup level

Previous Sample Locations

Excavation



Note: Sample identification shown is preceded by "10NC16SB". Background features are adapted from Montgomery Watson file titled "NECAPE.DWG" dated June 5, 2001. Adjusted using resurvey performed by Eco-Land, LLC, July 2009. Confirmation sample locations surveyed by Eco-Land, LLC and Trimble® GeoXH™.

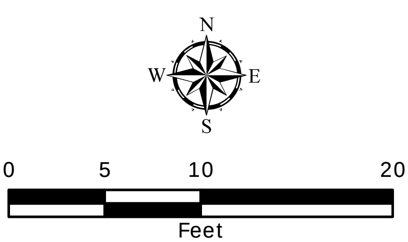


Figure 12

Northeast Cape, St. Lawrence Island, Alaska

Northeast Cape HTRW Removal Actions

Site 16 Confirmation Samples and Excavation Extents

Bristol ENVIRONMENTAL REMEDIATION SERVICES, LLC

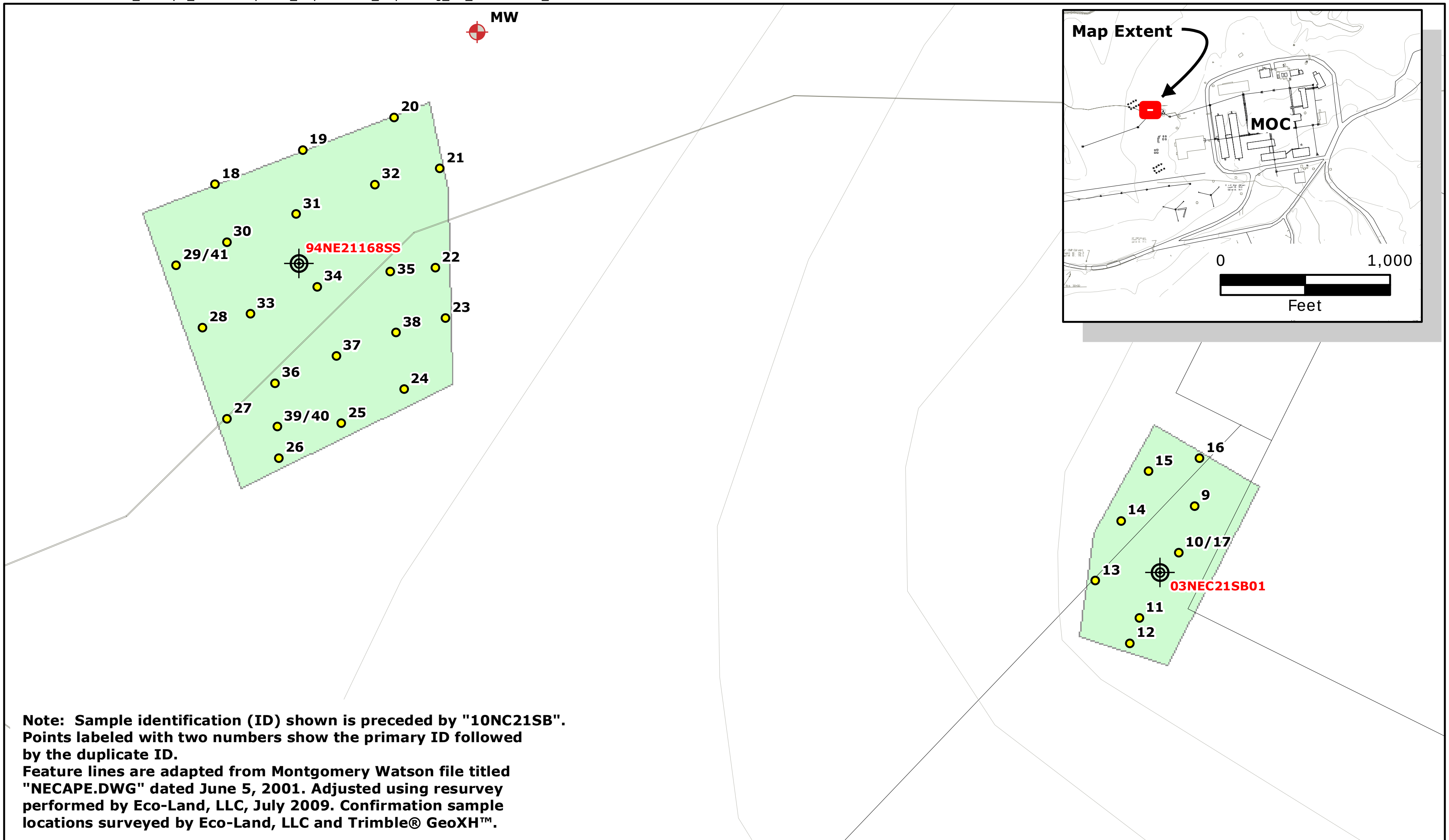
Phone (907)563-0013 Fax (907)563-6713

Project No. 410026

DATUM: NAD83	DATE	03-15-11	SHEET 1
PROJECTION: Alaska State Plane Zone 9	DWN.	BERS-RJ	of
	SCALE	1:120	1
	APPRVD.	BERS-MW	

File: G:\Jobs\410026_NECape_HTRW\Maps\RA_Report\Fig_12_Site16_v02.mxd

File: G:\Jobs\410026_NECape_HTRW\Maps\RA_Report\Final_Report\Fig_13_Site21PCBs_v02.mxd



Note: Sample identification (ID) shown is preceded by "10NC21SB". Points labeled with two numbers show the primary ID followed by the duplicate ID.
Feature lines are adapted from Montgomery Watson file titled "NECAPE.DWG" dated June 5, 2001. Adjusted using resurvey performed by Eco-Land, LLC, July 2009. Confirmation sample locations surveyed by Eco-Land, LLC and Trimble® GeoXH™.

Legend

- Site 21 PCB Confirmation Samples
- Previous Sample Locations
- Monitoring Well
- Excavation

N
W E
S

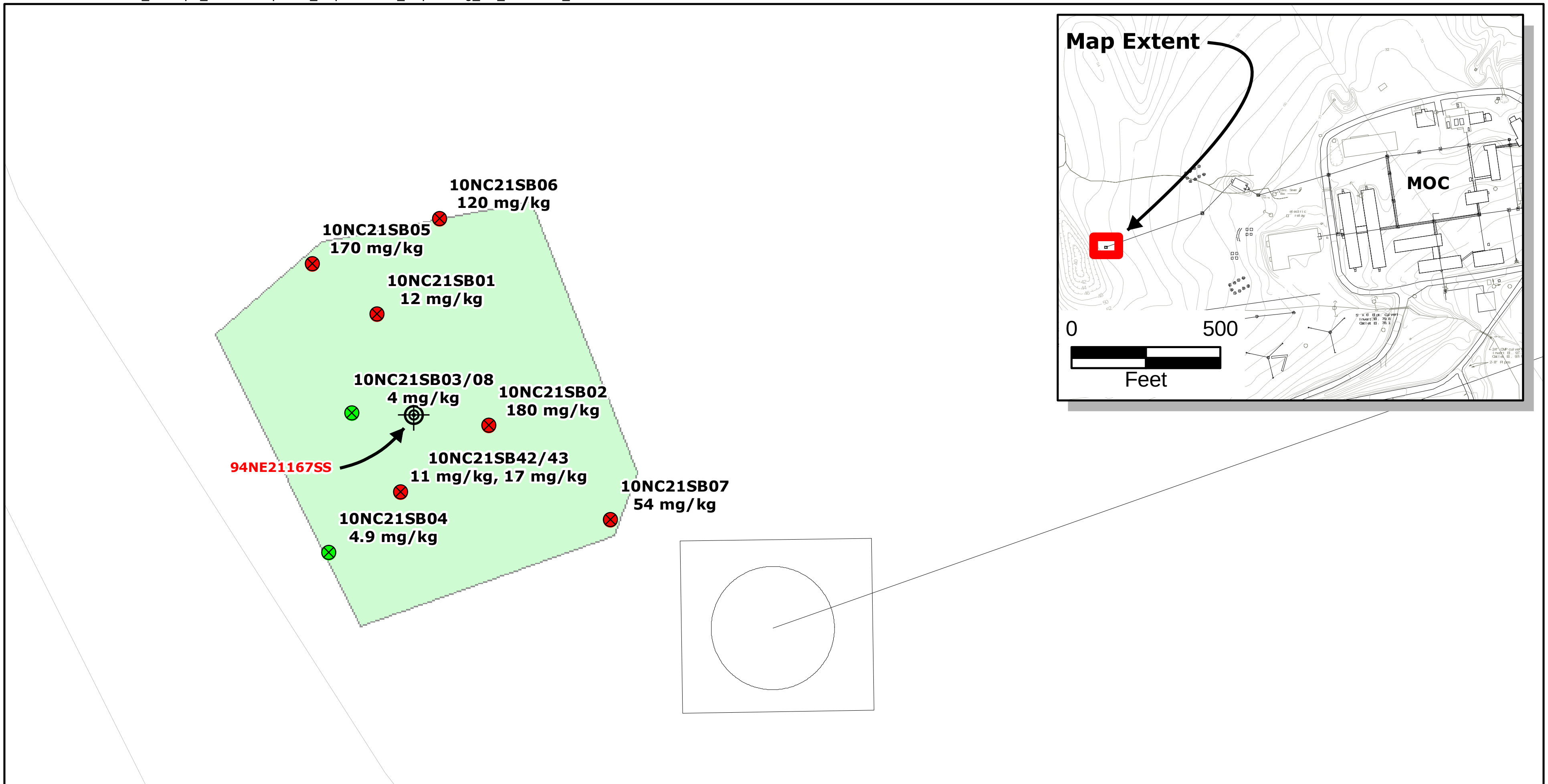
0 5 10 20
Feet

Figure 13
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Removal Actions
Site 21 Confirmation Samples and Excavation Extents

Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC
Phone (907)563-0013 Fax (907)563-6713
Project No. 410026

DATUM: NAD83	DATE 03-15-11	SHEET
PROJECTION:	DWN. BERS-RJ	1
Alaska State Plane Zone 9	SCALE 1:100	of
	APPRVD. BERS-MW	1

File: G:\Jobs\410026_NECape_HTRW\Maps\RA_Report\Final_Report\Fig_14_Site21As_v03.mxd



Note: Arsenic result is shown in milligrams per kilogram. Feature lines are adapted from Montgomery Watson file titled "NECAPE.DWG" dated June 5, 2001. Adjusted using resurvey performed by Eco-Land, LLC, July 2009. Confirmation sample locations captured using Trimble® GeoXH™.

Legend

- Arsenic Result Above Cleanup Level
- Arsenic Result Below Cleanup Level
- Previous Sample Location
- Excavation

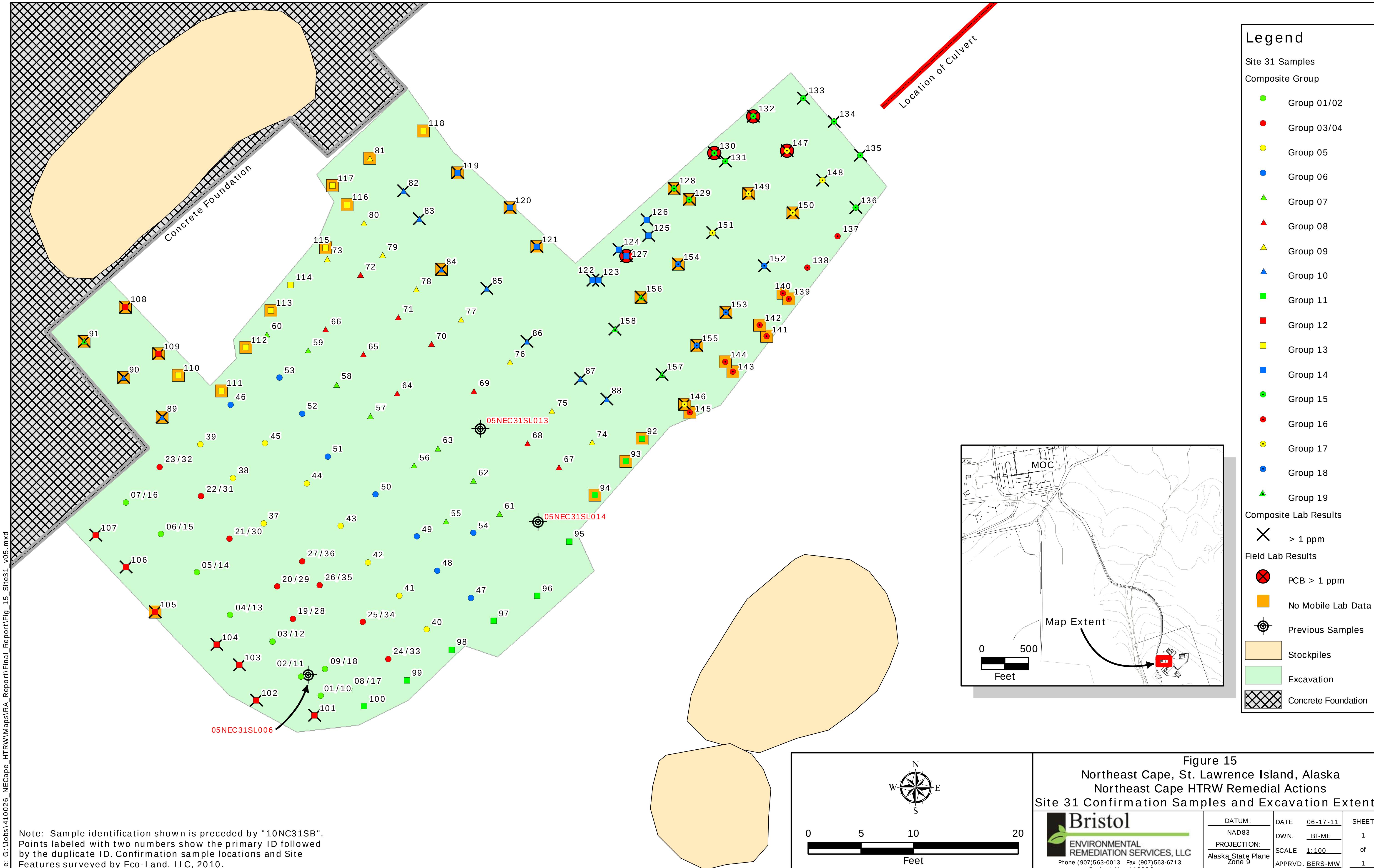
N
W E
S

0 5 10 20
Feet

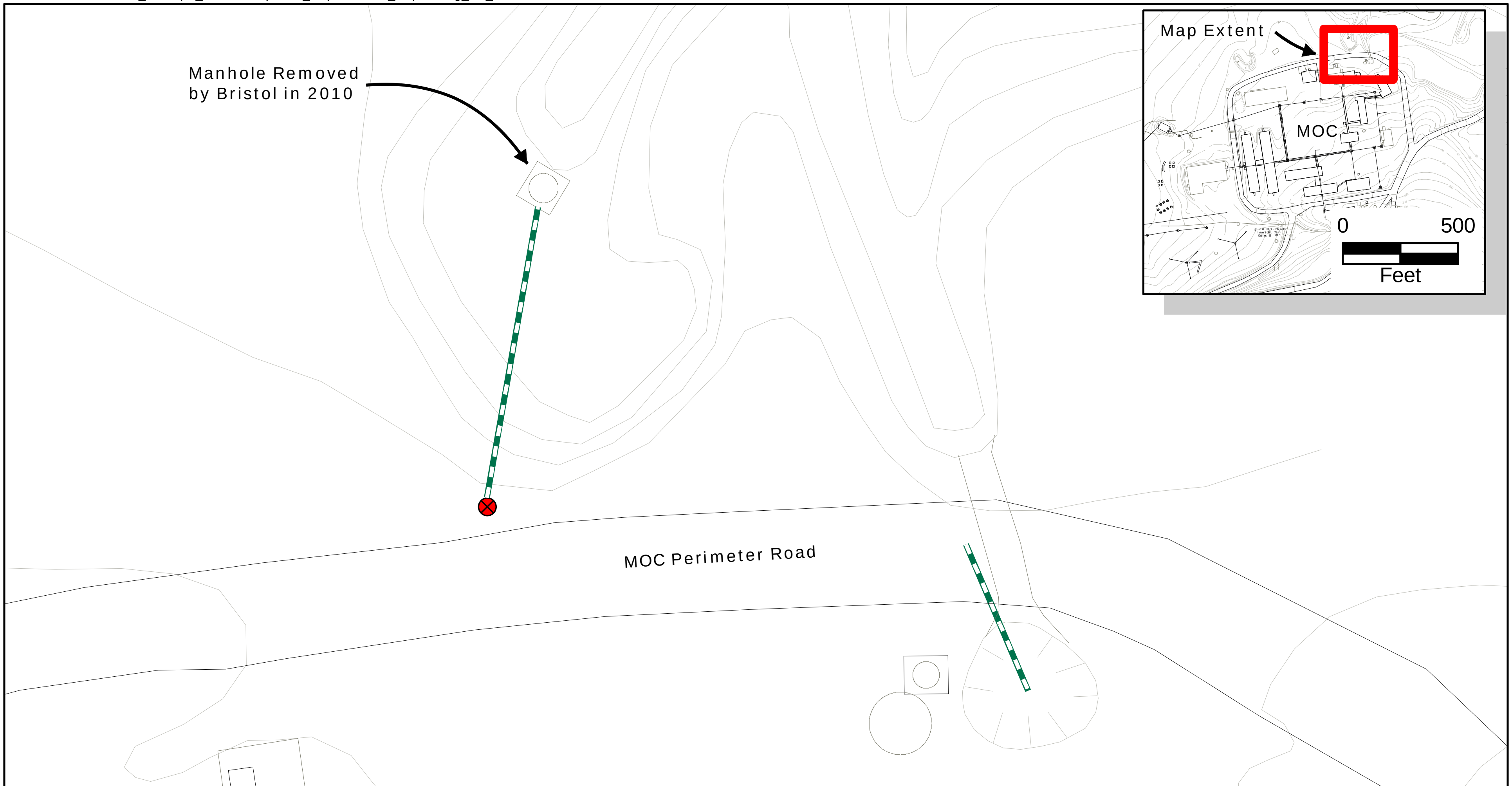
Figure 14
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Removal Actions
Site 21 Confirmation Samples and Excavation Extents

Bristol
ENVIRONMENTAL
REMEDIATION SERVICES, LLC
Phone (907)563-0013 Fax (907)563-6713
Project No. 410026

DATUM: NAD83	DATE 03-15-11	SHEET
PROJECTION: Alaska State Plane Zone 9	DWN. BERS-RJ	1
	SCALE 1:100	of
	APPRVD. BERS-MW	1


Legend
Site 31 Samples
Composite Group
Group 01/02
Group 03/04
Group 05
Group 06
Group 07
Group 08
Group 09
Group 10
Group 11
Group 12
Group 13
Group 14
Group 15
Group 16
Group 17
Group 18
Group 19
Composite Lab Results
> 1 ppm
Field Lab Results
PCB > 1 ppm
No Mobile Lab Data
Previous Samples
Stockpiles
Excavation
Concrete Foundation
Location of Culvert
Concrete Foundation
05NEC31SL013
05NEC31SL014
05NEC31SL006
MOC
Map Extent
0 500
Feet
N
W E
S
0 5 10 20
Feet
Figure 15
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Remedial Actions
Site 31 Confirmation Samples and Excavation Extents
Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC
Phone (907)563-0013 Fax (907)563-6713
Project No. 410026
DATUM:
NAD83
PROJECTION:
Alaska State Plane Zone 9
DATE 06-17-11
DWN. BI-ME
SCALE 1:100
APPRVD. BERS-MW
SHEET
1
of
1
Note: Sample identification shown is preceded by "10NC31SB".
Points labeled with two numbers show the primary ID followed
by the duplicate ID. Confirmation sample locations and Site
Features surveyed by Eco-Land, LLC, 2010.
File: G:\Jobs\410026_NECape_HTRW\Maps\RA_Report\Final_Report\Fig_15_Site31_v05.mxd

File: G:\Jobs\410026_NECape_HTRW\Maps\RA_Report\Final_Report\Fig_16_Site28.mxd



Note: Feature lines are adapted from Montgomery Watson file titled "NECAPE.DWG" dated June 5, 2001. Adjusted using resurvey performed by Eco-Land, LLC, July 2009. Culvert sections shown on this figure were removed by Bristol in 2010.

Legend

Plugged/Capped Culvert End

Culvert Locations

N
W E
S

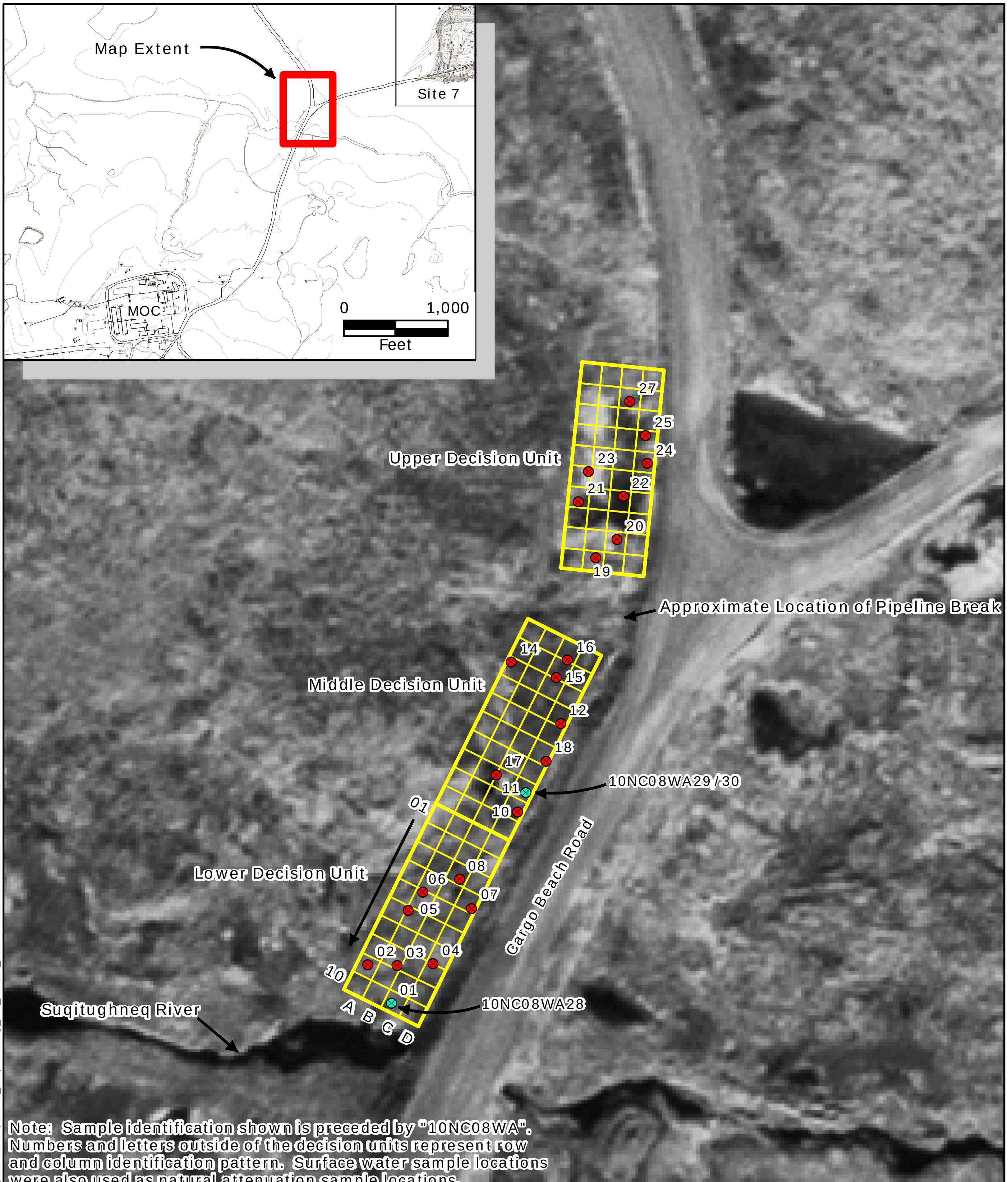
0 12.5 25 50
Feet

Figure 16
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Removal Actions
Site 28 Manhole and Culvert Removal Area

Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC
Phone (907)563-0013 Fax (907)563-6713

Project No. 410026

DATUM:	DATE	01-14-11	SHEET
NAD83	DWN.	BERS-RJ	1
PROJECTION:	SCALE	1:360	of
Alaska State Plane Zone 9	APPRVD.	BERS-MW	1



Legend

- Natural Attenuation Water & Soil Sample
- Surface Water Sample
- Decision Unit

N W E S

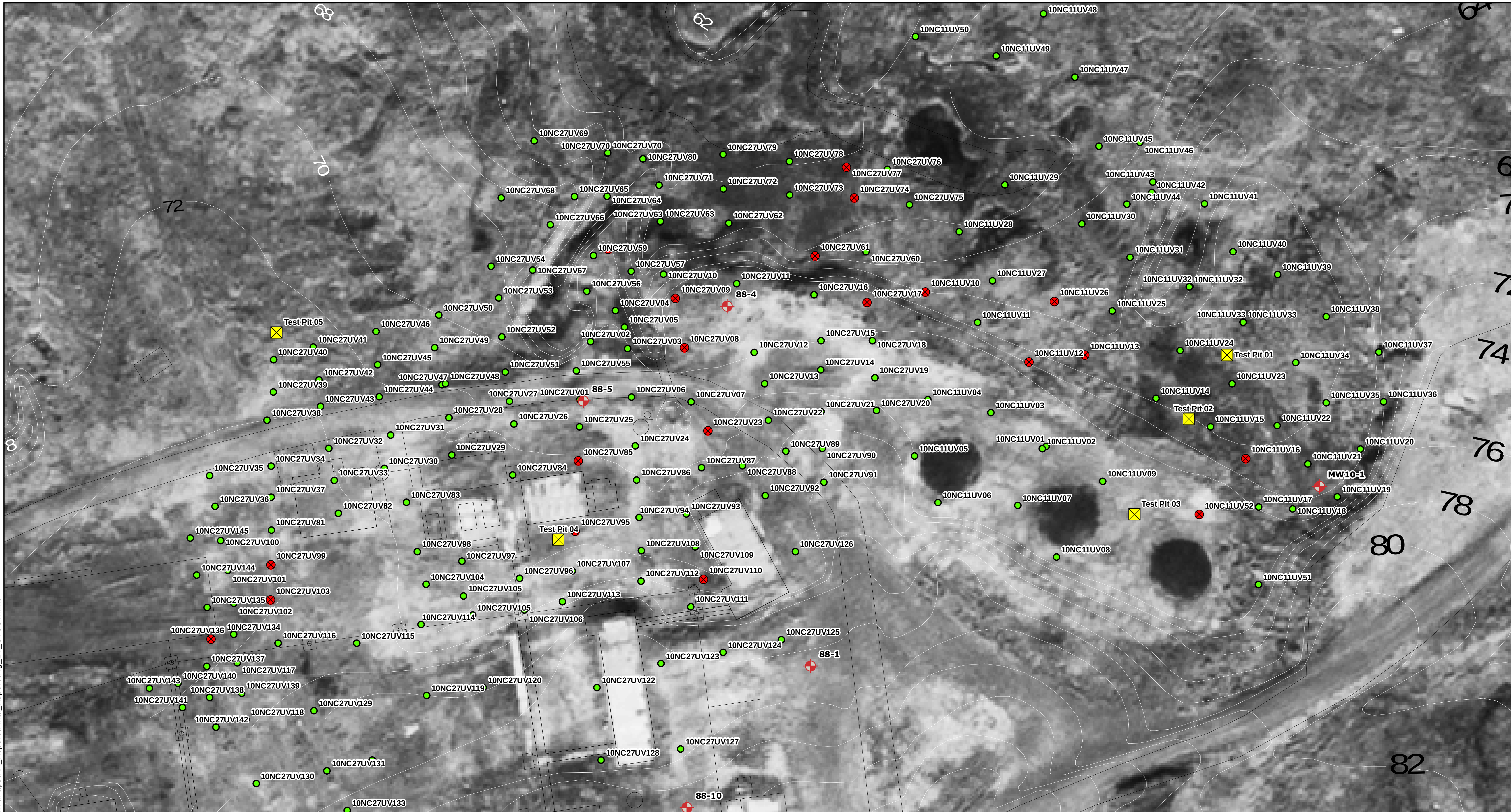
0 25 50
Feet

Figure 17
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Removal Actions
Site 8 Natural Attenuation Monitoring Area

Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC
Phone (907)563-0013 Fax (907)563-6713
Project No. 34110008

DATUM: NAD83	DATE	05-03-11	SHEET
PROJECTION:	DWN.	BI-ME	1
Alaska State Plane Zone 9 FIPS 5009 Feet	SCALE	1:800	of
	APPRVD.	BERS-MW	1

File: G:\Jobs\34110008_NE_Cape_2011\Maps\RA_Report\Fig_17_Site8_v03.mxd



Legend

- MOC Monitoring Well
- Correlation Location
- Test Pit
- UVOST Probe

Note: Feature and contour lines are adapted from Montgomery Watson file titled "NECAPE.DWG" dated June 5, 2001. Adjusted using resurvey performed by Eco-Land, LLC, July 2009. UVOST probe locations surveyed by Eco-Land, LLC and Trimble® GeoXH™.

N
W E
S

0 50 100
Feet

Figure 18
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Remedial Actions
MOC UVOST Probe Locations

Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC
Phone (907)563-0013 Fax (907)563-6713
Project No. 410026

DATUM:	DATE	01-14-11	SHEET
NAD 83	DWN.	BERS-RJ	1
PROJECTION:	SCALE	1:900	of
Alaska State Plane Zone 9	APPRVD.	BERS-MW	1

File: G:\Jobs\410026_NECape_HTRW\Maps\RA_Report\Final_Report\Fig_17_UVOST.mxd

Legend

- MOC Monitoring Well
- Correlation Location
- Test Pit
- UVOST Probe

Note: Feature and contour lines are adapted from Montgomery Watson file titled "NECAPE.DWG" dated June 5, 2001. Adjusted using resurvey performed by Eco-Land, LLC, July 2009. UVOST probe locations surveyed by Eco-Land, LLC and Trimble® GeoXH.

N
W E
S

0 100 200
Feet

Figure 19
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Remedial Actions
MOC Monitoring Well Locations

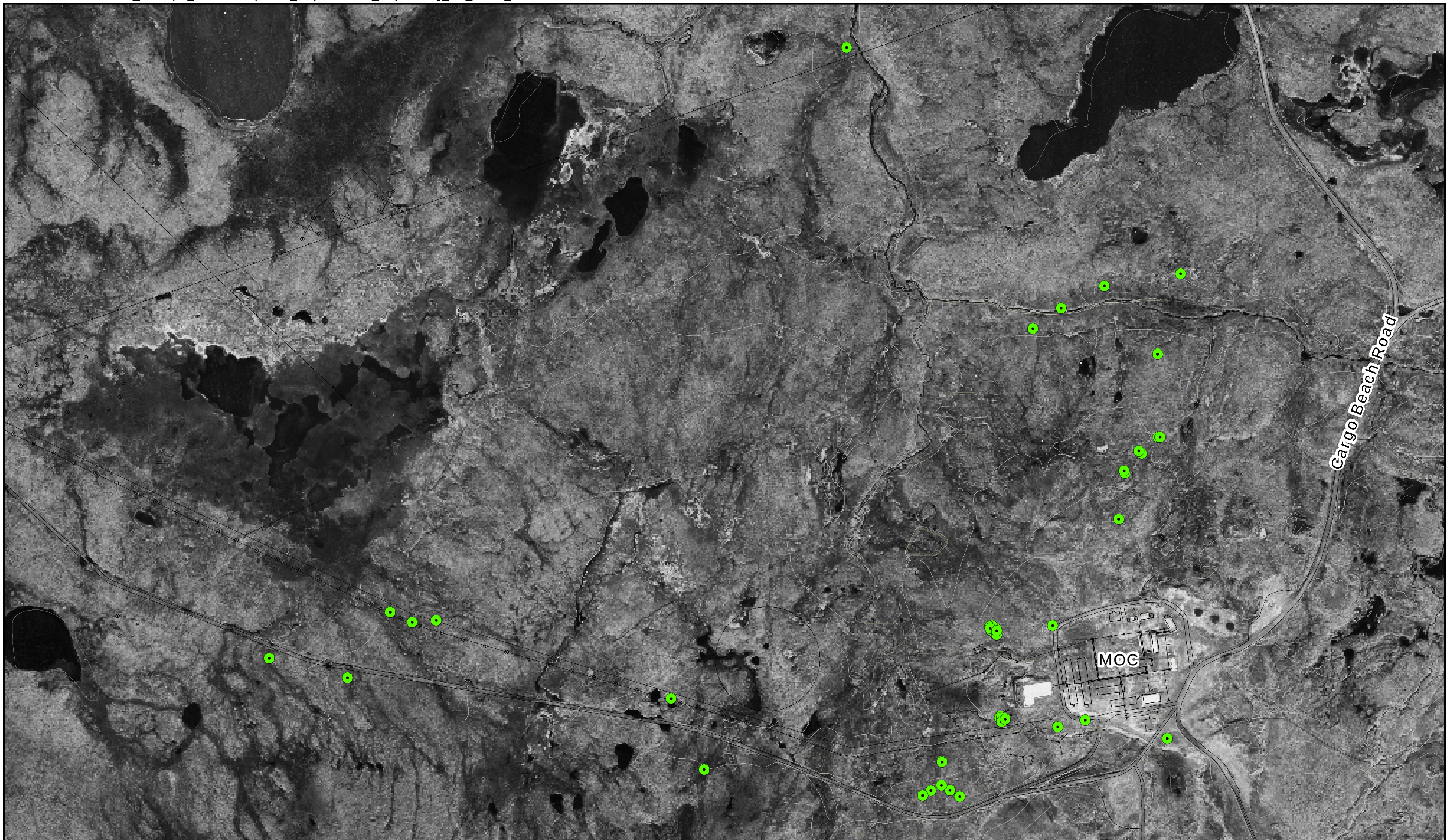
Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC
Phone (907)563-0013 Fax (907)563-6713

Project No. 410026

DATUM: NAD 83	DATE	01-14-11	SHEET
PROJECTION: Alaska State Plane Zone 9	DWN.	BERS-RJ	1
	SCALE	1:1,200	of
	APPRVD.	BERS-MW	1

File: G:\Jobs\410026_NECape_HTRW\Maps\RA_Report\Final_Report\Fig_19_MOCWells_v02.mxd

File: G:\Jobs\410026_NECape_HTRW\Maps\RA_Report\Final_Report\Fig_20_Poles_v02.mxd



Legend

Removed Poles

Note: Feature lines are adapted from Montgomery Watson file titled "NECAPE.DWG" dated June 5, 2001. Adjusted using resurvey performed by Eco-Land, LLC, July 2009. Pole locations shown on this figure were removed by Bristol in 2010.

N W E S

0 250 500 1,000
Feet

Figure 20
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Removal Actions
Wooden Poles Removed

Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC
Phone (907)563-0013 Fax (907)563-6713
Project No. 410026

DATUM:	DATE 03-24-11	SHEET
NAD83	DWN. BERS-RJ	1
PROJECTION:	SCALE 1:9,900	of
Alaska State Plane Zone 9	APPRVD. BERS-MW	1

APPENDIX A

Photograph Log

Photograph 1: Site 1 samples marked with lath. Direction: southeast. Date*:* August 2010.

Photograph 2: Site 3 sample pits and stockpile. Direction: southeast. Date: August 2010.

Photograph 3: Site 3 Stockpile POL soil removal. Direction: south.
Date: August 2010.

Photograph 4: Site 3 Stockpile samples marked with lath. Direction: south.
Date: August 2010.

Photograph 5: Site 3 Backfilled area with stockpile in background. Direction: east.
Date: August 2010.

Photograph 6: Site 6 Excavation area with sample flags and grid lath. Direction: east.
Date: July 2010.

Photograph 7: Site 6 POL-stained soil. Direction: downward view.
Date: July 2010.

Photograph 8: Site 6 view of partially capped excavation. Direction: west.
Date: July 2010.

Photograph 9: Site 6 Sampler collecting confirmation samples. Direction: north.
Date: August 2010.

Photograph 10: Site 6 backfilled excavation area. Direction: west.
Date: September 2010.

Photograph 11: Site 8 view of monitoring natural attenuation decision units.
Direction: southwest. Date: July 2010.

Photograph 12: Site 8 View of Middle Decision Unit towards Upper Decision Unit.
Direction: northeast. Date: July 2010.

Photograph 13: Site 8 Looking north across Suqitughneq River to the southwest end of the MNA units with outfall. Direction: north. Date: July 2010.

Photograph 14: Site 9 Access road into landfill area with erosion control measures. Direction: north. Date: July 2010.

Photograph 15: Site 9 Diversion trench construction. Direction: west. Date: July 2010.

Photograph 16: Site 9 Diversion trench during initial water breakthrough. Direction: northwest. Date: July 2010.

Photograph 17: Site 9 Landfill cap construction. Direction: south.
Date: July 2010.

Photograph 18: Site 9 Cap with rerouted waterbody in foreground. Direction: north.
Date: August 2010.

Photograph 19: Site 13 Prior to initial dig with historic sample sites flagged.
Direction: west. Date: July 2010

Photograph 20: Site 13 Excavation areas. Direction: north.
Date: September 2010.

Photograph 21: Site 13 Northern excavation area with confirmation sample locations marked. Direction: north. Date: September 2010.

Photograph 22: Site 13 Backfilled excavation with liner. Direction: east. Date: September 2010.

Photograph 23: Site 16 Excavation. Direction: downward view.
Date: August 2010.

Photograph 24: Site 16 Backfilled excavation. Direction: northwest.
Date: September 2010.

Photograph 25: Site 21 Eastern excavation area. Direction: downward view.
Date: August 2010.

Photograph 26: Site 21 Excavation area. Direction: west.
Date: August 2010.

Photograph 27: Site 21 Middle excavation with copious clay layers.
Direction: downward view. Date: August 2010.

Photograph 28: Site 21 Middle excavations filled with groundwater. Direction: west.
Date: August 2010.

Photograph 29: Site 21 Arsenic excavation. Direction: southwest.
Date: August 2010.

Photograph 30: Site 28 Manhole. Direction: northeast.
Date: July 2010.

Photograph 31: Site 28 Manhole and culvert excavation. Direction: north. Date: July 2010.

Photograph 32: Site 28 Using chop saw to separate a section of culvert and piping from manhole. Direction: downward view. Date: July 2010.

Photograph 33: Site 28 End of culvert detached from manhole that was filled with bentonite chips. Direction: downward view. Date: July 2010.

Photograph 34: Site 28 End of culvert that was detached from manhole and welded shut. Direction: downward view. Date: July 2010.

Photograph 35: Site 28 Manhole outfall with silt fences. Direction: southeast.
Date: July 2010.

Photograph 36: Site 28 Backfilled excavation after manhole and culvert were removed.
Direction: west. Date: July 2010.

Photograph 37: Site 28 Backfilled excavation after manhole and culvert were removed. Direction: northeast. Date: July 2010.

Photograph 38: Site 31 Pin flags marking historic sample points. Direction: east. Date: August 2010.

Photograph 39: Site 31 Excavation filled with groundwater and pin flags marking field-screening sample locations. Direction: northeast. Date: August 2010.

Photograph 40: Site 31 Excavation with pin flags marking sample locations. Direction: east. Date: August 2010.

Photograph 41: Site 31 Excavation. Direction: north. Date: September 2010.

Photograph 42: Site 31 Excavation with liner prior to backfilling.
Direction: northeast. Date: September 2010.

Photograph 43: Site 32 Excavation areas. Direction: southwest. August 2010.

Photograph 44: Site 32 Backfilled excavations. Direction: northwest.
Date: September 2010.

Photograph 45: Cargo Beach Road and dust suppression. Direction: southeast.
Date: August 2010.

Photograph 46: Pole-pulling operation with Nodwell vehicle near MOC. Direction: west.
Date: August 2010.

Photograph 47: Removed poles being stacked at MOC. Direction: east.
Date: August 2010.

Photograph 48: Miscellaneous wire collected from tundra. Direction: northeast.
Date: August 2010.

Photograph 49: Test pits being dug at the MOC. Direction: east.
Date: August 2010.

Photograph 50: Site 6 Bulk bag weighing operation. Direction: southwest.
Date: July 2010.

Photograph 51: UVOST operations at the MOC. Direction: southwest.
Date: August 2010.

Photograph 52: Rock screen plant in operation at Site 6. Direction: southwest.
Date: July 2010.

Photograph 53: Rock screen plant in operation at the borrow pit. Direction: northeast. Date: August 2010.

Photograph 54: Bulk bag operation at Site 6. Direction: south. Date: August 2010.

Photograph 55: Miscellaneous tires collected for disposal in an open-top container.
Date: August 2010.

Photograph 56: Test pit activity at MOC. Direction: downward view.
Date: August 2010.

Photograph 57: Sampling groundwater wells at MOC. Direction: downward view.
Date: August 2010.

Photograph 58: Local hire and bear guard Eugene Toolie. Direction: south.
Date: August 2010.

Photograph 59: Tundra debris removal by local hire and laborer Michael Toolie. Direction: east. Date: July 2010.

Photograph 60: Local hire Charles Kava measuring MNA decision unit water body at Site 8. Direction: downward view. Date: August 2010.

APPENDIX B

Comment Sheets

Alaska Department of Environmental Conservation (ADEC)
Contaminated Sites Program
Document Reviewed: February 2011 Northeast Cape HTRW Remedial Actions Draft Report
Commenter: Curtis Dunkin-ADEC **Date Submitted:** April 26, 2011 and May 18, 2011

Comment No.	Page/Line	Section	Comment / Recommendation	Response
1.		**Draft HTRW Report**	**Narrative Sections Comments**	
2.	ES-2	Executive Summary	States that 10 groundwater wells will be sampled, however elsewhere in document 9 wells are stated as sampled (pages 2, 10, 41). The 2010 work plan stated that 10 wells would be sampled; "8 from one group of stated wells and two from another to be chosen onsite depending on the condition of wells due to suspected frost jacking". Table 21 (MOC groundwater results) lists 9 individual monitoring wells as having been sampled with MW88-4 having been sampled as the duplicate. Why were 10 wells not sampled as stated in the approved work plan? This needs to be explained and corrected throughout the document.	In Section 4.1.2 Deviations from the Planning Documents: a bullet will be added stating that due to damage caused by frost jacking only 9 wells could be sampled at the MOC **ADEC-ACCEPTED**
3.	2	1	Need to state the contaminant(s) associated w/ the sludge removed from the manhole.	A statement has been added to the text that states: The sludge contained the following contaminants: DRO, PCBs, arsenic, barium, cadmium, chromium, lead, selenium, silver, and mercury. Laboratory results are provided in Appendix F Table 13. **ADEC-ACCEPTED**
4.	15	4.1.2	PCB Soil Removal at Sites 13 and 31: The Army Corps. of Eng.(COE) requested and received approval from ADEC to stockpile the PCB-contaminated soil at the former Bldg. 98 concrete pad. ADEC stipulated that the storage bags must be placarded and labeled and stored in a consolidated manner that minimized exposure surfaces of the	Bristol requested the USACE letter to landowners from C. Cossaboom This information will be

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			bags and accidental release. ADEC also stipulated that the COE inform and request approval from the landowner and to provide ADEC with written confirmation of landowner's approval. The COE met ADEC's requests. This should be explained in the narrative, and ADEC's approval email sent to the COE on 9/3/10 along with the approval letters from the landowners should be included in the document and referenced in the table of contents.	included in Section 4.1.2 PCB Soil Removal at Sites 13 and 31. The letter from USACE to ADEC will be included as will the ADEC email sent to the USACE on 9/3/10 in Appendix C **ADEC-ACCEPTED**
5.	16	4.1.2	POL Soil Removal at Sites 1 and 3: ADEC was not initially notified re: the consideration and decision to execute this deviation from the work plan. Regardless of the fact that the proposed deviation would not have caused adverse effects (i.e. unacceptable release or exposure of contaminants), it should be noted that ADEC requires that a responsible party inform and obtain ADEC approval regarding any deviations to work plans which have been approved by ADEC .	Comment is acknowledged and ADEC will be informed of any deviations to future NE Cape work plans which have been approved by ADEC. **ADEC-ACCEPTED**
6.	16	4.1.2	Laboratory Analysis: Because VOC analysis data was rejected due to exceedance of holding times for the site 9 surface water samples, the characterization of this site is incomplete. This needs to be discussed in the narrative(s) associated w/ this site. Samples will need to be recollected for analysis during the next mobilization – this should be stated in the appropriate narrative sections, including section 6.2.	The decision to resample the surface water at Site 9 for the VOC analyses will have to be made by the USACE. The laboratory only analyzed for BTEX, the Chain requested VOCs. BTEX was analyzed within holding times. This information will be included in the text. **ADEC-ACCEPTED**
7.	16	4.1.3	ADEC's approval of the work and sampling and analysis plans needs to be listed in this section and the 7/7/10 ADEC approval letter needs to be included in the report.	The following statement will be included in Section 4.1.3 and the letter included in Appendix C: On July 7, 2010 the ADEC sent a letter to the USACE approving the 2010 NE Cape HTRW Remedial Actions Work Plan and Sampling and Analysis Plan.

				ADEC-ACCEPTED
8.	22	5.1.1	Was any personnel onsite during the period in late Sept. when the crew left the island returned to Anchorage? Was containerized and/or exposed contaminated material left stored on the site during this time (not incl. the stockpiled PCB material on the Bldg. 98 pad)?	No personnel were on the island between Sept.16-Oct 1, 2010. Two hard units, a generator, the water system and 10 containers were left at the runway. Equipment was stored at Site 6 so it wasn't exposed to seawater spray. The rest of the equipment/supplies stored in containers and bulk bags filled with non-hazardous contaminated soil were stored on flats on Cargo Beach during this time. **ADEC-ACCEPTED**
9.	31	5.7	The July 2010 work plan stated in section 4.1.4.3 that the rock screening plant staged at site 6 would have to be moved and restaged in order to excavate the POL-contaminated soils at site 6, and that pre-staging and post-screening characterization samples would be collected. None of this is discussed (incl. screening location and sampled depicted in a new figure) in the draft report and needs to be included.	The text will be expanded to state that the screen plant was initially staged in a POL-contaminated area at Site 6. Eventually the screen plant had to be moved directly to the west onto a clean area. When the screen plant was removed from Site 6 up to the borrow site to process clean soil the area underneath where the screen plant was located at Site 6 was sampled (4 samples plus

				one duplicate: 10NC06SB48-52) and was confirmed to be clean. Laboratory results are provided in Appendix D Table 9. The Figure 9-Site 6 will be modified to identify these sample locations and the screen plant location. **ADEC-ACCEPTED**
10.	32	5.8	Why was initial field screening prior to excavation conducted at other POL sites but not this site?	It was based on a decision between the QAR, Site Superintendent, and the CQCSM. The text will be modified to state that the historical sample locations at Site 32 were located and marked by the survey team. A decision was made with the QAR that the site was to be initially checked with a PID and then Bristol excavated approximately 20 tons of soil from two excavations that incorporated the 3 historical sample locations (Figure 10). Field screening samples were collected to confirm that the floor and sidewalls were below cleanup levels and then confirmation samples were

				collected. **ADEC-ACCEPTED**
11.	35-36	5.13	The field screening results for the PCB-contaminated stockpiled material from site 31 need to be included in Table 12 and referenced in the document and Figure 14. Figure 14 currently depicts 3 separate stockpiles. Are all three stockpile locations associated w/ site 31 and/or PCB-contaminated above cleanup levels?	The field results are provided in the supplemental data that was provided to the USACE and will be provided to the ADEC. All 3 stockpiles shown on Figure 14 are associated with Site 31 and all samples collected from the stockpiles were above the PCB cleanup level of 1 ppm. **ADEC-ACCEPTED**
12.	Tables	General	Several of the titles and header info for the analytical data tables are either cut off at the top of the page or punch holes have removed the table #, etc. The layout of all tables needs to be adjusted so that all information can be viewed clearly.	All the tables have been reformatted to include a bigger header and to make sure that the title information is readable. **ADEC-ACCEPTED**
13.	37-38	5.15	Was the drainage pipe/culvert that was removed inspected for sludge, soil that could be contaminated, etc.? Any contents of the pipe/culvert (sludge, soil that could be contaminated, etc., or lack thereof) that was left in place (after cutting off the stated 63 ft. section) needs to be discussed in the narrative. Was the 2-inch pipe located inside the 12-inch pipe or did they run parallel to each other? Photographs 33 and 34 in Appendix A show a 2-inch pipe running parallel atop the 12-inch pipe, however there appears to be what looks like a cable or smaller pipe inside the 12-inch pipe. This needs to be discussed in the narrative. The narrative states 'contained a smaller 2-inch pipe' which insinuates that the 2-inch pipe is located inside the 12-inch pipe/culvert - this needs to be clarified/corrected. Have the pipes	The text will be modified to include the following information: A very small amount of sludge/soil was cleaned out of the pipe/culvert and bagged for disposal. Due to the limited amount it wasn't sent to the lab for analysis. In 2010 this area was also being characterized by a UVOST

			been traced to the location of origin and has that area been characterized? Lastly, the 2010 work plan did not discuss backfilling this area after removal, and in photographs 35-37 in Appendix A it appears that the backfill volume/amount is significantly greater than what was removed – it appears the shallow gulch was filled and leveled. Further characterization of this area is planned in the future. Please clarify re: volume of backfill and how/if this may affect future site characterization.	investigation. The UVOST investigation confirmed that there is POL-contamination above the cleanup level in the area where the culvert and pipe were removed. This area may be excavated in 2011. The text will state that a 2-inch pipe ran parallel to the 12-inch pipe and was most likely a steam pipe to thaw the main pipe. There appeared to also be a thaw wire inside the pipe. The pipe in the eastern drainage was completely removed. The pipe in the western drainage was cut-off, filled with bentonite chips, and capped per the SOW. It was not traced back to its origin but most likely originated at the Site 13 – Heat and Power Plant. The areas where the culvert, pipe and manhole were removed were re-graded but not back to the starting grade. No clean backfill was used. **ADEC-ACCEPTED**
14.	38	5.16	This section states that 197 UVOST probe points were advanced, however the UVOST investigation report states that 198 points were advanced and needs to be clarified.	198 probes were drilled but only 197 probes provided information due to the fact that

				one probe hit refusal at ~1' bgs and was abandoned. The HTRW Report and the UVOST Report will be corrected to be consistent in stating the number of probes **ADEC-ACCEPTED**
15.	40	5.16.3	Second paragraph of this section, insert the word '…to [approximately] 17 feet bgs. In the third paragraph, it is stated that 'Contamination above the cleanup level for DRO was only encountered…'; which is a presumptive and inappropriately worded statement given the fact that UVOST technology and the data it generates are accepted by ADEC as a screening tool only. This statement should be reworded, i.e. 'UVOST investigation results from this area indicate that the eastern edge of the former tank pad area is contaminated with DRO above the ADEC cleanup level'. The last paragraph from the UVOST Investigation executive summary on page ES-2 (discussing the results of the correlation sampling) should be included in this section.	The word approximately has been added to this paragraph and the last paragraph from the UVOST Investigation executive summary (pg ES-2) has been added. **ADEC-ACCEPTED**
16.	40	5.16.3 and UVOST Report Appendix B	Figures in Appendix B indicate that UVOST probes were advanced to a depth of 21 ft. (Figure 48-49 MSL-9.2% RE Area) – several of which had LIF responses that indicated contaminated soil above site-specific cleanup levels. However section 5.16.3 of the HTRW RA report only discusses depths of up to 17 feet. All probe depths and contaminant levels observed during the UVOST investigation need to be stated and discussed in the narratives of both the HTRW and UVOST report.	A statement will be added that a few UVOST probes were drilled to depths greater than 20 feet. Additional text will be added to summarize the depths and contaminant levels observed during the UVOST Investigation. In the Final HTRW Report Bristol will include a table and a discussion on the depths to contamination, the amount of overburden, and the estimated tonnage associated with the plumes on the pad that will

				guide the 2011 excavation based on evaluating all of the UVOST profiles. **ADEC-ACCEPTED**
17.	49-76	Header	The header info at the top of these pages (In-Situ Chemical Oxidation and Intrusive Drum…" is different than those proceeding them – it appears they are remnant from a previous report and need to be changed.	Headers have been corrected **ADEC-ACCEPTED**
18.	50	6.1.1	References Table B (site 3 screening results), however, there is not a Table B located anywhere in the report nor is it in the appendix of analytical data tables. Please insert and update the table of contents.	The reference will be clarified in the text. This information is included in the Supplemental Data that will be provided to ADEC. All field lab screening results are contained in Supplemental Data/Field Lab Results Tables. **ADEC-ACCEPTED**
19.	50	6.1.1	Include in the report all sample chromatograms associated with silica gel cleanup samples. Also include the ADEC Tech Memo titled Biogenic Interference and Silica Gel Cleanup dated May 18, 2006 9 either in section 6.1.1 or in Appendix G.	Only sample 03FL13 was treated with silica gel. The chromatograms for 03FL13 are in Supplemental Data/Field Lab Results. The ADEC Tech Memo will be referenced in the document and added to Appendix G. **ADEC-ACCEPTED**
20.	51	6.1.3	A correlation study (or reference to and summary of) needs to be provided for the modification to the EPA field testing method. Tables H through K are not included anywhere in the report and needs to be added and the table of contents amended. . **(Per confirmation from Bristol on May 18, 2010 the supplemental tables referenced alphabetically in the narrative are actually identified**	A tech memo summarizing the correlation results has been added to: Supplemental Data/Field Lab Results Tables H through K were provided

			numerically in the electronic copies of the supplemental data which was received by ADEC per request on May 5, 2011 and need to be revised).	electronically to the USACE in the Supplemental Data which will be provided to ADEC. Table IDs have been changed to match the text citations. **ADEC-ACCEPTED**
21.	60-61	6.11	Last sentence of page 60 'Samples were collected in areas until the field laboratory determined that the soil…' does not make sense - rephrase.	The sentence was rephrased: Samples were collected until field laboratory results indicated that contaminant concentrations were below cleanup levels or until groundwater was encountered **ADEC-ACCEPTED**
22.	64	6.14	First sentence, replace 'An historic sample…' w/ 'A historic sample…'	Corrected **ADEC-ACCEPTED**
23.	66	6.15	Omit the second sentence of the second paragraph "The area was excavated…". Include information in this section pertaining to the square area and depth below ground surface that was excavated. Was groundwater encountered/did the excavation site fill with water, and was this site backfilled?	2nd sentence has been omitted. The statement has been added that the PCB excavation was backfilled but not the arsenic location because groundwater was at the surface and the excavation filled with water. **ADEC-ACCEPTED**
24.	66	6.16	Last sentence of first paragraph does not make sense and needs to be rephrased.	This sentence has been revised to state: At the end of the 2005 removal action, a plastic liner had been placed in the excavation where the historical samples had been

				collected and the excavation was backfilled over the liner. This liner was removed and used as a guide to determine at what depth the excavation should begin in 2010. **ADEC-ACCEPTED**
25.	67	6.16	Insert '[and are] provided…' in the last sentence of the first paragraph beginning w/ 'Field-screening sample results…'.	These words have been added to this sentence **ADEC-ACCEPTED**
26.	68	6.16	Last sentence of this section, change the second use of the word 'samples' to make it singular.	The change has been made **ADEC-ACCEPTED**
27.	68	6.18	Include a description of the 8 sampling locations in each decision unit that were composited to make each laboratory sediment sample. This is explained in section 5.20 but needs to be explained in detail in the sampling and analysis section 6.18. Also see comment 35 below re: section 6.18.	This section will be expanded to discuss the 8 sample locations from each decision unit **ADEC-ACCEPTED**
28.	70	6.19	First paragraph of this page reference to Table 21 is incorrect and should be change to Table 16 which actually contains the MNA parameters for site 8.	Corrected **ADEC-ACCEPTED**
29.	71	6.20	Second paragraph of this page references tables 16-18, which is incorrect and should be changed to tables 17-19.	Corrected **ADEC-ACCEPTED**
30.	71	6.21	As stated previously in comments above, the work plan states that 10 monitoring wells were to be sampled, however it appears that only 9 were sampled. Explain why 10 wells were not sampled.	A statement will be included explaining that only 9 monitoring wells could be located that were not damaged and could be sampled. Wells selected for sampling were approved by the QAR. **ADEC-ACCEPTED**
31.	71	6.21	Incorrectly references table 22 as the natural attenuation parameters for the MOC	Corrected

			ground water monitoring – change to table 20.	**ADEC-ACCEPTED**
32.	71	6.21	Incorrectly references table 19 as the MOC ground water results – change to table 21.	Corrected **ADEC-ACCEPTED**
33.	72	6.21	At the end of the sentence beginning w/ 'The wells with the lowest…' insert '…depleting oxygen [in DRO-contaminated ground water] to aerobically degrade DRO'.	Bristol suggests changing this statement to the following: The wells with the highest contaminant concentrations had comparatively low DO, suggesting that aerobic microbial respiration and degradation of DRO has occurred, depleting DO concentrations. **ADEC-ACCEPTED**
34.		6.21	The entirety of sections 4.8 and 5.0 of the UVOST Investigation should be inserted in this section. This section also needs to state that the sampling procedures and results for the UVOST investigation at the MOC are discussed in more detail in the UVOST investigation report.	This section will incorporate the correlation results and reasons why 1% RE per 1,000 ppm was used as the conservative standard for this investigation. A section has been added to describe the results of the UVOST investigation and how Bristol evaluated the data to estimate the amount of contaminated soil associated with the different plumes that are above the cleanup level based on the UVOST investigation **ADEC-ACCEPTED**

35.	72	6.22	Incorrectly references table 20 as the concrete sample results – change to table 22.	Corrected **ADEC-ACCEPTED**
36.	72	6.22	The hazardous waste manifests (including all associated signature pages) for all manifested materials (arsenic contaminated soil and sludge from manhole) need to be attached as an appendix in the report.	They are provided as electronic files in the Supplemental Data that was provided to the USACE which will be provided to the ADEC **ADEC-ACCEPTED**
37.				
38.				
39.	**Draft HTRW Report**	**Appendix E**	**UVOST Investigation Report**	
40.	12-20	Appendix E UVOST Report	The titles of Figures # 4, 5, and 6 should be named so they are clearly associated with the Area NC11 referred to in section 4.6. Likewise, the titles of Figures # 7, 8, and 9 should be named so they are clearly associated with the Area NC27.	The figures and text have been improved. **ADEC-ACCEPTED**
41.	25	Appendix E UVOST Report	Section 5.1: replace the word 'diesel' with '…100 ppm of [DRO]. Section 5.2: Statement in last paragraph of this page 'Figure 3 represents the area with contamination greater than 9,200 ppm.' is presumptive and inappropriately worded for the same reasons in comment 14 above. Rephrase to state i.e. '….contamination suspected to be greater than 9,200 as indicated by the UVOST investigation results.'	Text has been corrected as suggested **ADEC-ACCEPTED**
42.	Appendix E UVOST Report	Appendix A – 9.2% RE Per-Foot MSL Figures	When using the acronym MSL in the narrative and on figures, the word 'above' needs to be inserted – since the elevations are based upon feet above mean sea level.	The word 'above' has been inserted into text **ADEC-ACCEPTED**
43.		Soil Boring Logs	A new figure should be included that depicts all soil boring locations. In the 'Borehole Diameter' section of all soil boring logs, only the word 'inches' is stated. Please clarify and insert the actual diameter.	A figure showing all the MOC UVOST Probe and Correlation Sample Locations will be provided in the main report. The Borehole Diameter on the

				Boring logs will be added to the logs. **ADEC-ACCEPTED**
44.	Appendix E UVOST Report	General	For reference purposes it would be helpful if all pages were numbered sequentially or by section throughout the UVOST report (i.e. Appendices A and B, as well as the boring log figures do not have page or Appendix reference numbers). It would also be helpful to create a new Appendix C which would be titled Soil Boring Logs.	Within Attachment B a Soil Boring Log file will be provided. Bristol will attempt to re-paginate the UVOST Investigation Report. **ADEC-ACCEPTED**
45.		**Draft HTRW Report**	**Appendices, Attachments, and Other General Comments**	
46.	General	Tarring material	ADEC was informed during its August 10, 2010 site visit that a significant amount of what appeared to be tarring material was discovered on the ground which was previously unknown to exist. The report should include general information regarding this discovery, and whether any action was taken to characterize, dispose, etc.	Section 5.24 in the HTRW Report discusses general information pertaining to the tar area and states that it may warrant further investigation. It will be removed in 2011. **ADEC-ACCEPTED**
47.	Figure 20	Appendix A	The colors dark green and dark blue are poor choices for this figure and are difficult to see with the heavy black/gray background; recommend changing to brighter colors (i.e. yellow, pink, orange). The figure states that all green sampling points were for natural attenuation. Were sediment samples also taken from these same locations? This needs to be clearly explained in the narrative and depictions corrected in Figure 20. The #19 located in the UDU covers up one of the sampling locations and should be adjusted to correct this. Also see comment 24 above re: Figure 20.	Colors will be changed on this figure. The legend will include the soil/sediment samples which were collected from the same locations as were the MNA water samples. The #19 sample location will be moved to not overlap with the sample location. **ADEC-ACCEPTED**
48.	General	Figures	It would be helpful to include a copy of figure # 2 on page 10 of the UVOST report in the general Figures section of the draft HTRW report immediately following Figure 17 (titled MOC UVOST Probe Locations); Please also replace the	The UVOST figure will be added to the HTRW Final Report. Bristol does not agree

			Signal_(%RE) legend currently depicted on this figure with a color-coded legend that reflects estimated mg/Kg levels of DRO contamination based on the proposed 1%=1000 mg/Kg DRO. Figures 18, 19, and 20 will need to be renumbered to 19, 20, and 21 respectively.	to change the legend to reflect DRO mg/kg levels. Figure 2 is a map that reflects the maximum LIF response from each of the UVOST probe locations (in 2-dimensions). The UVOST is a screening tool that will allow Bristol to target areas that most likely exceed the cleanup level of 9,200 mg/kg during the excavation in 2011 (e.g., those areas above 9.2%RE). The field screening lab will also be used to guide the excavations at the MOC. A note can be added to the figure that states that values greater than 9.2 %RE are assumed to exceed the 9,200 mg/kg cleanup level for DRO. Bristol also will add to the text that a thorough evaluation of the 2010 UVOST information was done by Bristol for the 2011 excavation plan at the MOC. The evaluation was based on evaluating individual profiles, topography changes between profiles, depth to groundwater, test pit information, and a

				realistic approach to excavating the peaks above 9.2% LIF shown on the UVOST profiles. **ADEC-ACCEPTED**
49.	Appendix F	Appendix F	All analytical data tables need to include all QA/QC samples (MS/MSD and duplicates) – many of which are missing in several tables.	All field duplicates are presented on the data tables and are noted with a superscript D at the end of the Sample ID. MS/MSDs and field duplicates with RPDs are presented in Appendix G (chemical data quality review). **ADEC-ACCEPTED**
50.	Table 8	Appendix F	Location ID's should be corrected: 08MLDU and 08MDU appear to be a primary and duplicate sample – what is the difference in MLDU and MDU?	IDs were corrected for 08MDU on Table 14 (Site 8 soil composite results). **ADEC-ACCEPTED**
51.	Table 13	Table 13	The cleanup level for lead is stated as 530 mg/Kg, and needs to be changed to 400 mg/Kg.	Corrected **ADEC-ACCEPTED**
52.	Table 15	Appendix F	As noted in comment 10 above, the title of Table 15 is barely legible, but appears to be titled Site 8 Outfall Surface Water Results. Is this supposed to be Site 9 Outfall…? It is currently not referenced at all in the narrative of the document (section 6.20).	The word 'Outfall' will be removed because Table 15 (Site 8) shows the results from 3 surface water samples that were collected at Site 8. **ADEC-ACCEPTED**
53.	ADEC Checklists	Appendix G	ADEC Checklists are not included in Appendix G (as stated in section 6.6 and need to be inserted.	They were provided to the USACE as Supplemental Data electronically. Bristol emailed them to ADEC on 4/28/11 and

				provided them to ADEC on a CD on 5/2/11 **ADEC-ACCEPTED**
54.	Supple-mental Data	Supple-mental Data	The supplemental data (incl. tables, screening data, etc. already mentioned as missing in several other comments) was not included in either the electronic or the hard copy of the version of the report that was provided to ADEC and needs to be included and added to the table of contents.	The supplemental data was provided to the ADEC on a CD on 5/4/11 **ADEC-ACCEPTED**
55.	Site 7 Landfill	Site 7 Landfill	The 2010 work plan included inspection and revegetation work at Site 7 however the current version of the report makes no reference to site 7. A section needs to be added that discusses the activities and work conducted at site 7. An agronomist from the State of Alaska participated in the 8-10-10 site visit at Northeast Cape specifically to observe and evaluate site 7. The agronomist also generated a recommendations statement regarding the vegetation issues associated with site 7. All of this information needs to be included in the report.	A section will be added to state that additional grass seed was placed on Site 7 and reference the letter received from the AK Plant Materials Center. The letter will be provided in Appendix C. **ADEC-ACCEPTED**
56.	Field Notes	Field Notes	Field notes are not included in the report and need to be included as an appendix – electronic copies would be sufficient.	Provided in the Supplemental Data that will be provided to the ADEC on 5/4/11. **ADEC-ACCEPTED**
57.	Quarry Agreement	Quarry Agreement	A copy of the 2010 Quarry Agreement between the landowner and the COE needs to be included in the report.	Will be included in Appendix C **ADEC-ACCEPTED**
			Additional ADEC Comments submitted on May 18, 2011	
58.			**Appendix G: Chemical Data Quality Review and Supplemental Data**	**Note: Appendix G (CDQR) submitted with the draft report was prepared by a third-party data reviewer (Cathy Larson-AECOM).**

				Modifications for the final report will be made by Marty Hannah of Bristol to expedite the final reporting process.
59.	3	1.0	The DRO/RRO results without silica gel are required for all samples. Samples that have only silica gel cleanup results are rejected. Regarding discrepancies, without silica gel must be reported for all samples. VOC list analyzed outside of holding times must be biased low estimates or rejected.	The statement under discrepancies in Section 1.0 of the CDVR is correct. DRO/RRO without silica gel was not indicated on the CoC. The samples were analyzed and reported with and without silica gel. The lab performed correctly, the CoC was incorrect. The statement in section 1.0 of the CDVR will be more clearly re-stated. **ADEC-ACCEPTED**
60.	25	2.1 Site 28	PCB's and mercury require solid samples to be cooled to <6 degrees C. This should be listed as a discrepancy (regardless of what the SAP specifies).	The temperature will be noted in the discrepancies. It will also be noted that the sample was concrete submitted for TCLP analyses for waste disposal purposes of the concrete manhole. **ADEC-ACCEPTED**
61.	25 and 27	2.1 Site 32 and 2.3	Specify what analysis was run for the broken sample.	Section 2.1-Site 32 will have an addition statement added indicating the broken

				sample was submitted for DRO/RRO analysis. **ADEC-ACCEPTED**
62.	31	2.6	PCB surrogate and MS/MSD high results need to be explained further – were the exceedances due to high PCB concentrations in the sample (e.g. coelution)?	Bristol will add clarification to section 2.6: For SDG 21107, 13 of 14 samples analyzed in this batch had surrogate (decachlrorobiphenyl) recoveries greater than 100%. Two of the 14 samples had surrogate recoveries exceed the upper control limit for decachlorobiphenyl. TCMX (secondary surrogate) was within limits for all samples in this SDG. 10NC16SB14 was non-detect for PCBs, 10NC16SB01had Aroclor 1260 reported between the DL and LOQ. Samples 10NC28BW01 and –BW02 were duplicate sludge samples submitted for TCLP analysis including PCB analysis. The recovery of TCMX (surrogate) greatly exceeded % recovery limits. The case narrative noted matrix

				interference is present. The % recovery for decachlorobiphenyl (surrogate) was within acceptance limits. Both samples had high concentrations of Aroclor 1254 (20 and 23 mg/kg). **ADEC-ACCEPTED** Composite 8-Site 13 MS/MSD statement will be clarified to indicate that parent sample concentrations of Aroclor 1260 (0.59 mg/kg) were more than 5 times greater than the spike amount (0.10 and 0.104 mg/kg) in the MS/MSD, the parent sample result for Aroclor 1260 is J flagged. The recoveries of Aroclor 1016 in the same MS/MSD sample also exceeded % recovery criteria. The sample was non-detect for Aroclor 1016 and no qualification is necessary. **ADEC-ACCEPTED**
63.	32	2.7	Why was TCLP PCB on concrete analyzed; was total PCB's analyzed on concrete?	The concrete sample was submitted for TCLP-PCB-

				Metals analysis for disposal purposes. The sludge removed from concrete manhole contained PCBs (Aroclor 1254) and metals (Ag, As, Cd, Hg, and Pb) above soil cleanup levels so the concrete was later submitted and analyzed based on the sludge results. **ADEC-ACCEPTED**
64.	37	2.9	Holding time is 14 days from collection and 40 days from extraction. Correct and verify the samples met/did not meet the appropriate holding time.	The statement in Section 2.7 and data table will be corrected to indicate that all 4 samples exceeded analytical holding time on the silica gel results by one day. Results will be HL flagged on the data table to indicate holding time exceedence with potential low bias. **ADEC-ACCEPTED**
65.	40	2.10	Were TOC samples collected, analyzed and reported per Tech Memo http://dec.alaska.gov/spar/csp/guidance/TOC-tech-memo-sept-2008.pdf?	Samples were collected and analyzed based on ADEC Tech Memo 06-001 for evaluation of biogenic interference. The site is a wetland area and biogenic presence is indicted by plated sheen on water in

				upgradient areas and the source area. Alternate cleanup levels had been established for DRO/RRO in the 2009 record of decision. **ADEC-ACCEPTED**
66.	55	2.15.1	Duplicate results are acceptable as long as the high value/result was used and they were reported per the ADEC tech memo 06-001. If performing the silica gel cleanup procedure per the department's tech memo, provide chromatograms for all samples (only one was provided electronically per ADEC's request on May 5, 2011). Additionally if not clearly identified in the report, document the sample name and final concentration on the chromatogram for cross referencing. Provide a table a table with primary, field duplicate and RPD results to facilitate review and document that the higher of the two results is used for reporting per the department's tech memo.	The chromatograms submitted on May 5th were for the only silica gel treated sample from the field lab. Chromatograms for all other silica gel treated samples are provided in the supplemental data (chemistry data). The sample ID and lab ID are provided in the sample summaries. The chromatograms have the sample ID. Both the primary and field duplicate results along with TOC and silica gel results are provided on the report tables. Table 2-15.1 of the CDQR provides the FD RPDs and qualifiers, if applicable. **ADEC-ACCEPTED**
67.	Correlation Study	Correlation Study	The submitted correlation study tech memo (received electronically by ADEC per request in comment 21 above on May 5, 2011), is unacceptable. This was	The correlation study and tech memo were referenced

			not included nor approved in the July 2010 Northeast Cape HTRW RA SAP. Because confirmation samples were taken however, this is somewhat of a moot point. For future reference however, at a minimum, an acceptable correlation study should be performed on site specific soil with a sufficient number of samples in the low, medium, and high concentration range to plot the regression curve and calculate an acceptable correlation coefficient (r^2).	in Section 3.1 of the 2010SAP. The Tech Memo, field lab SOPs and correlation results were included as Appendix C in the SAP. The lab is not certified and its purpose is to serve as a field screening tool. Field screening results were accepted by the TSDF for waste disposal purposes. No site specific soil was available prior to commencement of 2010 field operations. **ADEC-ACCEPTED, however for future information purposes, ADEC notes that the tech memo was not listed in the TOC's of the SAP, and should be more clearly referenced (i.e. see tech memo### on page##). ADEC generally only accepts correlation studies which are conducted using site specific matrices.**
68.	General	Supplemental Data	All supplemental data, ADEC checklists, field notes, manifests and disposal documents, field lab results, and laboratory data review reports need to be included electronically in the final report and referenced where necessary i.e. in the table of contents, appendices, tables, etc.	Supplemental data will be provided electronically with the final report along with their appendices and correct

				reference to Tables containing the field screening data supplied with the supplemental data. **ADEC-ACCEPTED**
69.			**End of ADEC Comments**	

REVIEW COMMENTS

PROJECT: NE Cape Remedial Actions (W911KB-10-C-0002)
DOCUMENT: Draft Remedial Action Report, February 2011 Location: St. Lawrence Island, Alaska

U.S. ARMY CORPS OF ENGINEERS	DATE: 8 March 2011 REVIEWER: N. Folcik PHONE: 753-5657	Action taken on comment by:

Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	USAED/ADEC RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
		Appendix E UVOST Investigation Review			
1.	Table of Contents	Rename Appendix A and B to Attachment A and B. This will eliminate having an appendix under an appendix.		Text has been modified accordingly.	A
2.	Executive Summary	The main Remedial Action report indicates 197 probes were installed. Appendix E indicates 198 probes were installed. Please correct this discrepancy throughout the document.		198 probes were advanced but one of the probes hit refusal at ~1'bgs and provided no information. This information will be included in the UVOST and the HTRW Final Report to be consistent.	A
3.	Section 3.1	Were 24 or 23 correlation samples collected?		23 correlation samples were taken.	A
4.	Figure 1 through Figure 9	UVOST probe IDs are not legible (even at 400% magnification). Please include a scale. Please include a border. Please include underlying features similar to Figure 17 in the Remedial Action report. For figures with plumes the plumes should be semitransparent to allow for identification of underlying site features. Please identify the locations where the investigation was limited due to terrain (discussed in executive summary). Please include a title block. Figure 1 – The % RE scale is not required because only the		The Figures have been modified by Bristol as suggested.	A

REVIEW COMMENTS

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		probe locations are presented in this figure.			
5.	Section 4.8	Were 24 or 23 correlation samples collected?		23 correlation samples were taken.	A
6.	Section 4.8	Is the statement about a poor correlation for LIF responses greater than 25% warranted? Generally this is true…however, the correlation for this site was even worse at low fluorescence.		The text has been modified accordingly.	A
7.	Section 4.8	I am very concerned with the results of the correlation study. This is by far the worst correlation I have ever seen on any UVOST job. Is there any possible explanation for sample NC11 SB-10 6-8? 2.3% = 26,000 DRO is hardly believable. I think the current 1% = 1000 ppm DRO is the best we can do. I would like to see some type of reason why this correlation study is so poor.		The text has been modified by P. Caron for the Final Report.	A
8.	Section 4.8 Table	Include title and table number. Please include a column that indicates the fluorescence level being targeted (nd, low, med, high) between the sample ID and LIF probe ID columns. The SOW and work plan required that samples be collected from ND, low, med, and high flourescencse. Please change the LIF Response column to Exsitu LIF Response. Please include a column indicating the average of the insitu flourescense for the sample interval between the LIF probe ID and Exsitu LIF Response.		The text and table have been modified by P. Caron for the Final Report	A

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9.	Section 4.8	Please include the correlation log .jpgs in Appendix B. Of particular interest is log NC11 SB-10 6-8.		Correlation logs are provided in Attachment B.	A
10.	Section 4.9	Could you please clarify what is meant by: "9.2% RE plume model was cut at .25-foot MSL slices and overlaid to produce figures showing the per foot contamination in this target area." Does this mean the every per foot figure includes 4 slices of max fluorescence and the highest of the each fluorescence is presented for the 1 foot interval? A much better way to present the data in the future would be to average each LIF data point over the subject interval.		Text has been modified by P. Caron for the Final Report.	A
11.	Section 5.2	The executive summary indicates that the contaminated plume was not fully delineated to the north and contradicts "the contaminated area was fully delineated on all sides".		The statement has been clarified in the executive summary.	A
12.	Section 5.2	Please estimate the quantity of soil in accordance with the SOW. Since we are using the conservative 1% = 1000 ppm DRO please base the quantity estimates on the average LIF response over the contaminated interval and not the max. The correlation samples are essentially averages of the sample interval.		Text modified following discussion at the meeting on 3/10/11 with the USACE.	A
13.	Appendix B	The upper background call outs for 10NC27 UV-61, 62, 63, 72, and 77 should be revised. The upper background fluorescence in each of these logs is in excess of 3%. It is possible that the fluorescence is masking contaminated soil and the subject interval is actually contaminated and not background. This is confirmed by sample 10NC27 UV-061.		Call outs modified by P. Caron and will be included in the Final Report.	A
14.	General	Please provide scanned copies of the field notes (UVOST and sampling) as an appendix.		Paul Caron has provided the field notes and they will be provided in the Final Report	A

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15.	General	Please provide the survey data for UVOST probes and correlations samples as an appendix.		The UVOST survey data will be placed into a folder under Appendix E	A
16.	General	Please submit legible figures, the correlation study .jpgs, and UVOST/sampling field notes as part of the response to comments. A complete review could not be completed due to these items missing.		Correlation Study.jpgs provided in Attachment B; Figures have been revised and field notes included. The Figures in Attachment 3 – 9.2% RE Section Figures remain difficult to read due to software package used to create figures	A
17.					
18.					
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29.					
30.					
31.					
32.					
33.					
		----- End of Comments ----			

REVIEW COMMENTS | **PROJECT: NE Cape Remedial Actions (W911KB-10-C-0002)**
DOCUMENT: Draft Remedial Action Report, February 2011 | **Location: St. Lawrence Island, Alaska**

U.S. ARMY CORPS OF ENGINEERS	**DATE: 7 March 2011** **REVIEWER: Aaron Shewman** **PHONE: 907.753.5558**	**Action taken on comment by:**

Item No.	**Drawing Sheet No., Spec. Para.**	**COMMENTS**	**REVIEW CONFERENCE** **A - comment accepted** **W - comment withdrawn** **(if neither, explain)**	**CONTRACTOR RESPONSE**	**USAED/ADEC RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)**
1.	General Comment	It would be very helpful and add clarity if former sample locations and results for all samples greater than cleanup levels were added to all figures.		Available former sample locations and results for all samples greater than cleanup levels will be added to all figures.	A
2.	General Comment	Are the monitoring wells shown on several of the maps truly present or are they carryover from the base map? Please add clarification to the legend on each figure where applicable.		A note has been added to the figures stating that wells were digitized from the base map. The only known wells are the wells that were sampled in 2010.	A
3.	General Comment	Tables in Appendix F need a larger blank header space to avoid titles being punched for binding resulting in illegibility.		Header space has been increased.	A
4.	Pg ES-4, Third Bullet	What confirmation samples were collected from Site 8? Site 9? The existing statement implies there was excavation performed at Site 8, which is not the case. Please clarify for both Site 8 and Site 9.		No – the text will be modified to eliminate Sites 8 and 9 from this bullet	A
5.	Page 24 Last paragraph First sentence	Please change "approved" to "accepted".		Cannot locate this on Page 24	A
6.	Page 28 Section 5.4.4	Second paragraph, fourth sentence, add "minimum" before "24-inches" if this is a true statement. The typical landfill cap cross-section required by the SOW appears to be missing from Appendix D, please add it.		Minimum has been added Cross-sections will be included in the Final Report	A
7.	Page 36 First	Please add a description of which direction the CMP was sloped.		Paragraph has been changed to note direction of the pipe slope.	A

U.S. ARMY CORPS OF ENGINEERS	**DATE: 7 March 2011** **REVIEWER: Aaron Shewman** **PHONE: 907.753.5558**	**Action taken on comment by:**

Item No.	**Drawing Sheet No., Spec. Para.**	**COMMENTS**	**REVIEW CONFERENCE** **A - comment accepted** **W - comment withdrawn** **(if neither, explain)**	**CONTRACTOR RESPONSE**	**USAED/ADEC RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)**
	paragraph				
8.	Page 39 First complete sentence	I cannot locate the test pit logs in Appendix E. Are they included with the boring logs as stated in the report?		Test pit logs were included with the UVOST LIF Probe Logs\soil boring logs. A separate .pdf of just the test pit boring logs is now provided in this renamed folder UVOST Probe and Test Pit Logs	A
9.	Page 39 Section 5.16.1 First paragraph Last sentence	Clarify the meaning of this sentence. Were borings co-located with test pits?		Statement has been modified to indicate test pit locations.	A
10.	Page 41	It appears the first four words on the page should be deleted.		Paragraph is correct in Version 2	A
11.	Page 44 Section 5.23 Second paragraph	The disposal weight (3 kilograms) of the mercury thermostat reported in Table 5-3 seems excessive. Please clarify whether or not the packaging ("small, one-gallon, UN-rated plastic bucket") was also disposed and counted in the disposal weight of the thermostat.		Table has been annotated to reflect that the gross weight includes the thermostat, mercury, bucket and absorbent material	A
12.	Page 44 Last sentence on	It appears the statement, "For transportation purposes, the overpack containers." should be deleted.		This paragraph has been corrected to eliminate the redundancy of sentences.	A

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Item No.	**Drawing Sheet No., Spec. Para.**	**COMMENTS**	**REVIEW CONFERENCE** **A - comment accepted** **W - comment withdrawn** **(if neither, explain)**	**CONTRACTOR RESPONSE**	**USAED/ADEC RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)**
	page				
13.	Page 50 Section 6.1.2	The UVOST report included in Appendix E does not include the total estimated volume of DRO contaminated soil above the site cleanup level of 9,200 mg/Kg, including the related calculations. It also does not include the estimated volume of DRO contaminated soil (with concentrations above the site cleanup level of 9,200 mg/Kg) from ground surface to 15 feet below ground surface, including related calculations. Please add these to either the UVOST report in Appendix E, or Section 6.1.2 of the RA Report.		A summary of the information provided at the meeting on 3/10/11 has been added to Section 6.1.2	A
14.	Page 61 Last paragraph First sentence	To clarify the statement, “Two samples…”, please insert “sediment” between “Two” and “samples”.		Text has been modified as suggested	A
15.	Page 66 First paragraph Last sentence	Rewrite this statement as follows: “Evidently, during a previous removal action a plastic liner had been placed at the depth from which the historic samples were collected, and then backfill was placed on the liner. This liner was used as a guide to begin the initial excavation.”		Text has been modified as suggested	A
16.	Page 68 Section 6.18	Clarify the sediment sampling procedure in this section.		The text for the sediment sampling procedure has been expanded	A
17.	Page 70,	Check table references in Sections 6.19, 6.20, 6.21, and 6.22. All appear to be incorrect.		Tables will be checked when all table additions and text changes are complete for the Final	A

U.S. ARMY CORPS OF ENGINEERS	**DATE: 7 March 2011** **REVIEWER: Aaron Shewman** **PHONE: 907.753.5558**	**Action taken on comment by:**

Item No.	**Drawing Sheet No., Spec. Para.**	**COMMENTS**	**REVIEW CONFERENCE** **A - comment accepted** **W - comment withdrawn** **(if neither, explain)**	**CONTRACTOR RESPONSE**	**USAED/ADEC RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)**
	71, 72			Report.	
18.	Page 70 Section 6.20	Please also report the turbidity results as required by the SOW.		Turbidity results have been added to Site 9 tables	A
19.		----- End of Comments ----			

REVIEW COMMENTS

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U.S. ARMY CORPS OF ENGINEERS	DATE: REVIEWER: Carey Cossaboom PHONE: 753-2689	Action taken on comment by:

Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	USAED/ADEC RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
1.	General	Some of my comments are of a grammatical nature and are supplied separately in a WORD document with Tracked Changes.		The track changes have been accepted and included in the revised document	A
2.	General	I believe the report could be consolidated such that the reader doesn't need to read the same paragraphs regarding how confirmation samples were collected or how QA/QC samples were collected at each site.		Text has been modified to consolidate sample collection procedures	A
3.	General	It is disconcerting to read what was done at a site and then have to go to a different section to see the results. Thus I would suggest a rearrangement such as: Sec. 1.0-5.3 as is Sec. 6.0 – 6.8 Sec. 5.5-5.24 & 6.9 – 6.19 combined per site Sec. 5.4 – 5.4.5 & 6.20 – 6.23 combined		Text has been revised to combine the Site Description and Results	A
4.	Pg. ES-2, 3rd bullet	Is Site 8 more accurately assessed as soil instead of sediment? If you have to remove a vegetative mat to get to mineral soil, perhaps this is soil and not sediment. Different cleanup levels!		Text and tables have been modified to state that samples collected were soil and include the soil cleanup level.	A
5.	Pg. ES-3, 8th bullet	Can you separate the debris at Site 9 from the rest of the NE Cape area?		The text modified to include a bullet describing the debris that was picked up at Site 9 e.g., 300 lbs of broken batteries and 14 tires	A
6.	Pg. ES-4, 6th bullet	How many yards is this? You mention 10 excavations, but only 6 sites; please add clarification such as 13 (3), 21 (2), 32 (2). Should add a bullet for Site 9.		The text modified to clarify the number of excavations at Sites 13, 21 and 32 and includes that 153 truckloads equates to 3,346 cubic yards of material	A
7.	Pg. 7, 1st line	"The primary stream drainage …" The Suqui River? Or Site 28?		The Suqitughneq River is being described here. Text has been added to clarify.	A

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8.	Pg. 13, CLIN 0001AE	Can you drop the .008 tons?		The .008 tons has been deleted	A
9.	Pg. 14, 1st bullet	Define the publication (QSM)		QSM 4.1 April 2009 has been identified as the updated required publication	A
10	Pg. 24, Sec. 5.1.6, 2nd par., 1st line	"A culvert was temporarily installed …." Was it later removed?		No the culvert was not removed. The word 'temporarily' has been removed from the sentence	A
11	Pg. 24, Sec. 5.1.6, 2nd par., 3rd sen.	"…, a temporary road was constructed …" Was it later removed?		No the road was not removed. The word 'temporary' has been removed from the sentence	A
12	Pg. 29, Sec. 5.4.5, last sen.	"… when practical." ?? Is there some debris remaining visible because it wasn't practical to bury it? Minor suggestion.		This statement was to imply that debris litter the tundra at NE Cape in areas that are not close to the Site 9 landfill. Therefore it was impractical to travel great distances to retrieve debris and bring it back to be buried under the landfill cap. "when practical" has been deleted. The sentence was modified to say that "Nonhazardous surface debris that resided close to, but outside of, the landfill boundary was hand-picked or dug up with an excavator and placed within the landfill cap area and was buried under the 2-foot cap.	A
13	Pg. 30, Sec. 5.6,	Where are/were the historical hot spots? They should be put on the map (Figure 8).		Historical sample locations have been added to the figures.	A

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	1st sen.				
14	Pg. 35, 3rd line	Can you put these sample locations on Figure 13?		Historical sample locations have been added to the figures.	A
15	Sec. 5.14	I would combine all of the Site 21 details in one section.		All the text referring to Site 21 is now included in Section 5.12	A
16	Pg. 37, Sec. 5.15, 2nd par., 2nd sen.	How long was the eastern culvert? How wide?		The following text was added describing the eastern culvert – The eastern culvert, consisting of 12-inch corrugated metal piping measured approximately 32 feet in length…...	A
17	Pg. 37, Sec. 5.15, 3rd par., 5th sen.	Was the 63-ft. section of pipe removed?		This section of pipe was removed and placed inside a Conex container for disposal. The text has been modified to clarify.	A
18	Pg. 39, Sec. 5.16.2	How was the hydraulic gradient calculated?		The text has been modified to state the following: the hydraulic gradient at the site, as measured from the south-central portion of the study area (MW 88-1) to the Site 28 drainage (MW 88-5) is 0.02. The hydraulic gradient was calculated using groundwater elevation data collected on August 3, 2010.	A
19	Pg. 44, Sec. 5.23, 2nd par.	Was the mercury visible? How much?		Text has been modified to describe the appearance and size of the mercury contained within the glass bulb. Now the text states: The glass bulb was intact and the mercury was contained within the glass. The amount of mercury was visible through the glass bulb and was approximately a one centimeter circumference sphere. A footnote on the Waste Disposal Summary Table has been added to state that the	A

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				mercury thermostat disposal weight includes the weight of the thermostat, mercury, container and absorbent.	
20	Pg. 57, Sec. 6.9, 5th line	"…. down to the historic levels, ….." Which were what?		Text has been changed to reflect the historic sample depths of between 0.5 and 0.7 feet below ground surface	A
21	Pg. 58, last par., 2nd sen.	This sentence needs to be reworded; it's not clear what it's saying.		Paragraph has been clarified to state: Initial soil field screening samples were tested using a PID. Four of the 11 PID field screening samples had elevated readings greater than 20 ppm, with two greater than 60 ppm, which indicated a presence of fuel. Soil field lab samples were collected and submitted to the field screening laboratory to determine DRO concentrations in the soil. The field screening laboratory sample results were below cleanup levels.	A
22	Pg. 58-59, 2nd par., 3rd sen.	What's the difference between field laboratory samples and field-screening samples submitted to the mobile lab? No. Field lab samples = analyzed at field lab? Field-screening samples = analyzed ay mobile lab? What's the difference??!		See contractor response to Item No. 21	D
23	Pg. 59, first par., 1st sen.	"The site had ….." Does this mean the pits already existed, or that you put them in?		Text has been modified to state that Bristol excavated the pits at Site 3.	A
24	Pg. 59, middle	There are two 10NC03SB02 samples on Figure 8.		The date was added to the first set collected on 7/31 to Figure 8 to differentiate the samples. Duplication of the Sample IDs	?

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	par.,	The accidental duplication discussion will be added?		was accidental and will be discussed in the text.	
25	Pg. 59, middle par.,	This dirt sounds like soil, not sediment. If there is no connecting stream – they are soil samples. ??		Text changed to reflect soil matrix.	A
26	Pg. 59, last par.,	Can you put these sample locations on Figure 8?		Sample locations have been added to Figure 8	A
27	Pg. 62, 4th sen.	"Concentrations of DRO and RRO for both samples were at or above site cleanup levels." There are no site cleanup levels for surface water. Our requirement is no sheen or TAH and TAqH.		Statement has been changed to show that the water was sheen free and that analytical results fell below the TAH and TAqH exceedances	A
28	Pg. 63, last par., last sen.	Continuing onto page 64. **This is an invalid statement**. Worst case scenario, if all samples except one are at zero, the one exceeding 1/n cleanup level would exceed the cleanup level.		A new figure and additional text has been included to further explain the composite sample results and the field-screening results which suggests that nearly all of the 3 excavations at Site 13 still have soil contaminated with PCBs above the 1 ppm cleanup level.	?
29	Figure 11	Composite samples should be grouped according to similar screening values or distinct geographic areas. Turning corners around a foundation was probably not a good choice for composite Group 01/20 or Group 02.		Comment acknowledged	A
30	Pg. 67, 5th par., 1st sen.	TestAmerica did the compositing?		Discrete samples were shipped to TestAmerica and the lab did the compositing.	A
31	Pg. 67, 5th par.	There is erroneous reasoning in this paragraph. Many of the composite groups on Table 12 are well below 1 ppm PCB. It		The text has been changed and figures modified to include this information.	?

U.S. ARMY CORPS OF ENGINEERS	DATE: REVIEWER: Carey Cossaboom PHONE: 753-2689	Action taken on comment by:

Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	USAED/ADEC RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
		would appear there is a high likelihood that most of these samples are below cleanup levels. According to the Sampling and Analysis Plan, Rev 1, July 2010, page 33, PCB composite samples that exceeded the 1/n cleanup level were to have the discrete samples individually tested. The Supplemental Data submitted has Field Lab Results Tables with Table 9 – Site 31 PCB Discrete Screening Results. Can these sample locations be mapped? Most of these samples are below cleanup levels.			
32	Pg. 67, end	A discussion is warranted here regarding potential remaining contamination.		The text will be modified to include the results from the field screening laboratory and the figure modified to include this information	A
33	Pg. 68, Sec. 6.17, 2nd par.	The PCB aroclor that exceeds 1 ppm here is 1254, not 1260 like at Sites 13 and 31. Why do you think that is?		The PCB congener that exceeded cleanup levels was Aroclor 1254 (20-23 mg/kg), not Aroclor 1260 that is prevalent at Sites 13 and 31. The source of Aroclor 1254 is not known	A
34	Pg. 69, Sec. 6.19	It makes more sense to me to have this section precede section 6.18.		The order of theses sections has been changed. Now Section 5.16	A
35	Pg. 70, Sec. 6.19	Please comment - Are the values of the NA parameters sufficient to expect Natural Attenuation could work?		With the exception of DO and ORP, none of the natural attenuation parameters taken at Site 8 varied significantly between the three decision units. Field results for manganese, ferrous iron, sulfate and nitrate were near or less than the method detection limits so their results are not definitive for assessing the MNA parameters. The DO and ORP levels indicate that conditions are amenable for oxidative degradation of hydrocarbons as	A

U.S. ARMY CORPS OF ENGINEERS	**DATE:** **REVIEWER: Carey Cossaboom** **PHONE: 753-2689**	**Action taken on comment by:**

Item No.	**Drawing Sheet No., Spec. Para.**	**COMMENTS**	**REVIEW CONFERENCE** **A - comment accepted** **W - comment withdrawn** **(if neither, explain)**	**CONTRACTOR RESPONSE**	**USAED/ADEC RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)**
				well as naturally occurring materials (NOM) that are present at the site. TOC results in all decisions units support the presence of NOM at concentrations far exceeding DRO concentrations. No petrogenic sheen or stressed vegetation was noted in any locations throughout Site 8. Plated biogenic sheen, which broke up when disturbed, was observed in all decision units.	
36	Pg. 71, Sec. 6.21, 2nd par.	How do the results in the 3 contaminated wells compare with historical results?		A table of selected historical results has been inserted into the text and is accompanied by a narrative summary of the data.	A
37	Pg. 72, Sec. 6.21, top par., 2nd sen.	" Ferrous iron, methane, … of microbial respiration." Suggesting what?		The three wells containing exceedences of DRO had the lowest DO concentrations. The two wells with the highest concentrations of DRO, monitoring wells 88-4 and 88-5, contained the highest concentrations of ferrous iron (21.4 mg/L and 45.5 mg/L), alkalinity (120 mg/L and 80 mg/L), and methane (2,100 µg/L and 99 µg/L). Ferrous iron, methane, and alkalinity are metabolic byproducts of anaerobic microbial respiration. The wells with the lowest contaminant concentrations had comparatively high DO, suggesting that microbes are depleting oxygen to aerobically degrade DRO. The high concentrations of methane, ferrous iron and alkalinity in monitoring wells 88-4 and 88-5 indicate anaerobic	A

U.S. ARMY CORPS OF ENGINEERS	DATE: REVIEWER: Carey Cossaboom PHONE: 753-2689	Action taken on comment by:

Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	USAED/ADEC RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
				degradation of DRO by methanogenic microbes. The high ferrous iron, alkalinity and methane suggest that degradation of DRO is occurring through anaerobic degradation, which is much slower than aerobic degradation.	
38	Pg. 72, Sec. 6.22, 1st par.	Should mention the other contaminants that exceed cleanup levels.		Text is modified to state: Two samples were collected from the sludge that was contained in the manhole that was removed from Site 28. The samples were submitted to TestAmerica for DRO, PCBs, and metals analyses. Sludge samples were collected to appropriately characterize the waste for proper disposal. Arsenic, cadmium, lead, silver, mercury, PCBs, and DRO were present above cleanup levels in sample 10NC28BW01. Concentrations of arsenic, cadmium, lead, mercury, PCBs, and DRO were present above cleanup levels in sample 10NC28BW02. Concentrations of lead and mercury were present at levels determined to be hazardous. The results from the sludge samples at Site 28 are presented in Table 13 (Appendix F). The PCB congener that exceeded cleanup levels was Aroclor 1254 (20-23 mg/kg), not Aroclor 1260 that is prevalent at Sites 13 and 31. The source of Aroclor 1254 is not known.	A

REVIEW COMMENTS

PROJECT: NE Cape Remedial Actions (W911KB-10-C-0002)
DOCUMENT: Draft Remedial Action Report, February 2011   Location: St. Lawrence Island, Alaska

U.S. ARMY CORPS OF ENGINEERS	DATE: REVIEWER: Carey Cossaboom PHONE: 753-2689	Action taken on comment by:

Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	USAED/ADEC RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
39	Pg. 73, last sen.	Please identify location of Tables 11 and 12 more precisely; I couldn't find them.		Text will be modified to state that these tables can be found in the Supplemental Data under Field Lab Results folder. And tables in the Supplemental Data are now better identified. Tables were designed with an S in front of the Table number.	A
40	Figure 8	Identify source of Monitoring Wells So the well source is Montgomery Watson (2001)?		Monitoring well locations were digitized from a shapefile that was received from USACE with the filename "2001_MWs_and_WPs.shp". "Heads up" digitizing was performed to get the points into real space due to the fact that the original file was in a local projection. Source is Montgomery Watson 2001.	?
41	Figure 8	There are two locations for 10NC03SB01/02		There is a soil/silica gel sample (10NC03SB01 with duplicate 10NC03SB02 notated as "10NC03SB01/02) that was collected in the drainage on 7/31/2010 that differs from the confirmation sample "10NC03SB01" that was collected on 8/17/2010 (noted on the figure as "10NC03SB01". The Figure legend has been modified to include Date Collected to differentiate the samples.	A
42	Figure 8	There are two locations for 10NC03SB03		Similar to the previous comment, there is a soil/silica gel sample collected in the drainage area on 7/31/2010 that differs from the confirmation soil sample collected on 8/17/2010. The samples have the same IDs, but were collected on different dates. Figure legend modified to include Date Collected to differentiate the samples.	A
43	Figure 9	Identify source of Monitoring Wells Montgomery Watson (2001)?		Source was identified as Montgomery Watson 2001 and added to the notes on the figure.	?

REVIEW COMMENTS | **PROJECT: NE Cape Remedial Actions (W911KB-10-C-0002)**
DOCUMENT: Draft Remedial Action Report, February 2011 **Location: St. Lawrence Island, Alaska**

U.S. ARMY CORPS OF ENGINEERS	DATE: REVIEWER: Carey Cossaboom PHONE: 753-2689	Action taken on comment by:

Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	USAED/ADEC RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
44	Figure 9	There are two locations for 10NC06SB01/02		One of these was mislabeled. The label was changed. The actual ID is 10NC06SB07.	A
45	Figure 9	Where are samples ending with 7, 53, 54, 55?		Sample 7 was added to the figure. 53 and 54 are the sediment samples and were added to the figure also. Sample 55-confirmation sample will be added to the figure.	A
46	Figure 9	Where are the water samples?		Sample 10N06WA01/02 was added to the figure and corresponds to the location of samples 10NC06SD53/54	A
47	Figure 10	Please show where the previous samples that were above cleanup levels are.		Historical sample locations were added to all of the figures.	A
48	Figure 14	Please cross-hatch (or somehow distinguish) the concrete foundation(s).		The concrete foundation was shaded gray.	A
49	Figure 14	The sentence directly above "Figure 14" is wrong. Please delete.		This sentence will be deleted.	A
50	Figure 15	Where is sample 42/43?		These sample locations were added to the figure in the southwestern quadrant of the excavation.	A
51	Appendix B	Why put comments to the Work Plans in the Remedial Actions Report? Should include these comments!		This Appendix will contain the Draft Final Report Comments	A
52	Appendix E	Can't read the numbers in any of the figures.		Figures will be improved for the Final Report. (Bristol could not improve the figures in Attachment 3 of the UVOST Report due to the software that generated the figures)	A
53	Appendix F, Table 2	Why are these the same sample numbers as on Table 3?		Sample IDs were incorrectly re-used. Samples were collected on 7-31 and 8-17. The collection dates are used to distinguish the sample locations. Text has been added to section to address the issue and on Figure 8.	A

REVIEW COMMENTS

PROJECT: NE Cape Remedial Actions (W911KB-10-C-0002)
DOCUMENT: Draft Remedial Action Report, February 2011 Location: St. Lawrence Island, Alaska

U.S. ARMY CORPS OF ENGINEERS	DATE: REVIEWER: Carey Cossaboom PHONE: 753-2689	Action taken on comment by:

Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	USAED/ADEC RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
* *		NOTE: All comments made on actual workplan document were accepted and incorporated into the final document.			
		----- End of Comments ----			

APPENDIX C

Permits
and Correspondence

Welker, Molly

From: Luetters, Susan
Sent: Tuesday, February 23, 2010 1:52 PM
To: Welker, Molly; Floyd, Christopher B POA
Subject: FW: NE Cape

From: Leinberger, Dianna L (DNR) [mailto:dianna.leinberger@alaska.gov]
Sent: Tuesday, February 23, 2010 1:33 PM
To: Luetters, Susan
Subject: RE: NE Cape

Susan,

The letter you have is still valid. Thanks for checking with us; we appreciate it.

-Dianna

Dianna Leinberger
Department of Natural Resources
Division of Mining, Land & Water
Northern Region Lands Section - Permits & Easements
907-451-3014

From: Luetters, Susan [mailto:sluetters@bristol-companies.com]
Sent: Tuesday, February 23, 2010 1:19 PM
To: Leinberger, Dianna L (DNR)
Subject: FW: NE Cape

From: Luetters, Susan
Sent: Tuesday, February 23, 2010 10:11 AM
To: 'dainna.leinberger@alaska.gov'
Cc: Welker, Molly; Floyd, Christopher B POA
Subject: NE Cape

Hi Dianna,

As per the attached, Bristol Environmental Remediation Services will be going back to Northeast Cape at the request of the USACE to continue the environmental remediation of the Formerly Used Defense Site. Included in this transmission is your 2009 "Letter of Entry for State tidelands within Kitnagak Bay, Saint Lawrence Island" For the purpose of accessing NE Cape for a Formerly Used Defense Site Cleanup and a Native American Lands Environmental Mitigation Program Project.

The conditions that surrounded the issuance of this Letter of Entry will not be changing for the 2010 season; therefore, do we need to re-request this authorization for the 2010 season or will the 2009 letter extend to cover this season since there is no expiration date on the authorization?

Thank you for your attention to this matter and we look forward to your response.

Sincerely,

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF PARKS AND OUTDOOR RECREATION

OFFICE OF HISTORY AND ARCHAEOLOGY

SARAH PALIN, GOVERNOR

550 W. 7TH AVENUE, SUITE 1310
ANCHORAGE, ALASKA 99501-3565
PHONE: (907) 269-8721
FAX: (907) 269-8908

July 2, 2009

File No.: 3130-1R COE/Environmental
3330-6N XSL-060

SUBJECT: Cleanup operations at Northeast Cape, Saint Lawrence Island
FUDS program

Guy R. McConnell
Chief, Environmental Resources Section
U. S. Army Corps of Engineers, Alaska District
P. O. Box 6898
Anchorage, AK 99506-0898

Dear Mr. McConnell:

The Alaska State Historic Preservation Office received your correspondence on May 29, 2009 and has reviewed your proposed cleanup operations under Section 106 of the National Historic Preservation Act. As mentioned in your letter, Alaska Heritage Resources Survey (AHRS) site, Northeast Cape AC & W and WACS (XSL-060) is within the area of potential effect. Demolition of XSL-060 has already been mitigated however, through implementation of a memorandum of agreement between the Corps and SHPO (signed in 1999). We concur with your finding therefore, that no historic properties will be adversely affected by this project.

Please contact Stefanie Ludwig at 269-8720 if you have any questions or if we can be of further assistance.

Sincerely,

Judith E. Bittner

Judith E. Bittner
State Historic Preservation Officer

JEB:sll

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES
Division of Mining, Land and Water

Northern Regional Land Section

SARAH PALIN, GOVERNOR

NORTHERN REGION
3700 AIRPORT WAY
FAIRBANKS, ALASKA 99709-4699
PHONE: (907) 451-3014
FAX: (907) 451-2751
dianna.leinberger@alaska.gov

May 18, 2009

Christopher Floyd
US Army Corps of Engineers, Alaska District
Environmental Resources Section
EN-CW-ER
PO BOX 6898
Elmendorf AFB, AK 99506-06898

RE: **Letter of Entry for state tidelands within Kitnagak Bay, Saint Lawrence Island**

For the purpose of accessing the Northeast Cape for a Formerly Used Defense Site Cleanup and a Native American Lands Environmental Mitigation Program Project

Dear Mr. Floyd,

The Department of Natural Resources, Division of Mining, Land and Water hereby grants the US Army Corps of Engineers (USACE) a "Letter of Entry" authorization to enter upon state tidelands for the express purpose of conducting barge landings for the continued assessment and cleanup of the Northeast Cape. The barge landings will occur at Kitnagak Bay located within Kateel River Meridian, Township 25 South, Range 54 West, sections 10, 11, 12, 14, 15.

The Northern Region Land Office is hereby providing this letter allowing for entry for the purpose of conducting the above described project. The Letter of Entry is subject to the following terms and conditions:

- The Letter of Entry does not convey any interest in state land and as such is revocable immediately, with or without cause. The USACE, its contractors and sub-contractors are authorized use of the barge landing within state tidelands, but are not authorized to preclude or restrict public access on and through the tideland area.

- All operations must be conducted in a manner that will assure minimum conflict with other users of the area. This Letter of Entry is subject to the principles of the public trust doctrine specifically the right of the public to use navigable waterways and the land beneath them for navigation, commerce, fishing, hunting, protection of areas for ecological study, and other purposes, must be protected.

- The Regional Manager or his designee reserves the right to grant other interests to the subject areas consistent with the public trust doctrine. The State of Alaska makes no representations or warranties whatsoever, either expressed or implied, as to the existence, number, or nature of such valid existing rights.

- All activities at the site shall be conducted in a manner that will minimize the disturbance to the natural character of the beach.

- All waste generated by the USACE, its contractors and sub-contractors under this Letter of Entry will be removed or otherwise disposed of as required by state and federal law.

- Abandonment of equipment is prohibited on state lands.

- Refueling of equipment and the storage of petroleum products on state owned tidelands is prohibited.

- The USACE, its contractors and sub-contractors shall immediately notify the Alaska Department of Environmental Conservation (ADEC) by telephone, and immediately afterwards send ADEC a written notice by facsimile, hand delivery, or first class mail, informing ADEC of any unauthorized discharges of oil to water, any discharge of hazardous substances other than oil and any discharge or cumulative discharge of oil greater than 55 gallons solely to land and outside an impermeable containment area. If a discharge, including a cumulative discharge, of oil is greater than 10 gallons but less than 55 gallons, or a discharge of oil greater than 55 gallons is made to an impermeable secondary containment area, the USACE, its contractors and sub-contractors shall report the discharge within 48 hours, and immediately afterwards send ADEC a written notice by facsimile, hand delivery, or first class mail. Any discharge of oil, including a cumulative discharge, solely to land greater than one gallon up to 10 gallons must be reported in writing on a monthly basis. The posting of information requirements of 18 AAC75.305 shall be met. Scope and Duration of Initial Response Actions (18 AAC 75.310) and reporting requirements of 18 AAC 75, Article 3 also apply.

  The USACE, its contractors and subcontractors shall supply ADEC with all follow-up incident reports. Notification of a discharge must be made to the nearest ADEC Area Response Team during working hours: Anchorage (907) 269-7500, fax (907) 269-7648; Fairbanks (907) 451-2121, fax (907) 451-2362; Juneau (907) 465-5340, fax (907) 465-2237. The ADEC oil spill report number outside normal business hours is (800) 478-9300.

- The USACE may not assign or transfer, in part or whole, the Letter of Entry to another party.

- The USACE must obtain written approval from the Regional Manager or his designee prior to making any changes or improvements to the project site or their operations as authorized by this Letter of Entry.

- This Letter of Entry does not relieve the USACE from securing other necessary state, federal and local permits. This Letter of Entry does not provide authorization for travel on private property.

- The USACE, its contractors and sub-contractors shall observe all federal, state and local laws and regulations applicable to the authorized areas, including regulations for the protection of fish and wildlife, and shall keep all premises in a neat, orderly, and sanitary condition.

- The Alaska Historic Preservation Act requires that if cultural or paleontological resources are discovered on state lands as a result of this activity, work that would disturb such resources must be stopped and the State Historic Preservation Office be contacted immediately at (907) 269-8720.

- This Letter of Entry is issued for a specific use. Use of the barge landing for purposes other than those specified constitutes a breach of this authorization and may result in revocation. This Letter of Entry is revocable with any applicable laws, statutes and regulations (state and federal).

Any questions regarding any aspect of this Letter of Entry shall be directed to Dianna Leinberger, Department of Natural Resources, Division of Mining, Land and Water, Northern Region Land Office, 3700 Airport Way, Fairbanks, Alaska 99709, (907) 451-3014, dianna.leinberger@alaska.gov.

Sincerely,

Dianna Leinberger

Dianna Leinberger
Natural Resource Specialist

STATE OF ALASKA

SEAN PARNELL
GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF COASTAL AND OCEAN MANAGEMENT
Hhttp://www.alaskacoast.state.ak.us

☒ *SOUTHCENTRAL REGIONAL OFFICE*
550 W. 7TH AVENUE, SUITE 705
ANCHORAGE, ALASKA 99501
PH: (907) 269-7470 / FAX: (907) 269-3981

❑ *CENTRAL OFFICE*
P.O. BOX 111030
JUNEAU, ALASKA 99811-1030
PH: (907) 465-3562 / FAX: (907) 465-3075

❑ *PIPELINE COORDINATOR'S OFFICE*
411 WEST 4TH AVENUE, SUITE 2C
ANCHORAGE, ALASKA 99501-2343
PH: (907) 257-1351 / FAX: (907) 272-3829

May 17, 2010

Michael R. Salyer
U.S. Army Corps of Engineers, Alaska District
Environmental Resources Section
CEPOA-EN-CW-ER
P.O. Box 6898
Elmendorf, AFB 99506-06898

SUBJECT: ACMP Review Not Required
St. Lawrence Island, FUDS Cleanup Northeast Cape
ID2010-0505AA

Dear Mr. Salyer:

The Division of Coastal and Ocean Management (DCOM) has received your Federal Consistency Determination and other information for proposed remedial actions at the Northeast Cape former military facility on St. Lawrence Island. The former radar and communication facilities are located south of Kitnagak Bay, approximately eight miles west of Northeast Cape. The project area is in Sections 15, 16, 21 and 22, Township 25 South, Range 54 West, Kateel River Meridian.

Based on the information you supplied DCOM has determined that this is the continuation of a project that was previously reviewed and found consistent with the Alaska Coastal Management Program (ACMP). The State identification numbers for the prior review is AK0203-17AA. The project was found consistent with the ACMP to the maximum extent practicable subject to specific conditions and alternative measures.

In 2009 additional remedial actions were proposed and were also found consistent (ACMP letter May 15, 2010).

I have circulated the US Army Corps of Engineers (USACE) modification letter and consistency determination to the Alaska Departments of Fish and Game and Natural Resources, and the Bering Straits CRSA. Based upon the information you supplied, DCOM *concurs* with your determination that the project is consistent with the ACMP and affected coastal district's enforceable policies to the maximum extent practicable, because it does not have any effect on any coastal use or resource substantially different than those previously reviewed by DCOM. However, please note that the alternative measures in this project's original consistency determination still apply.

You are not relieved from obtaining required permits and approvals from state federal or local agencies, before you begin the proposed work. Nothing in this letter excuses you from compliance with other statutes, ordinances, or regulations that may affect any proposed work.

This decision is ONLY for the proposed project as described. If there are any other changes to the proposed project, including its intended use, prior to or during its siting, construction, or operation, contact this office immediately to determine if further review and approval of the revised project is necessary.

Thank you for your cooperation with the ACMP.

Sincerely,

Jim Renkert

Jim Renkert
Project Review Coordinator

Encl: Guide to Preparing an ACMP Consistency Determination for Federal Activities
Federal Consistency Response
AK0203-07AA
DCOM Letter May 15, 2009

cc:

Alexander Wait	DNR/DMLW
David Gann	DNR/DCOM
Ellen Simpson	ADFG/Habitat
Fran Roche	DEC - JNU
Frank Maxwell	DNR/DMLW
Jeanne Proulx	DNR/DMLW
Kellie Westphal	DNR/DMLW
Mac McLean	ADFG/Habitat
Roselynn Ressa	DNR/DMLW
Sean Palmer	DEC - ANC
SHPO	DNR/SHPO

USACE Regulatory Branch	USACE
Larry Pederson	Bering Straits Native Corporation
Paul Rookok	Chair, BSCRSA Board

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, ALASKA
P.O. BOX 6898
ELMENDORF AFB, ALASKA 99506-0898

REPLY TO
ATTENTION OF:

September 3, 2010

Programs and Project Management Division
Environmental Special Projects

Alaska Department of Environmental Conservation
ATTN: Mr. Curtis Dunkin
555 Cordova Street
Anchorage, Alaska 99501

Dear Mr. Dunkin:

Per our recent phone conversation, this letter confirms the recent developments at our Northeast Cape FUDS Project. We have encountered more PCB-contaminated soil than anticipated. We recently modified our contract with Bristol Environmental to excavate an additional 800 tons of contaminated soil for off-island removal. The additional tonnage was necessary due to recent findings at Site 13 and Site 31.

You may recall that excavations at Site 13 and Site 31 were initially excavated in 2005. There was not enough money in our contract to complete those excavations in 2005, so Bristol was instructed to place a liner in those shallow excavations and backfill them with clean fill. Material above the liner was dug up and stockpiled at the start of work this season at Sites 13 and 31. As we were approaching the limits of the additional awarded quantities this week, Bristol tested the "clean" stockpiles of material in preparation for backfilling the excavations. The stockpiled material has become contaminated. Screening samples indicate the stockpiled materials contain PCBs ranging from less than 1 to 28 ppm.

We do not have enough money to handle these new additional quantities of contaminated soil. They stockpiles are estimated to contain 285 tons of soil. We do not think it's appropriate to put this contaminated soil back in the hole, therefore we propose to store it on site until next season.

We will store this contaminated soil in Super Sacks, each of which is capable of handling up to 10 tons of soil. These Super Sacks have a separate internal liner, and zip up completely to preclude leakage. They are DOT-approved shipping containers. We anticipate storing around 30 of these super sacks on a large concrete pad at the former Main Operations Complex. Each bag will be labeled to warn passersby that they contain contaminated soil.

We have notified the landowners at Northeast Cape, Kukulget, Inc., and Sivuqaq, Inc., by phone, and told them of our plans to store these super sacks over the winter. They did not object to our plan. Enclosed with this letter is a letter to the landowners which specify the plans we went over on the phone.

If you have any questions, please contact me at (907) 753-2689, or by e-mail at carey.c.cossaboom@usace.army.mil.

Sincerely,

Carey Cossaboom
Project Manager

Enclosures (2)

Welker, Molly

From: Cossaboom, Carey C POA [Carey.C.Cossaboom@usace.army.mil]
Sent: Friday, September 03, 2010 2:03 PM
To: Welker, Molly
Subject: FW: NECape Site 13 - 2010 HTRW

Molly,

See below.

Carey

-----Original Message-----
From: Dunkin, Curtis S (DEC) [mailto:curtis.dunkin@alaska.gov]
Sent: Friday, September 03, 2010 1:23 PM
To: Cossaboom, Carey C POA
Subject: RE: NECape Site 13 - 2010 HTRW

Carey,
Thanks for emailing the letter and informing ADEC that the landowners have been notified. Pending receipt of your signed letter and attachment, since I know that time is critical for the field crew to complete work and demobilize from Northeast Cape, this email serves as ADEC approval of the USACE's plan to store the contaminated soil discussed in your letter. Thank you for keeping ADEC apprised. Please provide ADEC with photos of the final stored soil including the labeling and warnings.
Regards

Curtis Dunkin
Environmental Program Specialist
ADEC Contaminated Sites Program
555 Cordova Street
Anchorage, AK 99501
Phone: 907-269-3053

-----Original Message-----
From: Cossaboom, Carey C POA [mailto:Carey.C.Cossaboom@usace.army.mil]
Sent: Friday, September 03, 2010 1:07 PM
To: Dunkin, Curtis S (DEC)
Subject: RE: NECape Site 13 - 2010 HTRW

Curtis,

The attached letter will probably see the mail come Tuesday. Similar letters will go the Native Corporations. See the photo of the first staged Super Sacks.

Carey Cossaboom
Project Manager
U.S. Army Corps of Engineers
907-753-2689 (ph.)
907-753-2829 (fax)
carey.c.cossaboom@usace.army.mil

-----Original Message-----
From: Dunkin, Curtis S (DEC) [mailto:curtis.dunkin@alaska.gov]
Sent: Thursday, September 02, 2010 11:00 AM
To: Cossaboom, Carey C POA
Subject: NECape Site 13 - 2010 HTRW

Carey,

Thank you for your call today and for informing me re: the PCB contaminated backfill material and the fact that more PCB-contaminated soil remains at site 13 than can be addressed/removed this year.

I conferred internally regarding your request to store the PCB-contaminated stockpile in super sacks on the concrete pad at the MOC. Because, as you stated the contaminant level is below 50mg/Kg, storing the properly containerized, sealed, covered/protected, and labeled/signed material should not be a problem. One concern that arose is whether the right of entry would be a concern re: storing material (most likely not), but I just wanted to point that out. It would also be appropriate to inform the landowner and notify them of the plan.

ADEC suggests that you submit a request letter describing the info you provided me on the phone today (site, volumes, contract mod., PCB conc's, expected contamination source from 2005, etc.) and other info in this email, detailing how the material will be securely stored and labeled/signed etc.
incl. the confirmation of notification to the landowner which ADEC can then approve.

Contact me if you have any questions.

Regards

Curtis Dunkin

Environmental Program Specialist

ADEC Contaminated Sites Program

555 Cordova Street

Anchorage, AK 99501

Phone: 907-269-3053

STATE OF ALASKA

SARAH PALIN, GOVERNOR

1300 COLLEGE RD.
FAIRBANKS, AK 99701
PHONE: (907) 459-7289
FAX: (907) 459-7303

DEPARTMENT OF FISH AND GAME

DIVISION OF HABITAT

FISH HABITAT PERMIT
FH09-III-OI03

ISSUED: April 22, 2009
EXPIRES: December 31, 2014

Ms. Molly Welker
Bristol Environmental and Engineering Services Corporation
111 W. 16th Ave., Third Floor
Anchorage, AK 99501-5109

Dear Ms. Welker:

RE: Bridge Repair, Northeast Cape White Alice Site Removal Action (St. Lawrence Island); T25S, R54W, Suqitughneq River; SID AK0203-17AA

Pursuant to AS 16.05.841, the Alaska Department ofFish and Game (ADF&G), Division of Habitat, has reviewed your proposal to place riprap or conduct maintenance activities in the Suqitughneq River (on St. Lawrence Island) to protect the bridge abutments. ADF&G received your request via email on April 17, 2009. Your original request was received on March 19, 2002 with a more detailed description received via email on April 3, 2002. The original activity was permitted under Fish Habitat Permit FG02-III-0072 which expired December 31,2005.

Your original proposed project entailed placing approximately 15 cubic yards of riprap at the base of the abutments of the bridge crossing the Suqitughneq River each work season (two work seasons are anticipated). An excavator, operating from the deck of the bridge, will place the riprap. The current proposed work will included any necessary repairs but will not exceed the original footprint and scope of work.

The Suqitughneq River supports anadromous Dolly Varden (and possibly whitefish) and resident fish (e.g., Alaska blackfish) in the area of your proposed activity. Based upon our review of your plans, your proposed project should not obstruct the efficient passage and movement of fish.

In accordance with AS 16.05.841, project approval IS hereby given subject to the following stipulations:

(1) Banks shall not be altered or disturbed in any way. If stream banks are inadvertently disturbed, they shall be immediately stabilized to prevent erosion.

(2) "End-dumping" riprap is prohibited. Riprap shall be strategically placed to prevent excess rock in the streambed.

The permittee is responsible for the actions of contractors, agents, or other persons who perform work to accomplish the approved plan. For any activity that significantly deviates from the approved plan, the permittee shall notify the ADF&G and obtain written approval in the form of a permit amendment before beginning the activity. Any action taken by the permittee, or an agent of the permittee, that increases the project's overall scope or that negates, alters, or minimizes the intent or effectiveness of any stipulation contained in this permit will be deemed a significant deviation from the approved plan. The final determination as to the significance of any deviation and the need for a permit amendment is the responsibility of the ADF&G. Therefore, it is recommended that the ADF&G be consulted immediately when a deviation from the approved plan is being considered.

This letter constitutes a permit issued under the authority of AS 16.05.841. This permit must be retained on site during construction. Please be advised that this approval does not relieve you of the responsibility of securing other permits, state, federal or local.

This permit provides reasonable notice from the commissioner that failure to meet its terms and conditions constitutes violation of AS 16.05.861; no separate notice under AS 16.05.861 is required before citation for violation of AS 16.05.841 can occur.

In addition to the penalties provided by law, this permit may be terminated or revoked for failure to comply with its provisions or failure to comply with applicable statutes and regulations. The department reserves the right to require mitigation measures to correct disruption to fish and game created by the project and which were a direct result of the failure to comply with this permit or any applicable law.

The recipient of this permit (permittee) shall indemnify, save harmless, and defend the department, its agents and its employees from any and all claims, actions or liabilities for injuries or damages sustained by any person or property arising directly or indirectly from permitted activities or the permittee's performance under this permit. However, this provision has no effect, if, and only if, the, sole proximate cause of the injury is the department's negligence.

Sincerely,

Denby S. Lloyd, Commissioner

BY: Robert F. "Mac" McLean, Regional Supervisor
Habitat Division
Alaska Department of Fish and Game

cc: Chris Milles, ADNR, Fairbanks
Ann Rappoport, USFWS, Anchorage
Jeanne Hanson, NMFS, Anchorage

RFM:mac

STATE OF ALASKA

SARAH PALIN, GOVERNOR

1300 COLLEGE RD.
FAIRBANKS, AK 99701
PHONE: (907) 459-7289
FAX: (907) 459-7303

DEPARTMENT OF FISH AND GAME

DIVISION OF HABITAT

FISH HABITAT PERMIT
FH09-III-OI02

ISSUED: April 22, 2009
EXPIRES: December 31, 2014

Ms. Molly Welker
Bristol Environmental and Engineering Services Corporation
111 W. 16th Ave., Third Floor
Anchorage, AK 99501-5109

Dear Ms. Welker:

RE: Equipment Stream Crossing, Northeast Cape White Alice Site Removal Action (St. Lawrence Island), T25S, R54W, Quangeghsaq River; SID AK 0203-17AA

Pursuant to AS 16.05.841, the Alaska Department of Fish and Game (ADF&G), Division of Habitat, has reviewed your proposal to make multiple crossings at multiple sites (four) across the Quangeghsaq River with amphibious all-terrain vehicles. Timbers or poles may need to be placed in and adjacent to the stream to create better crossing sites that prevent ATVs from getting stuck and reduce damage to vegetation. Access is needed to cut down and remove hundreds of poles from abandoned utility lines. ADF&G originally received a description of the proposed project on March 19, 2002 and a more detailed description via email on April 3, 2002. That activity was permitted under Fish Habitat Permit FG02-III-0073 which expired December 31, 2005. Additional access may be needed to conduct maintenance activities.

The Quangeghsaq River supports anadromous Dolly Varden (and possibly whitefish) and resident fish (e.g., Alaska blackfish) in the area of your proposed activity. Based upon our review of your plans, your proposed project may obstruct the efficient passage and movement of fish.

In accordance with AS 16.05.841, project approval IS hereby gIven subject to the following stipulations:

(1) Equipment crossings shall be made from bank to bank in a direction substantially perpendicular to the direction of stream flow.

Equipment crossings shall be made only at locations with gradually sloping banks. There shall be no crossings at locations with sheer or cut banks.

Banks shall not be altered or disturbed in any way to facilitate crossings. If stream banks are inadvertently disturbed, they shall be immediately stabilized to prevent erosion.

(2) If timber/poles are placed in and adjacent to the stream to create a crossing site, they must be placed in such a way that free passage of fish is assured. In addition, all material shall be completely removed from the streambed and banks at the end of each work season. If needed, the streambed shall be recontoured to assure that "trenches" are not left that will trap fish at low-water levels.

(3) Vehicle crossings shall be limited to only what is necessary to accomplish work.

(4) No damming or diversions are permitted.

The permittee is responsible for the actions of contractors, agents, or other persons who perform work to accomplish the approved plan. For any activity that significantly deviates from the approved plan, the permittee shall notify the ADF&G and obtain written approval in the form of a permit amendment before beginning the activity. Any action taken by the permittee, or an agent of the permittee, that increases the project's overall scope or that negates, alters, or minimizes the intent or effectiveness of any stipulation contained in this permit will be deemed a significant deviation from the approved plan. The final determination as to the significance of any deviation and the need for a permit amendment is the responsibility of the ADF&G. Therefore, it is recommended that the ADF&G be consulted immediately when a deviation from the approved plan is being considered.

This letter constitutes a permit issued under the authority of AS 16.05.841. This permit must be retained on site during construction. Please be advised that this approval does not relieve you of the responsibility of securing other permits, state, federal or local.

This permit provides reasonable notice from the commissioner that failure to meet its terms and conditions constitutes violation of AS 16.05.861; no separate notice under AS 16.05.861 is required before citation for violation of AS 16.05.841 can occur.

In addition to the penalties provided by law, this permit may be terminated or revoked for failure to comply with its provisions or failure to comply with applicable statutes and regulations. The department reserves the right to require mitigation measures to correct disruption to fish and game created by the project and which were a direct result of the failure to comply with this permit or any applicable law.

The recipient of this permit (permittee) shall indemnify, save harmless, and defend the department, its agents and its employees from any and all claims, actions or liabilities for injuries or damages sustained by any person or property arising directly or indirectly from permitted activities or the permittee's performance under this permit. However, this provision has no effect, if, and only if, the sole proximate cause of the injury is the department's negligence.

Sincerely,

Denby S. Lloyd, Commissioner

Robert F McLean

BY: Robert F. "Mac" McLean, Regional Supervisor
Habitat Division

cc: Chris Milles, ADNR, Fairbanks
Ann Rappoport, USFWS, Anchorage
Jeanne Hanson, NMFS, Anchorage

RFM:mac

STATE OF ALASKA

DEPT. OF ENVIRONMENTAL CONSERVATION
DIVISION OF WATER
WASTEWATER DISCHARGE AUTHORIZATION PROGRAM

SEAN PARNELL, GOVERNOR
555 Cordova
Anchorage, Alaska 99501-2617
PHONE: (907) 269-6285
FAX: (907) 334-2415

07/01/2011

Company: Bristol Environmental Remediation Services, LLC
ATTN: Steven Johnson
111 W. 16th Avenue, Third Floor
Anchorage AK 99501

Facility:
Site 9 - Housing and Operations Landfill Remediati
Cargo Beach Road
Northeast Cape, Saint Lawrence Island AK 99769

Permit Number: AKR10DB20

Thank you for submitting your Notice of Termination (NOT) form, terminating coverage under the ADEC's Stormwater Construction General Permit. The coverage for the facility listed above has been terminated effective midnight of 07/01/2011. By submission of this NOT form, you are certifying that you have reviewed the terms and conditions of the construction permit and have determined that the facility no longer requires coverage.

If you have any questions regarding this letter or other questions concerning the stormwater program, please call the ADEC contact: Greg Drzewiecki (907) 269-7692

Thank you for using the ADEC eNOI system.

For Agency Use
Permit # CGPNOT-0598

Notice of Termination (NOT) of Coverage for Storm Water Discharges Associated with Construction Activity Under an APDES Construction General Permit

Submission of this Notice of Termination (NOT) constitutes notice that the party identified in Section II of this form is no longer authorized to discharge storm water associated with construction activity under the APDES program for the site identified in Section III of this form. All necessary information must be included on the form. Coverage under the APDES Construction General Permit (CGP) is terminated at midnight of the day the NOT is signed. The NOT must be submitted within 30 days of one of the conditions in Section 6.2 of the CGP being met. Refer to the instructions at the end of this form for information on submitting a NOT.

I. Permit Information

Permit Tracking Number: AKR10DB20

Reason for Termination (Check only one):

- [x] Final stabilization has been achieved on all portions of the site for which you are responsible.
- [ ] Another operator has assumed control, according to Appendix F, Section 1.12 of the CGP, over all areas of the site that have not been finally stabilized.
- [ ] Coverage under an alternative APDES permit has been obtained.
- [ ] For residential construction only, temporary stabilization has been completed and the residence has been transferred to the homeowner.

II. Operator Information

Name: Bristol Environmental Remediation Services, LLC

Mailing Address:

Street (PO Box): 111 W. 16th Avenue, Third Floor

City: Anchorage State: AK Zip: 9901

Phone: 907-563-0013 Fax(optional):

Email:

III. Project/Site Information

Project/Site Name: Site 9 - Housing and Operations Landfill Remediati

Project Street/Location: Cargo Beach Road

City: Northeast Cape, Saint Lawrence Island State: AK Zip: 99769

Borough or similar government subdivision: Nome

IV. Certification Information

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Printed Name: Steven Johnson Title: CEO

Signature: Steven Johnson Date: 07/01/2011 Email:

Who May File an NOT Form

Permittees presently covered under the Alaska Pollutant Discharge Elimination System (APDES) General Permit for Storm Water Discharges Associated with Construction Activity may submit an NOT form when:

- *final stabilization has been achieved on all portions of the site for which you are responsible;*
- *another operator has assumed control, in accordance with Appendix F, Section 1.12 of the General Permit, over all areas of the site that have not been finally stabilized;*
- *coverage under an alternative APDES permit has been obtained; or*
- *for residential construction only, temporary stabilization has been completed and the residence has been transferred to the homeowner.*

"Final stabilization" means that all soil disturbing activities at the site have been completed and that a uniform perennial vegetative cover with a density of at least 70% of the native background vegetative cover for the area has been established on all unpaved areas and areas not covered by permanent structures, or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed. See "final stabilization" definition in Appendix A of the Construction General Permit for further guidance where background native vegetation covers less than 100 percent of the ground, in arid or semi-arid areas, for individual lots in residential construction, and for construction projects on land used for agricultural purposes.

Completing the Form

Type or print, in the appropriate areas only. "NA" can be entered in areas that are not applicable. If you have any questions about how or when to use this form, contact the ADEC Storm Water Program at (907) 269-6285 or online at http://www.dec.state.ak.us/water/wnpspc/stormwater/index.htm.

Section I. Permit Number

Enter the existing NPDES or APDES Storm water General Permit Tracking Number assigned to the project by EPA or ADEC's Storm water Program. If you do not know the tracking number, you can find the tracking number assigned to your facility on ADEC's Water Permit Search: www.dec.state.ak.us/water/WaterPermitSearch/Search.aspx or EPA's Notice of Intent (NOI) Search website (www.epa.gov/npdes/noisearch) if you submitted your NOI on EPA's website.

Indicate your reason for submitting this Notice of Termination by checking the appropriate box. Check only one.

Section II. Operator Information

a. Provide the legal name of the person, firm, public organization, or any other entity that operates the project described in this application and is covered by the permit tracking number identified in Section I. The operator of the project is the legal entity that controls the site operation, rather than the site manager.

b. Enter the operator's complete mailing address, telephone number, email address, and fax number (optional) of the operator.

Section III. Project/Site Information

Enter the official or legal name and complete street address, including city, state, zip code, and borough or similar government subdivision of the project or site. If the project or site lacks a street address, indicate the general location of the site (e.g., Intersection of State Highways 61 and 34). Complete site information must be provided for termination of permit coverage to be valid.

Section IV. Certification Information

The NOTs, must be signed as follows:

(1) For a corporation, a responsible corporate officer shall sign the NOT, a responsible corporate officer means:

(A) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation; or

(B) the manager of one or more manufacturing, production, or operating facilities, if

(i) the manager is authorized to make management decisions that govern the operation of the regulated facility, including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental statutes and regulations;

(ii) the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and

(iii) authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

(2) For a partnership or sole proprietorship, the general partner or the proprietor, respectively; or

(3) for a municipality, state, or other public agency, either a principal executive officer or ranking elected official shall sign the application; in this subsection, a principal executive officer of an agency means

(A) the chief executive officer of the agency; or

(B) a senior executive officer having responsibility for the overall operations of a principal geographic unit or division of the agency.

Include the name, title, and email address of the person signing the form and the date of signing. An unsigned or undated NOT form will not be considered valid termination of permit coverage.

Where to File NOT form

ADEC encourages you to complete the NOT form electronically via the Internet. ADEC's Online Application System (OASys) can be found at https://myalaska.state.ak.us/dec/water/opa. Filing electronically is the fastest way to terminate permit coverage and help ensure that your NOT is complete. If you choose not to file electronically, you must send the NOT to the address listed below.

If you file by mail, please submit the original form with a signature in ink. ADEC will not accept a photocopied signature. Remember to retain a copy for your records.

NOTs sent by mail:

Alaska Dept. of Environmental Conservation
Wastewater Discharge Authorization Program
555 Cordova Street
Anchorage, AK 99501
Phone: (907) 269-6285

DEPARTMENT OF THE ARMY
RIGHT-OF-ENTRY FOR
ENVIRONMENTAL ASSESSMENT AND RESPONSE

SAINT LAWRENCE ISLAND, ALASKA (Project, Installation or Activity)

NO. DACA85- 8-08-0134 (Property Identification Number)

The undersigned, hereinafter called the "**Owner**", in consideration of the mutual benefits of the work described below, hereby grants to the **UNITED STATES OF AMERICA**, hereinafter called the "Government", a right-of-entry upon the following terms and conditions:

1. The Owner hereby grants to the Government an irrevocable right to enter in, on, over and across the land described herein, for a period not to exceed five (5) years, **beginning June 1, 2008**, and terminating upon the earlier completion of remediation or the filling of a notice of termination in the local land records by the representative of the United States in charge of the Saint Lawrence Island remediation project, for use by the United States, its representatives, agents, contractors, and assigns, as a work area for environmental investigation and response; including the right to store, move, and remove equipment and supplies; erect and remove temporary structures on the land; investigate and collect samples; excavate and remove ordnance and explosive waste, pollutants, hazardous substances, contaminated soils, containerized waste, and replace with uncontaminated soil; excavate and remove all storage tanks (above, at and below ground level), contents and appurtenant piping; demolish and dispose of former military structures and debris; construct, operate, maintain, alter, repair and remove groundwater monitoring wells, groundwater purification and injection systems, appurtenances thereto and other devices for the monitoring and treatment of contamination in soil, air and water; and perform any other such work which may be necessary and incident to the Government's use for the environmental investigation and response on said lands; subject to existing easements for public roads and highways, public utilities, railroads and pipelines; reserving, however, to the landowner(s), their heirs, executors, administrators, successors and assigns, all such right, title, interest and privilege as may be used and enjoyed without interfering with or abridging the rights and right-of-entry hereby acquired.

2. The Owner also grants the right to enter and exit over and across any other lands of the Owner as necessary to use the described lands for the purposes listed above.

3. All tools, equipment, and other property taken upon or placed upon the land by the Government shall remain the property of the Government and may be removed by the Government at any time within a reasonable period after the expiration of this permit or right-of-entry.

4. Upon expiration or termination of this right-of-entry, the Government shall assure restoration of the ground contour and replace any pavement or other cover which was removed or damaged for this work, establish a groundcover of grass on areas not otherwise covered and reconnect any operating utility lines which were required to be disconnected or otherwise disrupted.

5. If any action of the Government's employees or agents in the exercise of this right-of-entry results in damage to the real property, the Government will, in its sole discretion, either repair such damage or make an appropriate settlement with the Owner. In no event shall such repair or settlement exceed the fair market value of the fee title to the real property at the time immediately preceding such damage. The Government's liability under this clause is subject to the availability of appropriations for such payment, and nothing contained in this agreement may be considered as implying that Congress will at a later date appropriate funds sufficient to meet any deficiencies. The provisions of this clause are without prejudice to any rights the Owner may have to make a claim under applicable laws for any damages other than those provided for herein.

6. The land affected by this right-of-entry is located in the State of Alaska, and is described as follows:

All surface and subsurface rights on Saint Lawrence Island, Alaska, within Township 20 South, Range 67 West, Kateel River Meridian and; Township 25 South, Range 54 West, Kateel River Meridian

WITNESS MY HAND AND SEAL this 17 day of June 2008.

Aaron Iworrigan

SAVOONGA AK 99769 JUN 17 2008 USPS

KUKULGET, INCORPORATED
Perry Pungowiyi, President

Perry Pungowiyi
Authorized Signature

P.O. Box 160
Address

(907) 984-6184
Telephone Number

UNITED STATES OF AMERICA

Veronica A. Hiriams
Veronica A. Hiriams
Chief, Real Estate Division
US Army Engineer District, AK
P.O. Box 898
Anchorage, Alaska 99506-0898

SAINT LAWRENCE ISLAND, ALASKA
(Project, Installation or Activity)

NO. DACA85-8-08-0134
(Property Identification Number)

SIVUQAQ, INCORPORATED
~~Bruce Boolowon, President~~ Merle Apassingok, Acting Chairman

Authorized Signature

P.O. Box 101 Gambell, AK. 99742
Address

(907) 985-5826
Telephone Number

STATE OF ALASKA

SARAH PALIN, GOVERNOR

1300 COLLEGE RD.
FAIRBANKS, AK 99701
PHONE: (907) 459-7289
FAX: (907) 459-7303

DEPARTMENT OF FISH AND GAME

DIVISION OF HABITAT

FISH HABITAT PERMIT
FH09-III-0103
Amendment #1

ISSUED: April 22, 2009
AMENDMENT #1 ISSUED: June 5, 2009
EXPIRES: December 31, 2014

Ms. Molly Welker
Bristol Environmental and Engineering Services Corporation
111 W. 16th Ave., Third Floor
Anchorage, AK 99501-5109

Dear Ms. Welker:

RE: Bridge Repair, Northeast Cape White Alice Site Removal Action (St. Lawrence Island); T25S, R54W, Suqitughneq River; SID AK0203-17AA

Pursuant to AS 16.05.841, the Alaska Department of Fish and Game (ADF&G), Division of Habitat, has reviewed Ms. Susan Luetters' email request, dated June 4, 2009, to amend Fish Habitat Permit FH09-III-0103 to authorize withdrawal of up to 3,000 gallons per day of water from the Suqitughneg River (180,000 gallons per season). Water will be withdrawn with a 4-inch diameter pump at a rate of 35 gpm. Proposed season of use is July 15, 2009 to September 15, 2009.

In accordance with AS 16.05.841, Fish Habitat Permit FH09-III-0103 is hereby amended subject to the following stipulation:

(1) In fish bearing waters, pump intakes or stream diversions shall be designed to prevent intake, impingement, or entrapment of fish. Each water intake structure shall be centered in a screened enclosure. The effective screen opening may not exceed ¼ inch. To reduce fish impingement on the screened surfaces, water velocity at the screen/water interface may not exceed 0.5 feet per second when the pump is operating.

NOTE: Due the small water withdrawal rate, the simplest manner to achieve compliance with this stipulation is to perforate the lower third of a 5-gallon plastic bucket with a large number of ¼-inch holes, place some large rock in the bucket to keep it submerged, and then place the intake hose (presumably with a small rock chuck) in the bucket.

All other terms and conditions of FH09-III-0103 remain in effect.

Sincerely,

Denby S. Lloyd, Commissioner

BY: Robert F. "Mac" McLean, Regional Supervisor
Habitat Division
Alaska Department of Fish and Game

cc: Chris Milles, ADNR, Fairbanks
Ann Rappoport, USFWS, Anchorage
Jeanne Hanson, NMFS, Anchorage

RFM:mac

STATE OF ALASKA

SARAH PALIN, GOVERNOR

1300 COLLEGE RD.
FAIRBANKS, AK 99701
PHONE: (907) 459-7289
FAX: (907) 459-7303

DEPARTMENT OF FISH AND GAME

DIVISION OF HABITAT

FISH HABITAT PERMIT
FH09-III-0103
Amendment #1

ISSUED: April 22, 2009
AMENDMENT #1 ISSUED: June 5, 2009
EXPIRES: December 31, 2014

Ms. Molly Welker
Bristol Environmental and Engineering Services Corporation
111 W. 16th Ave., Third Floor
Anchorage, AK 99501-5109

Dear Ms. Welker:

RE: Bridge Repair, Northeast Cape White Alice Site Removal Action (St. Lawrence Island); T25S, R54W, Suqitughneq River; SID AK0203-17AA

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(1) In fish bearing waters, pump intakes or stream diversions shall be designed to prevent intake, impingement, or entrapment of fish. Each water intake structure shall be centered in a screened enclosure. The effective screen opening may not exceed ¼ inch. To reduce fish impingement on the screened surfaces, water velocity at the screen/water interface may not exceed 0.5 feet per second when the pump is operating.

NOTE: Due the small water withdrawal rate, the simplest manner to achieve compliance with this stipulation is to perforate the lower third of a 5-gallon plastic bucket with a large number of ¼-inch holes, place some large rock in the bucket to keep it submerged, and then place the intake hose (presumably with a small rock chuck) in the bucket.

All other terms and conditions of FH09-III-0103 remain in effect.

Sincerely,

Denby S. Lloyd, Commissioner

BY: Robert F. "Mac" McLean, Regional Supervisor
Habitat Division
Alaska Department of Fish and Game

cc: Chris Milles, ADNR, Fairbanks
Ann Rappoport, USFWS, Anchorage
Jeanne Hanson, NMFS, Anchorage

RFM:mac

STATE OF ALASKA

Sean Parnell, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF AGRICULTURE

☐ **CENTRAL OFFICE**
1800 GLENN HIGHWAY, SUITE 12
PALMER, ALASKA 99645-6736
PHONE: (907) 745-7200
FAX: (907) 745-7112

☐ **NORTHERN REGION OFFICE**
1648 S. CUSHMAN ST., # 201
FAIRBANKS, ALASKA 99701-6206
PHONE: (907) 328-1950
FAX: (907) 328-1951

☐ **PLANT MATERIALS CENTER**
5310 S. BODENBURG SPUR
PALMER, ALASKA 99645-9706
PHONE: (907) 745-4469
FAX: (907) 746-1568

August 16, 2010

Carey Cossaboom
Project Manager
U.S. Army Corps of Engineers

Carey,

After visiting the NE Cape cleanup site I believe a maintenance fertilization program may be real valuable in order to meet the 70% cover requirement for the sites. The process is starting but the plants could use some help. An application of fertilizer (20-20-10) at 500 pounds per acre would help the process along. I believe this will give the plants the boost they need.

Species composition of the seeded areas does correspond with the applied seed mix of 70% Tufted hairgrass and 30% Red fescue, although not at that density. The seeded perennial grasses are performing relatively well and there is no indication of extreme stress. The brown color and yellowing of the grasses at some sites is probably due to fertilizer deficiency and would benefit from an additional application. Some sites are heavily compacted and may require breakup in order for grasses to become established. This is especially true where the three tanks were removed.

Sporadic vegetation cover at one site is likely the result of using hand-held broadcast seeders to apply the seed mix. It looks like a lot of the area was simply missed. If available, a broadcast seeder mounted on the back of an ATV vehicle will provide more uniform coverage of the seed mixture. One good way to prevent misses while seeding and fertilizing areas with employees not familiar with broadcast applications is to set the spreader at half the rate. Apply the product in one direction, and then repeat the application perpendicular to the first application. Skips and void are often prevented using the two step application method. I recommend reseeding this site with 70% Tufted hairgrass and 30% Red fescue at a rate of 1 pound per 1,000 square feet. Follow with 20-20-10 fertilizer at a rate of 500 pounds per acre. The fertilizer should be applied concurrent with or prior to seeding to avoid unnecessary disturbance. Seeding will need to be completed prior to August 1.

The appearance of native species other than those planted, resulted from natural reinvasion from the surrounding community. These species will continue to colonize the site over time providing additional ground cover. Non-seeded grass species that have been identified include: Deschampsia caespitosa (Hairgrass), Festuca rubra (Red fescue), Arctagrostis latifolia (Polargrass), Trisetum Spicatum (Spike trisetum), Hierochloe odorata (Sweetgrass), Poa Alpina (Alpine bluegrass), and Calamagrostis nutkaensis (Nootka reedgrass). These species appear to be performing well and will add a natural appearance to the project.

If I can be of further assistance please do not hesitate to give me a call.

Sincerely,

Phil Czapla
Alaska Plant Materials Center
907-745-8747
phil.czapla@alaska.gov


This site will require a mechanical implement, such as ripper to fracture the soil.


I recommend reseeding this site with 70% Tufted hairgrass and 30% Red fescue. Fertilize with 20-20-10 at 500 pounds per acre. Yellowing of the grasses is probably due to fertilizer deficiency.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

June 29, 2009

Guy R. McConnell
Chief, Environmental Resources Section
U.S. Army Corps of Engineers, District Alaska
PO Box 6898
Elmendorf AFB, AK 99506-0898

Dear Mr. Connell:

I have reviewed your May 18, 2009 letter to Doug Mecum concerning an Army Corps of Engineers (ACOE) Formerly Used Defense Site (FUDS) project proposed at Northeast Cape on Saint Lawrence Island. The Steller sea lion (*Eumetopias jubatus*) is a species listed as "endangered" under the Endangered Species Act and may occur in the project vicinity. There is Steller sea lion designated critical habitat on haulout sites located on South Punuk Island at (64 04.0N, 168 51.0W) and at SW Cape (63 18.0N, 171 26.0W) on St. Lawrence Island. Other listed species you have identified as potentially present include: blue, fin, humpback, North Pacific right, and sperms whales.

According to your project description, contractors will access St. Lawrence Island by landing craft at Kitnagak Bay on the opposite site of the island and approximately 19 miles away from the nearest designated Steller sea lion critical habitat at South Punuk Island. As stated in your description: "There will be no reason for the landing craft to approach either of these two critical habitats." Any aircraft associated with the project will approach from the east and land at the Northeast Cape airstrip, and there will be no need to approach the Punuk Islands.

Based on the information in your letter and data available to us concerning critical habitat and the distribution of Steller sea lions and other species listed as "endangered" under NOAA Fisheries jurisdiction in the project area, we concur with your conclusion that the proposed activities will have no effect on the Federally listed species identified. However, our information concerning possible Steller sea lion use of St. Lawrence Island is scant and somewhat dated. Thus, if for any reason ACOE staff or contractors observe or encounter Steller sea lions within the project area, we request operations immediately cease and that ACOE staff contact our office to reinitiate consultation.

Please contact Mr. Dana J. Seagars (907-271-5005) or by e-mail (dana.seagars@noaa.gov) if you have any questions or require additional information.

Sincerely,

Bridget Mansfield for

Kaja Brix
ARA, Protected Resources Division

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, ALASKA
REGULATORY DIVISION
P.O. BOX 6998
ELMENDORF AFB, ALASKA 99506-0898

REPLY TO
ATTENTION OF:

MAY 19 2010

Regulatory Division
POA-2010-209

Ms. Molly Welker, Project Manager
Bristol Environmental Remediation Services
111 W. 16th Avenue
Anchorage, Alaska 99501

Dear Ms. Welker:

This is in response to your April 2010, application for a Department of the Army (DA) permit, to continue hazardous materials clean-up at Northeast Cape on St. Lawrence Island, Alaska. The project was assigned file number POA-2010-209, Kitnagak Bay which should be referred to in all correspondence with us. The project site is located within Section 8, T. 25 S., R. 54 W. Kateel River Meridian; at Latitude 63.31º N., Longitude -168.95º W.; approximately 8 miles west of Northeast Cape, and can be noted on USGS map St. Lawrence.

Based upon the information and plans you provided, we hereby verify that the work described above, which would be performed in accordance with the enclosed plan (sheets 1-10), dated May 2010, is authorized by Nationwide Permit (NWP) No. 38, Cleanup of Hazardous and Toxic Waste. NWP No. 38 and its associated Regional and General Conditions can be accessed at our website at www.poa.usace.army.mil/reg. You must comply with all terms and conditions associated with NWP No. 38.

Further, please note General Condition 26 requires that you submit a signed certification to us once any work and required mitigation are completed. Enclosed is the form for you to complete and return to us.

This verification is valid until the NWPs are modified, reissued, or revoked. All of the existing NWPs are scheduled to be modified, reissued, or revoked prior to March 18, 2012. It is incumbent upon you to remain informed of changes to the NWPs. We will issue a public notice when the NWPs are reissued. Furthermore, if you commence or are under contract to commence this activity before the date that the relevant nationwide permits are modified or revoked, you will have twelve (12) months from the date of the modification or revocation of the NWPs to complete the activity under the present terms and conditions of these nationwide permits.

Nothing in this letter excuses you from compliance with other Federal, State, or local statutes, ordinances, or regulations.

You may contact me via email at mary.f.leykom@usace.army.mil, by mail at the address above, by phone at (907) 753-2711, or toll free from within Alaska at (800) 478-2712, if you have questions or to request paper copies of the jurisdictional determination, regional and/or general conditions. For additional information about our Regulatory Program, visit our web site at www.poa.usace.army.mil/reg.

Sincerely,

Mary Leykom

Mary Leykom
Project Manager

Enclosures

CF/BCF: NORTH
ADEC: Sean.Palmer@alaska.gov
ADF&G-DH, Anchorage: michael.daigneault@alaska.gov
ADNR-DCOM, Anchorage: Dnr.dcompraanc@alaska.gov
ADNR-DMLW, Anchorage: dnr.scro.dcom.cor@alaska.gov
ADNR-DMLW, Fairbanks: Chris.Milles@alaska.gov
ADNR-DMLW, Anchorage: kellie.westphal@alaska.gov
SHPO, ADNR Office of History and Archaeology: oha_revcomp@dnr.state.ak.us
EPA: AOOARU.R10@epamail.epa.gov
NMFS, Anchorage: HCD.Anchorage@noaa.gov
NOAA-Marine Chart Div.: john.whiddon@noaa.gov
USFWS, Fairbanks: Jewel_Bennett@fws.gov
USFWS, Anchorage: greg_balogh@fws.gov
USFWS, Anchorage: Frances_Mann@fws.gov
USFWS, Anchorage: tina_racy@fws.gov
U.S. Coast Guard: D17-PF-DPW-ACOE@uscg.mil

Enclosure

US Army Corps of Engineers
Alaska District

Permit Number: POA-2010-209, NWP 38

Name of Permittee: Bristol Environmental Remediation Services

Date of Issuance:

Upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to Mary Leykom at the following address:

U.S. Army Corps of Engineers
Alaska District
Regulatory Division
Post Office Box 6898
Elmendorf AFB, Alaska 99506-0898

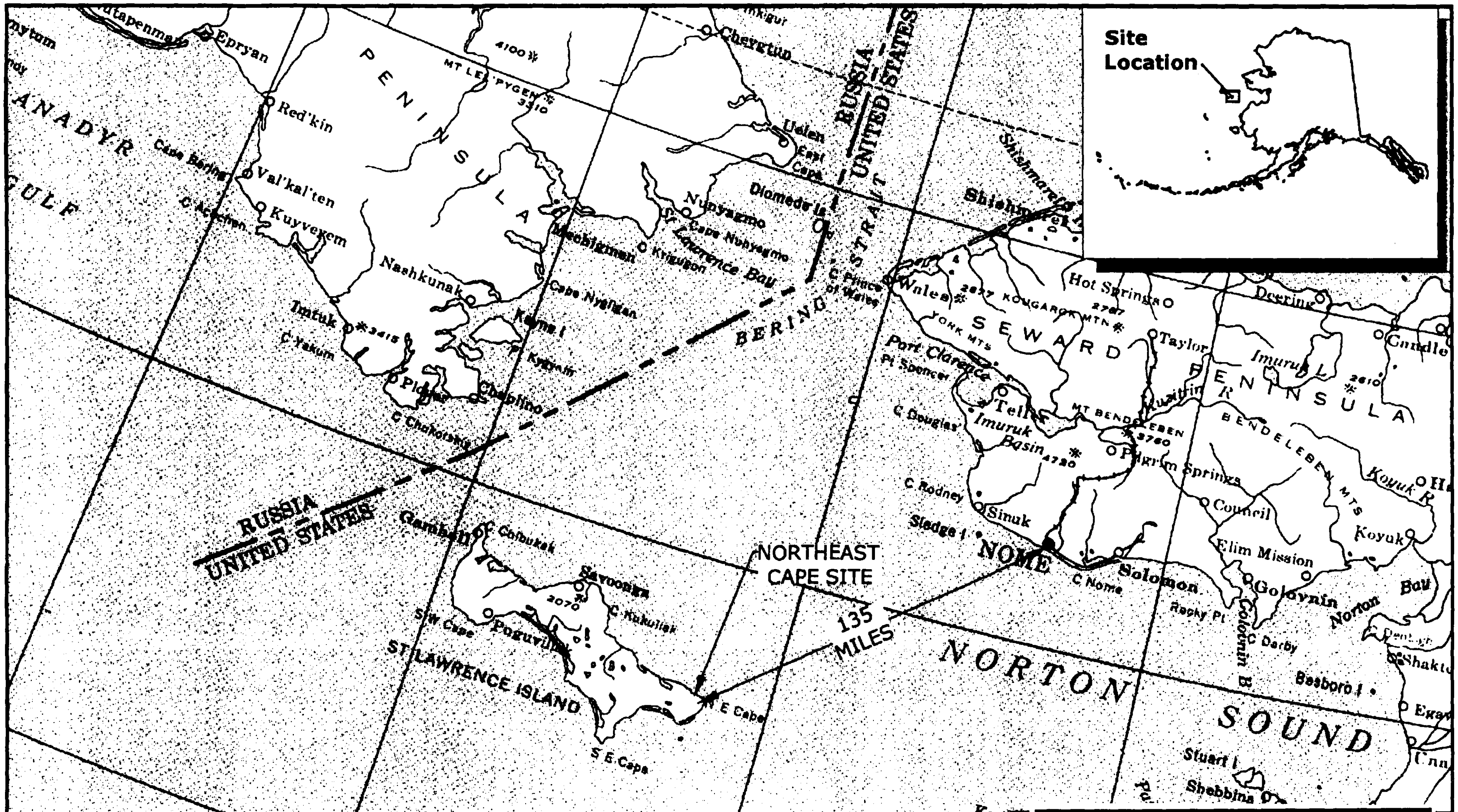
Please note that your permitted activity is subject to a compliance inspection by an U.S. Army Corps of Engineers representative. If you fail to comply with this permit you are subject to permit suspension, modification, or revocation.

I hereby certify that the work authorized by the above-referenced permit has been completed in accordance with the terms and conditions of the said permit, and required mitigation was completed in accordance with the permit conditions.

______________________________ ____________________________

Signature of Permittee Date

Drawing: K:\JOBS\210075 NE CAPE SUPPORT\ACAD-ENVIRO\COE FIGURES\210075_COE_FIG1.DWG - Layout: FIG1
User: DTANNAHILL Mar 23, 2010 - 4:13pm Xrefs: COE-85X11L.DWG - Images: NECAPE.JPG



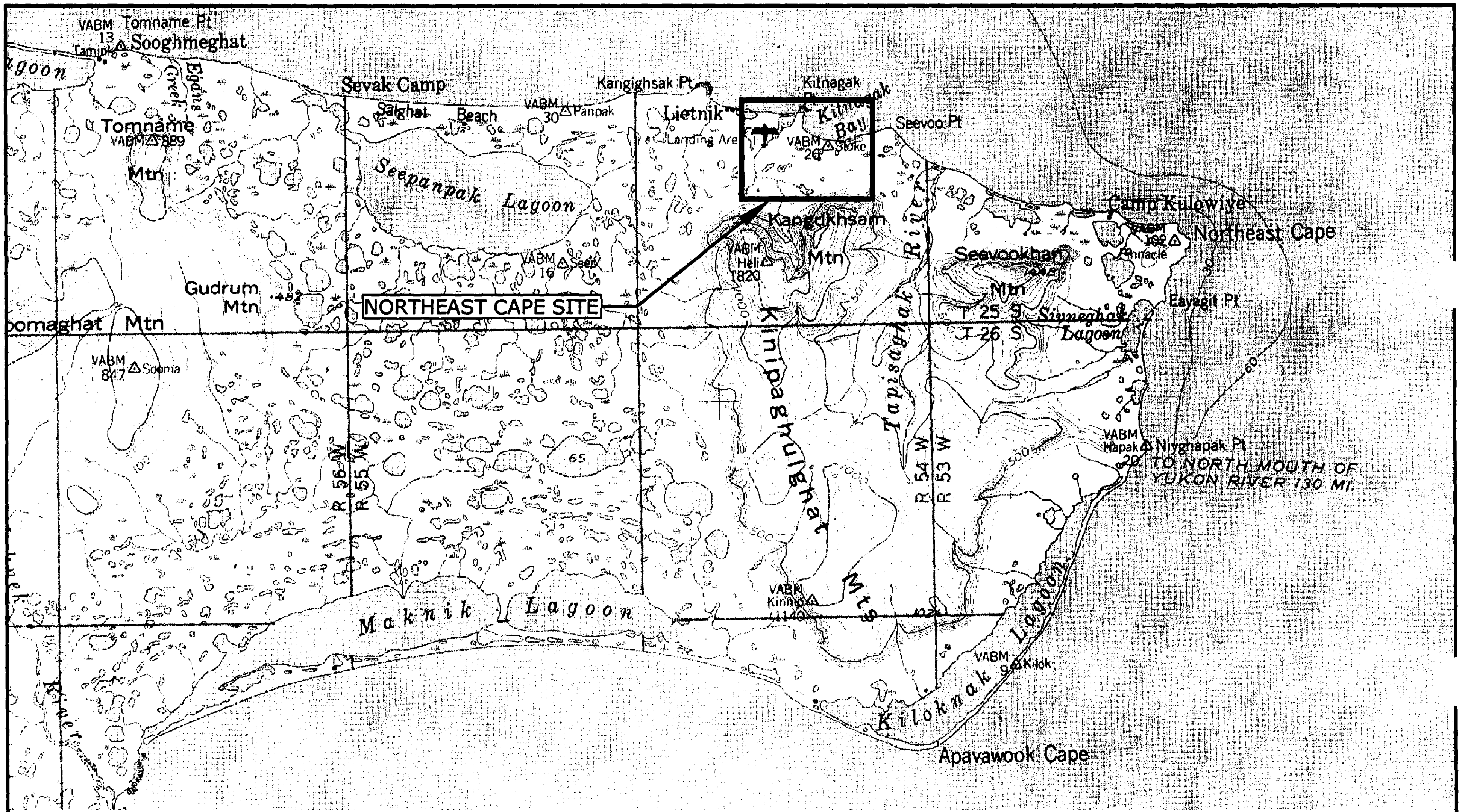
Source: USGS National Atlas Sheet Number 42-43

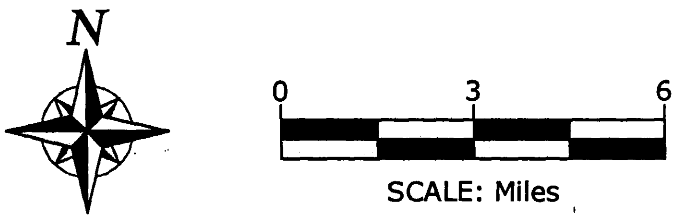
N

0 25 50
Scale: Miles

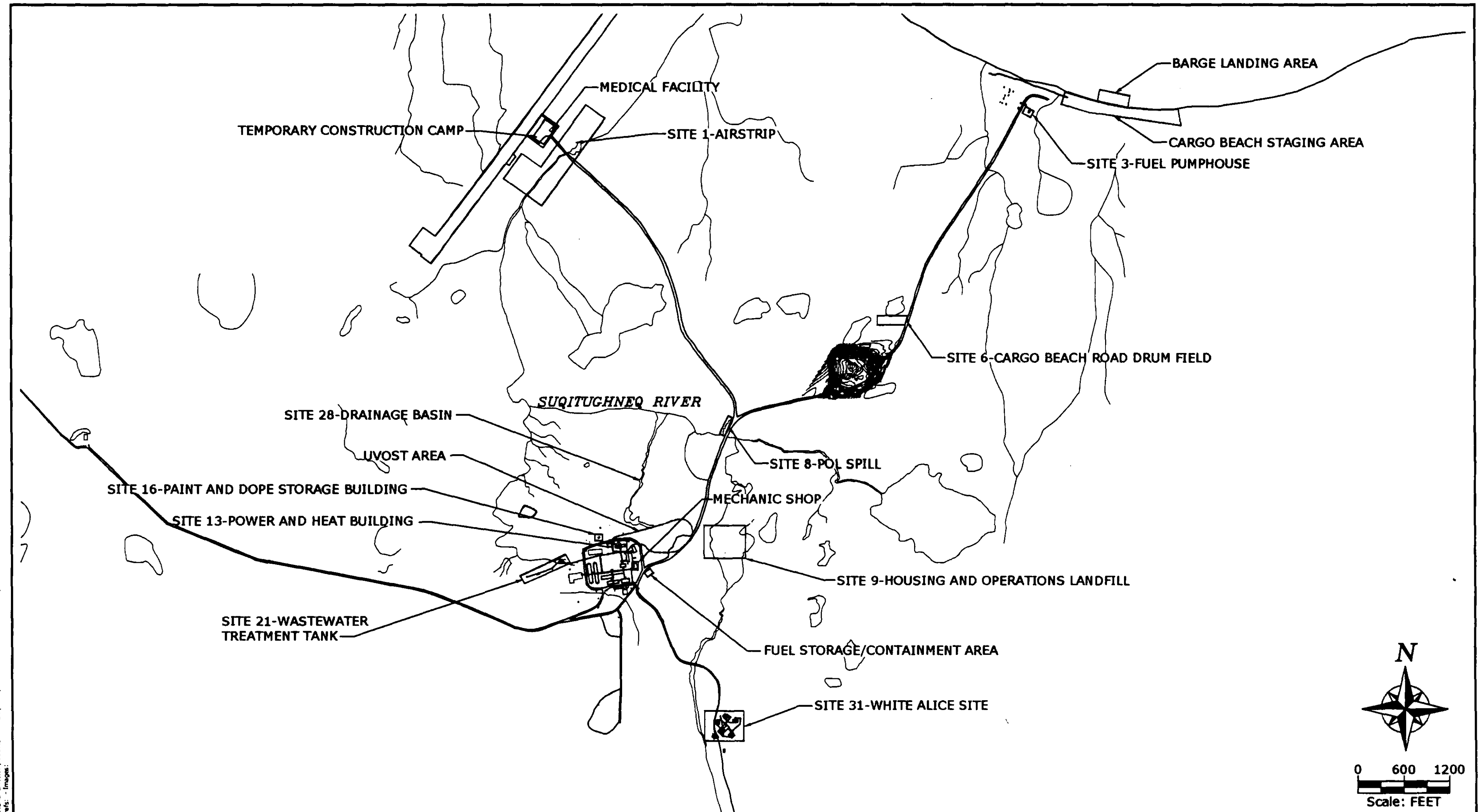
POA-2010-209 Kitnagak Bay
Bristol Environmental Remediation
St. Lawrence Island Air Force clean-up
Location map
Sheet 1 of 10 May 2010

Drawing: K:\JOBS\210075 NE CAPE SUPPORT\ACAD-ENVIRO\COE FIGURES\210075_COE_FIG2.DWG - Layout: FIG2
User: DTANNAHILL Mar 25, 2010 - 11:14am Xrefs: COE-85X11L.DWG - Images: NE1.JPG





POA-2010-209 Kitnagak Bay
Bristol Environmental Remediation
St. Lawrence Island Air Force clean-up
Location detail
Sheet 2 of 10 May 2010



LEGEND

POL PETROLEUM, OIL, AND LUBRICANTS

UVOST ULTRAVIOLET OPTICAL SCREENING TOOL

NOTE

1. DRAWING ADAPTED FROM MONTGOMERY WATSON FILE TITLED NECAPE.DWG, DATE 05 JUNE 2001. BASED ON RESURVEY PERFORMED BY ECO-LAND, LLC JULY 2009

POA-2010-209 Kitnagak Bay

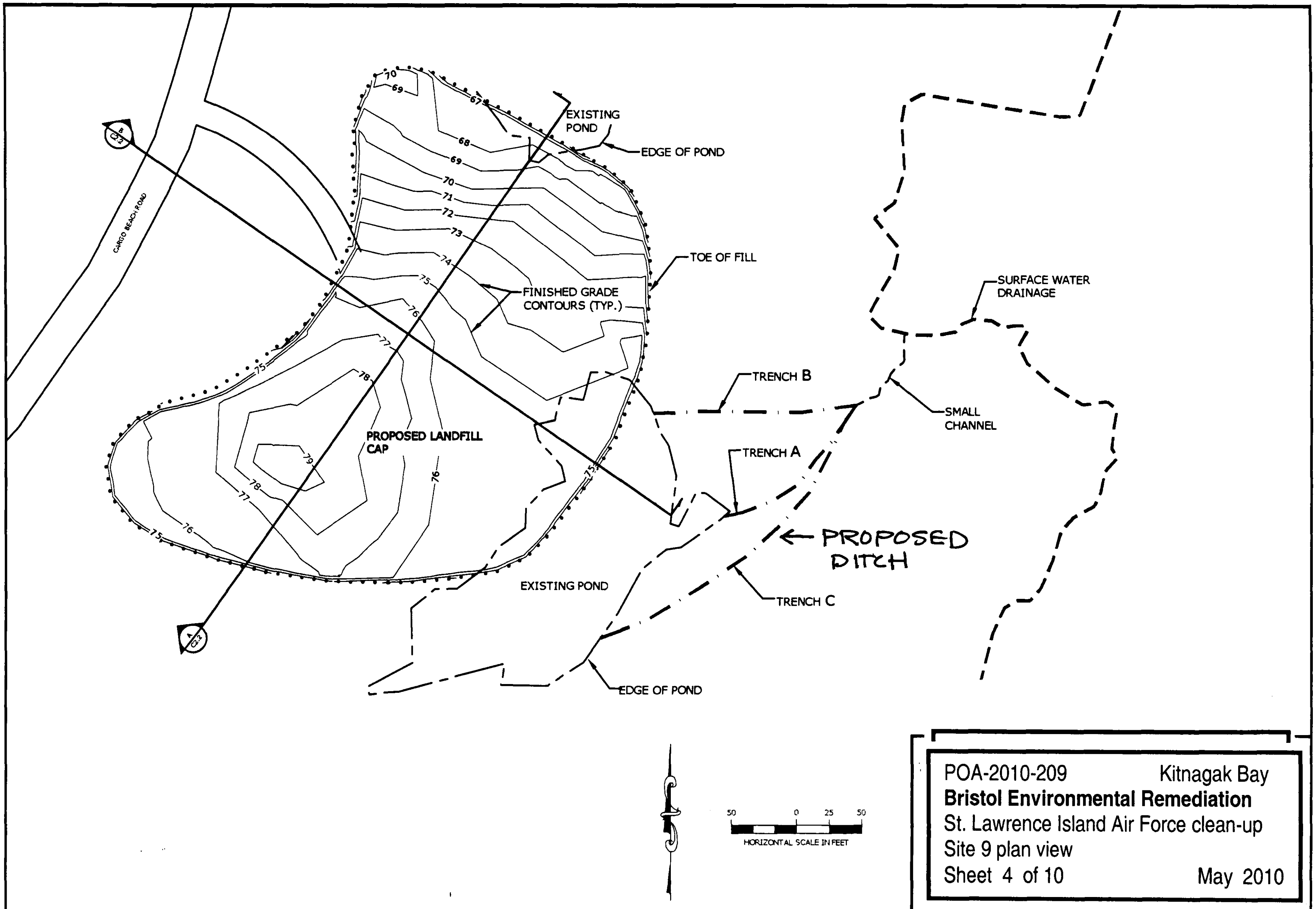
Bristol Environmental Remediation

St. Lawrence Island Air Force clean-up

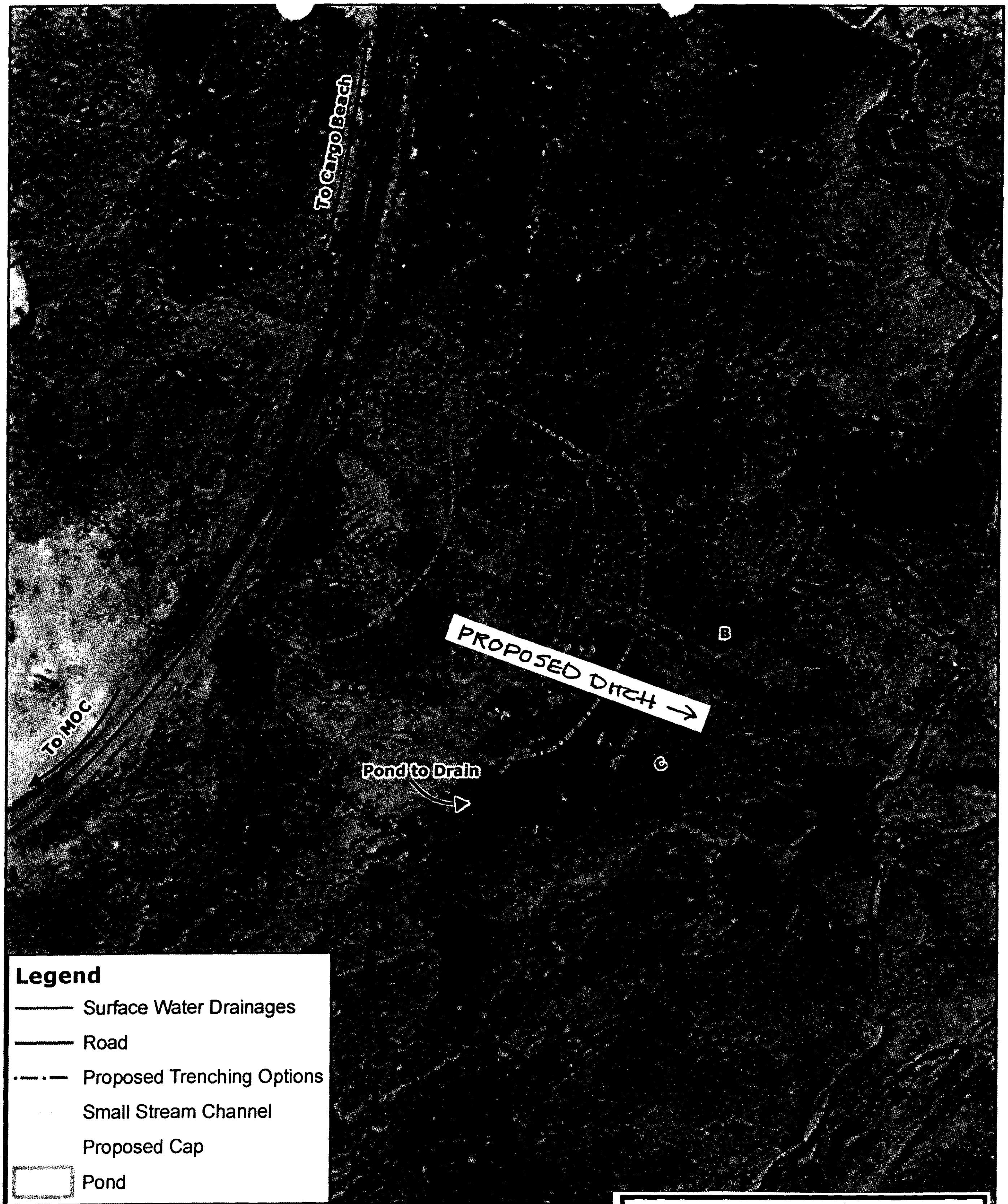
Plan view of clean-up sites

Sheet 3 of 10 May 2010

Drawing: K:\JOBS\210075 NE CAPE SUPPORT\ACAD-ENVIRO\COE FIGURES\210075_COE_FIG3.DWG - Layout: FIG3
User: DTANNAHILL Mar 24, 2010 - 12:58pm Xrefs: COE-85X11L.DWG - Images: None



POA-2010-209 Kitnagak Bay
Bristol Environmental Remediation
St. Lawrence Island Air Force clean-up
Site 9 plan view
Sheet 4 of 10 May 2010



Source Information:
Digital Globe Imagery - East Cape,
St. Lawrence Island, Dated 8-26-2008

A = 143 feet
B = 131 feet
C = 266 feet

A = preferred

N
W E
S

0 25 50 100
Feet

Northeast C
Northeas
Site 9 Hou

Bristol
ENVIRONMENTAL
REMEDIATION SE
Phone (907)563-0013 Fax (9
Project No. 4100

POA-2010-209 Kitnagak Bay
Bristol Environmental Remediation
St. Lawrence Island Air Force clean-up
Site 9 ditch location
Sheet 5 of 10 May 2010

File: G:\Jobs\410026_NECape_HTRW\Maps\Site9_w_aerial.mxd

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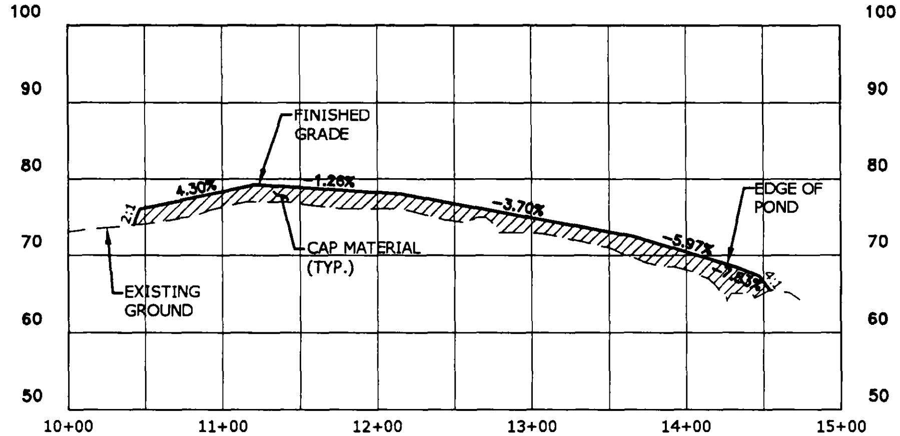
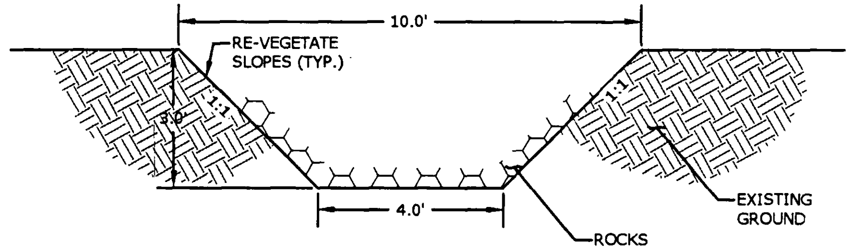
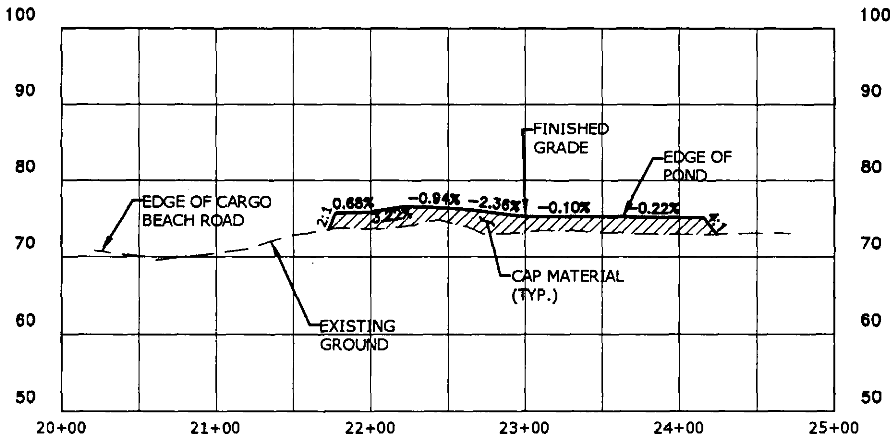
User: DTANNAHILL Mar 23, 2010 - 3:13pm Xrefs: COE-85X11L.DWG - Images: None



NORTH-SOUTH SITE CROSS SECTION

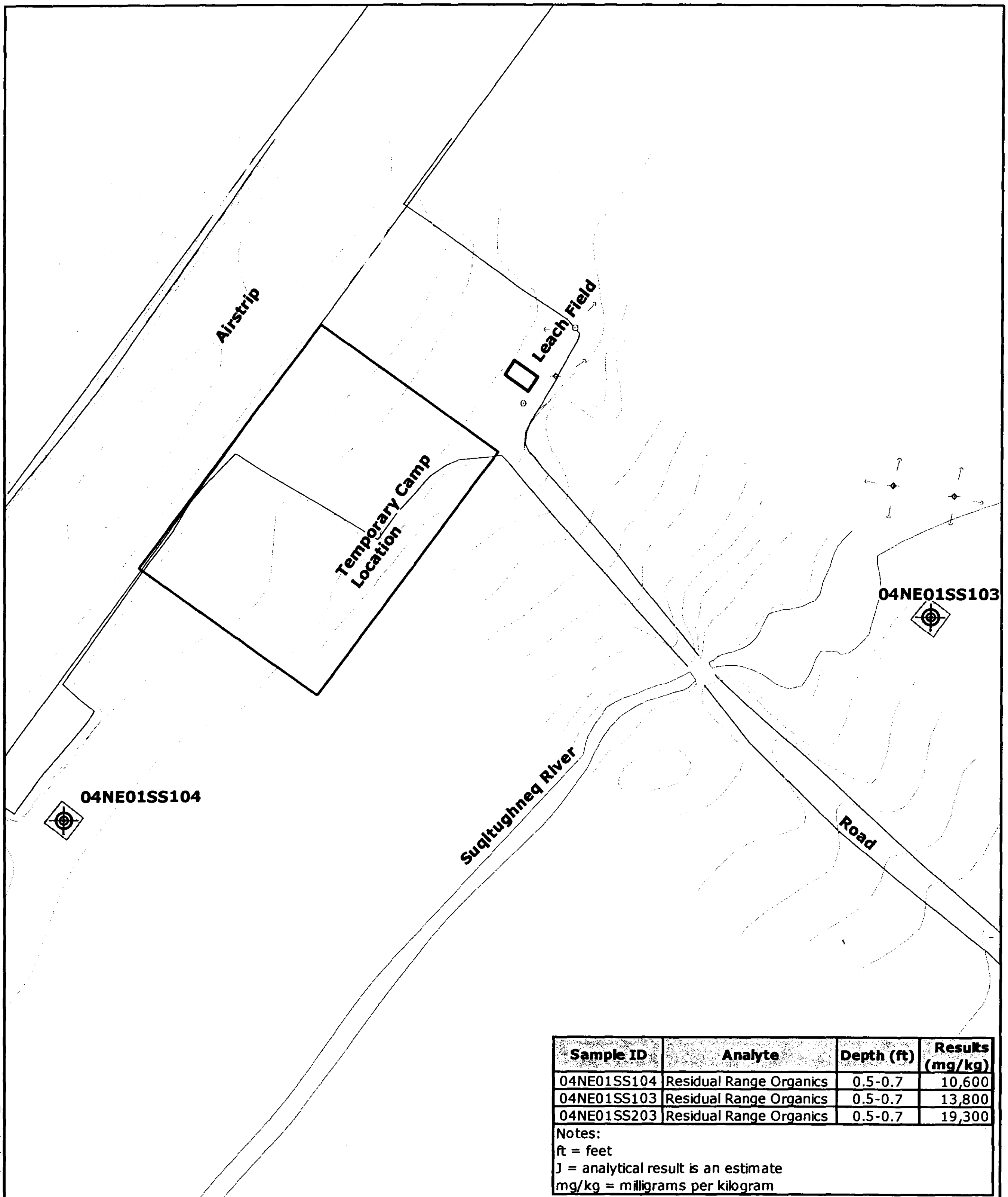


TYPICAL TRENCH SECTION



WEST-EAST SITE CROSS SECTION

POA-2010-209 Kitnagak Bay
Bristol Environmental Remediation
St. Lawrence Island Air Force clean-up
Site 9 typical sections
Sheet 6 of 10 May 2010



Sample ID	Analyte	Depth (ft)	Results (mg/kg)
04NE01SS104	Residual Range Organics	0.5-0.7	10,600
04NE01SS103	Residual Range Organics	0.5-0.7	13,800
04NE01SS203	Residual Range Organics	0.5-0.7	19,300

Notes:
ft = feet
J = analytical result is an estimate
mg/kg = milligrams per kilogram

Legend

Previous Sample Locations

2010 Excavations

N W E S

0 25 50 100
Feet

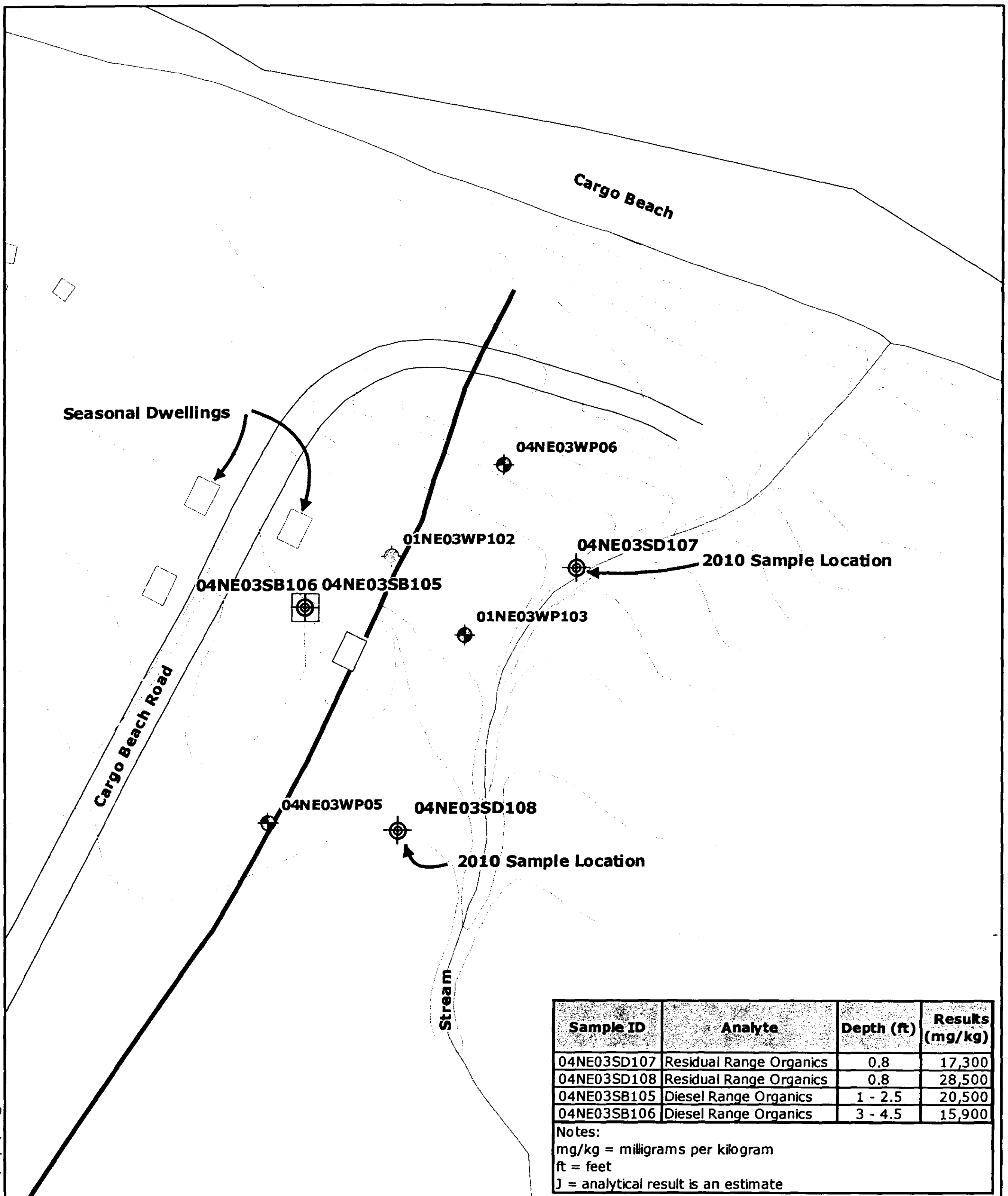
Notes:
BACKGROUND DRAWING ADAPTED FROM MONTGOMERY WATSON FILE TITLED "NECAPE.DWG", JUNE 5, 2001.

Figure 4A

North
No

POA-2010-209 Kitnagak Bay
Bristol Environmental Remediation
St. Lawrence Island Air Force clean-up
Site 1 – Airstrip excavation locations
Sheet 7 of 10 May

File: G:\Jobs\410026_NECape_HTRW\Maps\Site_1.mxd



Sample ID	Analyte	Depth (ft)	Results (mg/kg)
04NE03SD107	Residual Range Organics	0.8	17,300
04NE03SD108	Residual Range Organics	0.8	28,500
04NE03SB105	Diesel Range Organics	1 - 2.5	20,500
04NE03SB106	Diesel Range Organics	3 - 4.5	15,900

Notes:
mg/kg = milligrams per kilogram
ft = feet
J = analytical result is an estimate

Legend

- Wells Installed 2004
- Previous Sample Locations
- Former Fuel Pipeline
- 2010 Excavations

N W E S

0 25 50 100
Feet

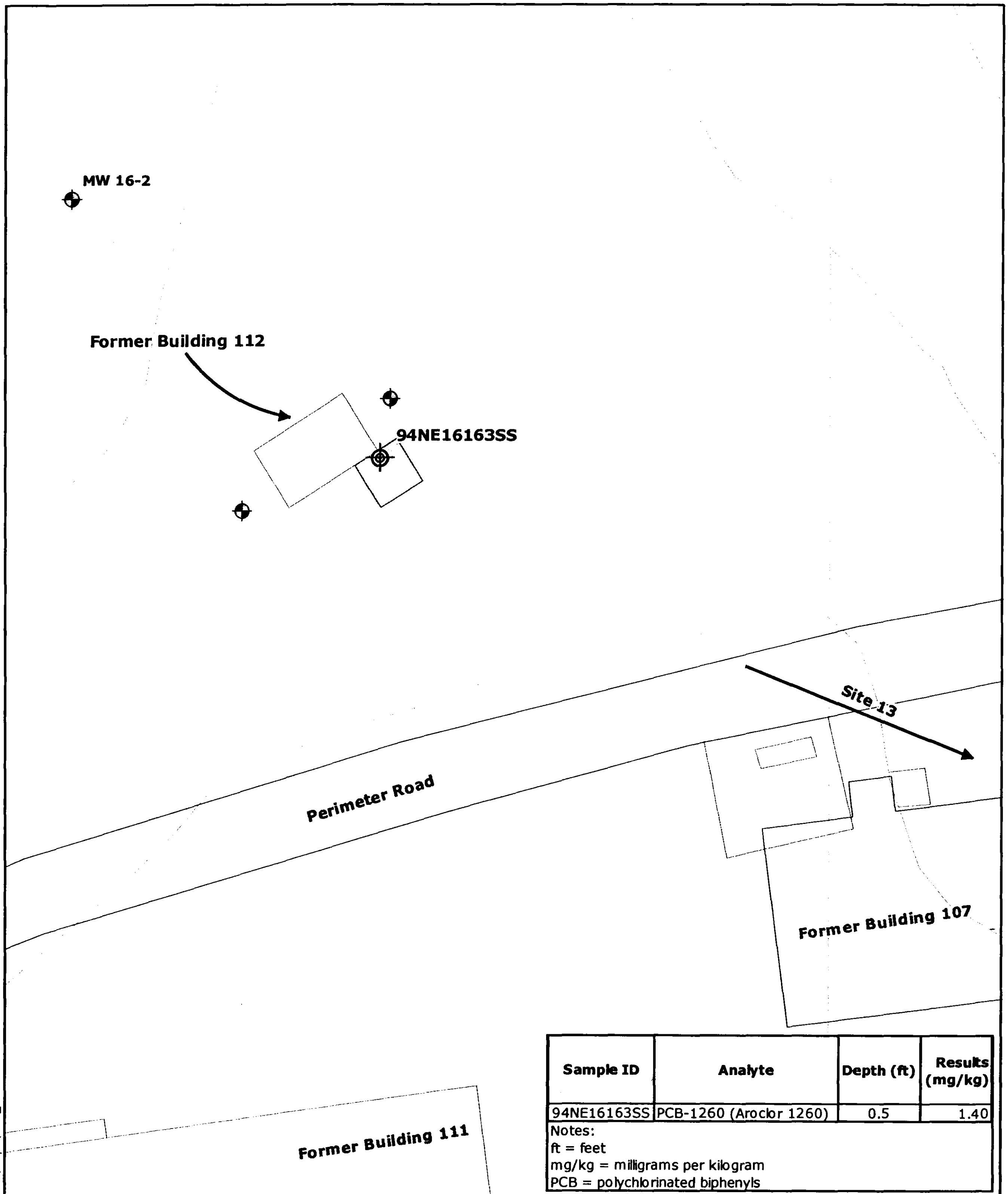
Notes:
BACKGROUND DRAWING ADAPTED FROM MONTGOMERY WATSON FILE TITLED "NECAPE.DWG", JUNE 5, 2001.

Figure 4B

North
Nor

POA-2010-209 Kitnagak Bay
Bristol Environmental Remediation
St. Lawrence Island Air Force clean-up
Site 3 – Fuel pumphouse excavation
Sheet 8 of 10 May

File: G:\Jobs\410026_NECape_HTRW\Maps\Site_3.mxd



Sample ID	Analyte	Depth (ft)	Results (mg/kg)
94NE16163SS	PCB-1260 (Aroclor 1260)	0.5	1.40

Notes:
ft = feet
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyls

Legend

- Previous Sample Locations
- Site 16 Monitoring Wells
- 2010 Excavations

N E S W

0 5 10 20 30
Feet

Notes:
BACKGROUND DRAWING ADAPTED FROM MONTGOMERY WATSON FILE TITLED "NECAPE.DWG", JUNE 5, 2001.

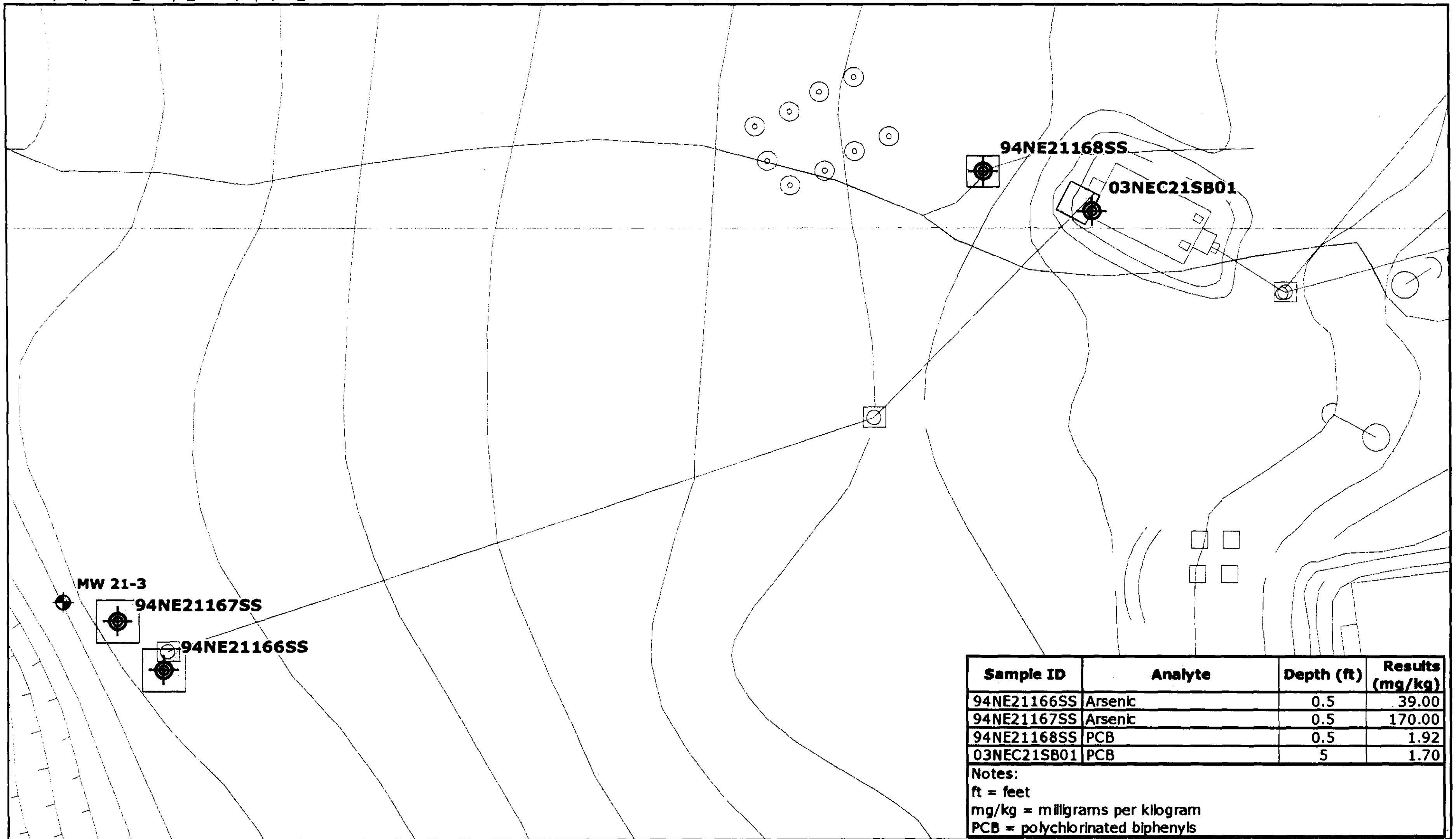
Figure 4C

North
No
Site

POA-2010-209 Kitnagak Bay
Bristol Environmental Remediation
St. Lawrence Island Air Force clean-up
Site 16 – Paint storage excavation
Sheet 9 of 10 May 2010

File: G:\Jobs\410026_NECape_HTRW\Maps\Site_16.mxd

File: G:\Jobs\410026_NECape_HTRW\Maps\Site_21.mxd



Sample ID	Analyte	Depth (ft)	Results (mg/kg)
94NE21166SS	Arsenic	0.5	39.00
94NE21167SS	Arsenic	0.5	170.00
94NE21168SS	PCB	0.5	1.92
03NEC21SB01	PCB	5	1.70

Notes:
ft = feet
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyls

Legend

2 Previous Sample Locations
4 Site 21 Monitoring Wells
46 2010 Excavations

Notes:
BACKGROUND DRAWING ADAPTED FROM MONTGOMERY WATSON FILE TITLED "NECAPE.DWG", JUNE 5, 2001. 48

N W E S

0 25 50 100
Feet

Figure 4D

Nc

S

POA-2010-209 Kitnagak Bay
Bristol Environmental Remediation
St. Lawrence Island Air Force clean-up
Site 21 – Wastewater treatment excavation
Sheet 10 of 10 May 2010

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Anchorage Fish and Wildlife Field Office
605 West 4th Avenue, Room G-61
Anchorage, Alaska 99501-2249

in reply refer to AFWFO

May 13, 2009

Susan Luetters
Bristol Environmental & Engineering Services Corporation
111 W 16th Ave., Third Floor
Anchorage, Alaska 99501

Re: St. Lawrence Island NE Cape Site USACE Dump Cleanup (*Consultation number 2009-0093*)

Dear Ms. Luetters,

On April 14, 2009, we received your email that Bristol Environmental & Engineering Services Corporation is working with the U.S. Army Corps of Engineers relative to a former military installation and White Alice Site that is in the process of being remediated towards closure. This site is located on the northeast corner of St. Lawrence Island. The Cargo Beach Road Landfill is an unpermitted landfill that was used as the installation's main solid waste disposal area from 1965 until closure in 1974. Bristol Environmental & Engineering Services Corporation is currently preparing the storm water pollution prevention plan relative to the removal of drums within an area that is the former dump site for the facility. Bristol Environmental & Engineering Services Corporation is scoped to remove 75 tons of contaminated soil with an option of another 150 tons of contaminated soil if needed. There will be no field screening or soil sampling and an in-situ chemical oxidation process will be used to remediate petroleum hydrocarbons in groundwater and soil at the former Main Operations Complex. Bristol Environmental & Engineering Services Corporation will remove drums filled with liquid up to 2500 gallons and the whole site will be capped with local material from a nearby and existing borrow area.

On May 11, 2009, I spoke with Chris Floyd from the Army Corps of Engineers. Apparently this former dump site was used to dispose of containers filled with various unknown liquids and when the military was done using the site, the dump site was simply covered with a large mound of dirt. Currently, contaminants, namely petroleum hydrocarbons, are leaking out of the sides of this mounded area and this project is to remedy that situation, remove drums, and re-cap the site more effectively.

As stated in the information you provided on April 14, 2009, drums containing liquids will be transported to a drum-processing area, to be established along Cargo Beach Road immediately northeast of the site. Contaminated soil will be placed in lined intermodal shipping containers for off-island disposal. Wastewater will be cleaned and disposed of on-site. From your email on April 23, 2009, with respect to the potential for migratory ground nesting birds, the crew will evaluate the site prior to beginning work. However, consultation by you with a Bristol employee that has been involved with the project in the past indicated that there is a high fox population on that end of the island which makes the likelihood of ground nesting birds rather low.

As we discussed on April 21, 2009, yellow-billed loons (*Gavia adamsii*, listed as a candidate species in 2009) nest on St. Lawrence Island. However, they are less than likely to nest in the action area because the site is disturbed and lacking vegetation in some places. In addition, the fox population is reported to be high in the action area and the crew will look for migratory bird nests prior to beginning work.

Spectacled eiders (*Somateria fischeri,* listed as threatened in 1993) may stage for migration off the northern coast of the action area from July 15 – October 1. This work is proposed for Summer 2009 and thus spectacled eiders may be present in the vicinity during the action. However, wastewater will be cleaned on-site without an outfall and wastes will be transferred to appropriate containers for storage and off-island disposal.

As a result, we believe the probability that this action will result in the taking of listed species is discountable. As a result, the Service concurs with your determination that the proposed action is not likely to adversely affect listed species or adversely modify critical habitat. Preparation of a biological assessment or further consultation under section 7 of the ESA is not necessary at this time. In view of this, requirements of section 7 have been satisfied. However, obligations under the ESA must be reconsidered if new information reveals project impacts that may affect listed species or critical habitat in a manner not previously considered, if this action is subsequently modified in a manner which was not considered in this assessment, or if a new species is listed or critical habitat is determined that may be affected by the identified action.

This letter relates only to federally listed or proposed species, and/or designated or proposed critical habitat, under our jurisdiction; namely, the Aleutian shield fern (*Polystichum aleuticum*, listed as endangered in 1988), spectacled eider (*Somateria fischeri,* listed as threatened in 1993), North American breeding Steller's eider (*Polysticta stelleri*, listed as threatened in 1997), the southwest distinct population segment of northern sea otter (*Enhydra lutris kenyoni,* listed as threatened in 2005), short-tailed albatross (*Phoebastria albatrus*, listed as endangered in 2000), polar bear (*Ursus maritimus*, listed as threatened in 2008), Kittlitz's murrelet (*Brachyramphus brevirostris,* listed as a candidate species in 2005), and yellow-billed loon (*Gavia adamsii*, listed as a candidate species in 2009). This letter does not address species under the jurisdiction of the National Marine Fisheries Service, or other legislation or responsibilities under the Fish and Wildlife Coordination Act, Clean Water Act, National Environmental Policy Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, or Bald and Golden Eagle Protection Act.

Thank you for your cooperation in meeting our joint responsibilities under section 7 of the ESA. If you have any questions, please contact me at (907) 271-3063 and refer to consultation number 2009-0093.

Sincerely,

Tim Langer

Tim Langer, Ph.D.
Endangered Species Biologist

T:\s7\2009 sec 7\NLAA\20090093 s7 letter.pdf

MATERIAL SUPPLY AND
QUARRY OPERATING AGREEMENT

Kukulget Inc., whose address is P.O. Box 160 Savoonga, Alaska 99769, and Sivuqaq Inc., whose address is P.O. Box 101 Gambell, Alaska 99742, Alaska Native Corporations created pursuant to the Alaska Native Claims Settlement Act, herein referred to as "Owners," and Bristol Environmental Remediation Services LLC, whose address is 111 W. 16th Avenue, Third Floor, Anchorage, Alaska 99501, herein referred to as "Contractor" agree to the extraction of material and the operation of the quarry and such other rights as are designated in this contract, subject to the following provisions:

1. DESCRIPTION - LOCATION, MATERIAL, AND PRICE:

1.1. Quarry Description. The material source area covered by this agreement is the borrow site south of the Main Operations Complex at Northeast Cape, St. Lawrence Island, Alaska shown on the attached figure.

1.2. Royalty. The royalty price for all types of material removed from the Quarry during the Term of this Agreement is:

Material Type	Unit Price
All Material	$10.00 (per Cubic Yard)

Quantities to be determined by truck count.

2. EXCLUSIVE RIGHTS AND DUTIES:

Owner hereby grants to Contractor and Contractor accepts from Owner, the exclusive right to manage and operate the Quarry for the Term of this Agreement (defined in ¶3). Management and operation of the Quarry shall include, without limitation, the following:

A. The exclusive right to manage the extraction and removal of Materials from the Quarry;

B. The exclusive right, to secure access to the Quarry to avoid an attractive nuisance and deter unauthorized extraction of Materials therefrom, up to and including, fencing the perimeter and/or access to the Quarry;

C. The duty to perform all reclamation identified in the Letter of Intent (section 5).

3. TERM:

The term of this Agreement ("term") shall commence on July 1, 2010 and expire on December 31, 2010.

4. PAYMENTS AND DEPOSITS:

Within 30 days after the cessation of work for winter, or completion or termination, Contractor in any year in which the Contractor extracts or transports material from the Quarry, Contractor shall pay payments as described in Paragraph 1.2.

5. LETTER OF INTENT/ANNUAL RECLAMATION STATEMENT:

By July 1, 2010 and prior to commencing any operations in any Quarry subject to this Agreement, the Contractor shall file a "Letter of Intent" (Letter) with the State of Alaska Department of Natural Resources, Division of Land (Division of Land) as required by State law. The contractor shall also file an "Annual Reclamation Statement" (Statement) with the Division of Land as required by State law. The Statement shall be filed before December 31 of any calendar year during which Quarry operations were carried out under this Agreement. The Contractor shall provide copies of the Letter and the Statement(s) to the Owners.

6. RECLAMATION PLAN:

Contractor shall comply with the requirements of the Letter (section 5) regarding reclamation. The Contractor shall document reclamation activities per the Statement (section 5).

7. CONFLICT WITH CONTRACT.

In the event that any provision of this Material Supply Contract and Quarry Operating Agreement shall conflict with Contractor's Contract W911KB-10-C-0002 with the Corp of Engineers for the Northeast Cape HTRW Remedial Actions, St. Lawrence Island, Alaska, contract W911KB-10-C-0002 shall control and this Agreement shall be considered amended to bring it into conformity with W911KB-10-C-0002.

8. INSPECTION OF QUARRY:

Prior to commencing any operations at the Quarry, authorized representatives of Contractor and Owners may inspect the Quarry to determine whether and to what extent prior mining operations have resulted in visual environmental contamination that requires remediation. Contractor shall have no obligation to perform remediation of contamination discovered at this inspection; provided, however, that from the date of such inspection Contractor shall be liable for all hazardous materials deposited at the Quarry as a result of Contractor's operations during the term hereof, or any extension . Failure by the parties to do so shall not affect the enforceability of this Agreement, provided Contractor prepares and transmits its environmental findings to Owners, at its address set forth in ¶17, below in writing, before beginning Operations.

9. BOOKS AND RECORDS OF ACCOUNT:

Contractor shall maintain accurate and complete records, log books and books of account documenting: (a) the volume of gravel extracted from the Quarry seasonally and submitted to Owners; (b) the amounts due and payable by Contractor and; the amounts actually paid by Contractor to Owners pursuant to this Agreement.

Materials from the Quarry shall be measured by truckloads. Each truck load will contain 24 cubic yards. Truck count shall be performed and recorded by the operator loading haul units at the quarry site. The operator will provide the truck count to the Contractor's Site Superintendent or his designee on a daily basis. The Site Superintendent will provide a summary of the truck count to Owner within five business days of receiving a request from the Owner.

10. OPERATING REQUIREMENTS:

10.1. Standards of Operations. Contractor shall excavate and remove Material from the Quarry in compliance with all laws, regulations, ordinances, orders and its contract with the Corps W911KB-10-C-0002. Contractor shall conduct and maintain its Operations in a commercially reasonable, workman like and clean manner, and shall take all necessary precautions to prevent or suppress fires and to prevent erosion, contamination or destruction of the land and adjacent wetlands and waters. The Contractor agrees to carry out its quarry operations only in areas previously disturbed by others at the Quarry site.

10.2. Supervision. Contractor shall maintain adequate supervision at all times when Operations are in progress to ensure compliance with the provisions of this contract and all applicable federal, state, and local laws and regulations.

10.3. Agents. The provisions of this Contract apply with equal force upon any agent, employee, or contractor designated by Contractor to perform any of the Operations under this contract. Contractor is liable for the noncompliance caused by any such agent, employee, or contractor.

10.4. Grave Sites or Archaeological Sites. No grave or archaeological site shall be in any way disturbed, removed, or damaged. Upon encountering any grave or archaeological site, Contractor shall immediately cease work in the area of the site and shall immediately notify Owners.

11. COMPLIANCE WITH APPLICABLE LAWS:

Contractor shall comply with all local, State and federal laws, statutes, ordinances, rules, regulations, decrees, injunctions, orders and codes applicable to the operation or management of the Quarry, including without limitation, mining reclamation, mining safety and health (i.e., "MSHA") and occupational safety and health (i.e., "OSHA"). These laws and regulations are, by this reference, made a part of this Contract.

12. REQUIRED PERMITS:

Contractor shall obtain and maintain, at its expense and throughout the Term, all licenses, permits, approvals, consents and certificates from local, state and federal authorities which may be necessary or appropriate for its management and operation of the Quarry.

13. ASSIGNMENT:

This contract may be assigned or transferred pursuant to 30 days advance notice to Owners.

14. PERMITS:

Any permits necessary for Operations under this Contract must be obtained by Contractor before commencing those Operations.

15. WARRANTIES:

This sale is made without any warranties, express or implied, as to quantity, quality, merchantability, profitability, or fitness for a particular use of the Material to be extracted from the Quarry under contract. Contractor specifically waives any claims that may arise resulting from the use of the Material.

16. NOTICES:

All notices and other documents required or authorized under this Contract must be in writing and are deemed delivered upon receipt provided that the same are sent certified mail, postage paid, to the party to which the same is mailed the following address or such other address as such party may by written notice provide:

To the Owner:

Kukulget Inc.
P. O. Box 160
Savoonga, AK 99769

Sivuqaq Inc.
P.O. Box 101
Gambell, AK 99742

with a copy to Fortier & Mikko, P.C. 101 W. Benson Blvd., Suite 304, Anchorage, AK 99503.

To the Contractor:

Bristol Environmental Remediation Services, LLC
111 W. 16th. Avenue, Third Floor
Anchorage, Alaska 99501

17. INTEGRATION AND MODIFICATION:

This Contract, including all laws and documents that by reference are incorporated in it or made a part of it, contains the entire agreement between the parties. This Contract may not be modified or amended except by a document signed by both parties to this contract. Any amendment or modification which is not in writing, signed by both parties, is null and void and of no legal effect.

18. SEVERABILITY OF CLAUSES OF CONTRACT:

If any provision of this Contract is adjudged to be invalid, that judgment does not affect the validity of any other provision of this Contract, nor does it constitute any cause or action in favor of either party as against the other.

19. CONSTRUCTION:

Words in the singular number include the plural, and words in the plural number include the singular.

20. HEADINGS:

The headings of the numbered paragraphs in this Contract shall not be considered in construing any provisions of this Contract.

21. "EXTRACTED," "EXTRACTION":

In this Contract, use of the terms "Extracted" and "Extraction" encompasses the severance or removal, as well as extraction, by Contractor of any Material covered by this Contract.

22. WAIVERS:

No agent, representative, or employee of Owners has authority to waive any provision of this Contract unless expressly authorized to do so in writing by the Presidents of Kukulget Inc. and Sivuqaq Inc.

23. GOVERNING LAW:

This Contract shall be governed by and construed in accordance with Alaska law. Venue and jurisdiction shall lie exclusively in the Superior Court for the State of Alaska, Third Judicial District, at Anchorage, Alaska.

24. EFFECTIVE DATE:

This Contract shall be effective this 1 day of June, 2010.

25. **BY SIGNING THIS CONTRACT,** Owner, and Contractor, agrees to be bound by its provisions as set out above.

CONTRACTOR:

By: Molly Luck
Its: Project Manager
1 June 2010

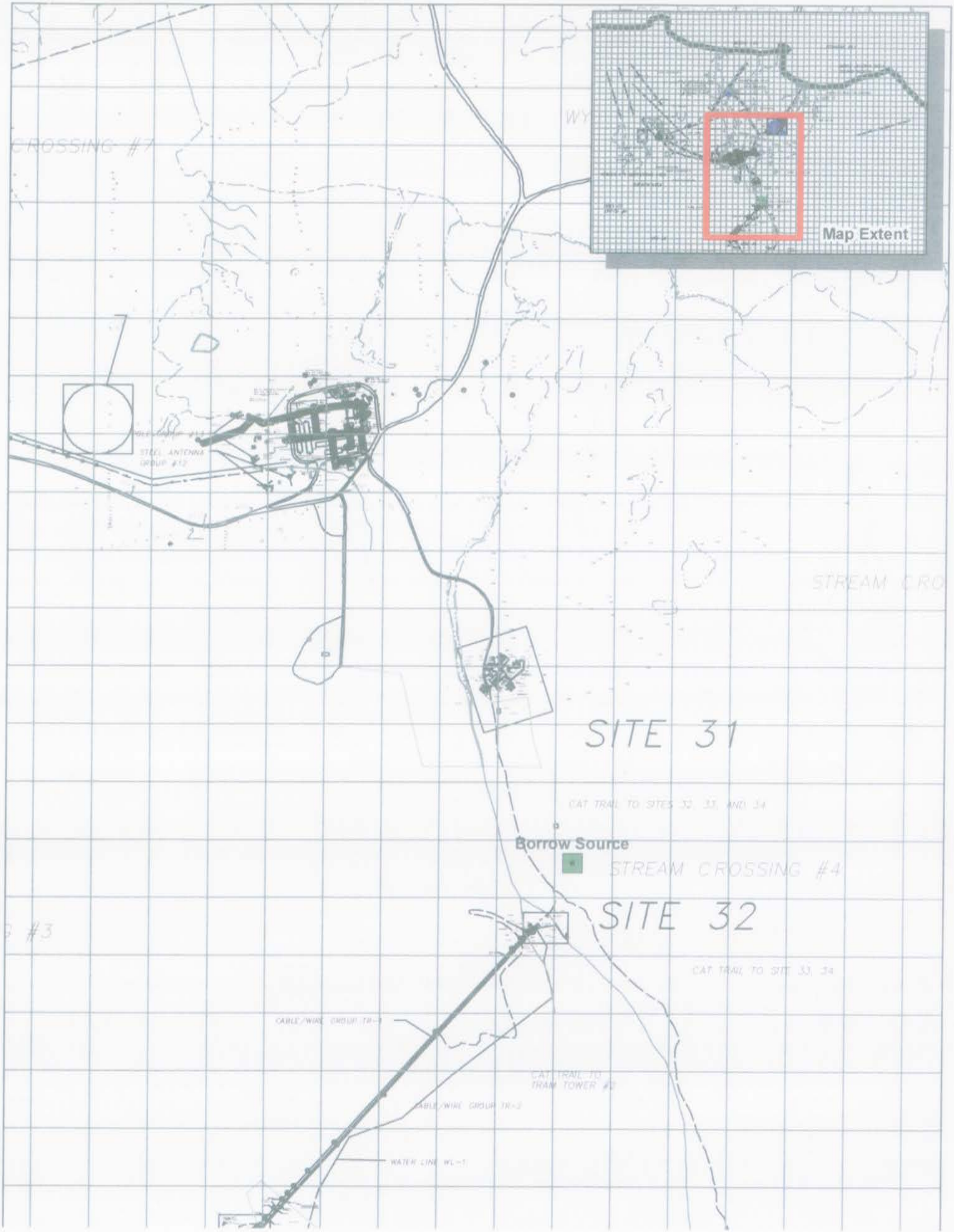
OWNER:

Kukulget Inc.

By: [signature]
Its: Vice President

Sivuqaq Inc.

By: ____________________
Its: ____________________



CROSSING #7
Map Extent
STEEL ANTENNA GROUP #12
STREAM CRO
SITE 31
Borrow Source
STREAM CROSSING #4
SITE 32
CAT TRAIL TO SITE 33, 34
CABLE/WIRE GROUP TR-2
WATER LINE WL-1

APPENDIX D

UVOST Investigation at the MOC

Bristol Environmental
Remediation Services, LLC
111 West 16th Avenue
Anchorage, Alaska 99501

UltraViolet Optical Screening Tool (UVOST®)/ Laser-Induced Fluorescence (LIF) Northeast Cape, Alaska

July 2011

Prepared By
Hammer Environmental Services
1970 South Whiting Circle, Unit #2
Palmer, Alaska 99645

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FIGURES

ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

%RE	percent relative emittance
bgs	below ground surface
cm	centimeter
DRO	diesel range organics
DTI	Dakota Technologies, Inc.
GC	gas chromatograph
Hammer Environmental	Hammer Environmental Services
LIF	Laser-Induced Fluorescence
MOC	Main Operations Complex
MSL	mean sea level
NAPL	non-aqueous phase liquid
NE Cape	Northeast Cape
nm	nanometers
PAHs	polynuclear aromatic hydrocarbons
POL	petroleum, oil, and lubricants
ppm	parts per million
QA/QC	quality assurance/quality control
RRO	residual range organics
SPOC	Shock-Protected Optical Compartment
UV	ultraviolet
UVOST	UltraViolet Optical Screening Tool

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EXECUTIVE SUMMARY

Hammer Environmental Services (Hammer Environmental) conducted a site investigation to characterize petroleum, oil, and lubricant (POL) contamination adjacent to the former fuel storage tanks and other associated former buildings at the Main Operations Complex (MOC) at Northeast Cape, St. Lawrence Island, Alaska.

The principal data acquisition method utilized was the UltraViolet Optical Screening Tool (UVOST®) and its Laser-Induced Fluorescence (LIF) probe. The scope of work called for Hammer Environmental to utilize the UVOST to investigate the horizontal and vertical extent of POL contamination at the MOC. A total of 197 UVOST probe locations were completed within the area. Overall, the UVOST/ LIF system effectively identified POL contamination in the soil. The LIF data indicates a light-to-medium POL contaminant. From this signature, it is expected that the contaminant is a type of light-end POL, or possibly a mixture of gasoline and arctic diesel. There are signs of some contaminated areas consisting of heavier POLs, such as hydraulic or transformer oils, but these responses were isolated in their area. Some signatures suggest there has been considerable degradation occurring; either through remedial activities or natural attenuation.

For the purposes of the investigation, the total area was split between two monitoring well locations. The first area, NC11, was located directly adjacent to the former tanks. A total of 52 UVOST probes were completed in this area. Approximately 31 of the 52 UVOST probe locations yielded LIF fuel-type responses. The maximum LIF response at this site was 395.8% relative emittance (%RE) at probe location 10NC11 UV-031. The horizontal extent of the contaminated plume was fully identified on the south and east sides. The horizontal extent to the north has low data density due to inaccessible terrain, and the west side was the NC27 Site.

The NC27 area was much larger in size and included multiple former buildings. A total of 145 UVOST probes were completed in this area. Approximately 107 of the 145 UVOST probe locations yielded LIF fuel-type responses. The maximum LIF response at this site was 310.3% RE at probe location 10NC27 UV-063. The horizontal extent of the contaminated plume was fully identified on the south, west, and northwest sides. The horizontal extent in part of the northeast side has low data density due to inaccessible terrain. On the east side of area NC27 was the NC11 area.

In general, the UVOST probe locations that yielded LIF responses produced elevated analytical results. Unfortunately, the correlation between the ex-situ UVOST screening and the field gas chromatography analytical results did not follow a typical linear progression. Correlation samples ranged from 86 parts per million (ppm) to 16,320 ppm per 1% RE, with an average range from 500 ppm to 1,500 ppm. This is outside the optimal range. To be both conservative and reasonable, a value of 1% RE per 1,000 ppm was used to represent in-situ LIF readings. Thus, 9.2% RE represents the targeted 9,200 ppm. Figure 3 represents the area of LIF responses greater than 9.2%.

1.0 INTRODUCTION

1.1 GENERALIZED SCOPE OF WORK

The UltraViolet Optical Screening Tool (UVOST®) investigation was conducted adjacent to the former fuel storage tanks and other associated former buildings in the Main Operations Complex (MOC) at Northeast Cape (NE Cape) between July 21 and August 7, 2010. The scope of work included provisions for Laser-Induced Fluorescence (LIF) tooling and associated appurtenances for a light non-aqueous phase liquid investigation at the site. LIF was accomplished using the UVOST developed by Dakota Technologies, Inc. (DTI) of Fargo, North Dakota. Using the Geoprobe 6610DT direct-push drill rig, the UVOST tool was advanced to final depths ranging between 10 and 24 feet below ground surface (bgs).

The purpose of the work was to characterize the subsurface soil in these areas to determine the total area of the contaminant plume and estimate the volume of contaminated soil.

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2.0 LIF/UVOST TECHNOLOGY

The UVOST uses LIF technology to identify petroleum, oil, and lubricants (POL) contamination in the subsurface. The primary objective of this technology is to delineate the lateral and horizontal extent of petroleum contamination at a site with known or suspected contaminated soil and/or groundwater in the non-aqueous phase liquid (NAPL) form. The UVOST is advanced through the subsurface using a percussion-driven, direct-push drill unit. Each probe provides continuous, real-time data on petroleum contamination at a maximum rate of one data reading per every two centimeters of downward push.

Fluorescence is a property within some compounds where absorbed ultraviolet (UV) light stimulates the release of photons (light) at a specific wavelength, often in the visible range. Since many aromatic hydrocarbons fluoresce, this property can be used to detect small amounts of a substance within a much larger matrix, such as gasoline in soil. Laboratories have used fluorescence as an analytical method for decades. The availability of high-powered light sources and optical fibers has recently allowed these fluorescence methods to be taken and applied to in-field activities.

The UVOST system (also known as Rapid Optical Screening Tool [ROST]) was developed by DTI. The UVOST sends UV light through optical fibers that are strung through hollow direct-push steel rods. The light reflects off a tiny mirror within the UVOST probe (known as the SPOC [Shock Protected Optical Compartment]) and exits the SPOC through a small sapphire window. As the probe is advanced, soil sliding past the window becomes exposed to UV light. If contaminants with fluorescent compounds exist within the exposed media, the compounds will fluoresce. The fluorescence response is then transmitted back through a fiber optic line and analyzed by an oscilloscope. The specific analysis of the oscilloscope is interpreted and displayed instantaneously in graphical and numerical form on a fluorescence vs. depth log. Since hydrocarbon bonds will fluoresce at different wavelengths, viewing the individual wavelengths provides distinct patterns of the waveform. These unique patterns are the “fuel signatures” of the petroleum hydrocarbon within the soil matrix and can be used to differentiate differing petroleum contaminants (such as diesel, gasoline, coal tar, etc).

Signal intensities are calibrated to a known standard reference solution (M1) before each probe point. During the probe, the height and area under the waveform represents the signal intensity of each individual wavelength relative to that standard; represented as percent relative emittance or %RE. (Relative emittance is a percentage of the reference emittance of the M1 standard.). The concentration of a contaminant in the soil matrix is directly related to the signal intensity and % fluorescence. These %-fluorescence readings are delivered instantly to the system field control, typically a laptop computer, at a rate of one per second. By regulating the direct-push rate of the drill machine to 2 centimeters (cm) per second, the log in turn records a %-fluorescence every 2 cm. By field standards, this is considered to be high-density continuous logging. Soil samples are typically used in conjunction with the UVOST to confirm the specific contaminant and correlate the signal strength to more familiar analytical concentration values.

A real-time log of each probe is generated in the field using the UVOST software and is displayed on the laptop computer. The depth of probe advancement is reflected on the Y axis (left side), while percent fluorescence is on the X axis (bottom). A smaller box on the screen displays four separate colored peaks, which represents the individual waveform pattern at each specific reading within the log. These wave patterns can be used to distinguish the differing POL signatures.

A background level of fluorescence is associated with each UVOST probe push. This background fluorescence response varies with each log and is a function of the probe mirror, window, and fiber-wire conditions at the time of the push. For example, dust on the mirror or a crack in the window will generally increase the background fluorescence reading and may affect the waveform. Additionally, the background is a function of the non-contaminated soil type. For example, naturally occurring organics or differing soil lens may emit low levels of fluorescence that can be seen on the log.

3.0 FIELD ACTIVITIES

3.1 PROJECT APPROACH

Probe locations were selected to identify areas of potential contamination, and were spaced 30 to 50 feet apart. Probes were advanced to final depths ranging between 10 and 24 feet bgs. One-hundred ninety-eight (198) UVOST probes and 23 correlation soil samples were collected throughout the MOC investigation area (Figure 1). One UVOST probe encountered refusal at approximately one foot bgs, making the total number of *completed* UVOST probes 197. The UVOST data for the correlation soil samples were collected ex-situ and soil was analyzed for diesel-range organics (DRO) in the field laboratory.

3.2 UVOST FIELD WORK

The fieldwork was conducted from July 21 and August 7, 2010.

As each push was being conducted, the UVOST system was monitored continuously to ensure the data quality objectives were being achieved and maintained. The following actions were used to ensure data quality during operations:

- Verified the M1 signal level and the time delay were in the proper position and within acceptable limits.
- Calibrated the UVOST with the M1 prior to every push.
- Monitored the laser signal energy during each push.
- Monitored the wave pattern on the oscilloscope.
- Monitored the graphic output on the UVOST computer and verified the information was being recorded and the system was functioning properly.
- After every push – placed M1 on the probe window to visually verify that the signals were within tolerance.
- Visually inspected the probe prior to and after every push to verify it was in good working order, and made repairs/adjustments as necessary.

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4.0 RESULTS

4.1 GENERAL RESULTS

The "fuel signature" is obtained through a combination of all four wave channels and is a combination of the representative heights of the fluorescence, as well as the total area within each channel. The height of the fluorescence in each channel represents the total amount of photons immediately released by the NAPL contaminant when subjected to the large UV light provided. The width, or thickness, of the waveform in each channel represents the continual release of photons once the UV source is absent. These photons are released at a slightly slower rate as they are typically shared with the contaminant molecules present. The total area under the curves is the %RE.

Waveforms within the first 350 nanometers (nm) (Blue) channel is in response to polynuclear aromatic hydrocarbons (PAHs) with two or three hydrocarbon "benzene" rings. These constituents are considerably more volatile and typically are included as constituents of both the gasoline range organics and DRO analytical range. Waveforms in the second 400 nm (Green) include PAHs with some three and four benzene rings that are typically included as constituents of the DRO analytical range. Waveforms in the third 450 nm (Orange) include five to eight benzene rings and waveforms in the fourth 500 nm (Red) include nine to twelve benzene rings. These constituents are included in portions of the DRO and residual range organics (RRO) analytical range, as well as other heavier organic hydrocarbons.

A total of 197 UVOST/LIF probes were completed at the site. The UVOST probe LIF logs are provided in Attachment 1. Considering the multitude of differing fuel signatures, each type of fuel signature will be discussed below. Figure 1 identifies the locations of the UVOST probe locations. Figure 2 represents the contaminated area by maximum %RE. Figure 3 represents the contaminated area with maximum fluorescence greater than 9.2% RE and is representative of the assumed area of contaminant concentrations greater than 9,200 parts per million (ppm).

4.2 LIGHT FUEL SIGNATURE

Light fuel signatures indicate gasoline-types fuels or light end constituents of diesel fuels. Due to the extreme cold weather conditions of Alaska, it was common for gasoline to be added to diesel fuel to help reduce the possibility of the fuel becoming more solid, or gelling. The Light fuel signature used for speciation is dominated in the 350-nm wave channel and has good lifetime in all four channels.

4.3 LIGHT/ MEDIUM FUEL SIGNATURE

Light/ Medium fuel signatures are more consistent with diesel fuels. The Light/ Medium fuel signature used for speciation is dominated equally in the 350 nm and 400 nm wave channel and has a good lifetime in 400 nm, 450 nm, and 500 nm channels. The 350 nm channel has a higher response (peak) with a much shorter lifetime. This is typically the result of the contaminant degrading over time in the more volatile range (350 nm channel). This can occur at sites with a higher infiltration rate and hydraulic conductivity, or when considerable subsurface disturbance occurs.

A total of 121 UVOST/LIF probes contained noticeable responses similar to the Light and Light/ Medium fuel signature. Sections 4.6 and 4.7 summarize the areas having these signature responses.

4.4 MEDIUM/ HEAVY FUEL SIGNATURE

Medium/ Heavy fuel signatures are more consistent with exotic fuels (such as modified naval fuels), crude oil, or deoxygenated areas. The Medium/ Heavy fuel signature used for speciation is dominated in the 450 nm wave channel, has shorter lifetime in all four channels, and has minimal response in the 350 nm channel. These types of fuel signatures are outside the normal usage of the UVOST, making interpretation of these fuels difficult.

Two UVOST/LIF probes contained responses with a Medium/ Heavy fuel signature: 10NC27 UV-085, and 10NC27 UV-111. The contaminant at 10NC27 UV-085 occurred between 5 and 18 feet bgs, with a maximum fluorescence of 60.1% RE. The contaminant at 10NC27 UV-111 occurred between 8 and 16 feet bgs, with a maximum fluorescence of 16.2% RE. These probe locations are totally isolated from each other.

4.5 HEAVY FUEL SIGNATURE

Heavy fuel signatures are more consistent with exotic fuels (such as transformer oil) and industrial type wastes. The Heavy fuel signature used for speciation is dominated by the

450 nm and 500 nm wave channels. The lifetimes are extremely short in all four channels, with minimal response in the 350 nm channel. These types of fuel signatures are outside the normal usage of the UVOST, making interpretation of these fuels difficult. The Heavy signature could be a fuel, such as Bunker C, or simply organics, such as peat, fluorescing in the subsurface.

Only one UVOST/LIF probe contained responses with a Heavy fuel signature: 10NC27 UV-107. This contaminant occurred between 11.5 and 14.5 feet bgs. The maximum response for this signal was 66.7% RE. This was the only UVOST location that yielded this Heavy fuel signature.

4.6 NORTHEAST MAIN OPERATIONS COMPLEX AND FORMER FUEL TANK PAD (NC11)

A total of 21 UVOST/LIF probes at Area NC11 contained noticeable responses similar to the Light and Light/ Medium fuel signature. It was typical in most locations for the Light signature to be included with a Light/ Medium signature. The Light fuel signature was often in the more shallow depths with the Light/ Medium directly underneath. This occurs when portions of the contaminant are better preserved over time, likely due to the interaction of the contaminant at the groundwater interface.

Eleven (11) UVOST locations yielded LIF responses greater than 25% RE. Of these, five yielded responses greater than 50% RE and five yielded responses greater than 100% RE. These locations included 10NC11 UV-022 (148.5% RE), 10NC11 UV-026 (142.2% RE), 10NC11 UV-031 (395.8% RE), 10NC11 UV-035 (310.2% RE), and 10NC11 UV-052 (131.4% RE). Location 10NC11 UV-031 yielded the greatest LIF response of the entire project, at 395.8% RE. The depth of contamination ranged from 2 to 20 feet bgs, with typically the upper range of 2 to 8 feet bgs being better preserved and the lower range of 8 to 20 feet bgs being considerably more degraded. There was definite indication of peat in wide-range areas of the site, but not in all logs. This peat layer was typically between 2 to 10 feet bgs and had a background fluorescence around 2% to 2.5% RE. There seemed to be no apparent correlation between the depth of the contaminant and the peat layers. Although, there did seem to be indications that the contamination in the peat layers was better preserved.

4.6.1 Northeast MOC and Former Fuel Tank Pad - 9.2% RE Plume

Twenty-two (22) UVOST locations at Area NC11 yielded LIF responses greater than 9.2% RE.

4.7 NORTHWEST MAIN OPERATIONS COMPLEX (NC27)

A total of 107 UVOST/LIF probes at Area NC27 contained noticeable responses similar to the Light and Light/ Medium fuel signature. As in the Northeast MOC, it was typical in most locations for the Light signature to be included with a Light/ Medium signature. The Light fuel signature was often in the more shallow depths, with the Light/ Medium directly underneath. This occurs when portions of the contaminant are better preserved over time, likely due to the interaction of the contaminant at the groundwater interface.

Twenty-nine (29) UVOST locations yielded LIF responses greater than 25% RE. Of these, 14 yielded responses greater than 50% RE and 7 yielded responses greater than 100% RE. These locations included 10NC27 UV-017 (172.5% RE), 10NC27 UV-030 (265.8% RE), 10NC27 UV-058 (277.3% RE), 10NC27 UV-061 (122.8% RE), 10NC27 UV-063 (310.3% RE), 10NC27 UV-74 (177.9% RE), and 10NC27 UV-077 (301.3%RE). Location 10NC27 UV-063 yielded the greater LIF response in this area at 310.3% RE. Figure 2 represents the contaminated area by maximum %RE.

The depth of contamination ranged from 2 to 20 feet bgs, with typically the upper range of 2 to 8 feet bgs being better preserved and the lower range of 8 to 20 feet bgs being considerably more degraded. There was definite indication of peat in wide-range areas of the site, but not in all logs. This peat layer was typically between 2 to 10 feet bgs and had a background fluorescence around 2% to 2.5% RE. A typical example of the peat response can be observed in 10NC27 UV-012 and 10NC27 UV-015. There was definitive signs that some contaminant was within the peat layer as observed in 10NC27 UV-005 and 10NC27 UV-010; although, most of the heavier contaminated areas were beneath the peat layer or in areas where the peat seemed to be absent. There seemed to be no apparent correlation between the depth of the contaminant and the peat layers. Waveform data indicates that the contamination in the peat layers was better preserved.

4.7.1 Northwest Main Operations Complex- 9.2% RE Plume

Sixty-nine (69) UVOST locations at Area NC27 yielded LIF responses greater than 9.2% RE. Figure 2 represents the contaminated area with maximum fluorescence greater than 9.2% RE. Figure 3 is representative of the assumed area of contaminant concentrations greater than 9,200 ppm.

4.8 CORRELATION SAMPLING AND EVALUATION

Twenty-three (23) soil samples were collected in the field and screened using the UVOST/LIF equipment. The samples were analyzed for DRO and RRO on site using a field gas chromatograph (GC) unit. The POL concentrations in the soil were correlated with the percent fluorescence readings obtained during UVOST/LIF soil screening. Sample locations were chosen based on UVOST results. For correlation, the intent is to collect samples in a range of low (1% to 6% RE), medium (6% to 15% RE), and high (greater than 15% RE) in-situ LIF responses, to enable comparison of POL concentration and fluorescence over a range of contaminant levels. Typically, “clean” samples are taken to verify the lack of false positive readings. Soil boring logs for the correlation sampling probes are provided in Attachment 2.

Soil for the sample is homogenized in a plastic bag and then screened using the UVOST/LIF to determine ex-situ fluorescence. This screening data is used to correlate fluorescence with the field GC-measured DRO concentration. Variability in concentration exists within the sample jar. Similarly, variability also exists within the homogenized soil. An attempt to counter this variability is done by screening 3 to 4 different volumes of soil to determine an average from each sample.

The following table (Table 1) compares LIF screening of each sample and the corresponding analytical lab data (LIF Response is measured as the Recorded %RE minus the Background %RE).

Table 1 Correlation Data LIF Responses vs. Analytical Results

Sample ID	LIF Probe ID	In-Situ LIF Response (Average %RE)	Ex-Situ LIF Response (%RE)	DRO (mg/kg)	Correlation (DRO vs %RE)
Low Range		**1 - 6**			
NC11 SB-10, 2-4	10NC11 UV-010	5.8	1.2 – 1.4	111	93
NC11 SB-10, 6-8	10NC11 UV-010	5.4	1.1 – 2.1	26,003	16,320
NC27 SB-9, 8-11	10NC27 UV-009	5.6	2.4 – 3.3	3,329	1,080
NC27 SB-61, 0-5	10NC27 UV-061	5.3	3.2 – 5.7	14,604	2,920
NC27 SB-74, 8-10	10NC27 UV-074	2.3	1.5 – 3.4	3,183	1,330
NC27 SB-95, 15-17	10NC27 UV-095	5.9	1.0 – 1.2	602	500
Medium Range		**6 - 15**			
NC11 SB-12, 6-8	10NC11 UV-012	8.0	17 – 44	18,777	670
NC11 SB-13, 4-6	10NC11 UV-013	15.0	5 – 16	45,482	2,800
NC11 SB-16, 4-8	10NC11 UV-016	7.4	10	34,936	3,500
NC11 SB-52, 10-12	10NC11 UV-052	12.3	5 – 11	2,963	370
NC11 SB-52, 15-16	10NC11 UV-052	6.1	3.2 – 12	2,482	496
NC27 SB-8, 2-4	10NC27 UV-008	13.4	8 – 11	38,144	4,015
NC27 SB-99, 12-16	10NC27 UV-099	13.4	6.3 – 20	9,907	708
NC27 SB-103, 14-16	10NC27 UV-103	12.9	4.1 – 10	6,802	972
NC27 SB-136, 15-17	10NC27 UV-136	7.6	5.5 – 6.9	2,840	450
High Range		**Greater 15**			
NC11 SB-26, 9-11	10NC11 UV-026	36.6	1.0 – 1.2	1,085	986
NC27 SB-17, 14-17	10NC27 UV-017	15.5	30 – 73	16,486	300
NC27 SB-23, 6-9	10NC27 UV-023	22.0	9.5 – 10.5	20,779	2,080
NC27 SB-58, 13-17	10NC27 UV-058	47.0	1.3 – 2.3	2,403	1,200
NC27 SB-61, 5-8	10NC27 UV-061	16.3	1.2 – 2.6	1,302	650
NC27 SB-77, 9-11	10NC27 UV-077	48.3	Clean	ND	NA
NC27 SB-85, 12-16	10NC27 UV-085	22.9	3.6 – 16	1,389	107
NC27 SB-110, 8-10	10NC27 UV-110	15.6	1.0 – 1.2	86	86

Notes:

%RE	=	percent relative emittance	mg/kg	=	milligrams per kilogram
DRO	=	diesel range organics	NA	=	not applicable
LIF	=	Laser-Induced Fluorescence	ND	=	non-detect

In general, the UVOST probe locations that yielded LIF responses produced elevated analytical results. Unfortunately, the correlation between the ex-situ UVOST screening and the field GC analytical results did not follow a typical linear progression. The optimal correlation range for any UVOST investigation is between 100 ppm and 250 ppm per 1% RE. The raw correlation for this particular site ranged from 86 ppm to 16,320 ppm per 1% RE, with the average range from 500 ppm to 1,500 ppm. Once the standard 10% outliers were removed, this range became 300 ppm to 2,800 ppm per 1% RE, with an average range of 500 ppm to 1,000 ppm. This is obviously outside the optimal range.

To determine a correlation that is statistically sound, reasonable, and conservative, three differing statistical averages were considered. First, the most considerable outliers were removed; this included only NC11 SB-10, 6-8 (16,320). This yielded a mean-type average of 1,186 ppm per 1% RE. Second, an equal number (equal to 10% of the entire data set) of both high and low outliers were removed; this included NC11 SB-10, 6-8 (16,320), NC27 SB-8, 2-4 (4,015), and NC11 SB-16, 4-8 (3,500), on the high-end and NC27 SB-110, 8-10 (86), NC11 SB-10, 2-4 (93), and NC27 SB-85, 12-16 (107) on the low end. This yielded a mean-type average of 1,007 ppm per 1% RE. Finally, the samples were grouped into subsets with 500 ppm per 1% RE intervals. The results were as follows: 0-500 ppm = 8; 501-1,000 ppm = 6; 1,001-1,500 ppm = 2; 1,501-2,000 = 0; 2,001 and above = 6. There are 14 of the 22 correlations less than 1,000 ppm per 1% RE, with the largest group being 501-1,000 ppm per 1% RE at 8 samples.

Evaluation of the three statistical methods suggest a correlation value of 1% RE per 1,000 ppm is statistically sound and conservative. Past experiences at sites with ranging correlations have prompted the use of a conservative standard of 1% RE per 1,000 ppm. Thus, this value is conservative for this site.

There can be a variety of factors that can influence the correlation of ex-situ LIF readings and analytical data. These factors can include the age of the contamination, the depth of the contaminated zone, infiltration rate (percolation) and elevated rainfall, the hydraulic conductivity of the soil at the groundwater table interface, temperature, oxygen availability, and other natural attenuation factors (i.e., microbial population). The LIF response is dependent upon the availability of PAHs to emit their radical photon. “Weathering” tends to target the smaller, more volatile, more soluble, more oxidized constituents in the fuels, such as PAHs.

Typically, diesel fuels will behave in a more "normalized" fashion, as they commonly contain around 38% PAHs. These PAHs range from the smaller benzene, toluene, ethylbenzene, and xylene (BTEX) molecules to the larger, more complex PAHs. Since UVOST does not read the BTEX constituents (as they are single benzene rings), it is the degradation of the larger PAHs that affect the LIF response. But even these PAHs will be removed over time from oxygenation, solubility, and natural attenuation. As this occurs, the LIF response will decrease while the DRO values will remain. There are far more and larger molecules with the DRO range.

Another factor that can generate errors in correlation value is differing contaminants and releases. Differing contaminants will typically weather differently under normal conditions. Differing releases can influence the correlation because the age of the contaminant is different throughout the area of investigation. At sites where there is a single release, this becomes a non-factor. But in large investigation areas, such as NE Cape where multiple sources may have contributed to multiple releases of varying contaminants, the potential for this sort of error increases substantially.

Other factors that can affect the correlation include field/ human errors and lab/ human errors. Although it can be difficult to admit and even more difficult to distinguish, human error can occur during the collection and analysis of soil sample. Because of this, it is common to expect the existence of outliers. A prime example of this sort of field error outlier is NC11 SB-10, 6 to 8 feet Every indication suggests that this specific correlation result is the product of a field error, either through a miscommunication during the sampling process or a simple human error such as a mistaken label. Within any quality assurance/quality control (QA/QC) process, there are a variety of steps taken to ensure the data obtained is as accurate as possible. That said, human error can sometimes occur. As a result, the removal of obvious outliers such as NC11 SB-10, 6 to 8 feet is part of this particular QA/QC process. Past field experience has shown that as much as 20% of outliers (10% high and 10% low) can be normal.

4.9 9.2% RE PLUME

One of the goals of the UVOST investigation was to determine the area with contamination above 9,200 ppm for the purpose of a Remedial Action/ Excavation. Using the above correlation of 1% RE per 1,000 ppm, an LIF response value of 9.2% RE was used as the excavation boundary. Figure 3 addresses the 2-D geographic boundary of this contaminated area. To estimate the non- or less contaminated overburden area, contaminant vs depth calculations were needed. Due to the irregular depths of the contaminants and the large varying topography of the site, a simple 3-D depth analysis was very difficult to generate. To accomplish this, the 9.2% RE plume model was cut at 0.25-foot mean sea level (MSL) slices and then overlaid to produce figures showing the per 1.0-foot contamination in this target area. Although this is not a true weighted average over the 1.0-foot interval, it creates a visual representation of the software model's interpolation of the contamination present at the individual elevation slices. Thus, each per foot MSL figure actually contains five individual slices. Attachment 3 contains these per foot MSL figures.

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5.0 CONCLUSIONS

5.1 DISCUSSION OF CONCLUSIONS

Results from the UVOST/ LIF probes indicate the existence of multiple and high levels of POL contamination adjacent to the former fuel storage tanks and other associated former buildings at Northeast Cape, Alaska. The general principle for UVOST/LIF response is 1% RE is equal to approximately 100 ppm of [DRO] in an homogeneous sand matrix. Site-specific correlation of LIF response and soil analytical concentrations should be used when making contaminant concentration estimates.

The correlation of in-situ soil data to ex-situ soil data is challenging for both traditional soil sampling and the UVOST. When soil is removed from the subsurface many of its properties change, including density, matrix definition, and pore-space/ void ratios. Because of this, the following conclusions are made from knowledge of traditional fuel degradation properties and past experience using LIF data at “older” sites

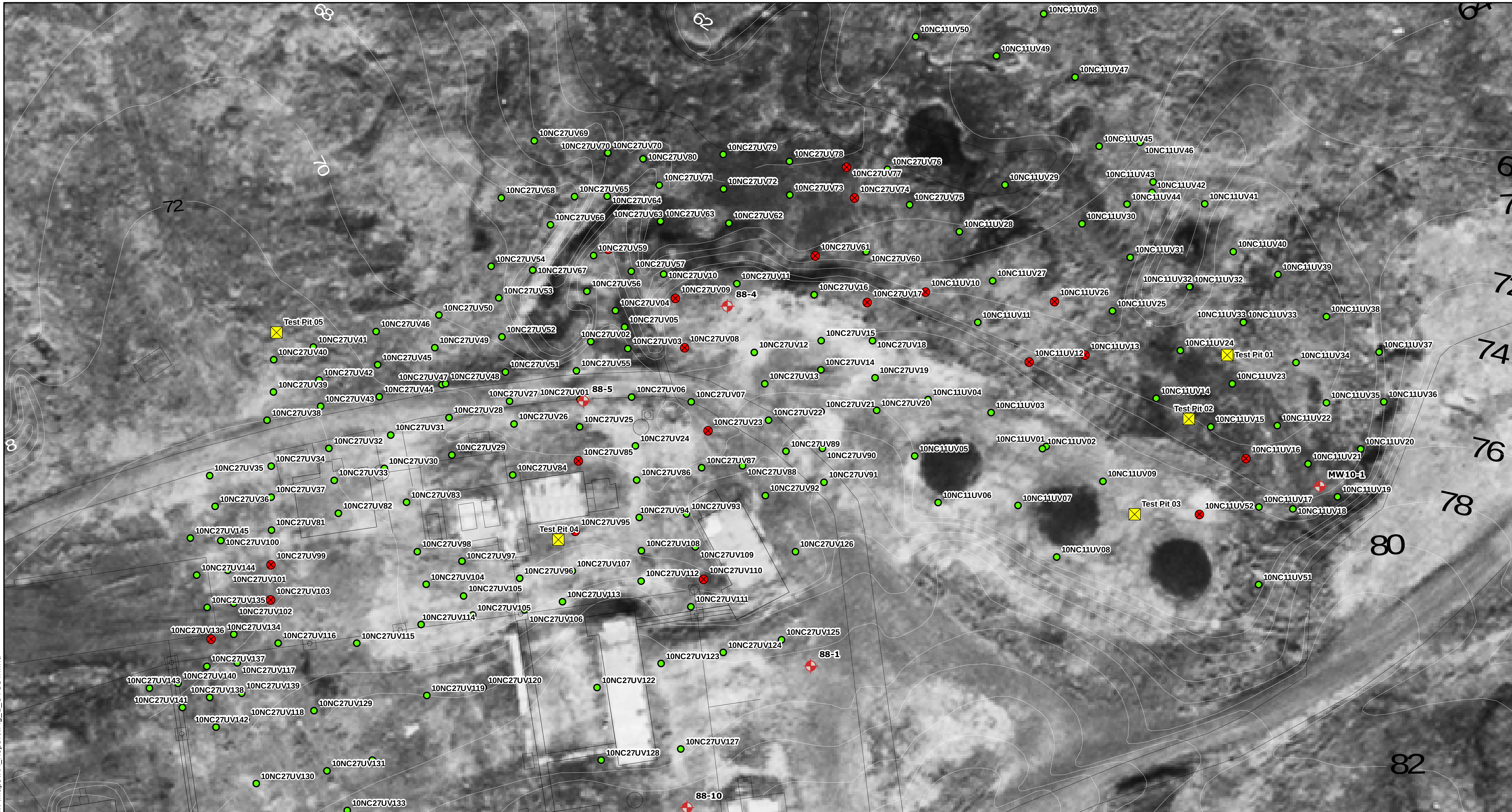
5.2 OVERALL CONCLUSIONS

The enormous amount of data acquired by this investigation makes specific conclusions very difficult to generate. There is tremendous evidence that the contamination is widespread in specific areas and includes some differing fuel types. The best way to use the generated data is through the plume maps generated by DTI and to focus on areas of obviously high levels of contamination.

The contaminated area was fully delineated on all sides. Figure 2 represents the contaminated area. Figure 3 represents the area with contamination suspected to be greater than 9,200 ppm as indicated by the UVOST investigation results. Contamination occurs at many different depths rather than a single depth, making calculation of total contaminated soil volume difficult. In most cases, the higher levels of suspected contaminant concentration are less than 12 feet bgs; however, there are high suspected contaminant concentrations as deep as 16 feet bgs in the Northwest MOC.

Additional contaminant volume calculations can be made for specific areas that would yield the greatest benefit for removal action and meet remedial action objectives. The area of 9.2% RE delineated in Figure 3 is the suggested area of contamination calculated after observing all the current data available and using past experience at sites of this type with similar degraded fuel signatures and correlation data.

FIGURES



Legend

- MOC Monitoring Well
- Correlation Location
- Test Pit
- UVOST Probe

Note: Feature and contour lines are adapted from Montgomery Watson file titled "NECAPE.DWG" dated June 5, 2001. Adjusted using resurvey performed by Eco-Land, LLC, July 2009. UVOST probe locations surveyed by Eco-Land, LLC and Trimble® GeoXH™.

N
W E
S

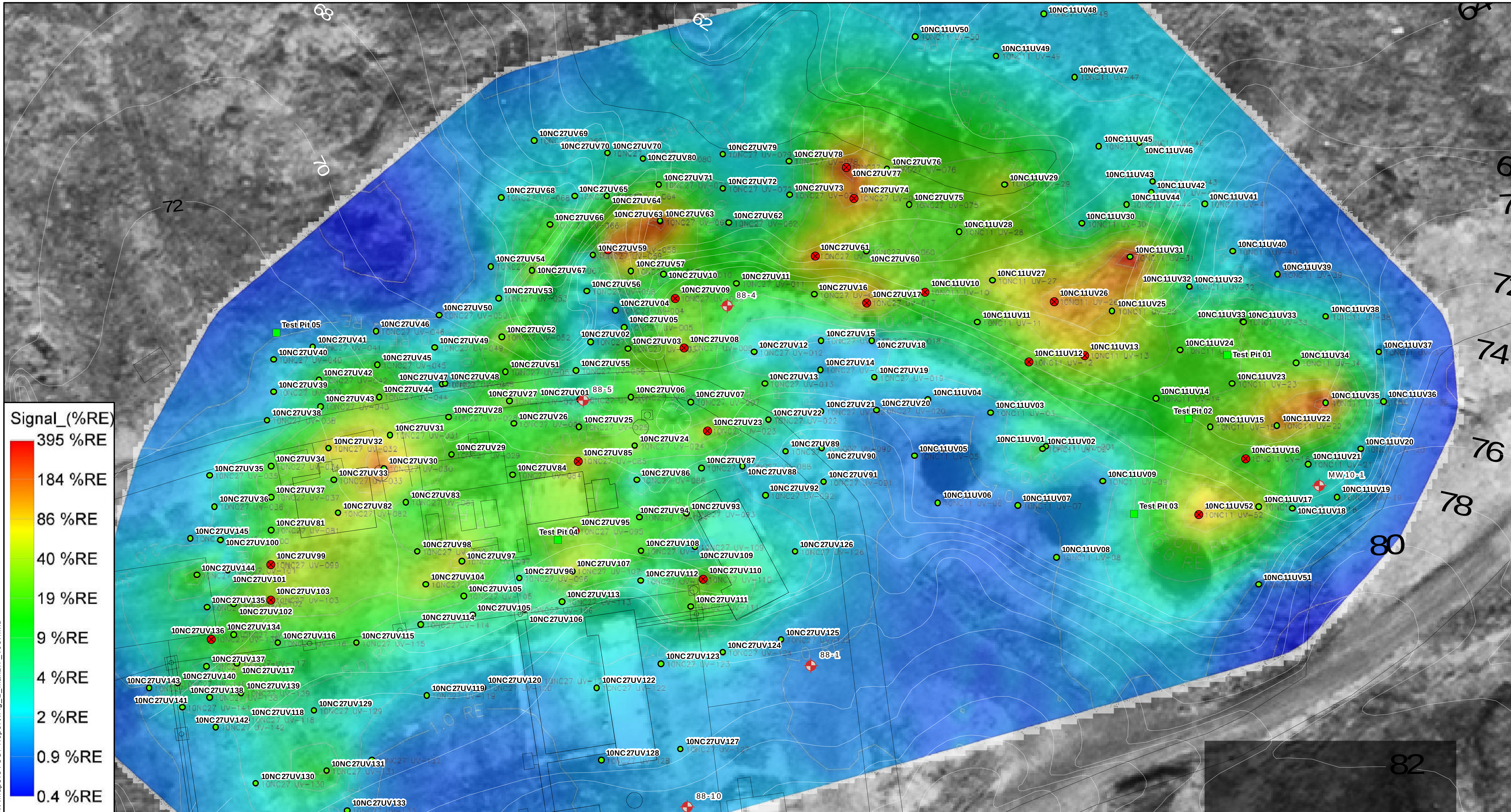
0 50 100
Feet

Figure 1
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Remedial Actions
MOC UVOST Probe Locations

Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC
Phone (907)563-0013 Fax (907)563-6713
Project No. 410026

DATUM:	DATE	01-14-11	SHEET
NAD 83	DWN.	BERS-RJ	1
PROJECTION:	SCALE	1:900	of
Alaska State Plane Zone 9	APPRVD.	BERS-MW	1

File: G:\Jobs\410026_NECape_HTRW\Maps\RA_Report\Fig_1_UVOST.mxd



Legend

- MOC Monitoring Well
- Correlation Location
- Test Pit
- UVOST Probe

Note: Feature and contour lines are adapted from Montgomery Watson file titled "NECAPE.DWG" dated June 5, 2001. Adjusted using resurvey performed by Eco-Land, LLC, July 2009. UVOST probe locations surveyed by Eco-Land, LLC and Trimble® GeoXH. Values greater than 9.2% RE are assumed to exceed the 9,200 mg/kg clean up level for DRO.

N E S W

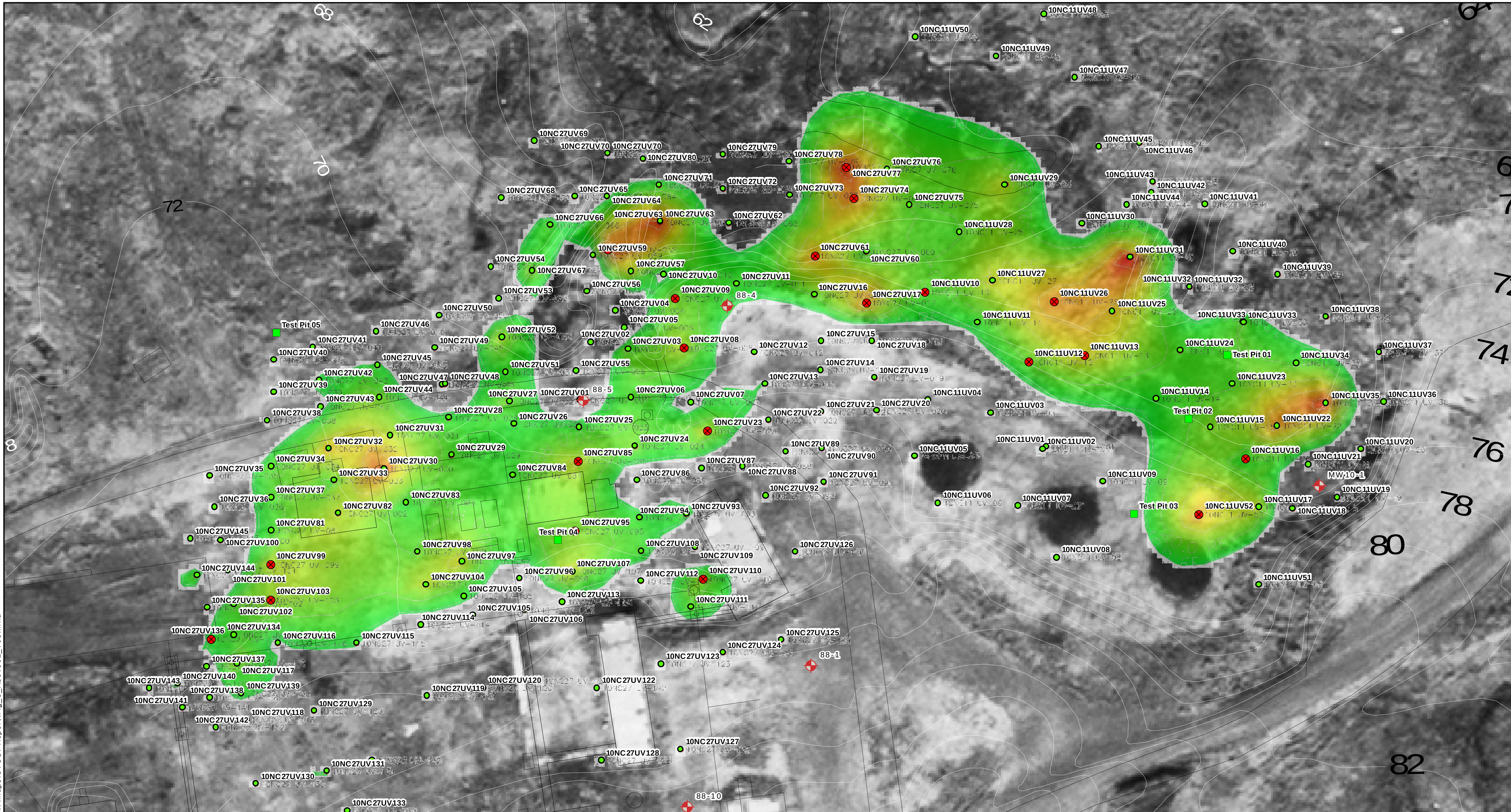
0 50 100
Feet

Figure 2
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Remedial Actions
MOC UVOST Maximum LIF Response

Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC
Phone (907)563-0013 Fax (907)563-6713
Project No. 410026

DATUM: NAD 83	DATE 07-12-11	SHEET
PROJECTION: Alaska State Plane Zone 9	DWN. BI-ME	1
	SCALE 1:900	of
	APPRVD. BERS-MW	1

File: G:\Jobs\410026_NECape_HTRW\Maps\UVOST Report\Fig_2_MaxLIF_v03.mxd



Legend

- MOC Monitoring Well
- Correlation Location
- Test Pit
- UVOST Probe

Note: Feature and contour lines are adapted from Montgomery Watson file titled "NECAPE.DWG" dated June 5, 2001. Adjusted using resurvey performed by Eco-Land, LLC, July 2009. UVOST probe locations surveyed by Eco-Land, LLC and Trimble® GeoXH. Values greater than 9.2% RE are assumed to exceed the 9,200 mg/kg clean up level for DRO.

N
W E
S

0 50 100
Feet

Figure 3
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Remedial Actions
MOC UVOST LIF Response Above 9.2%

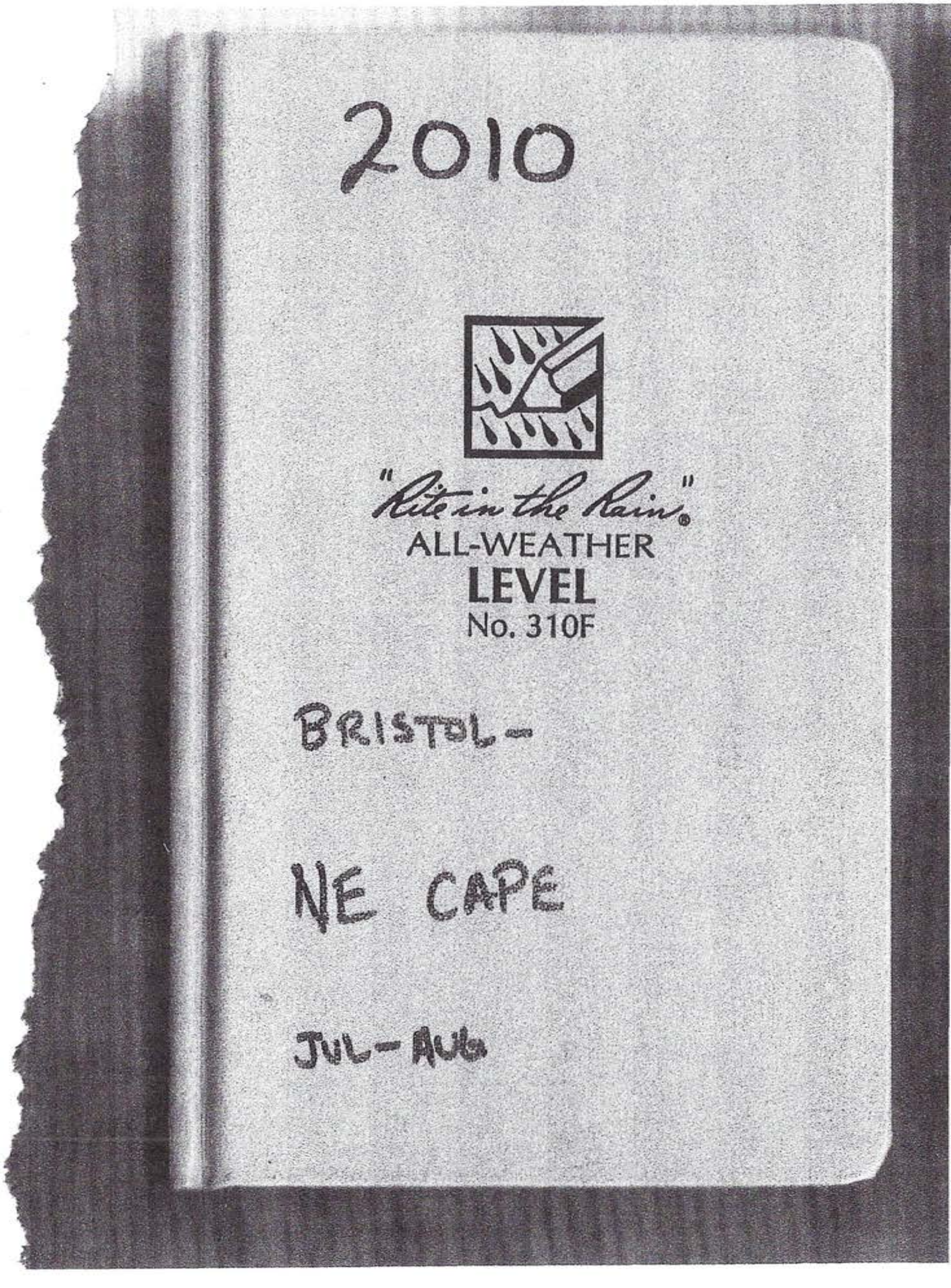
Bristol
ENVIRONMENTAL
REMEDIATION SERVICES, LLC
Phone (907)563-0013 Fax (907)563-6713
Project No. 410026

DATUM: NAD 83	DATE	07/12/11	SHEET
PROJECTION: Alaska State Plane Zone 9	DWN.	BI-ME	1
	SCALE	1:900	of
	APPRVD.	BERS-MW	1

File: G:\Jobs\410026_NECape_HTRW\Maps\UVOST Report\Fig_3_Above92_v03.mxd

ATTACHMENT 1

UVOST Probe LIF Logs


2010
"Rite in the Rain"®
ALL-WEATHER
LEVEL
No. 310F
BRISTOL -
NE CAPE
JUL-AUG

WEDS 21 JUL 2010

CAMP SET-UP
0700 - SAFETY MTG
0730 - UVOST SET-UP
1000 - ON-SITE SET-UP

NC 11 UV-001 (BACK = 0.4%)

START - 1150 DEPTH - 11.4
STOP - 1210 REFUSAL
MI √ = OK

REFUSAL LAYER @ 11.4 FT
FUEL 6 - 11 FT
MAX 8% @ 11 FT

DUMMY PUSH TO 27 FT
(12 - 27 FT RODS BENT)

TOUGH LAYER 11.5 - 12.5 FT

21 JUL

NEW SITE 27

NC 27 UV-001 (BG = 0.3%)

START - 1435
STOP - 1450
MI ✓ = OK

DEPTH - 12.7 FT
REFUSAL

FUELS 5.1 - 7.3 FT
MAX 8% @ 6 FT

NC 27 UV-002 (BG = 0.4%)

START - 1500
STOP - 1525
MI ✓ = OK

DEPTH - 18.8 FT
STOPPED

SMALL FUELS 3.5 - 6 FT
MAX 3%

SCRATCH ON WINDOW; DIDN'T EFFECT MI.
DAMPNER BROKE

NC 27 UV-003 (BG = 0.4%)

START - 1540
STOP - 1555
MI ✓ = OK

DEPTH - 14 FT
REFUSAL

FUELS 5 - 7.5 FT
MAX 23% @ 5.3 FT

NC 27 UV-004 (BG = 0.3%)

START - 1610
STOP - 1625
MI ✓ = OK

DEPTH - 18.9 FT
STOPPED

CLEAN

21 JUL

NC 27 UV-005 (BG = 0.4%)

START - 1700
STOP - 1715
M|V = OK

DEPTH - 17 FT
STOPPED

SMALL FUEL 6-7 FT
MAX 3% @ 6.2 FT

NC 27 UV-006 (BG = 0.3%)

START - 1730
STOP - 1740
M|V = OK

DEPTH - 16 FT
STOPPED

FUEL 1-6 FT
MAX 17% @ 4.5 FT

NC 27 UV-007 (BG = 0.5%)

START - 1755
STOP - 1805
M|V = OK

DEPTH - 16.32
STOPPED

FUELS 1 - 9 FT
MAX 10% @ 8 FT

NC 27 UV-008 (BG - 0.3%)

START - 1820
STOP - 1835
M|V = OK

DEPTH - 16 FT
STOPPED

FUELS 2.5 - 7.5 FT
MAX 45% @ 4 FT

21 JUL

NC 27 UV-009 (BG-0.3%)

START - 1845 DEPTH - 20 FT
STOP - 1900 STOPPED
MIV = OK, LITTLE LOW
- LASER RECHARGE -

FUELS 5 - 10 FT
MAX 28% @ 9 FT

THURS 22 JUL

- SUPER WINDY / RAINY
- WARM-UP ISSUES

NC 27 UV-010 (BG = 0.4%)

START - 1005 DEPTH = 16 FT
STOP - 1025 STOPPED
MIV = OK

FUELS 2.5 - 9 FT
MAX 10% @ 5.5 FT

NC 27 UV-11 (BG - 0.3%)

START - 1110 DEPTH - 20 FT
STOP - 1130 STOPPED
MIV - OK

FUELS 10 - 18 FT
MAX 14% @ 17 FT

~~TOO WINDY~~

- WINDS TOO STRONG
- ROD BENT
- STOP WORK

FRI 23 JUL

NC 27 UV-12 (BG - 0.3%)

START - 0915
STOP - 0925
M | ✓= OK

DEPTH - 17.5 FT
STOPPED

SMALL FUELS 0.5 - 1 FT
MAX 0.8%
SMALL FUELS 14-15 FT
MAX 1.4%

NC 27 UV-13 (BG - 0.4%)

START - 0940
STOP - 0955
M | ✓= OK

DEPTH - 16 FT
STOPPED

FUELS 1 - 6.5 FT
MAX 10% @ 6 FT

NC 27 UV-14 (BG - 0.3%)

START - 1010
STOP - 1020
M | ✓= OK

DEPTH - 16 FT
STOPPED

SMALL FUL @ 11 FT (1.6%)
OTHERWISE CLEAN

NC 27 UV-15 (BG - 0.3%)

START - 1055
STOP - 1115
M | ✓= OK

DEPTH - 16 FT
STOPPED

CLEAN

23 JUL

NC27 UV-16 (BG - 0.2%)

START - 1120
STOP - 1135
MI √ = OK

DEPTH - 20 FT
STOPPED

FUELS 11.5 - 18.5 FT
MAX 19% @ 14.7 FT

NC27 UV-17 (BG - 0.2%)

START - 1145
STOP - 1200
MI √ = OK

DEPTH - 22 FT
STOPPED

FUEL 7.5 - 21 FT
MAX 173% @ 15.5 FT

NC27 UV-18 (BG - 0.2%)

START - 1210
STOP - 1225
MI √ = OK

DEPTH - 18 FT
STOPPED

SMALL FUELS 6 - 16 FT
MAX 2.2% @ 7 FT

NC27 UV-19 (BG - 0.5%)

START - 1410
STOP - 1450
MI √ -

DEPTH - 17 FT
ROD SNAPPED @ PROBE

FUELS 1 - 17 FT
MAX 5% @ 12.5 FT

NEW FIBER-OPTIC, PROBE, ETC.

23 JUL

NC 27 UV - 20 (BG - 0.5%)

START - 1525 DEPTH - 8 FT
STOP - 1530 REFUSAL
M|√ =

NEAR TANKS ; BE PART OF NC11

NC 27 UV-21 (BG - 0.6%)

START - 1550 DEPTH - 16 FT
STOP - 1600 STOPPED
M|√ = OK

VERY SMALL SURFACE HIT (1.4% @ 1.7 FT)

CLEAN

NC 27 UV-22 (BG - 0.9%)

START - 1610 DEPTH - 16 FT
STOP - 1630 STOPPED
M|√ = OK

SCRATCH ON WINDOW, BG A BIT ↑
FUELS 3.5 - 4.5 FT
MAX 6.4% @ 4.3 FT

NC 27 UV 23 (BG - 0.7%)

START - 1650 DEPTH - 16 FT
STOP - 1705 STOPPED
M|√ = LITTLE LOW (NEEDS RECHARGE)

FUELS 5 - 10 FT
MAX 60% @ 7 FT

SAT 24 JUL

COLD, RAINY / MISTING

NC 27 UV-24 (BG - 0.8%)

START - 0915
STOP - 0935
M/√= OK

DEPTH - 16 FT
STOPPED

FUELS 1 - 9.5 FT
MAX 27% @ 8.5 FT

NC 27 UV-25 (BG - 0.8%)

START - 0950
STOP - 1025
M/√= OK

DEPTH - 20 FT
STOPPED

FUELS 3 - 18 FT
MAX 13.% @ 17.5 FT

NC 27 UV-26 (BG - 0.9%)

START - 1045
STOP - 1055
M/√= OK

DEPTH - 20 FT
STOPPED

FUELS 8 - 19 FT
MAX 10% @ 18.3 FT

NC 27 UV-27 (BG - 0.8%)

START - 1110
STOP - 1125
M/√= OK

DEPTH - 22
STOPPED

FUELS 11 - 21 FT
MAX 27% @ 17 FT

27 JUL

NC 27 UV-28 (BG-0.7%)

START - 1135
STOP - 1150
MI√= OK

DEPTH - 21 FT
STOPPED

FUELS 6 - 20 FT
MAX 13% @ 18.2 FT

3 REFUSALS (LUNCH)

= PUT ON NEW WINDOW

NC 27 UV-29 (BG-0.8%)

START - ~~1200~~ 1330
STOP - 1350
MI√=

DEPTH - 21.3 FT
STOPPED

FUELS 6.5 - 18 FT
MAX 18% @ 12.5 FT

3 BENT RODS; WINDOW SMASHED (PROBABLY @ 18 FT)
PROBE & LEAD BENT

NEW SET-UP; CHARGED LASER

NC 27 UV-30 (BG-0.7%)

START - 1530
STOP - 1545
MI√= OK

DEPTH - 23.1 FT
STOPPED

FUELS 8-21.5 FT
MAX 265% @ 16.2 FT

NC 27 UV-31 (BG-0.5%)

START - 1555
STOP - 1610
MI√= OK

DEPTH - 23.1 FT
STOPPED

FUELS 5 - 22 FT
MAX 47% @ 13.5 FT

24 JUL

NC 27 UV-32 (BG - 0.5%)

START - 1630
STOP - 1645
MIV - OK

DEPTH - 23.7 FT
REFUSAL

FUELS 8-23 FT
MAX 94% @ 17 FT

3 BENT RODS; STRAIGHTENED WITH GEOPROBE DRILL (OK FOR NOW)

PRE-DRILLED 7 TIMES

NC 27 UV-33 (BG - 0.5%)

START - 1755
STOP - 1805
MIV = OK

DEPTH - 18.7 FT
REFUSAL

FUELS 11-17 FT
MAX 15% @ 16 FT

PRE-DRILLED 6 TIMES

NC 27 UV-34 (BG - 0.5%)

START - 1830
STOP - 1840
MIV = OK

DEPTH - 23 FT

FUELS 12-21 FT
MAX 19% @ 17.5 FT

SUN 25 JUL

WINDY, COLD

NC27 UV-35 (BG- 0.6%)

START- 0830 DEPTH - 20 FT
STOP- 0850 STOPPED
MI √ = OK

CLEAN

(NEW WINDOW)

NC27 UV-36 (BG - 0.6%)

START-0925 DEPTH- 20 FT
STOP- 0940 STOPPED
MI√= OK

CLEAN

AHH!! FLAT TIRE!

NC27 UV-37 (BG-0.5%)

START - 1040 DEPTH - 21 FT
STOP- 1055 STOPPED
MI √ = LOW - LASER RECHARGE

FUELS 11-19 FT
MAX 16% @ 16.5 FT

NC27 UV-38 (BG- 0.6%)

START - 1130 DEPTH - 20 FT
STOP- 1145 STOPPED
MI√= OK

SMALL FUELS 12-14 FT
MAX 2% @ 12.5 FT

25 JUL

NC 27 UV-39 (BG — 0.6%)

START - 1155
STOP - 1210
MIV = OK

DEPTH - 20 FT
STOPPED

SMALL FUELS 9-12 FT
MAX 3.7% @ 11.5 FT

NC 27 UV-40 (BG - 0.8%)

START - 1330
STOP - 1345
MIV = OK

DEPTH - 18 FT
STOPPED

CLEAN

NC 27 UV-41 (BG - 0.7%)

START - 1400
STOP - 1415
MIV = OK

DEPTH - 17.8 FT
STOPPED

CLEAN

NC 27 UV-42 (BG - 0.8%)

START - 1450
STOP - 1510
MIV = OK

DEPTH - 20 FT
STOPPED

FUELS 10-18 FT
MAX 13% @ 15 FT

25 JUL

NC27 UV-43 (BG-0.7%)

START-1530 DEPTH- 17.7 FT
STOP- 1545 STOPPED
MI/ = OK

FUELS 7.5 - 13.5 FT
MAX 6% @ 9 FT

NC27 UV-44 (BG- 0.8%)

START- 1555 DEPTH- 17.7 FT
STOP- 1610 STOPPED
MI/ = OK

FUELS 8.5 - 13 FT
MAX 27% @ 9.5 FT

NC 27 UV-45 (BG- 0.8%)

START- 1625 DEPTH - 17.6 FT
STOP- 1640 STOPPED
MI/ = OK

FUELS 11.5 - 16.5 FT
MAX 14% @ 13 FT

NC 27 UV-46 (BG-0.7%)

START - 1655 DEPTH - 17.6 FT
STOP - 1705 STOPPED
MI/ = OK

CLEAN

25 JUL

NC27 UV-47 (BG-0.7%)

START - 1730 DEPTH - 20 FT
STOP - 1745
M|V= / WINDOW SMASHED

LITTLE FUELS 7-16 FT
MAX 2% @ 15 FT

NOT SURE WHERE IN PUSH WINDOW SMASHED. MAY HAVE TO RE-PUSH.

LEAD ROD BENT. RE-SET.

MONDAY 26 JUL

NICE, WARM

REDO OF UV-47

NC 27 UV-48 (BG-0.6%)

START-0850 DEPTH-17.6 FT
STOP-0910 STOPPED
MIV= LITTLE LOW; RECHARGE TIME.

SMALL FUELS 9-14 FT
MAX 2.4% @ 9. FT

(2 BENT RODS - REBENT STRAIGHT)

NC 27 UV-49 (BG-0.6%)

START-1030 DEPTH-20 FT
STOP-1050 STOPPED
MIV= OK

FUELS 14-18 FT
MAX 4% @ 16.8 FT

NC27 UV-50 (BG-0.8%)

START-1105 DEPTH-17.4 FT
STOP-1120 STOPPED
MIV= OK

CLEAN

NC27 UV-51 (BG-0.7%)

START-1130 DEPTH-17.5 FT
STOP-1145 STOPPED.
MIV= OK

FUELS 10-11.5 FT
MAX 12% @ 10.5 FT

26 JUL

NC 27 UV-52 (BG-0.7%)

START-1200
STOP-1215
MI√= OK

DEPTH - 17.4 FT
STOPPED

FUELS 11.5 - 14.5 FT
MAX 39% @ 13.2 FT

NC 27 UV-53 (BG-0.8%)

START-1305
STOP-1320
MI√= OK

DEPTH- 17.5 FT
STOPPED

FUELS 12-13 FT
MAX 6% @ 12.5 FT

NC 27 UV-54 (BG-0.8%)

START-1330
STOP-1345
MI√= OK

DEPTH - 16.4 FT
REFUSAL

CLEAN

NC 27 UV-55 (BG-0.8%)

START-1410
STOP-1425
MI√= OK

DEPTH- 16 FT
STOPPED

SMALL FUELS @ 3, 8, 9.5 FT
MAX 4% @ 3 FT

PRETTY CLEAN HOLE

26 JUL

NC 27 UV-56 (BG - 0.9%)

START - 1440
STOP - 1450
MI√ = OK

DEPTH - 14.5 FT
REFUSAL

CLEAN

NC27 UV-57 (BG - 0.8%)

START - 1500
STOP - 1515
MI√ = OK

DEPTH - 17 FT
STOPPED

FUELS 0 - 4 FT
MAX 11% @ 3 FT

FUELS 14.5 - 16 FT
MAX 53% @ 14.5 FT

NC27 UV-58 (BG - 0.8%)

START - 1600
STOP - 1620
MI √ = OK

DEPTH - 20 FT
STOPPED

FUELS 0-6 FT
MAX 83% @ 4 FT
FUELS 11 - 18 FT
MAX 27% @ 14 FT

NC27 UV-59 (BG - 0.7%)

START - 1635
STOP - 1650
MI√ = OK

DEPTH - 17.4 FT
STOPPED

SMALL FUELS 12 - 16 FT
MAX 4% @ 14.5 FT

26 JUL

NC 27 UV-60 (BG-0.8%)

START - 1710
STOP - 1725
MIV = OK

DEPTH - 16 FT
STOPPED

FUELS 3 - 6 FT
MAX ~~7.5%~~ 8% @ 4.5 FT

FUELS 7.5 - 9 FT
MAX 15% @ 8 FT

NC 27 UV-61 (BG-0.8%)

START - 1735
STOP - 1750
MIV = OK

DEPTH - 14.7 FT
STOPPED

FUELS 0 - 3 FT
MAX 12.3% @ 2.5 FT

FUELS 5.5 - 8 FT
MAX 12.3% @ 7.5 FT

TUES 27 JUL

- OUT OF TOOLING ; RESET 2 SET-UPS
- TRANSFERRED DATA
- FIXED DAMPNER

NC27 UV-62 (BG-0.9%)

START - 1325
STOP - 1340
MIV = OK

DEPTH - 16 FT
STOPPED

FUELS 0-7 FT / ALL SMALL AFTER 2 FT
MAX 10% @ 1.5 FT

NC27 UV-63 (BG-1.0%)

START - 1355
STOP - 1410
MIV = OK

DEPTH - 16 FT
STOPPED

FUELS 0-3 FT
MAX 14% @ 0.7 FT
FUELS 6-12 FT
MAX 310% @ 10.5 FT

NC27 UV-64 (BG-1.0%)

START - 1430
STOP - 1445
MIV = OK

DEPTH - 16 FT
STOPPED

FUELS 8% @ 2 FT
FUELS 6-8 FT
MAX 9% @ 6.7 FT

NC27 UV-65 (BG-0.9%)

START - 1455
STOP - 1510
MIV = OK

DEPTH - 16 FT
STOPPED

CLEAN

27 JUL

NC27 UV-66 (BG - 0.9%)

START - 1525
STOP - 1540
MI√ = OK

DEPTH - 19.3 FT
STOPPED

FUELS 13-15 FT
MAX 16% @ 13.7 FT

NC27 UV-67 (BG - 0.8%)

START - 1555
STOP - 1610
MI√ = OK

DEPTH - 18.7 FT
STOPPED

FUELS 9.5 - 16 FT
MAX 30% @ 15.6 FT

NC27 UV-68 (BG - 0.9%)

START - 1620
STOP - 1635
MI√ = OK

DEPTH - 16 FT
STOPPED

CLEAN

NC27 UV-69 (BG - 0.8%)

START - 1645
STOP - 1700
MI√ = OK

DEPTH - 16 FT
STOPPED

CLEAN

27 OCT

NC27 UV-70 (BG-0.72o)

START-1710
STOP-1725
MIV= OK

DEPTH-16 FT
STOPPED

SMALL FUELS 0-3 FT
(MAX 42o)

MOSTLY CLEAN

2 BENT RODS ; LASER RECHARGE / DONE

WEDS
28 JUL

NC27 UV-71 (BG - 1.0%)

START - 0850 DEPTH - 12 FT
STOP - 0905 STOPPED
MIV = OK

FUELS 1.5 - 3 FT
MAX 14% @ 2.6 FT

NC27 UV-72 (BG - 0.9%)

START - 0930 DEPTH - 12 FT
STOP - 0945 STOPPED
MIV = OK

SMALL FUELS 0 - 4 FT
MAX 7% @ 0.2 FT

SMALL FUELS 7.5 - 11 FT
REALLY SMALL IN ORGANICS

NC27 UV-73 (BG - 0.9%)

START - 0955 DEPTH - 12 FT
STOP - 1010 STOPPED
MIV = OK

SMALL FUEL IN ORGANICS @ SURFACE
OTHERWISE CLEAN

NC27 UV-74 (BG - 0.9%)

START - 1015 DEPTH - 13.5 FT
STOP - 1030 STOPPED
MIV = OK

FUELS 5.5 - 8 FT
MAX 7.4 @ 7.9 FT

FUELS 9.5 - 13 FT
MAX 178 @ 10.8 FT

28 JUL

NC27 UV-75 (BG-1.0%)

START- 1110 DEPTH - 15.6 FT
STOP- 1125 STOPPED
MIV= OK ; WINDOW SCRATCHED

FUELS 2-4.5 FT
MAX 5%

FUELS 7-15 FT
MAX 20% @ 12.6 FT

- NEW WINDOW

NC27 UV-76 (BG- 0.9%)

START- 1140 DEPTH - 17 FT
STOP- 1155 STOPPED
MIV=

FUELS 8-16 FT
MAX 32% @ 8.3 FT

NC27 UV-77 (BG- 0.9%)

START - 1330 DEPTH - 12 FT
STOP - 1345 STOPPED
MIV= OK

FUELS 2-12 FT
MAX 300% @ 9.5 FT

NC27 UV-78 (BG- 0.9%)

START- 1400 DEPTH- 10.6 FT
STOP- 1410 REFUSAL
MIV= OK

FUELS @ 8.5 & 10.5 FT
MAX 7% @ 10.5 FT

28 JUL

NC27 UV- 79 (BG-1.0%)

START - 1415
STOP - 1425
MIV = OK

DEPTH - 12 FT
STOPPED

CLEAN

NC27 UV-80 (BG-0.9%)

START - 1440
STOP - 1450
MIV = OK

DEPTH - 12 FT
STOPPED

CLEAN

OUT OF THE MUCK

NC27 UV-81 (BG-0.9%)

START - 1530
STOP - 1545
MIV = LITTLE LOW; WINDOW SCRATCHED

DEPTH - 16 FT
STOPPED

FUELS 11-15 FT
MAX 13% @ 13 FT

NC27 UV-82 (BG-1.4%)

START - 1600
STOP - 1615
MIV = OK; SCRATCHES GONE

DEPTH - 20 FT
STOPPED

FUELS 12 - 20 FT
MAX 51% @ 15.3 FT

28 JUL

PREPROBED 12 TIMES;
MOVED 2 TIMES

NC27 UV-83 (BG - 0.9%)

START - 1700
STOP - 1715
MIV = OK

DEPTH - 19.2 FT
STOPPED

FUELS 9.5 - 19 FT
MAX 11% @ 13.4FT

SUPER TOUGH HOLE!

29 JUL

SAMPLING

27 UV-08: 2.5-4.5 FT

UV-09: 8 - 11 FT

UV-17: 14-17 FT

UV-23: 6.5-9 FT

UV-58:

UV 61:

UV 74:

UV 77:

FRI 30 JUL

NC27 UV-84 (BG - 1.0%)

START - 0825
STOP - 0840
MIV = OK

DEPTH - 19 FT
STOPPED

FUELS 10-18 FT
MAX 13% @ 17.7 FT

NC27 UV-85 (BG - 0.9%)

START - 0910
STOP - 0925
MIV = OK

DEPTH - 19 FT
STOPPED

VERY DIFFERENT FUEL
MED / HEAVY SIGN. (TRANSFORMER??)

FUELS 5 - 18 FT
MAX 60% @ 15.5 FT

NC27 - UV - 86 (BG - 1.1%)

START - 1000
STOP - 1010
MIV = OK

DEPTH - 16.4 FT
STOPPED

CLEAN

NC27 UV-87 (BG - 0.8%)

START - 1025
STOP - 1040
MIV = OK

DEPTH - 16 FT
STOPPED

SMALL FUELS 6.5 - 11 FT
MAX 5% @ 7.5 FT

30 JUL

NC27 UV-88 (BG - 0.9%)

START - 1045
STOP - 1100
MIV = OK

DEPTH - 16 FT
STOPPED

CLEAN

NC27 UV-89 (BG - 0.8%)

START - 1200
STOP - 1220
MIV = OK

DEPTH - 16 FT
STOPPED

CLEAN

NC27 UV-90 (BG - 1.0%)

START - 1230
STOP - 1245
MIV = OK

DEPTH - 16 FT
STOPPED

CLEAN

NC27 UV-91 (BG - 0.9%)

START - 1300
STOP - 1315
MIV = OK

DEPTH - 16 FT
STOPPED

CLEAN

30 JUL

NC27 UV-92 (BG – 1.0%)

START – 1330 DEPTH – 16 FT
STOP – 1345 STOPPED
MI √ = OK

CLEAN

NC27 UV-93 (BG – 0.9%)

START – 1410 DEPTH – 21 FT
STOP – 1425 STOPPED
MI √ = OK

FUELS 8 – 20 FT
MAX 16 % @ 9.8 FT

- 2 BENT RODS, BENT LEAD, SPOOL TOTAL LOSS.

- RESTRING, RESET, AND GO

NC27 UV-94 (BG – 0.3%)

START – 1545 DEPTH – 15.7 FT
STOP – 1600 REFUSAL
MI √ = OK; HIGH BACKGROUND

FUELS 8.5 – 14.5 FT
MAX 13 % @ 9.7 FT
WINDOW SCRATCHED AROUND 14.5 FT =
HIGH BACKGROUND

NC27 UV-95 (BG – 0.3%)

START – 1715 DEPTH – 17.7 FT
STOP – 1730 REFUSAL
MI √ = OK

FUELS 15 – 17 FT
MAX 28 % @ 16 FT

LOTS OF ROCKS IN SUBSURFACE = BIG VOIDS / HARD DRILLING

30 JUL

NC27 UV-96 (BG - 0.3%)

START - 1740 DEPTH - 20.2 FT
STOP - 1755 REFUSAL
MIV =

FUELS 6 - 20 FT
MAX 9% @ 18.3 FT

SAT 31 JUL

NC27 UV-97 (BG-0.4%)

START-0830 DEPTH- 18 FT
STOP- 0845 STOPPED
M/V= OK

FUELS 5.5 - 18 FT
MAX 63% @ 12.1 FT

NC27 UV-98 (BG-0.3%)

START-0915 DEPTH- 16 FT
STOP- 0930 STOPPED
M/V= OK

FUELS 8-15 FT
MAX 19% @ 13.1 FT

- 1 ROD BENT; LEAD BENT; SPOC TOAST!
- 2 NEW SET-UPS
- WELDED SPOC

NC27 UV-99 (BG-0.9%)

START- 1410 DEPTH - 20 FT
STOP - 1425 STOPPED
M/V= OK ∴ HIGH BACKGROUND

FUELS 12.5-20 FT
MAX 49% @ 13.3 FT

∴ WINDOW SCRATCHED AROUND 8 FT = HIGH BACKGROUND

NC27 UV-100 (BG-1.6%)

START- 1445 DEPTH- 16 FT
STOP- 1500 STOPPED
M/V= OK

CLEAN

∴ SCRATCH STILL THERE, BUT WEARING OFF. TRY ONE MORE HOLE - THEN SEE
- POLISHED OFF SCRATCH WITH BUFFING SHEET

31 JUL

NC27 UV-101 (BG - 0.6%)

START - 1515
STOP - 1530
MIV = OK

DEPTH - 16 FT
STOPPED

~~CLEAN~~ SMALL FUELS 7-12 FT
(MAX @ 2.8%)
OTHERWISE CLEAN

NC27 UV-102 (BG - 0.6%)

START - 1545
STOP - 1600
MIV = OK

DEPTH - 20 FT
STOPPED

FUELS 9-20 FT
MAX 19% @ 13.3 FT

— 1ST 2 RODS BENT —

NC27 UV-103 (BG - 0.7%)

START - 1910
STOP - 1930
MIV = OK

DEPTH - 19 FT
STOPPED

FUELS 12-19 FT
MAX 36 @ 15 FT

∴ SUPER WELD LEAD / PROBE ROD BENT BEYOND REPAIR.

LASTED 1 HOLE. EXPERIMENT GONE [illegible] AWAY.

SUN 1 AUG

NC27 UV-104 (BG - 0.8%)

START - 1100
STOP - 1120
MIV = OK

DEPTH - 20 FT
STOPPED

FUELS 8-20 FT
MAX 53% @ 16.6 FT

NC27 UV-105 (BG - 0.7%)

START - 1135
STOP - 1158
MIV = OK

DEPTH - 22 FT
STOPPED

FUELS 8.5 - 22 FT
MAX 12% @ 21.8 FT

∴ STRINGPOT NOT FUNCTIONING — NEW CABLE
— OLD CABLE ??

NC27 UV-106 (BG - 0.8%)

START - 1510
STOP - 1530
MIV = OK

DEPTH - 20 FT
STOPPED

FUELS 8 - 20 FT
MAX 7% @ 8.6 FT

NC27 UV-107 (BG - 0.8%)

START - 1540
STOP - 1555
MIV = OK

DEPTH - 15.5 FT
REFUSAL

BIG HEAVY POL 11.5 - 14 FT
MAX 67% @ 12.1 FT

LIGHTER FUEL 14 - 15.5 FT
MAX AROUND 8%

1 AUG

NC27 UV-108 (BG-0.5%)

START- 1610
STOP- 1625
MI✓= OK

DEPTH- 16.0 FT
REFUSAL

FUELS 11-12 FT
MAX 17% @ 11.3 FT

NC27 UV-109 (BG-0.7%)

START- 1640
STOP- 1655
MI✓= OK

DEPTH- 16.6 FT
REFUSAL

SMALL FUELS 9-11 FT
MAX 4% @ 10.4 FT

NC27 UV-110 (BG-0.7%)

START- 1810
STOP- 1825
MI✓= OK

DEPTH- 20 FT
STOPPED

FUELS 6-14.5 FT
MAX 41% @ 8.9 FT

NC27 UV-111 (BG-0.6%)

START- 1840
STOP- 1855
MI✓= OK

DEPTH- 16.5 FT
REFUSAL

FUELS 8-15 FT
MAX 16% @ 12 FT.

MONDAY 2 AUG

NC27 UV-112 (BG-0.6%)

START- 1030 DEPTH - 18 FT
STOP- 1050 REFUSAL
MIV= OK

FUELS 11-18 FT
MAX 7.5% @ 11.6 FT

NC27 UV-113 (BG-0.6%)

START- 1100 DEPTH - 17.5 FT
STOP- 1120 REFUSAL
MIV= OK

FUELS IN PEAT 11-17.5 FT
MAX 7% @ 13.4 FT

PRE-PROBED NEXT 8 HOLES (8-12 FT NORM)

NC27 UV-114 (BG-0.5%)

START- 1425 DEPTH - 18 FT
STOP - 1435 STOPPED
MIV= OK

FUELS 16.5 -17.5 FT
MAX 4% @ 17.1 FT
∴ OTHERWISE CLEAN

NC27 UV-115 (BG-0.5%)

START- 1445 DEPTH - 20 FT
STOP- 1500 STOPPED
MIV= OK

FUELS 11.5 - 20 FT
MAX 10% @ 18.1 FT

2 AUG

NC27 UV-116 (BG-0.7%)

START-1510
STOP-1520
MIV= OK

DEPTH-19 FT
STOPPED

FUELS 13-19 FT
MAX 10% @ 16.6 FT

NC27 UV-117 (BG-0.6%)

START-1535
STOP-1545
MIV= OK

DEPTH-19 FT
STOPPED

FUELS ~~13~~ 13-19 FT
MAX 32% @ 15 FT

NC27 UV-118 (BG-0.6%)

START-1550
STOP-1600
MIV= OK

DEPTH-19 FT
STOPPED

FUELS 17-19 FT
MAX 5% @ 18.9 FT

NC27 UV-119 (BG-0.7%)

START-1620
STOP-1630
MIV= OK

DEPTH-17.8 FT
STOPPED

CLEAN

2 AUG

NC27 UV-120 (BG-0.7%)

START - 1635
STOP - 1645
MIV = OK

DEPTH - 17.3 FT
STOPPED

CLEAN

NC 27 UV-121 (BG-0.7%)

START - 1700
STOP - 1710
MIV = OK ; LITTLE LOW / RECHARGE

DEPTH - 17.7 FT
STOPPED

CLEAN

NC27 UV-122 (BG-0.8%)

START - 1740
STOP - 1750
MIV = OK

DEPTH - 17.5 FT
STOPPED

SMALL FUELS 14.5-16 FT
MAX 4% @ 14.8 FT

NC27 UV-123 (BG-0.6%)

START - 1815
STOP - 1830
MIV = OK

DEPTH - 17.7 FT

SMALL FUELS 13-17.7 FT
MAX AROUND 2%

OTHERWISE CLEAN

2 AUG

NC27 UV-124 (BG- 0.6%)

START - 1925
STOP - 1940
MIV = OK

DEPTH - 17.6 FT
STOPPED

FUELS 11-17.6 FT
MAX 5% @ 15.3 FT

NC27 UV-125 (BG- 0.6%)

START - 2010
STOP - 2020
MIV = OK

DEPTH - 18.5 FT
STOPPED

CLEAN

NC27 UV-126 (BG-0.7%)

START - 2035
STOP - 2050
MIV = OK

DEPTH - 16.8 FT
STOPPED

SMALL FUELS 5-13.5 FT
MAX AROUND 3%
∴ OTHERWISE CLEAN

NC27 UV-127 (BG-)

ON PAD / TRY TOMORROW

TUES 3 AUG

NC27 UV-127 (BG-0.8%)

START- 0958 DEPTH - 18 FT
STOP- 1010 STOPPED
MIV= OK

CLEAN

NC27 UV-128 (BG-0.7%)

START- 1030 DEPTH - 18 FT
STOP- 1045 STOPPED
MIV= OK

CLEAN

NC27 UV-129 (BG-0.6%)

START- 1115 DEPTH - 18 FT
STOP- 1130 STOPPED
MIV= OK

FUELS 13-18 FT
MAX 5% @ 17 FT

NC27 UV-130 (BG-0.7%)

START- 1340 DEPTH-
STOP- 1350
MIV= OK

LITTLE FUEL 17-17.5 FT
MAX AROUND 3%

∴ OTHERWISE CLEAN

3 AUG

NC27 UV-131 (BG-0.6%)

START-1315
STOP-1325
MI ✓= OK

DEPTH-20 FT
STOPPED

FUELS 17-20 FT
MAX 13% @ 17.5 FT

NC27 UV-132 (BG-0.6%)

START-1245
STOP-1305
MI ✓= OK

DEPTH-18 FT
STOPPED

SMALL FUEL 14.5-15.5 FT
MAX AROUND 2.5%
∴ OTHERWISE CLEAN

3 BENT RODS IN PRE-PROBE

NC27 UV-133 (BG-0.7%)

START-1420
STOP-1440
MI ✓= OK

DEPTH-17.7 FT
STOPPED

SMALL FUEL 15.5-17.7 FT
MAX AROUND 2%
∴ OTHERWISE CLEAN

OVER TO SITE '11'

3 AUG

(NEXT TO UV-01)

NC11 UV-02 (BG - 0.6%)

START - 1900 DEPTH - 20 FT
STOP - 1930 STOPPED
MIV = OK

FUELS 8 - 20 FT
MAX 11% @ 11.4 FT

NC11 UV-03 (BG - 0.5%)

START - 1720 DEPTH - 12 FT
STOP - 1740 REFUSAL
MIV = OK

CLEAN TO 12 FT

(DID 4 AUG)

~~NC11 UV-04 (BG -)~~

~~START - DEPTH -~~
~~STOP -~~
~~MIV =~~

SPENT OVER 2-HRS TRYING TO PRE-PROBE; TRY LATER

(DID 4 AUG)

NC11 UV-05 (BG - 0.5%)

START - 0940 DEPTH - 17.5 FT
STOP - 1000 STOPPED
MIV = OK

CLEAN

NC11 UV-06 (BG - 0.5%)

START - 2150
STOP - 2210
MIV = OK, LOW RECHARGE

DEPTH - 17.7 FT
STOPPED

CLEAN

NC11 UV-07 (BG - 0.5%)

START - 2020
STOP - 2035
MIV = OK

DEPTH - 19 FT
STOPPED

CLEAN

NC11 UV-08 (BG - 0.5%)

START - 2110
STOP - 2130
MIV = OK

DEPTH - 19 FT
STOPPED

CLEAN

NC11 UV-09 (BG - 0.6%)

START - 1945
STOP - 2005
MIV = OK

DEPTH - 16.6 FT
REFUSAL

CLEAN

WEDS 4 AUG

STARTED ON PAD / BAD DEAL

NC11 UV-10 (BG-0.7%)

START-1410 DEPTH-16 FT
STOP-1425 STOPPED
MIV=OK

FUELS 2.5-13 FT
MAX 9% @ 4 FT
MAX 18% @ 7.2 FT

NC11 UV-11 (BG-0.6%)

START-1445 DEPTH-16 FT
STOP-1510 STOPPED
MIV=OK

FUELS 6-15 FT
MAX 11% @ 14.9 FT

BENT SPOC & ROD

NEW SUPER SPOC

NC11 UV-12 (BG-0.5%)

START-1745 DEPTH-10.6 FT
STOP-1810 REFUSAL
MIV=OK

FUELS 5-10.6 FT
MAX 19% @ 6.8 FT

NC11 UV-13 (BG-0.7%)

START-1835 DEPTH-18 FT
STOP-1850 STOPPED
MIV=OK

FUELS 2-18 FT
MAX 67% @ 11.7 FT

4 AUG

NC11 UV-14 (BG - 0.9%)

START- 1910
STOP- 1935
MIV=

DEPTH - 14 FT
STOPPED

FUELS 0 - 12 FT
MAX 12% @ 8.9 FT

NC11 UV-15 (BG- 0.8%)

START- 2120
STOP- 2135
MIV= OK

DEPTH - 15 FT
STOPPED

FUELS 2-15 FT
MAX 28% @ 4.2 FT

NC11 UV-16 (BG- 0.8%)

START- 2100
STOP- 2110
MIV= OK

DEPTH- 15 FT
STOPPED

FUELS 0- 15 FT
MAX 11% @ 8.4 FT

NC11 UV-17 (BG- 0.7%)

START- 2040
STOP- 2050
MIV= OK

DEPTH- 15.5 FT
STOPPED/REFUSAL

FUELS 0- 15.5 FT
MAX 55% @ 15.5 FT

∴ STOPPED AS DRILLING BECAME
CONSIDERABLY HARDER

4 AUG

NC11 VV-18 (BG - 0.9%)

START - 2015
STOP - 2030
MIV = OK

DEPTH - 15 FT
STOPPED

SMALL FUELS 0-8 FT
MAX AROUND 3%

THURS 5 AUG

NC11 UV-19 (BG - 0.6%)

START - 1110 DEPTH - 15 FT
STOP - 1120 STOPPED
MIV = OK

FUELS AROUND 12 FT (3%)
∴ OTHERWISE CLEAN

NC11 UV-20 (BG - 0.6%)

START - 1135 DEPTH - 15 FT
STOP - 1145 STOPPED
MIV = OK

SMALL FUELS 2-4 FT (<2%)
∴ OTHERWISE CLEAN

NC11 UV-21 (BG - 0.6%)

START - 1150 DEPTH - 15 FT
STOP - 1200 STOPPED
MIV = OK

FUELS 7-14 FT
MAX 5% @ 10.9 FT

NC11 UV-22 (BG - 0.6%)

START - 1310 DEPTH - 15 FT
STOP - 1330 STOPPED
MIV = OK

FUELS 2-15 FT
MAX 148% @ 9.5 FT

5 AUG

NC11 UV-23 (BG- 0.6%)

START- 1340
STOP- 1350
MIV= OK

DEPTH- 15 FT
STOPPED

FUELS 8-15 FT
MAX 18% @ 8.4 FT

NC11 UV-24 (BG- 0.7%)

START- 1410
STOP- 1425
MIV= OK

DEPTH - 15 FT
STOPPED

FUELS 3-6 FT
MAX 18% @ 5.3 FT

NC11 UV-25 (BG- 0.7%)

START- 1435
STOP- 1450
MIV= OK

DEPTH - 12.6 FT
REFUSAL

FUELS 1.5 - 12.6 FT
MAX 92% @ 5.5 FT

NC11 UV-26 (BG- 0.6%)

START - 1500
STOP - 1520
MIV= OK

DEPTH - 15 FT
STOPPED

FUELS 8 - 14 FT
MAX 142 @ 10.6 FT

5 AUG

NC11 UV-27 (BG - 0.7%)

START - 1530
STOP - 1545
MI√ = OK

DEPTH - 15 FT
STOPPED

FUELS 5-15 FT
MAX 59% @ 5.4 FT

NC11 UV-28 (BG - 0.8%)

START - 1555
STOP - 1610
MI√ = OK

DEPTH - 15 FT
STOPPED

LIGHT FUELS 1-9 FT
MAX 17% @ 4.2 FT

NC11 UV-29 (BG - 0.7%)

START - 1630
STOP - 1650
MI√ = OK

DEPTH - 15 FT
STOPPED

FUELS 0-11 FT
MAX 51% @ 1.3 FT

NC11 UV-30 (BG - 0.7%)

START - 1710
STOP - 1725
MI√ = OK

DEPTH - 11.6 FT
REFUSAL

CLEAN

5 AUG

NC11 UV-31 (BG-0.6%)

START - 1730
STOP - 1745
MIV = OK

DEPTH - 15 FT
STOPPED

FUELS 3 - 13 FT
MAX 396% @ 3.8 FT

NC11 UV-32 (BG-0.8%)

START - 1755
STOP - 1810
MIV = OK

DEPTH - 15 FT
STOPPED

CLEAN

NC11 UV-33 (BG-0.8%)

START - 2010
STOP - 2020
MIV = OK

DEPTH - 15 FT
STOPPED

FUELS 5-14 FT
MAX 21% @ 5.4 FT

NC11 UV-34 (BG-0.7%)

START - 1950
STOP - 2000
MIV = OK

DEPTH - 15 FT
STOPPED

FUELS 9-14 FT
MAX 16% @ 9.1 FT

5 AUG

NC11 UV-35 (BG - 0.8%)

START - 1920
STOP - 1940
MI✓ = OK

DEPTH - 13.3 FT
REFUSAL

FUELS 1-3 FT
MAX AMOUNT 23%

FUELS 8 - 13.3 FT
MAX 310% @ 9 FT

FRI 6 AUG

NC11 UV-36 (BG - 0.8%)

START - 1010
STOP - 1030
M|V = OK

DEPTH - 14.7 FT
REFUSAL

CLEAN

NC11 UV-37 (BG - 0.8%)

START - 1045
STOP - 1100
M|V = OK

DEPTH - 15 FT
STOPPED

CLEAN

NC11 UV-38 (BG - 0.8%)

START - 1110
STOP - 1125
M|V = OK

DEPTH - 15 FT
STOPPED

CLEAN

NC11 UV-39 (BG - 0.7%)

START - 1135
STOP - 1150
M|V = OK

DEPTH - 15 FT
STOPPED

CLEAN

6 AUG

NC11 UV-40 (BG - 0.7%)

START - 1325
STOP - 1340
MIV = OK

DEPTH - 15 FT
STOPPED

CLEAN

NC11 UV-41 (BG - 0.8%)

START - 1400
STOP - 1410
MIV = OK

DEPTH - 15 FT
STOPPED

CLEAN

NC11 UV-42 (BG - 0.7%)

START - 1420
STOP - 1430
MIV = OK

DEPTH - 7.5 FT
REFUSAL

FUELS 6 - 7.5 FT
MAX 9% @ 7.5 FT

(STEP-OFF 10-FT)

NC11 UV-43 (BG - 0.7%)

START - 1515
STOP - 1530
MIV = OK

DEPTH - 15 FT
STOPPED

CLEAN
(HMM?)

6 AUG

NC11 UV-44 (BG - 0.8%)

START - 1540
STOP - 1555
MIV = OK

DEPTH - 15 FT
STOPPED

FUELS 5-11 FT
MAX 5% @ 5.9 FT

NC11 UV-45 (BG - 0.9%)

START - 1605
STOP - 1615
MIV = OK

DEPTH - 15 FT
STOPPED

CLEAN

NC11 UV-46 (BG - 0.7%)

START - 1625
STOP - 1640
MIV = OK

DEPTH - 15 FT
STOPPED

FUELS / SMALL 5-11 FT
MAX AROUND 4%

NC11 UV-47 (BG - 0.7%)

START - 1650
STOP - 1710
MIV = OK

DEPTH - 15.5 FT
STOPPED

CLEAN

6 AUG

NC11 UV-48 (BG - 0.7%)

START - 1915
STOP - 1925
MIV = OK

DEPTH - 8.8 FT
REFUSAL

CLEAN

NC11 UV-49 (BG - 0.8%)

START - 1850
STOP - 1905
MIV = OK

DEPTH - 8.9 FT
REFUSAL

CLEAN

NC11 UV-50 (BG - 0.7%)

START - 1815
STOP - 1830
MIV = OK

DEPTH - 15 FT
STOPPED

CLEAN

SAT 7 AUG (BACK TO NC27)

NC27 UV-134 (BG-0.7%)

START- 1130
STOP- 1150
MIV= OK

DEPTH- 18.6 FT
STOPPED

FUELS 8-18.6 FT
MAX 14% @ 16 FT

NC27 UV-135 (BG-0.7%)

START- 1210
STOP- 1225
MIV= OK

DEPTH- 18 FT
STOPPED

FUELS 8-12 FT
AROUND 2%
MAX 5% @ 12.3 FT

FUELS 16-18 FT
MAX 6% @ 17 FT

NC27 UV-136 (BG- 0.7%)

START- 1330
STOP- 1345
MIV= OK

DEPTH- 18 FT
STOPPED

FUELS 7-18 FT
MAX 12% @ 15.4 FT

NC27 UV-137 (BG-0.7%)

START- 1400
STOP- 1420
MIV= OK

DEPTH- 18 FT
STOPPED

FUELS 15-18 FT
MAX 8% @ 15.3 FT

7 AUG

(NEW WINDOW)

NC27 UV-138 (BG-0.5%)

START-1440 DEPTH-17.7 FT
STOP-1455 STOPPED
MI✓= OK

FUELS 15-17.7 FT
MAX 5% @ 17.2 FT

NC27 UV-139 (BG-0.5%)

START-1510 DEPTH-18 FT
STOP-1525 STOPPED
MI✓= OK

FUELS 14-18 FT
MAX 13% @ 14.8 FT

NC27 UV-140 (BG-0.5%)

START-1540 DEPTH-18 FT
STOP-1600 STOPPED
MI✓= OK; LITTLE LOW

FUELS 12-18 FT
MAX 13% @ 15.9 FT

(LASER ALIGNING)

NC27 UV-141 (BG-0.5%)

START-1640 DEPTH-18 FT
STOP-1650 STOPPED
MI✓= OK

FUELS 15-18 FT
MAX AROUND 3%

7 AUG

NC27 UV-142 (BG - 0.4%)

START - 1700
STOP - 1715
MIV = OK

DEPTH - 18 FT
STOPPED

FUELS 11-18 FT
MAX 4% @ 17.5 FT

NC27 UV-143 (BG - 0.4%)

START - 1720
STOP - 1730
MIV = OK

DEPTH - 18 FT
STOPPED

SMALL FUELS 17-18 FT
MAX AROUND 2%

NC27 UV-144 (BG - 0.6%)

START - 1850
STOP - 1910
MIV = OK

DEPTH - 18 FT
STOPPED

FUELS 10-18 FT
MAX 19% @ 16.8 FT

NC27 UV-145 (BG - 0.5%)

START - 1920
STOP - 1935
MIV = OK

DEPTH - 18 FT
STOPPED

CLEAN

THAT'S IT. BACK TO NC11

7 AUG

NC11 UV-51 (BG-0.5%)

START- 1955
STOP- 2015
MIV= OK

DEPTH- 18 FT
STOPPED

CLEAN

NC11 UV-52 (BG-0.5%)

START- 2025
STOP- 2045
MIV= OK

DEPTH- 20 FT
STOPPED

FUELS 4- 19 FT
MAX 131% @ 17.7 FT

11	SB-10	2-4	111	1.4%		80			
	SB-10	6-8	26,003	2.3%	2.3	11,305			
	SB-12	6-8	18,777	46.3%	32	405	586		
	SB-13	4-6	45,482	16.3%	10	2790	4548		
	SB-16	4-8	34,936	10.3%	10	3391	3494		
	SB-26	9-11	1,088	1.2%	1.2	904			
	SB-52	10-12	2,963	11.5%	8	257	370		
	SB-52	15-16	2,482	12.2%	5	203	500		
	SB-99	12-16	9,027	20.2%	12	450	758		
27	SB-8	2-4	38,144	10.6%	8	3598	4768		
	SB-9	8-11	3329	3.4%	3	980	1111		
	SB-17	14-17	16,486	91.4%	60	180	274		
	SB-27/23	6-9	18,422	11.2%	10	1645	1842		
	SB-58	13-17	2403	2.4%	1.5	1000	1600		
	SB-61	0-5	14,604	5.7%	4.5	2562	3245		
	SB-61	5-8	1302	2.6%	2	500	650		
	SB-74	8-10	3183	3.4%	2	936	1590		
	SB-77	9-11	ND	—	—	—	—		
	SB-85	12-16	1389	17.1%	15	81	93		
	SB-95	15-17	602	1.2%	1.2	501	501		
	SB-103	14-16	6802	10.5%	5	650	1360		
	SB-110	8-10	86	1.2%	1.2	72			
	SB-136	15-17	2840	6.9%	6	406	473		1186 / 1587

MED

11 13
14
17
27 1
3
63
64
66
67
75
85 60
94
106
111 16

27 17 172.5
(15-15.8 7 25%)
30 265.8
(16.2 FT)
58 277.3
(13.6-16 7 50%)

CL

11 21 / 52
27 38 / 145

11 ~~13 69.2~~
22 148.5
(9.2 → 10 FT 7 25%)
26 142.2
(9 → 12 FT 7 25%)
31 395.8
(3.5 → 5 FT 7 80%)
35 310.2
(8.5 → 8.5 7 50%)
52 131.4
(16-19 7 25%)
61 122.8
(7-8 FT 7 25%)
63 310.3
(6-10.5 7 250%)
74 177.9
(10-11 7 150%)

HEAVY

~~11 ...~~
27 107 67%

PEAT - 2-~~8~~ 10 FT
FULL → PEAT = 27 → 05
= 27 → 10

2 → 3%

LIGHT → MED

LIGHT - TOP
LIGHT / MED - BELOW

77 301.3
(9.4-10 FT 7 100%)

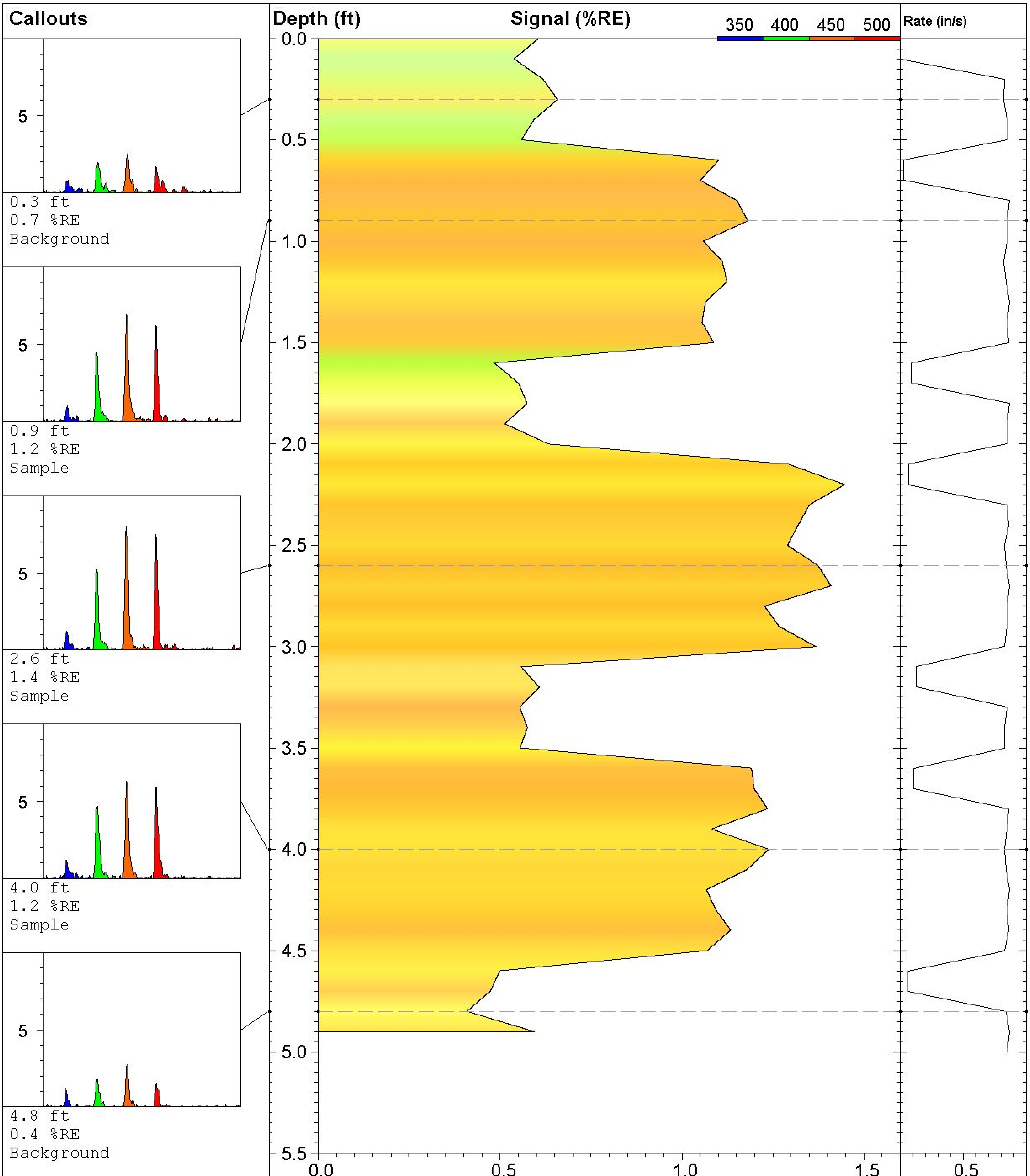
	25	50
11	I	~~IIII~~
27	~~IIII~~ ~~IIII~~ IIII	~~IIII~~ III

	100	~~200~~
11	~~IIII~~	
27	~~IIII~~ II	

11 8 - DENUDED ~~12~~ 20
2 - 8 PRESERVED

27 2 ~~15~~ 20

EX-SITU



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10NC11 SB-10 2-4

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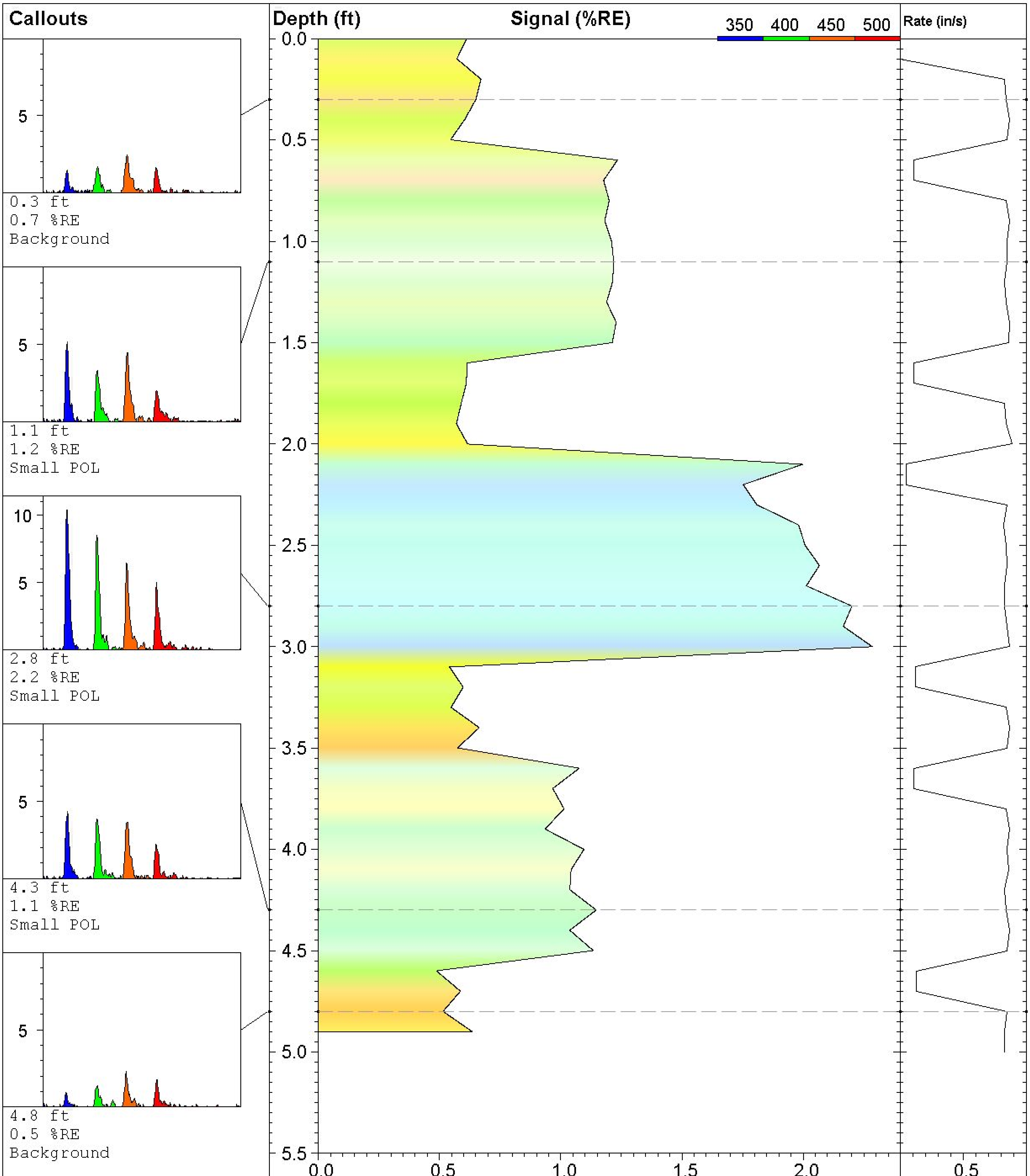
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **5.00 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.4 % @ 2.20 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-09 11:44 ADT**



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10NC11 SB-10 6-8ft

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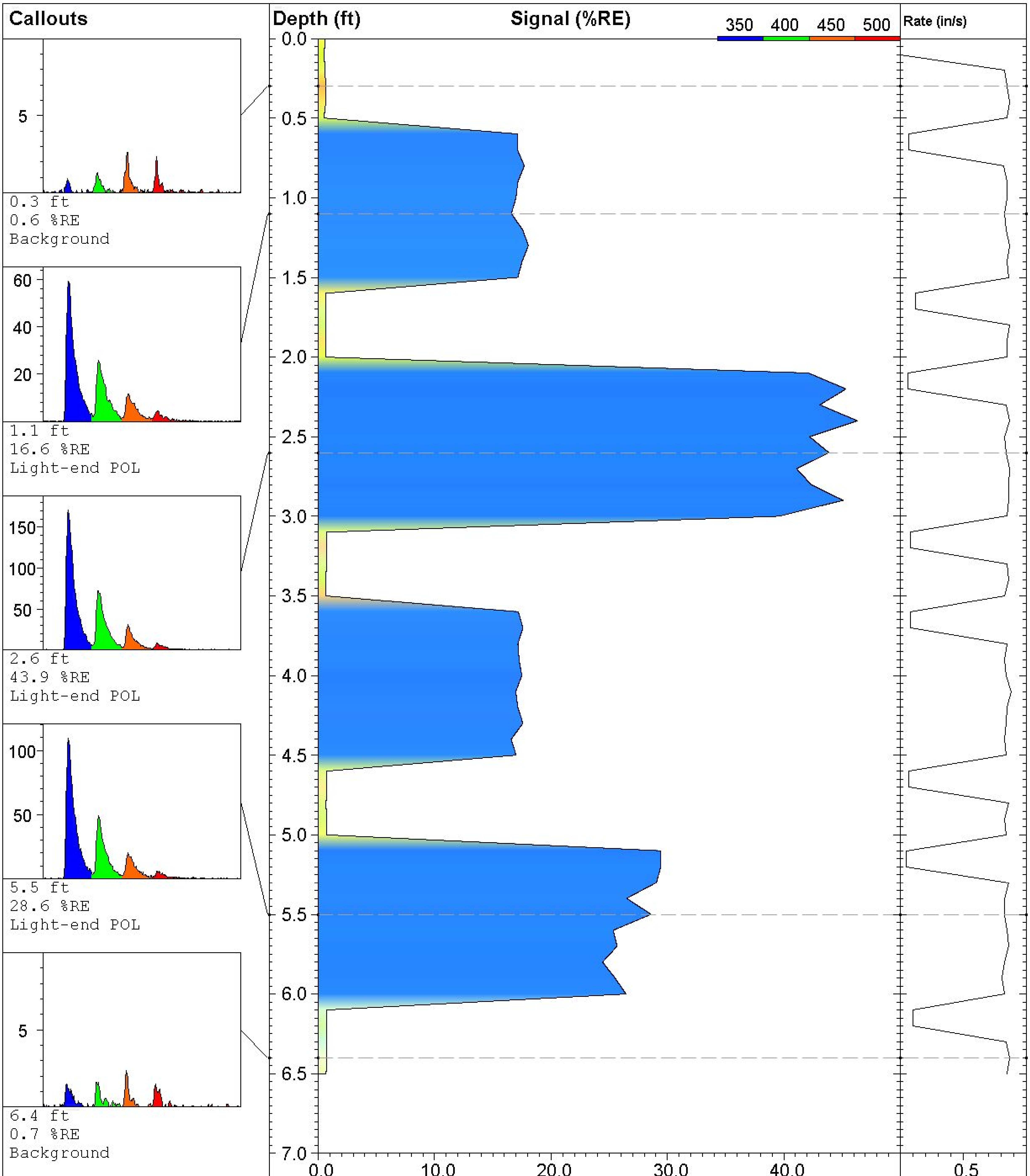
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **5.00 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.3 % @ 3.00 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-09 11:33 ADT**



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10NC11 SB-12 6-8

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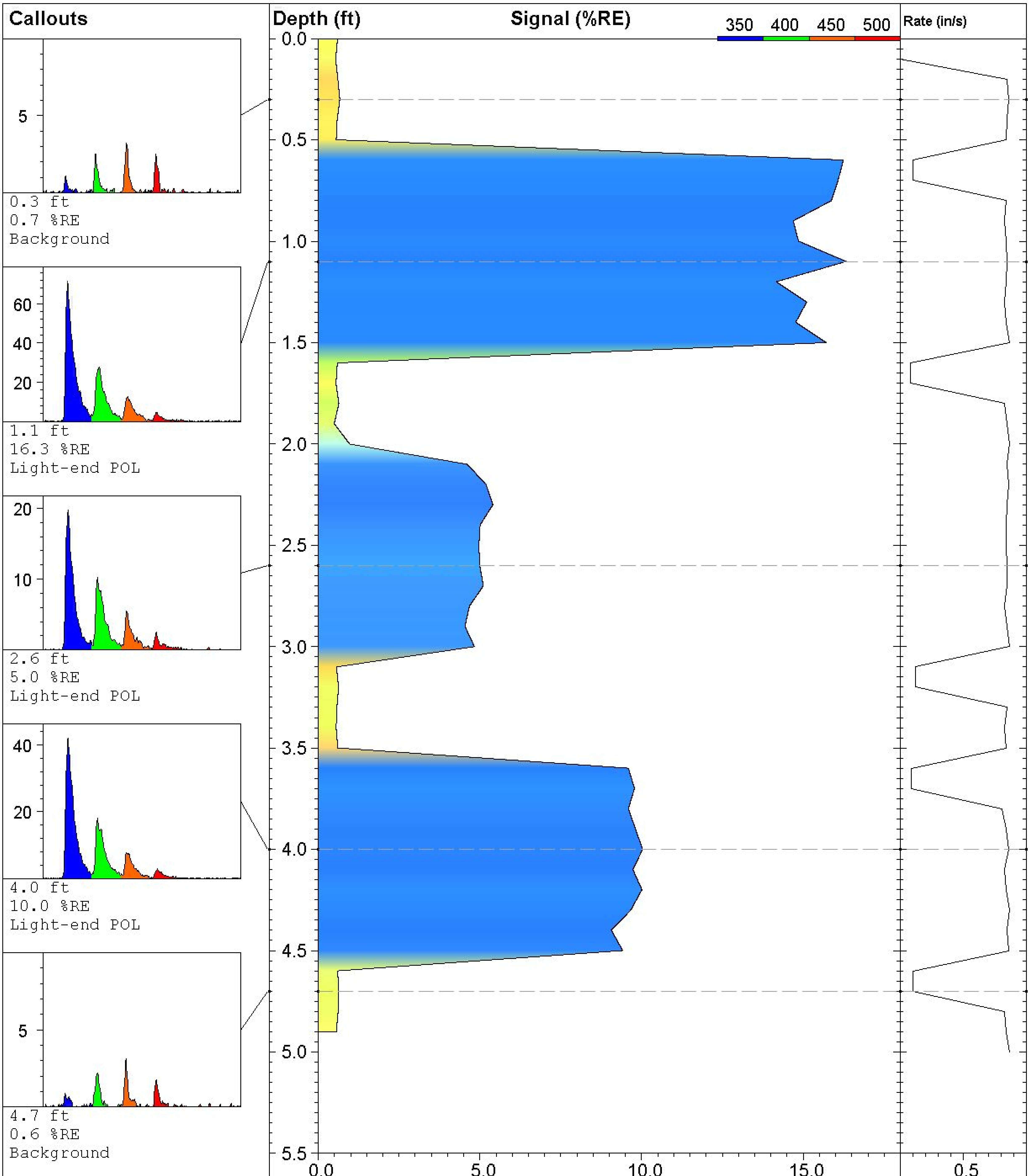
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **6.50 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **46.3 % @ 2.40 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-09 11:50 ADT**



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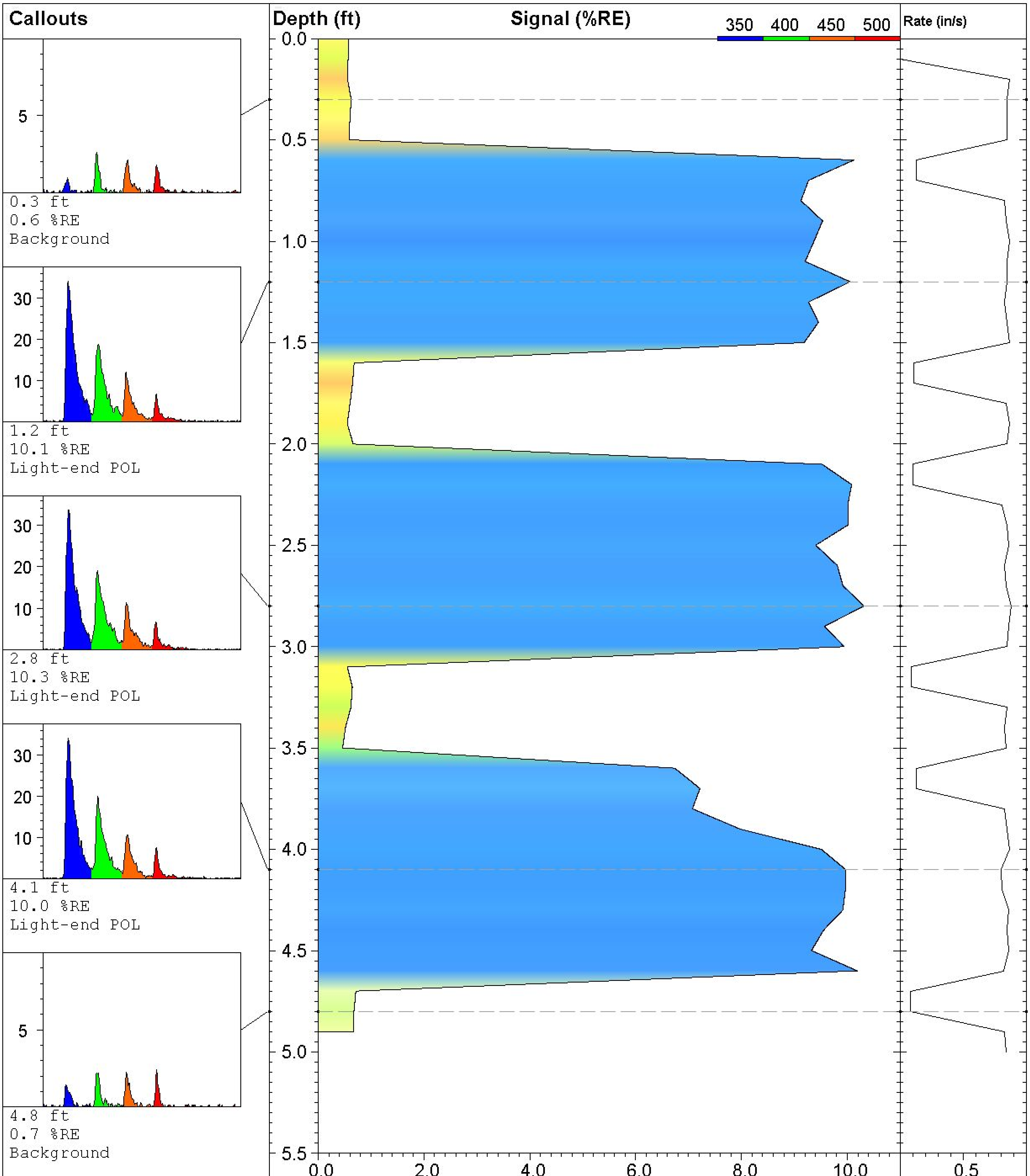
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **5.00 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **16.3 % @ 1.10 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-09 12:11 ADT**



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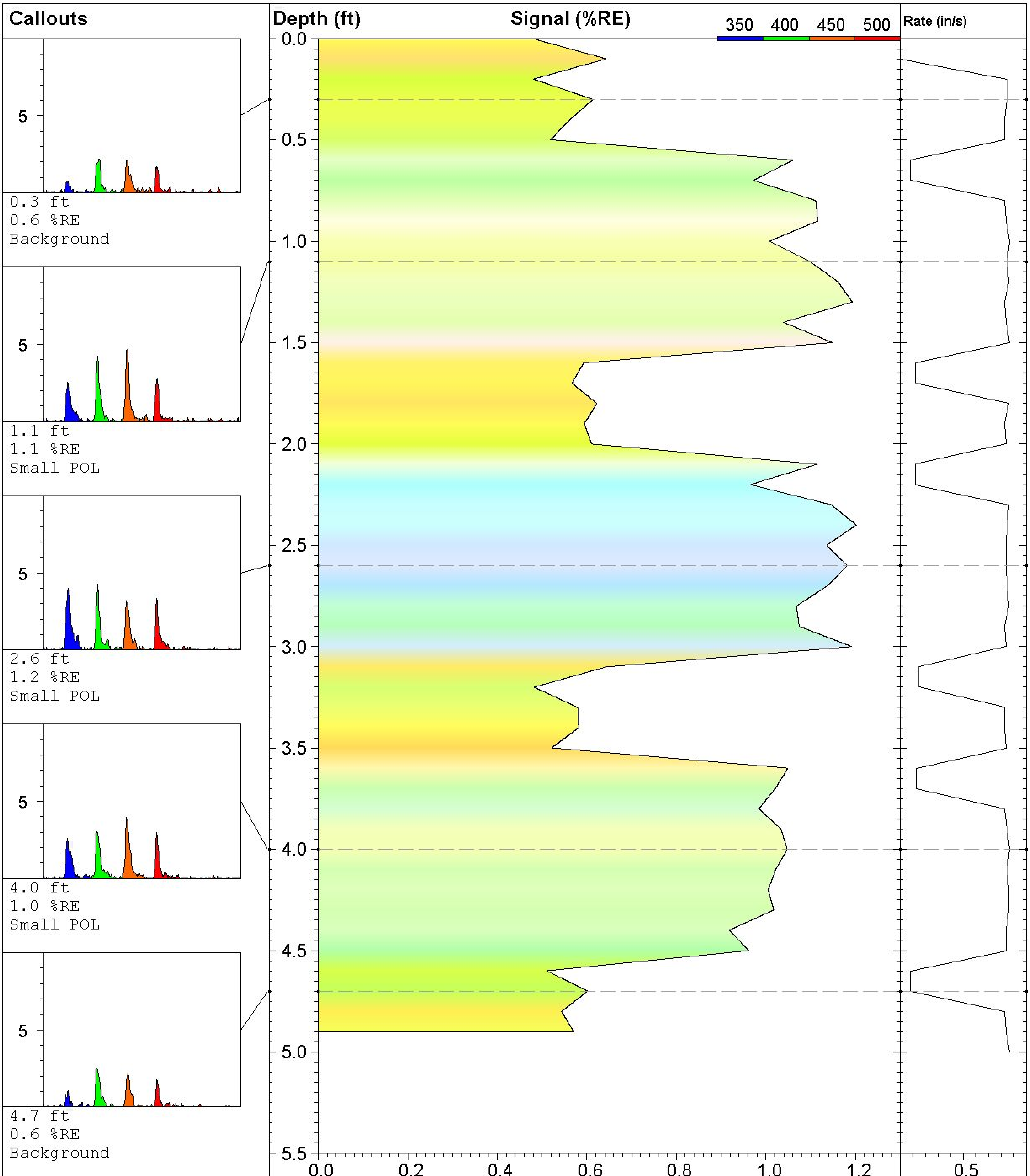
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **5.00 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **10.3 % @ 2.80 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-09 11:38 ADT**



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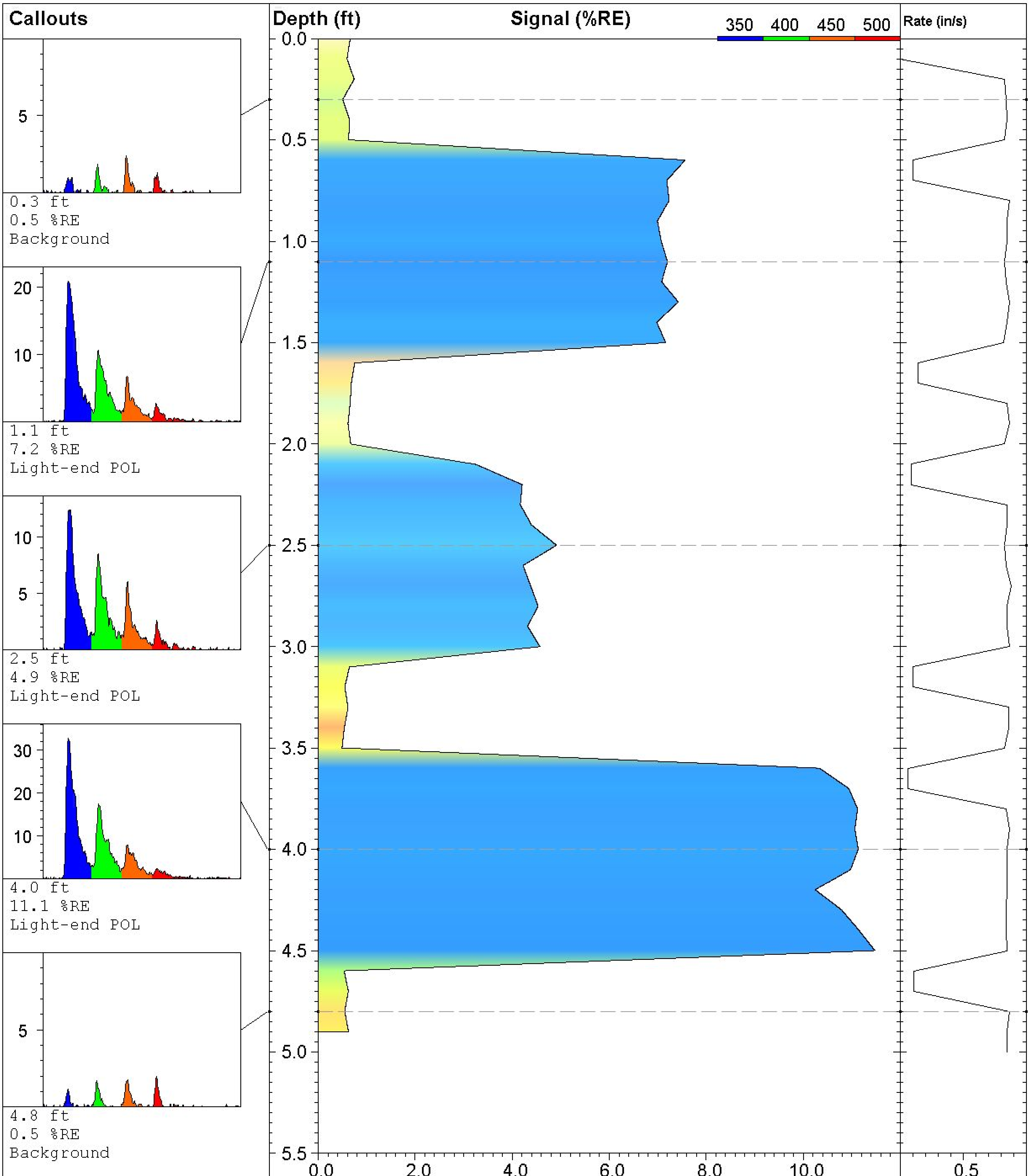
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **5.00 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.2 % @ 2.40 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-09 12:07 ADT**



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10NC11 SB-52 10-12

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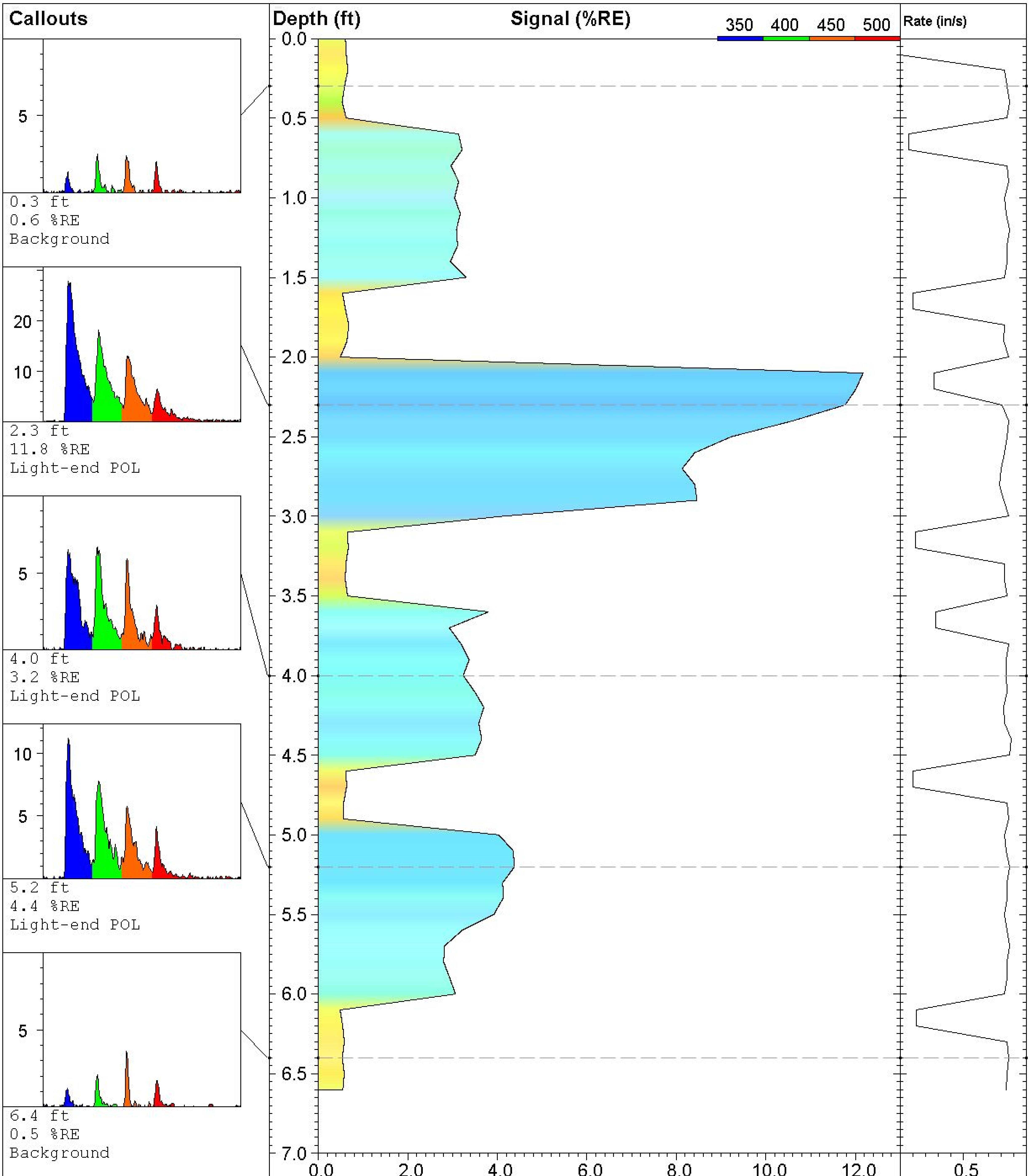
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **5.00 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **11.5 % @ 4.50 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-09 11:56 ADT**



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10NC11 SB-52 15-16

UVOST By Dakota
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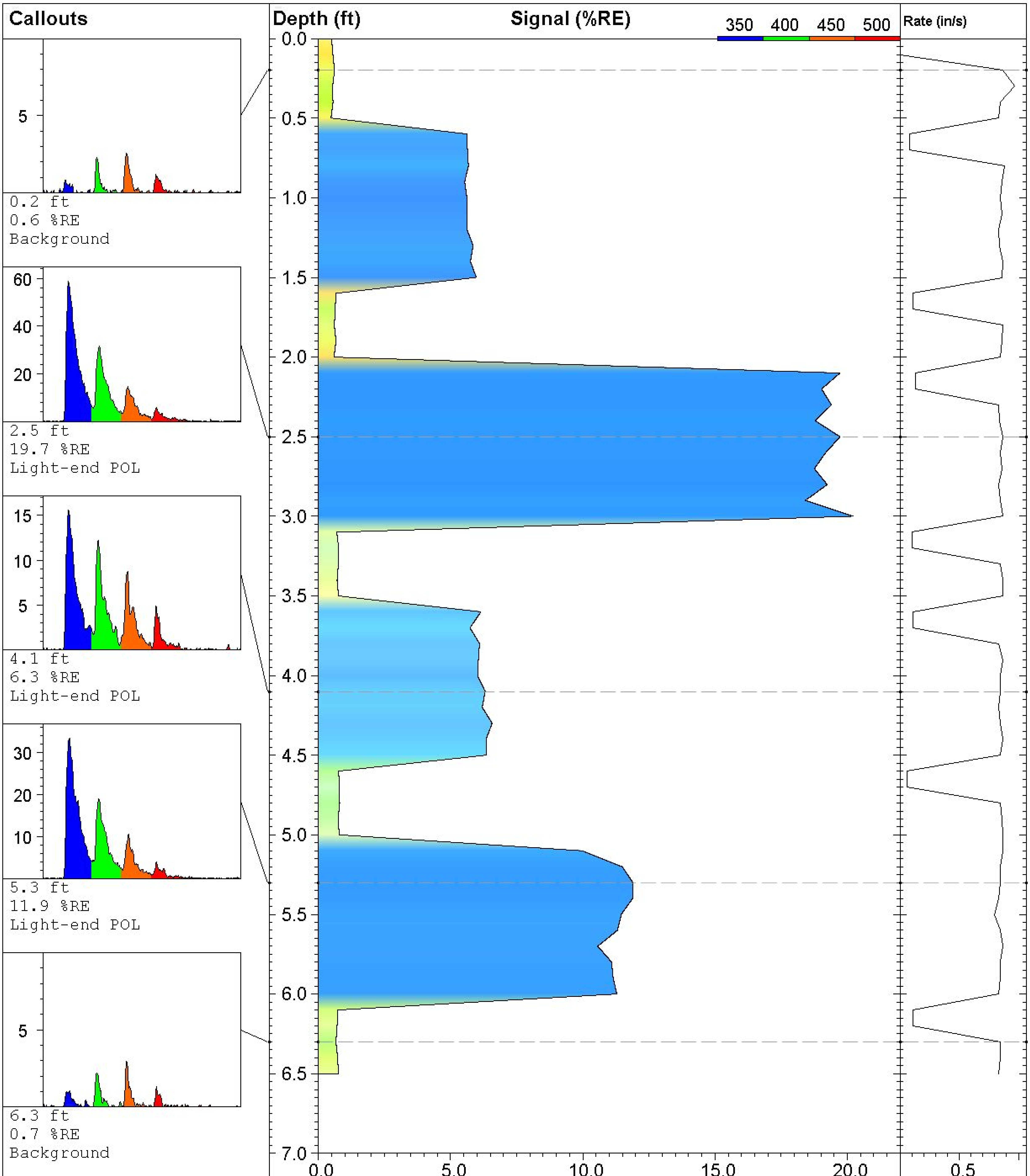
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **6.60 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **12.2 % @ 2.10 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-09 12:01 ADT**



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10NC11 SB-99 12-16ft

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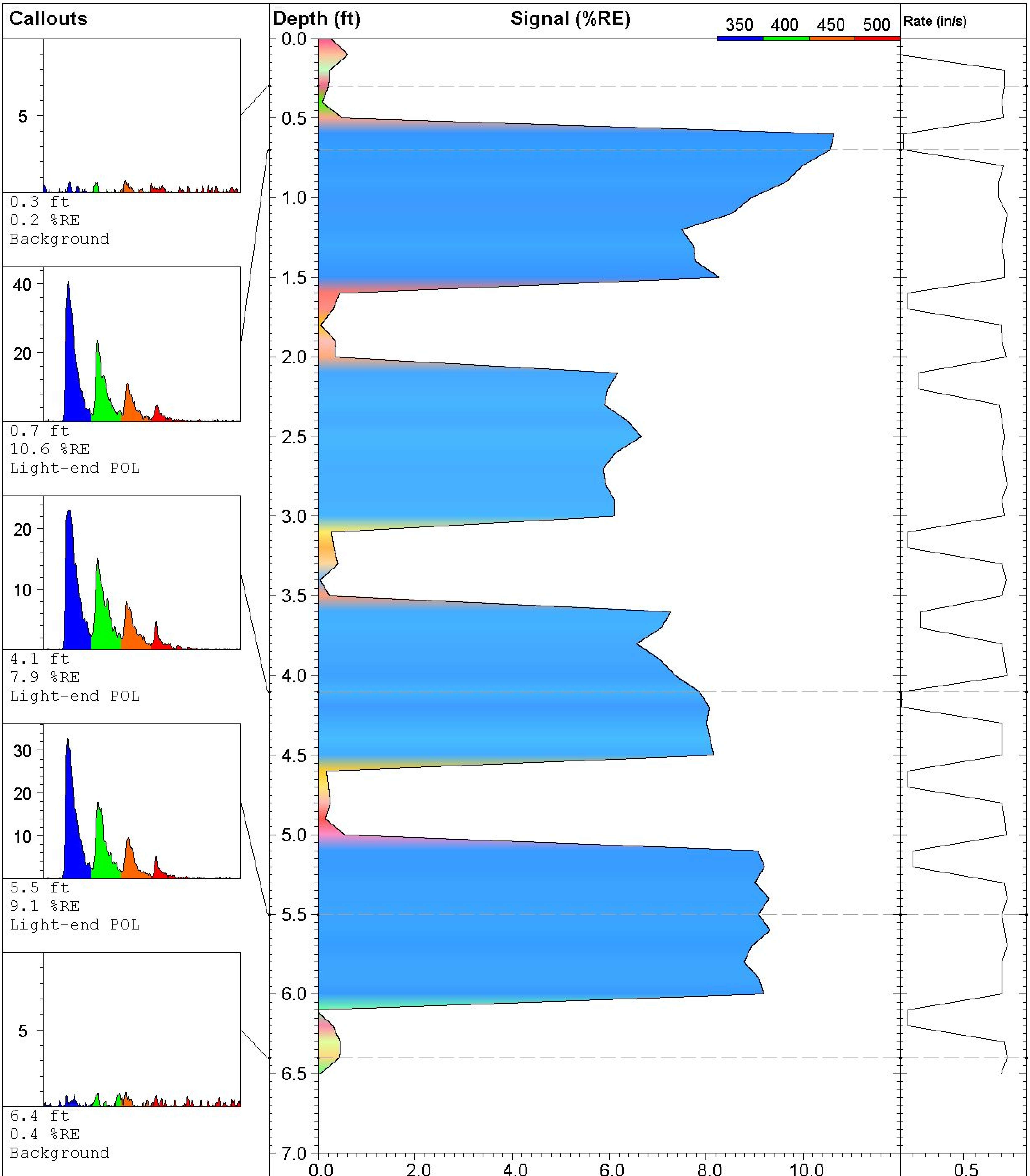
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **6.50 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **20.2 % @ 3.00 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-09 11:13 ADT**



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10NC27 SB-08 2-4

UVOST By Dakota
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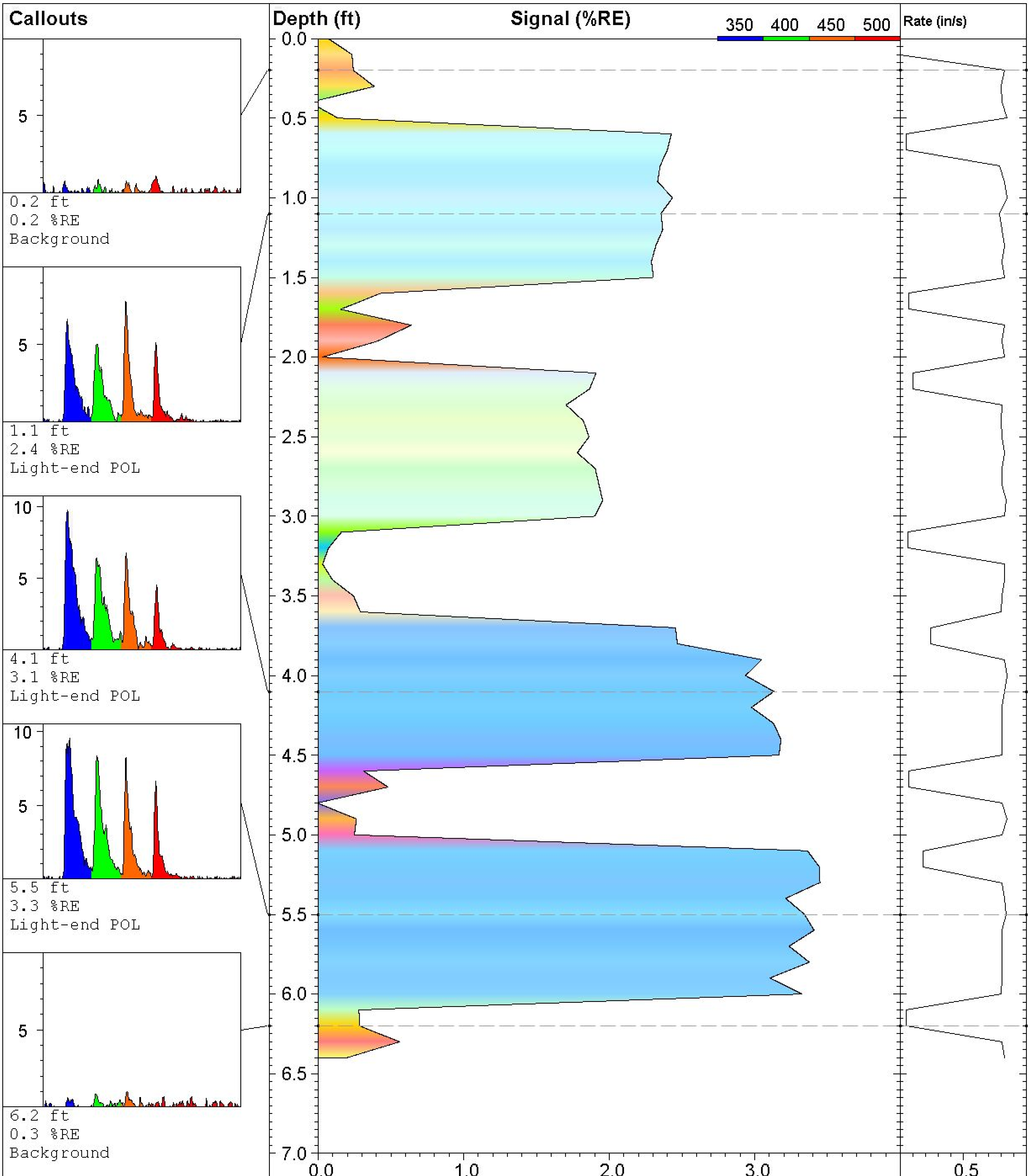
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **6.50 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **10.6 % @ 0.60 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-29 13:15 ADT**



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10NC27 SB-09 8-11

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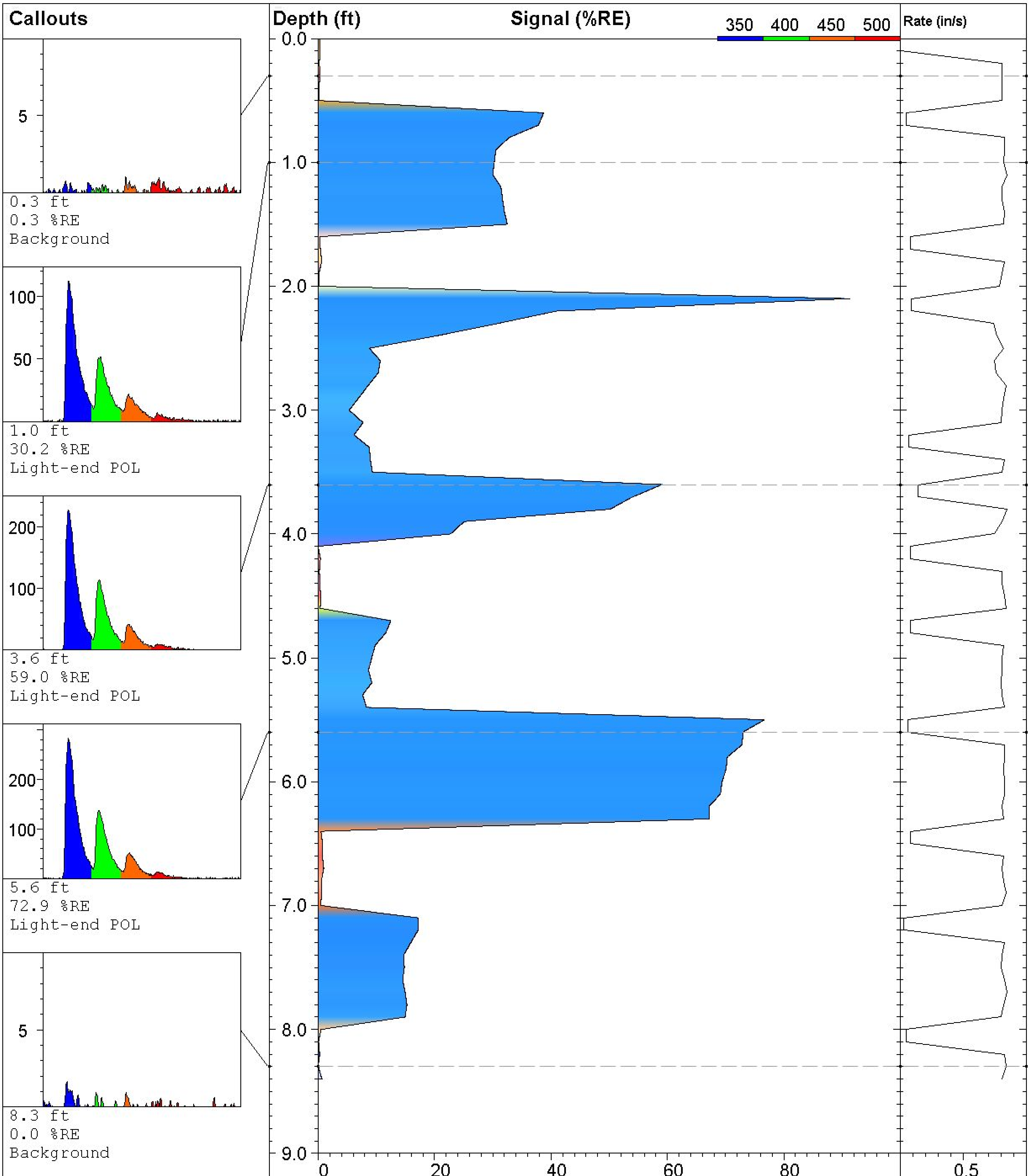
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **6.40 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **3.4 % @ 5.30 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-29 13:27 ADT**



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10NC27 SB-17 14-17

UVOST By Dakota
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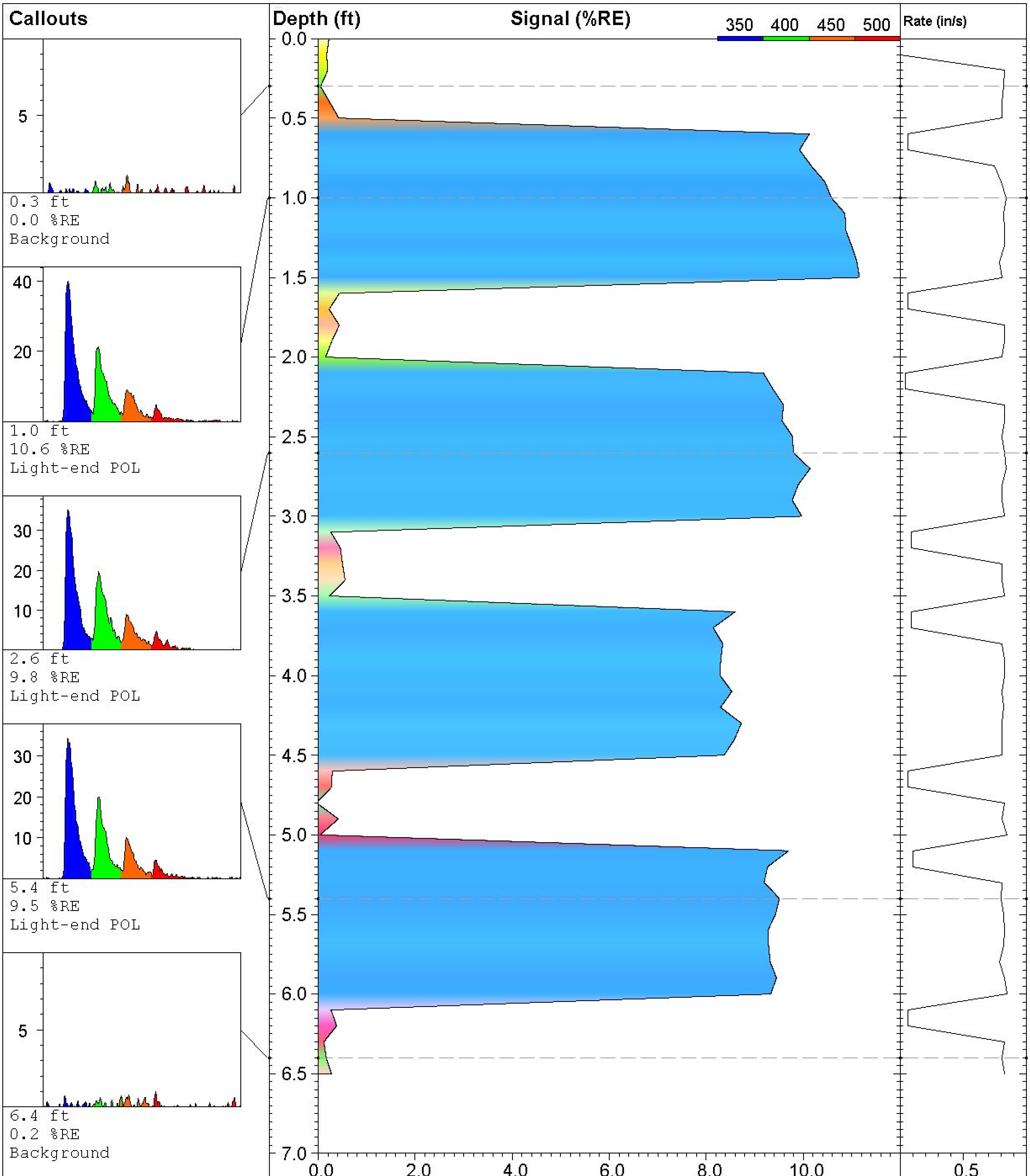
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **8.40 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **91.4 % @ 2.10 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-29 13:43 ADT**



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10NC27 SB-27 6-9

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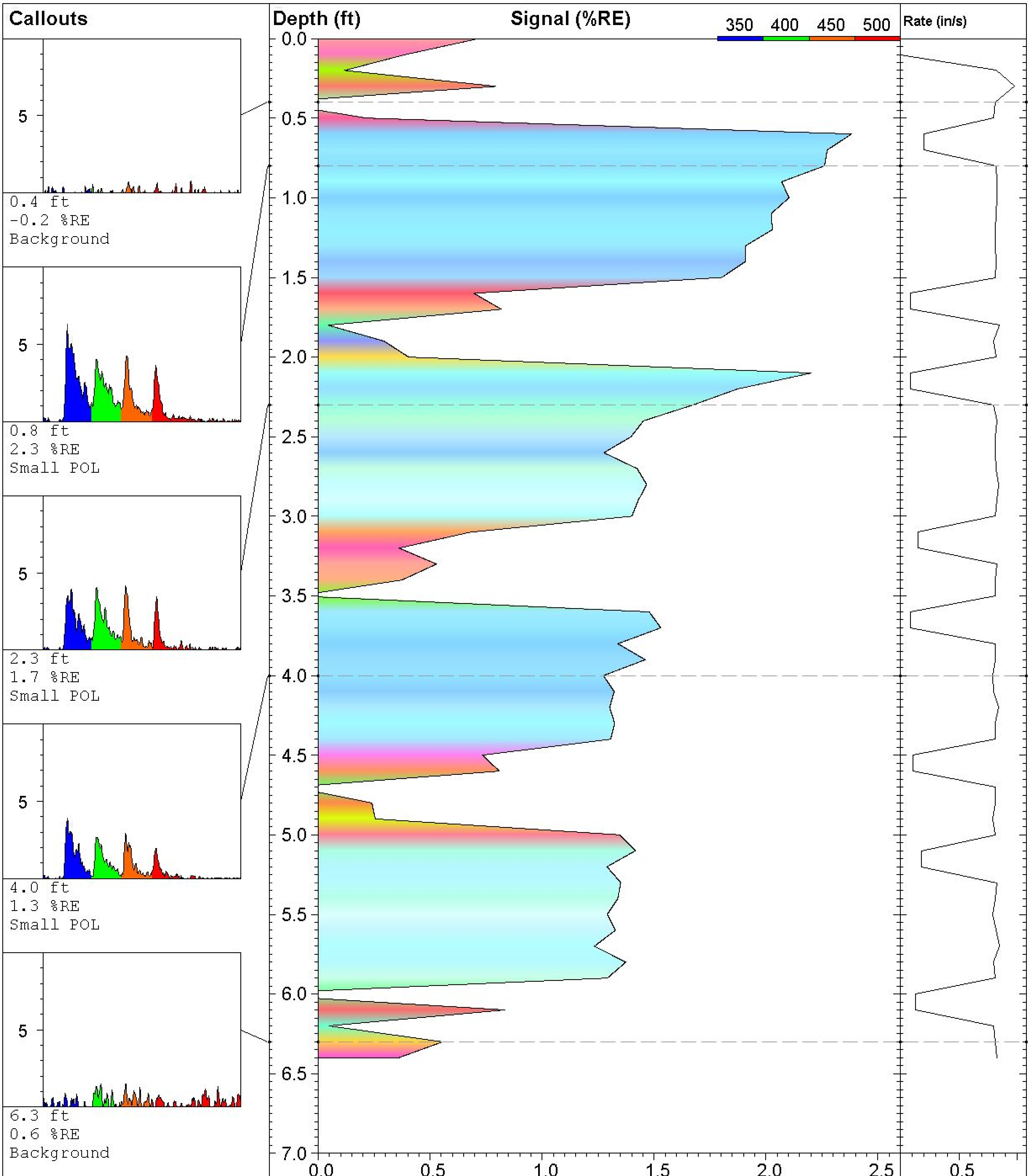
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **6.50 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **11.2 % @ 1.50 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-29 13:33 ADT**



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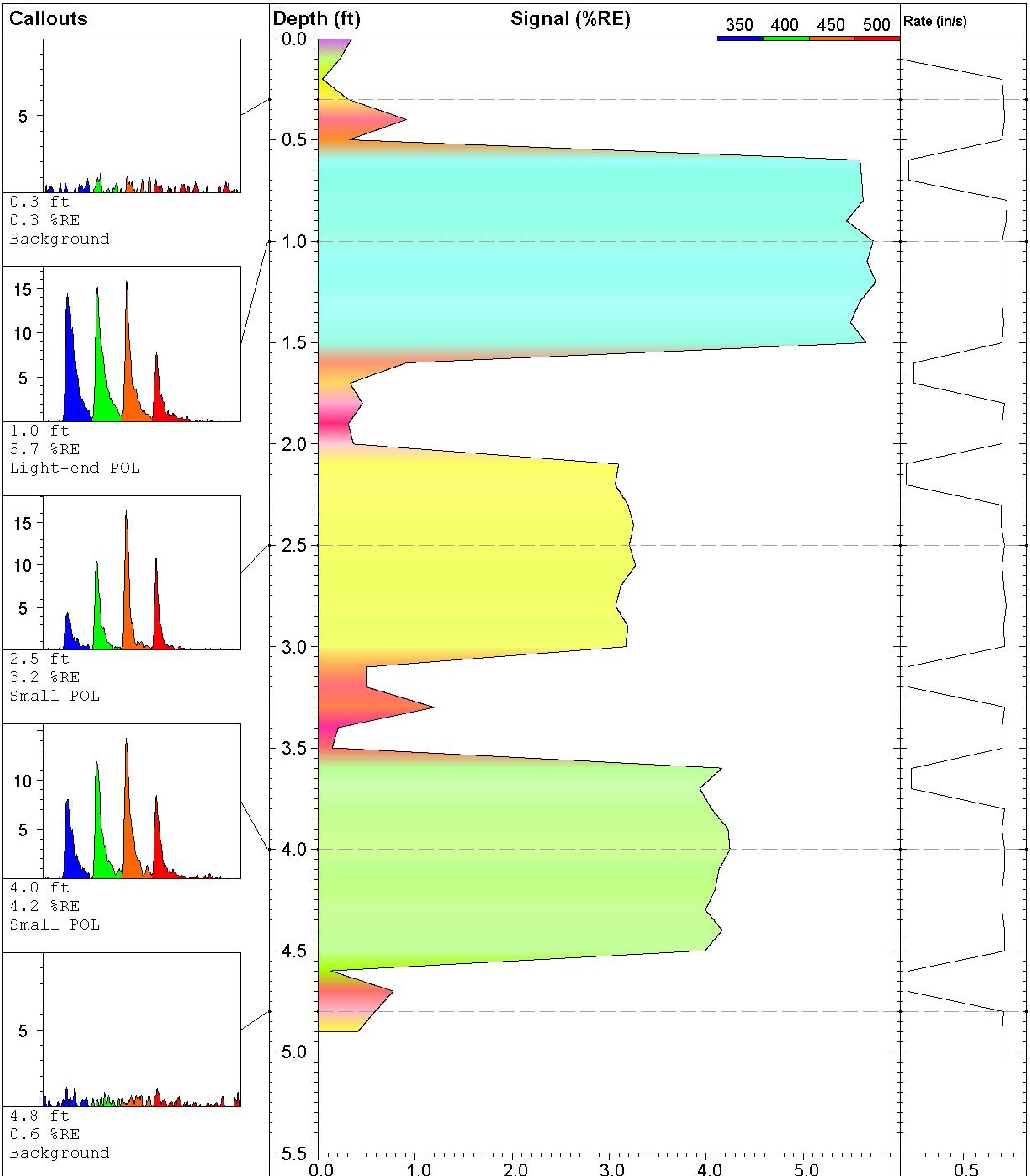
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **6.40 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.4 % @ 0.60 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-29 17:19 ADT**



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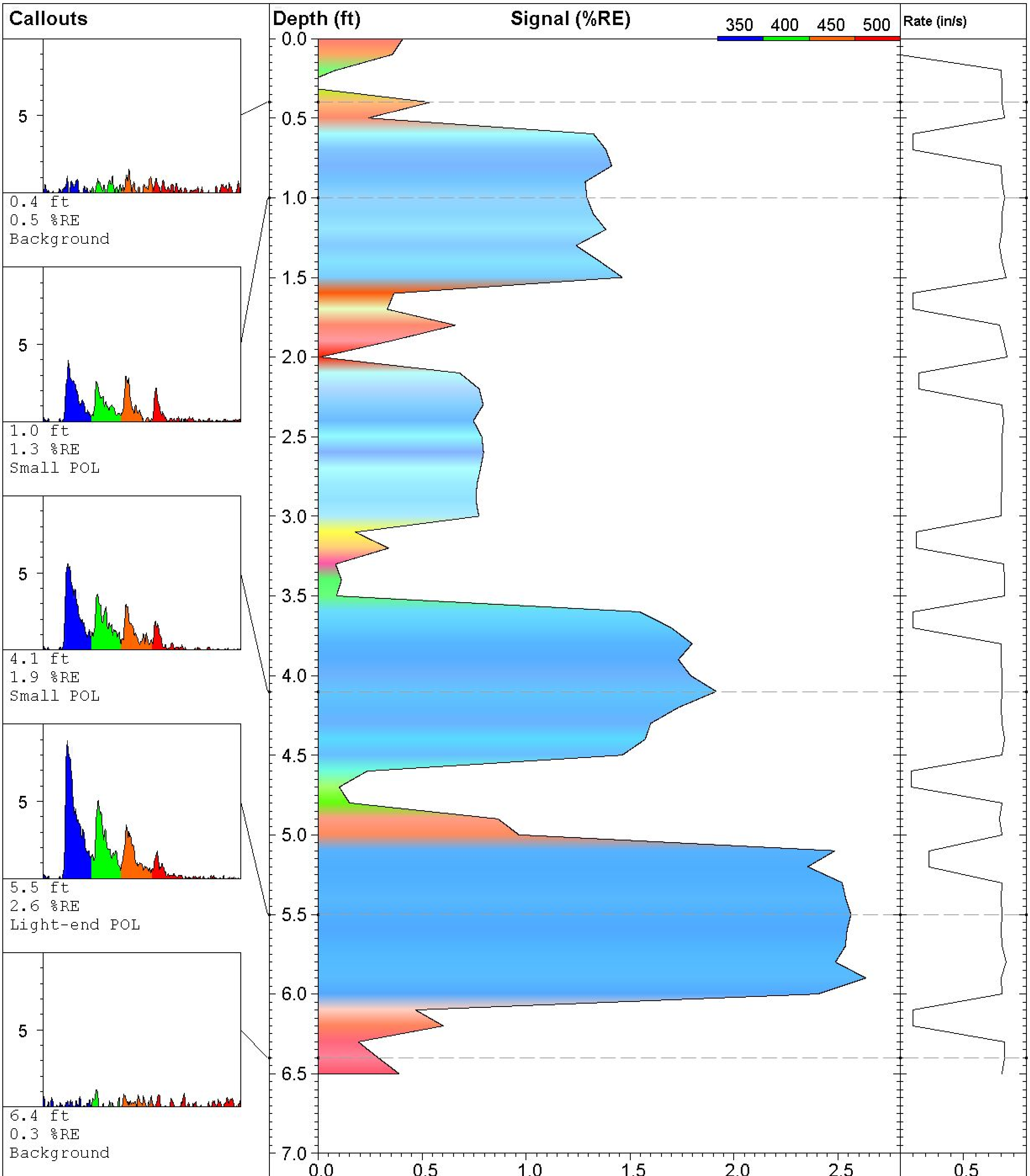
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **5.00 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **5.7 % @ 1.20 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-29 16:53 ADT**



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10NC27 SB-61 5-8

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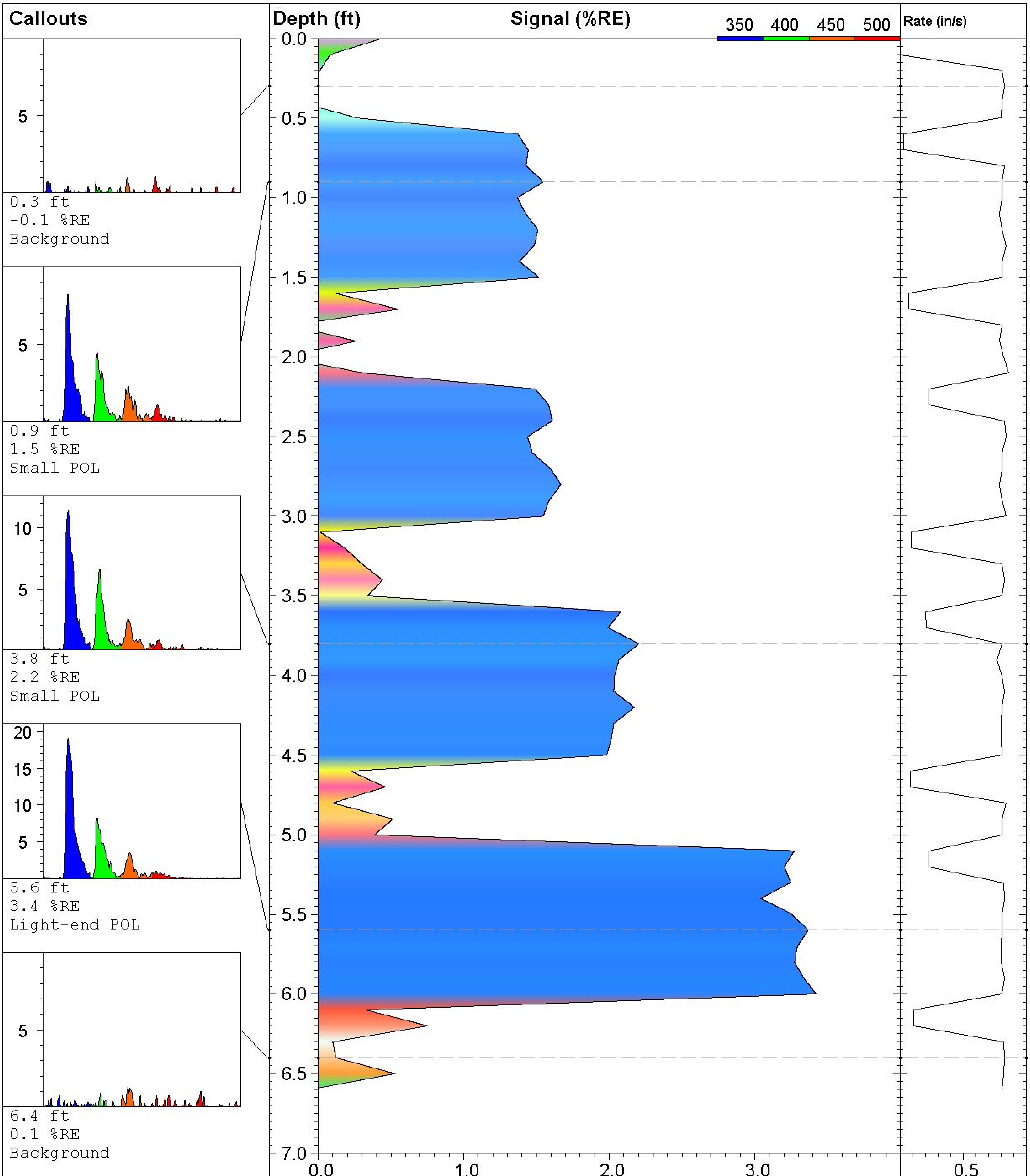
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **6.50 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.6 % @ 5.90 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-29 17:07 ADT**



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10NC27 SB-74 8-10

UVOST By Dakota
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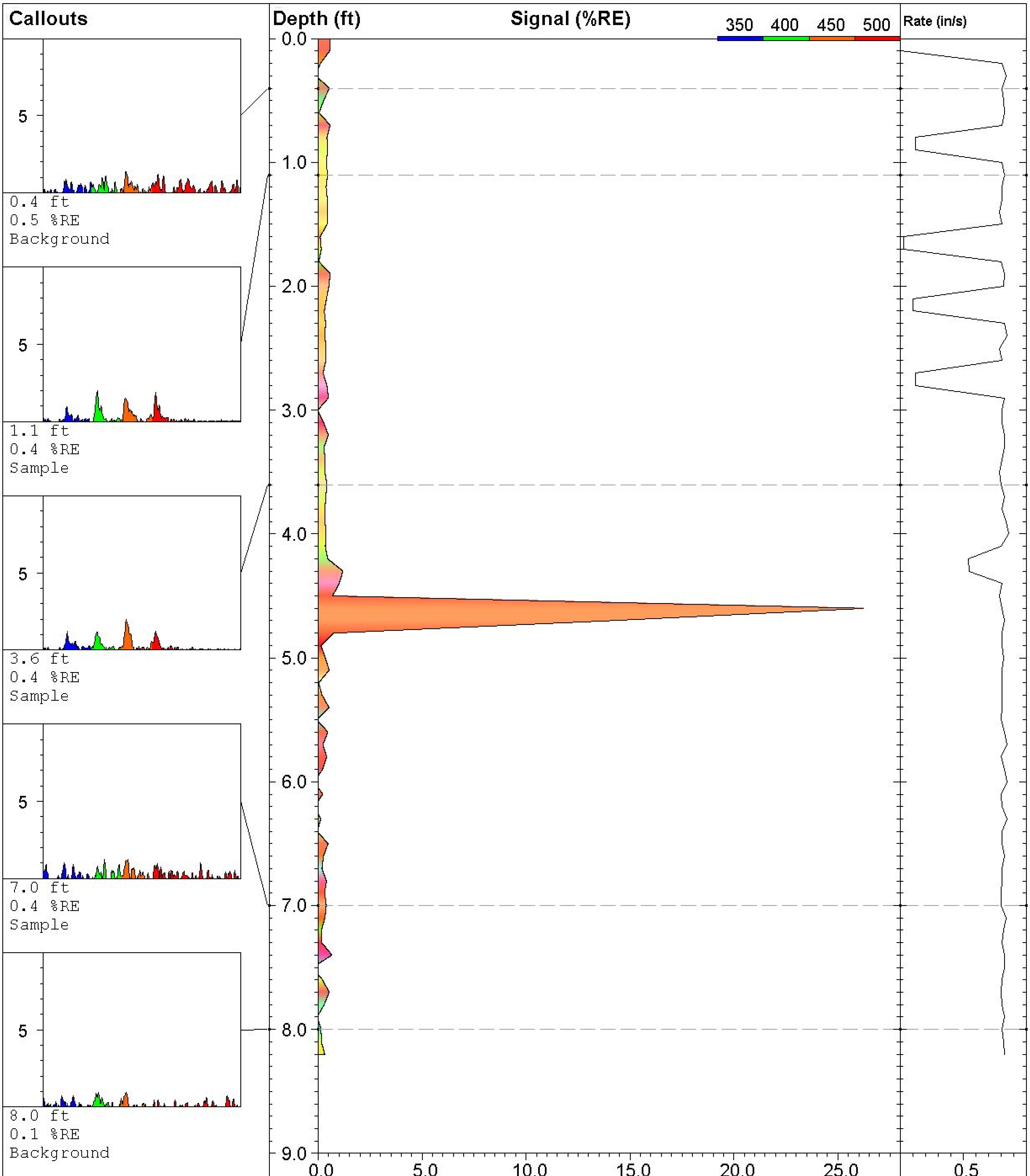
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **6.60 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **3.4 % @ 6.00 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-29 17:13 ADT**



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10NC27 SB-77 9-11

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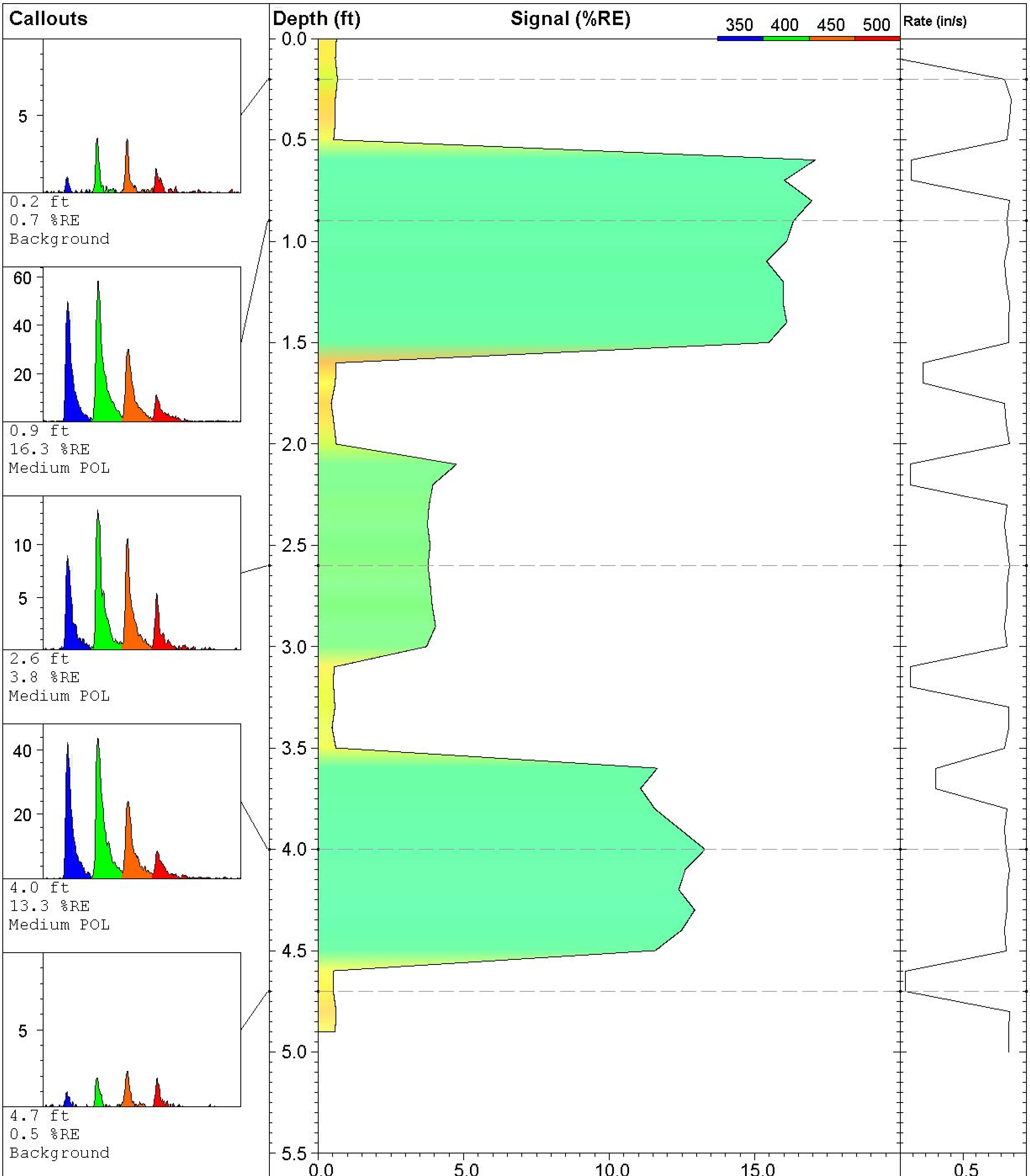
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **8.20 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **26.3 % @ 4.60 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-29 17:02 ADT**



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10NC27 SB-85 12-16

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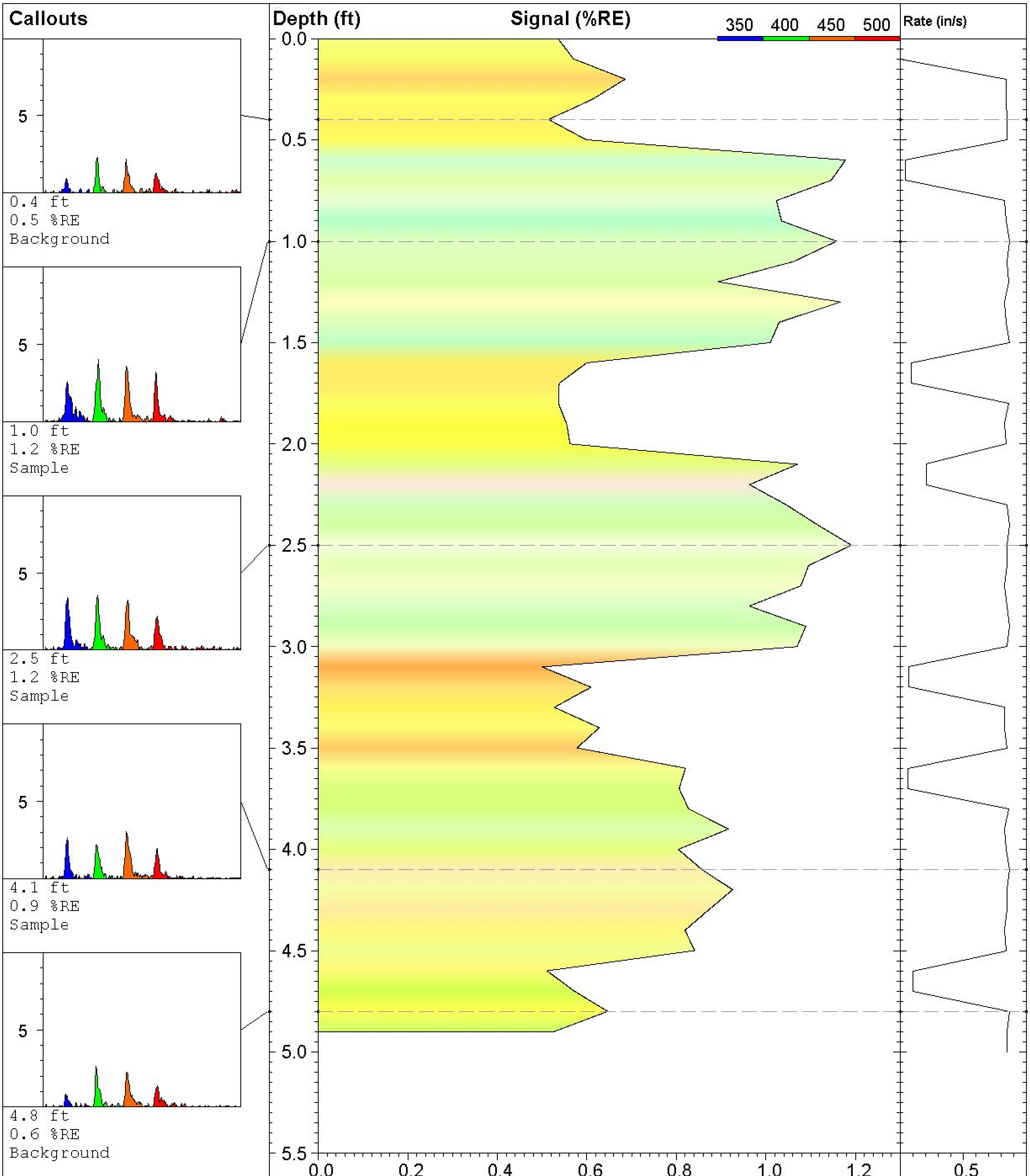
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **5.00 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **17.1 % @ 0.60 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-09 13:36 ADT**



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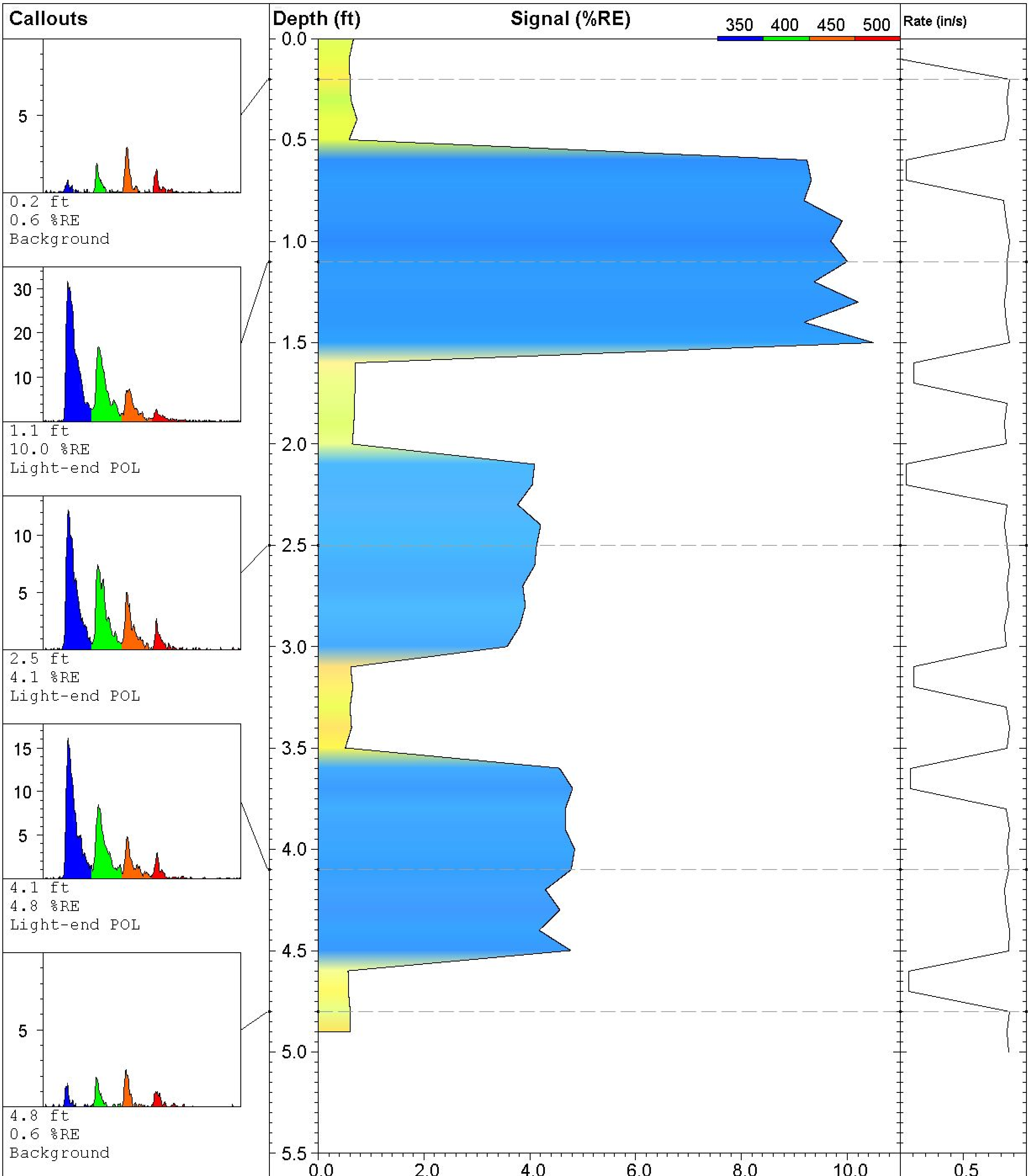
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **5.00 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.2 % @ 2.50 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-09 13:31 ADT**



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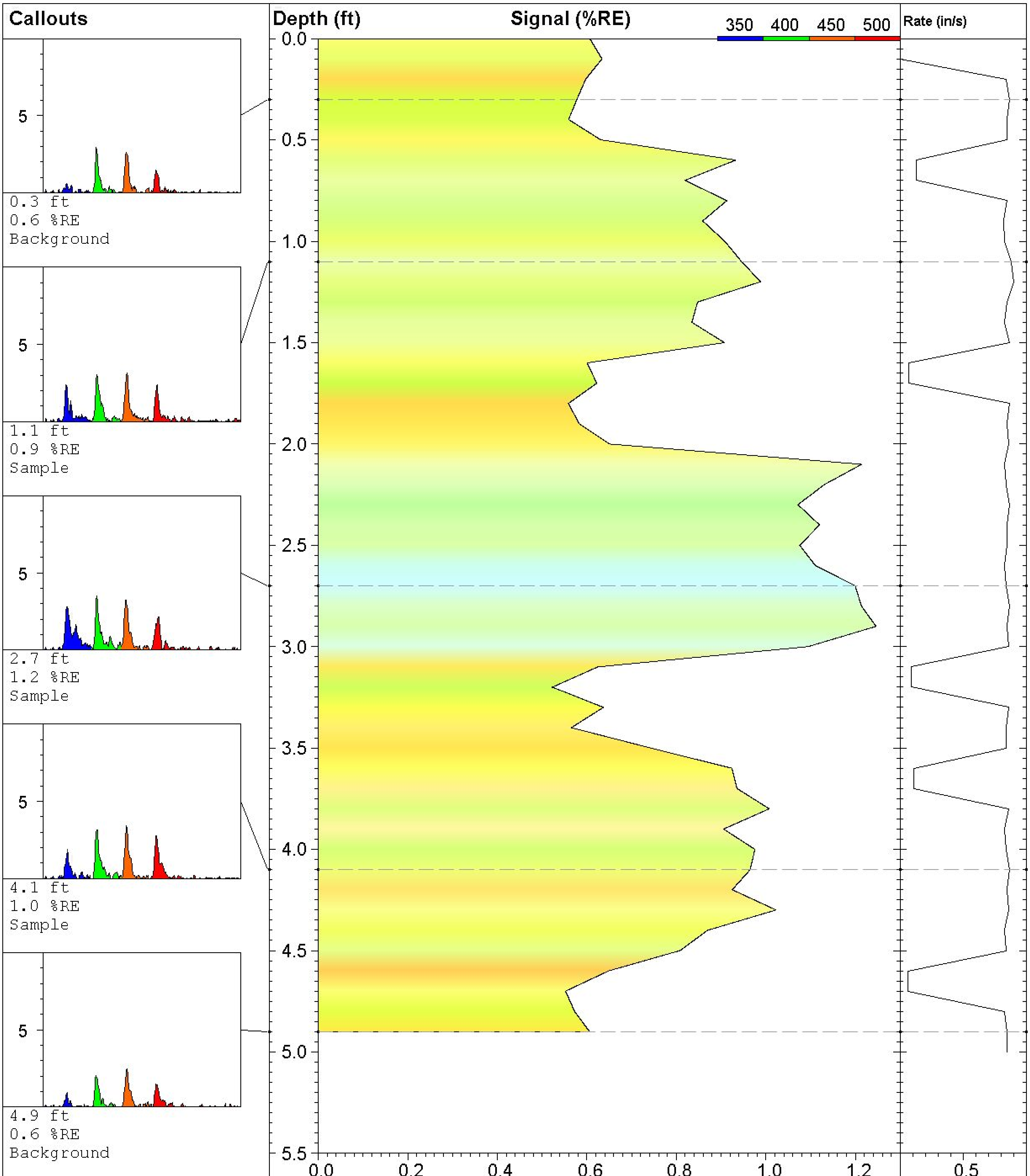
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **5.00 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **10.5 % @ 1.50 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-09 13:26 ADT**



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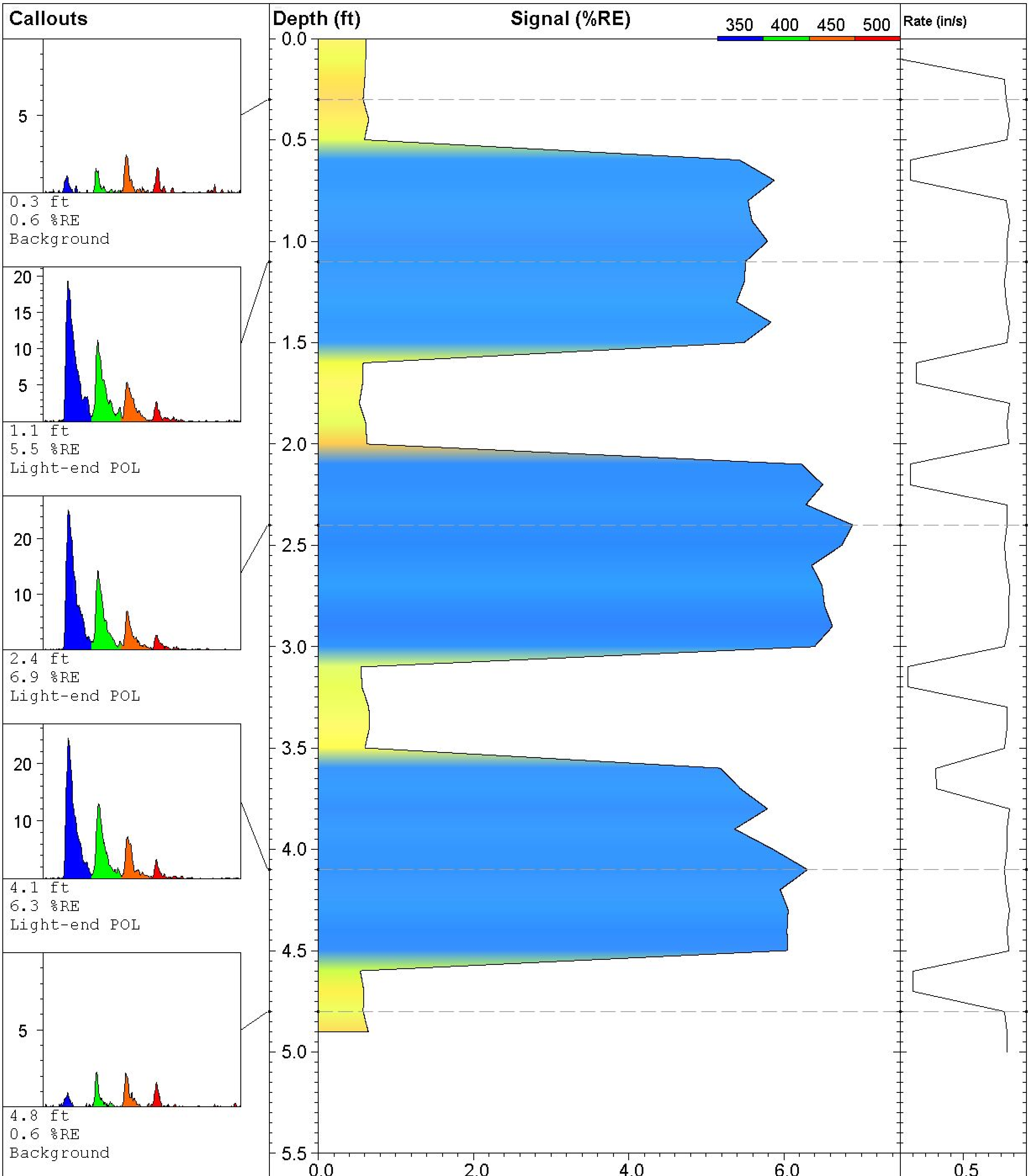
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **5.00 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.2 % @ 2.90 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-09 13:15 ADT**



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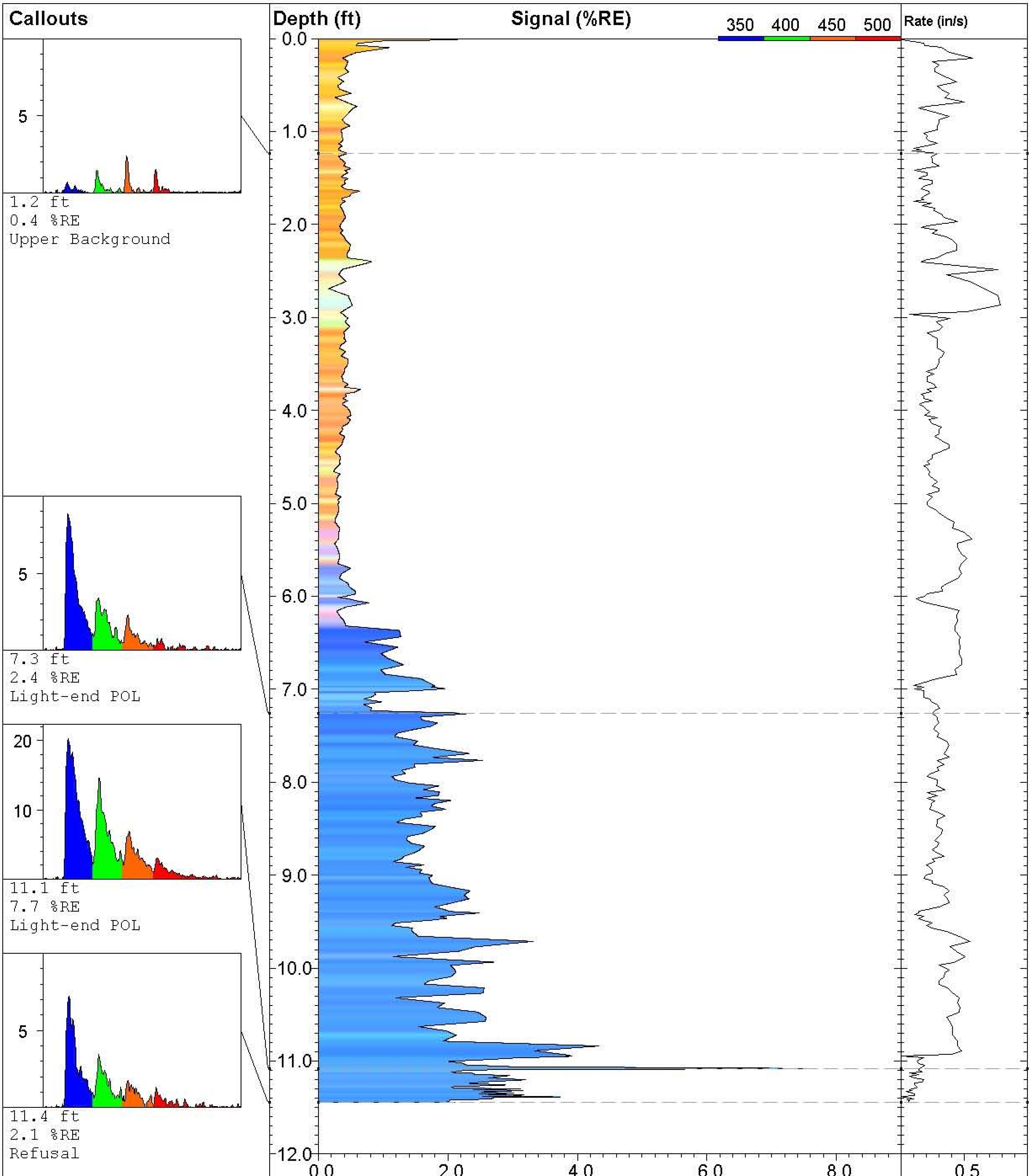
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**

Final depth:	**5.00 ft**
Max signal:	**6.9 % @ 2.40 ft**
Date & Time:	**2010-08-09 13:21 ADT**

IN-SITU



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10NC11 UV-001

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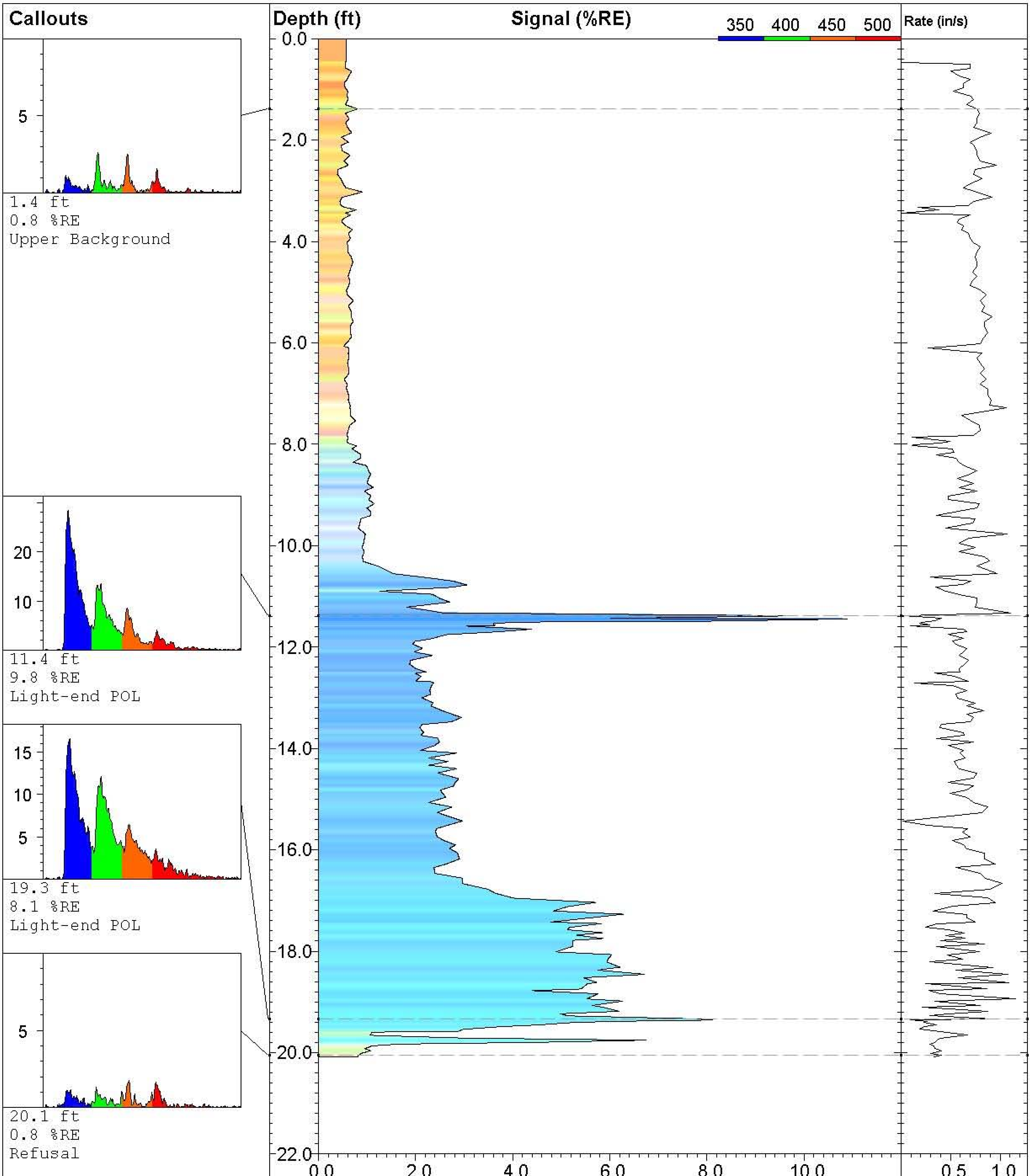
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **11.45 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **7.7 % @ 11.08 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-21 11:55 ADT**



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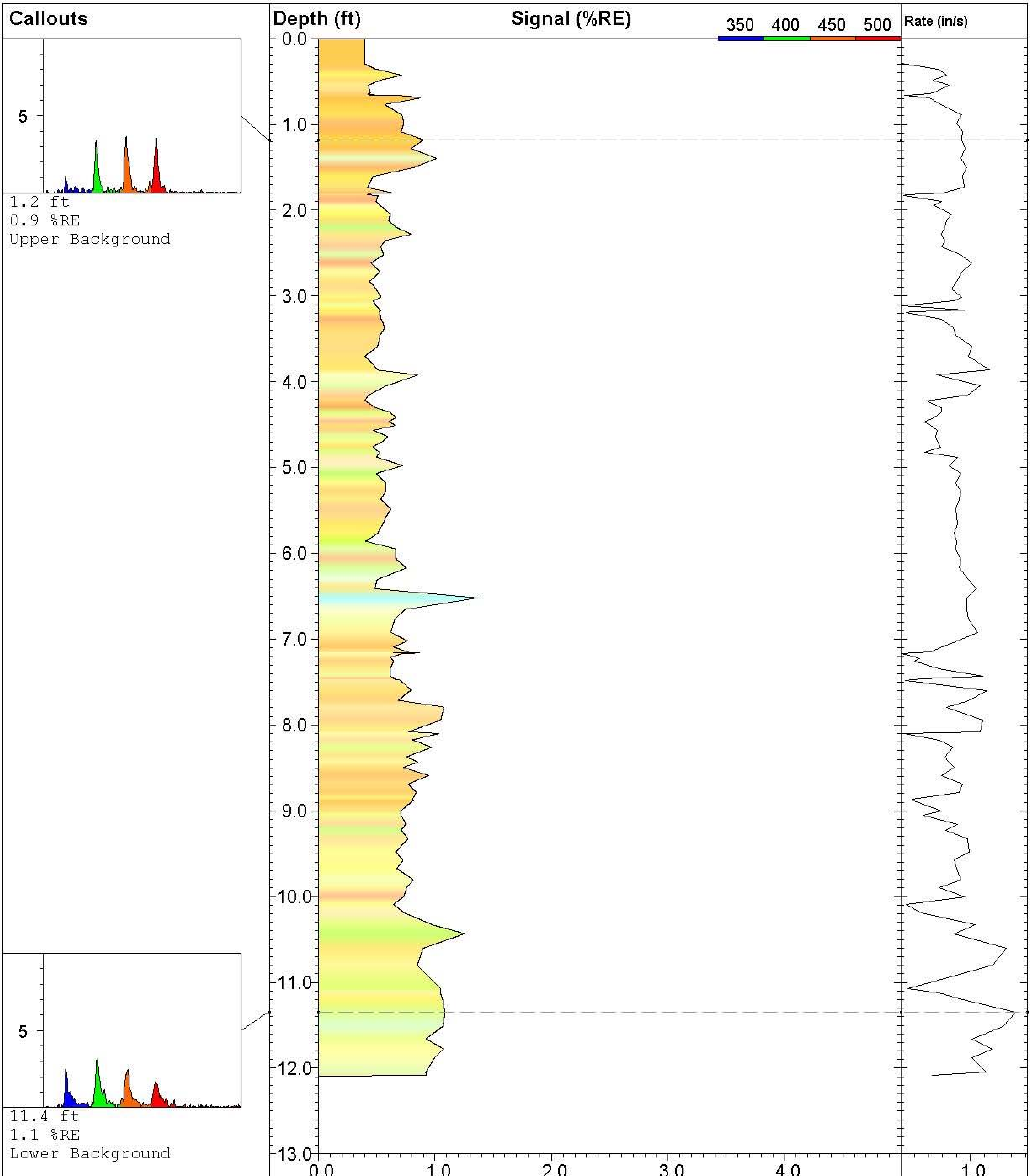
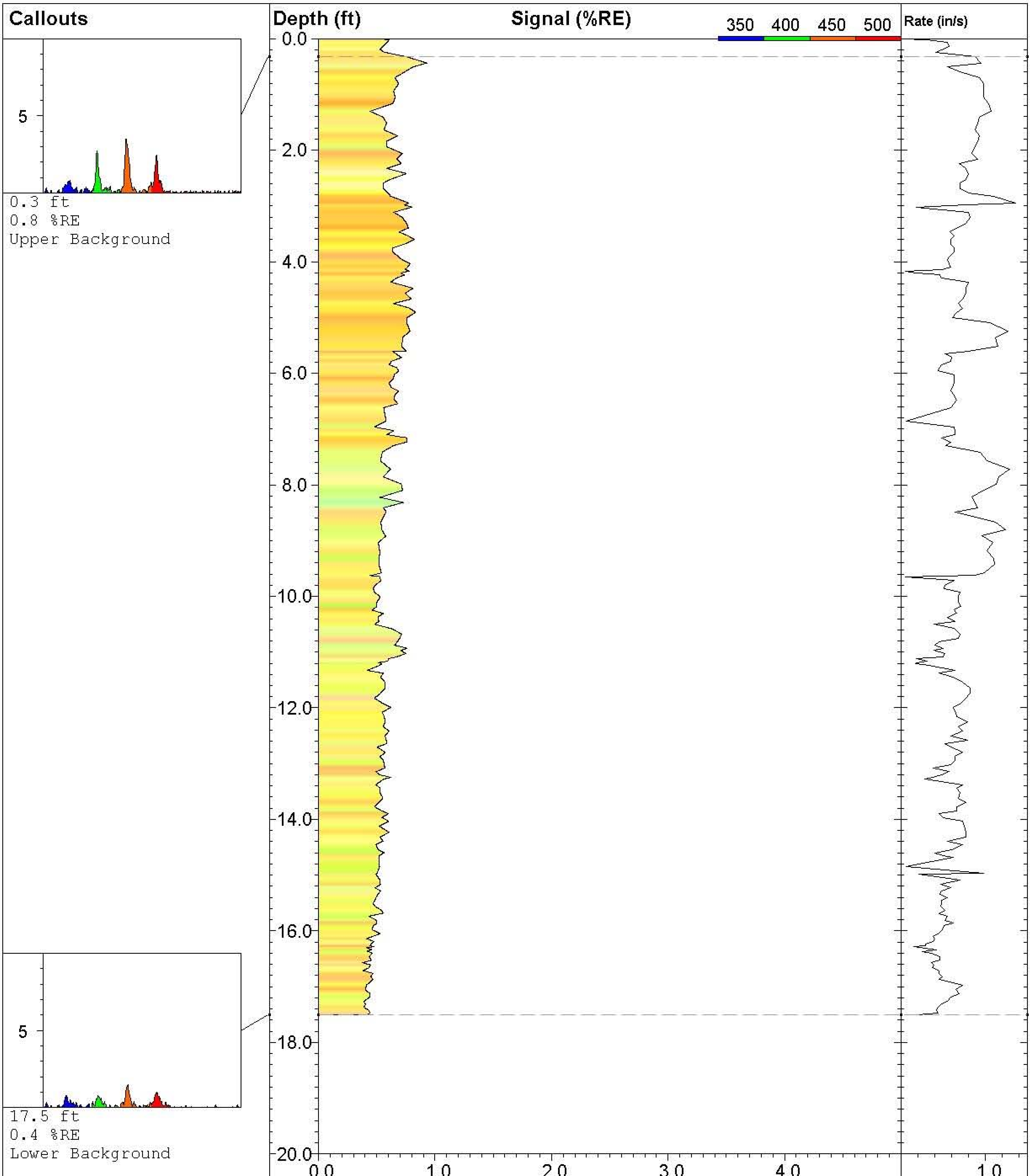
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.09 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **11.1 % @ 11.44 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-03 19:24 ADT**



Hammer Environmental Services	10NC11 UV-03		UVOST By Dakota www.DakotaTechnologies.com
PO Box 872804	*Site:* **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **12.09 ft**
Wasilla, Alaska 99687 (907) 841-2216	*Client:* **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.4 % @ 6.52 ft**
www.hammerenvironmental.com	*Job:*	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-03 17:41 ADT**



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10NC11 UV-05

UVOST By Dakota
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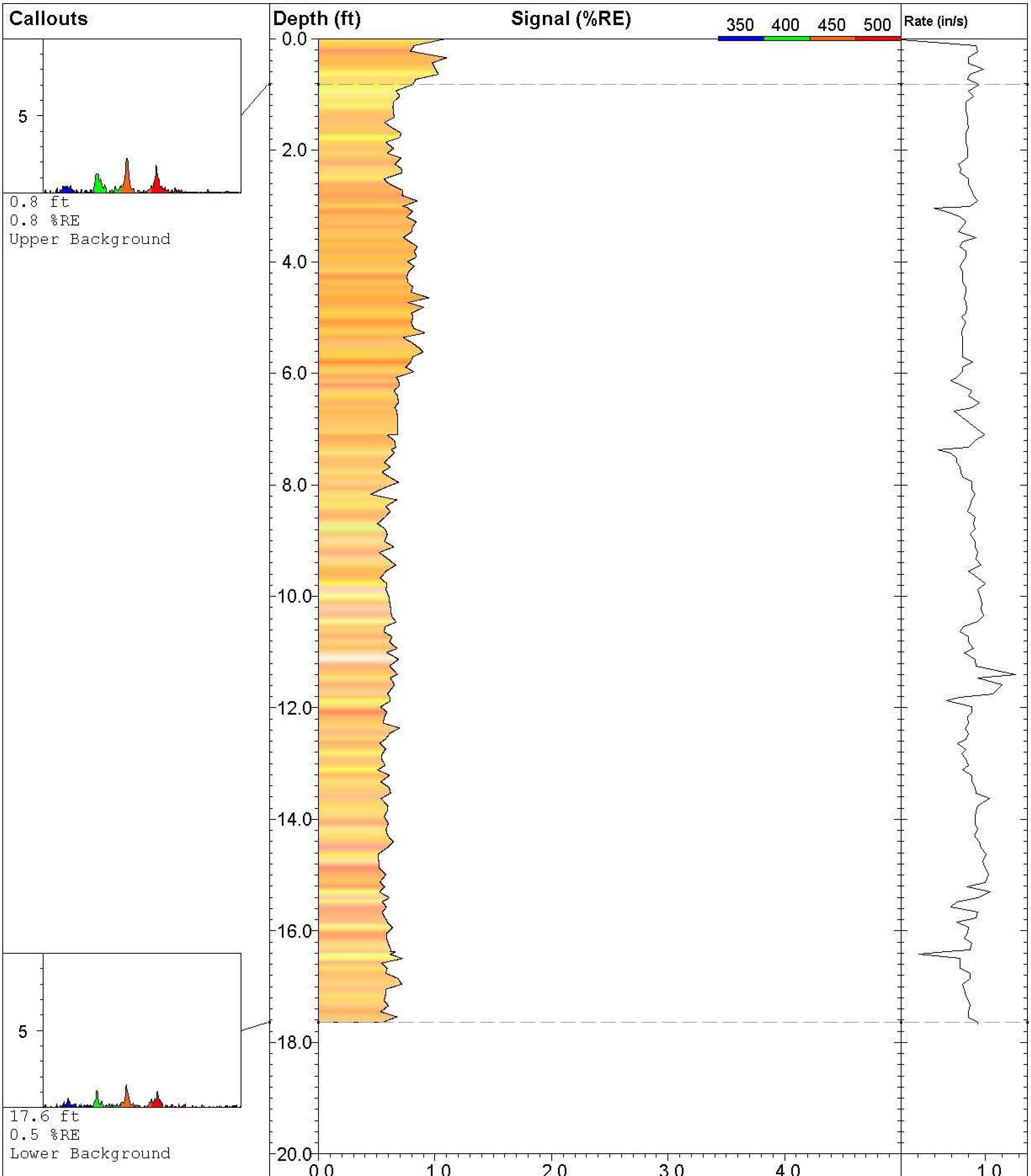
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.50 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **0.9 % @ 0.44 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-04 09:59 ADT**



10NC11 UV-06		**UVOST By Dakota** www.DakotaTechnologies.com
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.67 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.1 % @ 0.34 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-03 22:03 ADT**

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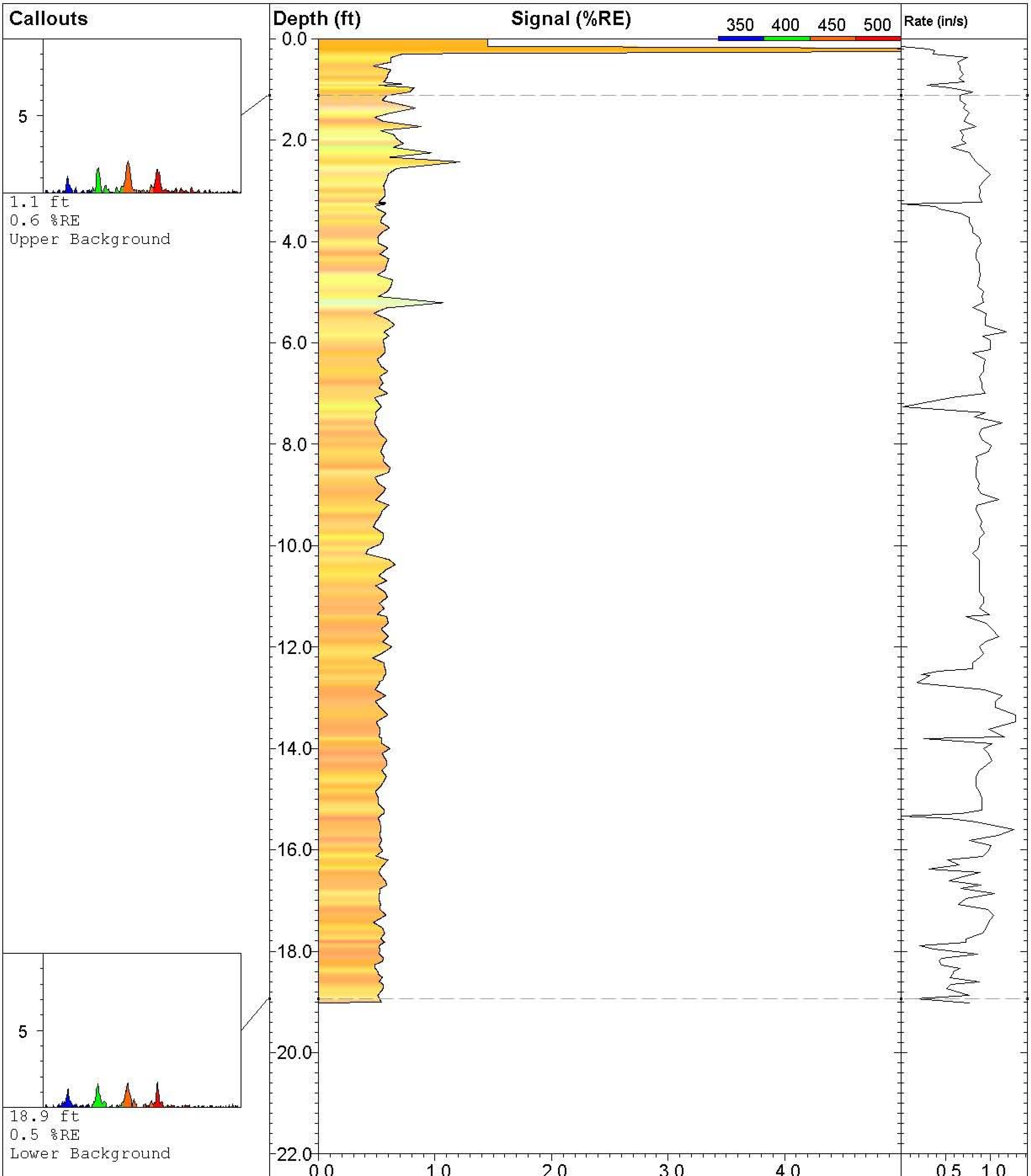

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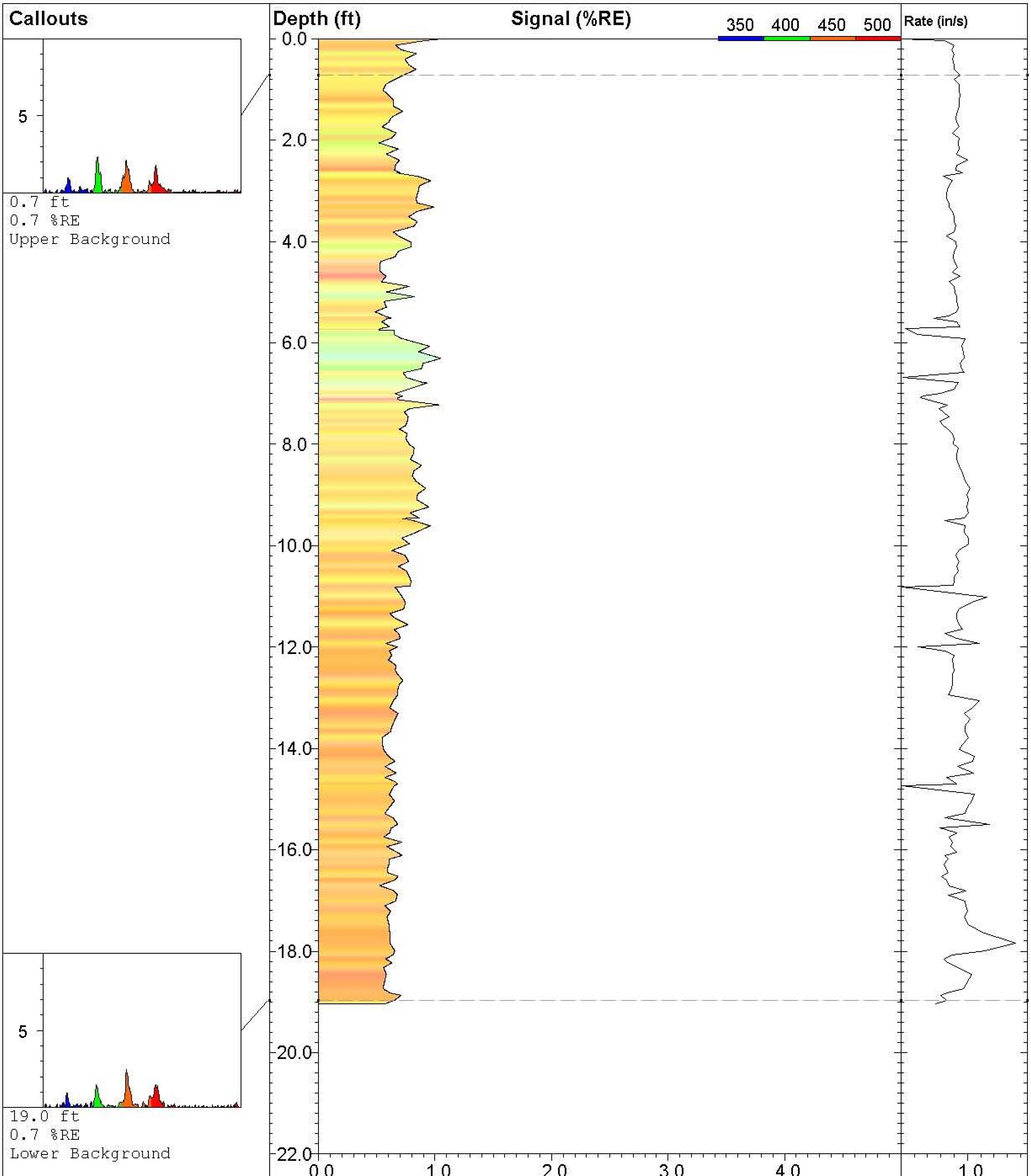
10NC11 UV-07

UVOST By Dakota
www.DakotaTechnologies.com

Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **19.02 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **6.3 % @ 0.21 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-03 20:24 ADT**



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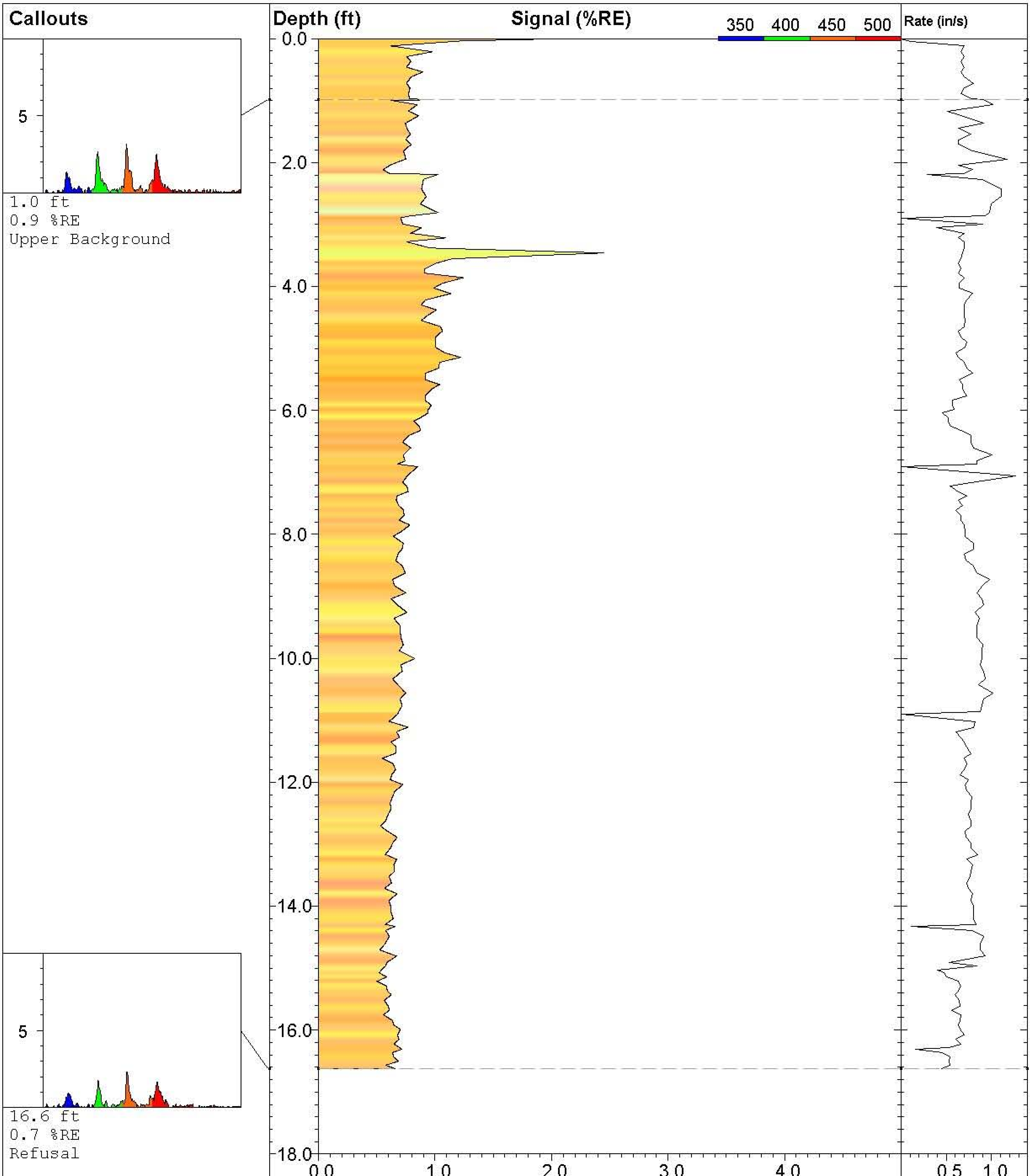
10NC11 UV-08

UVOST By Dakota
www.DakotaTechnologies.com

Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **19.04 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.1 % @ 0.00 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-03 21:22 ADT**



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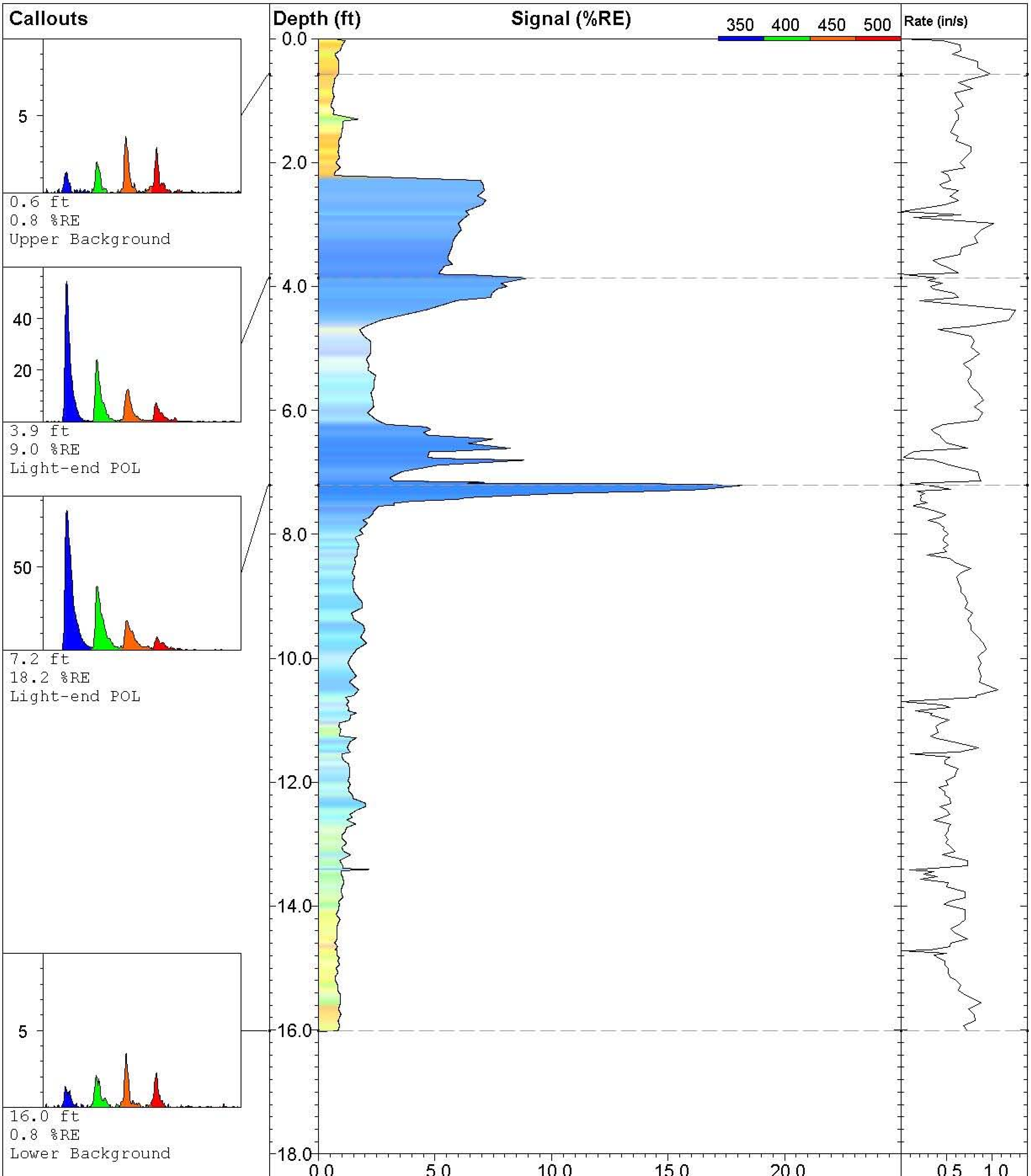
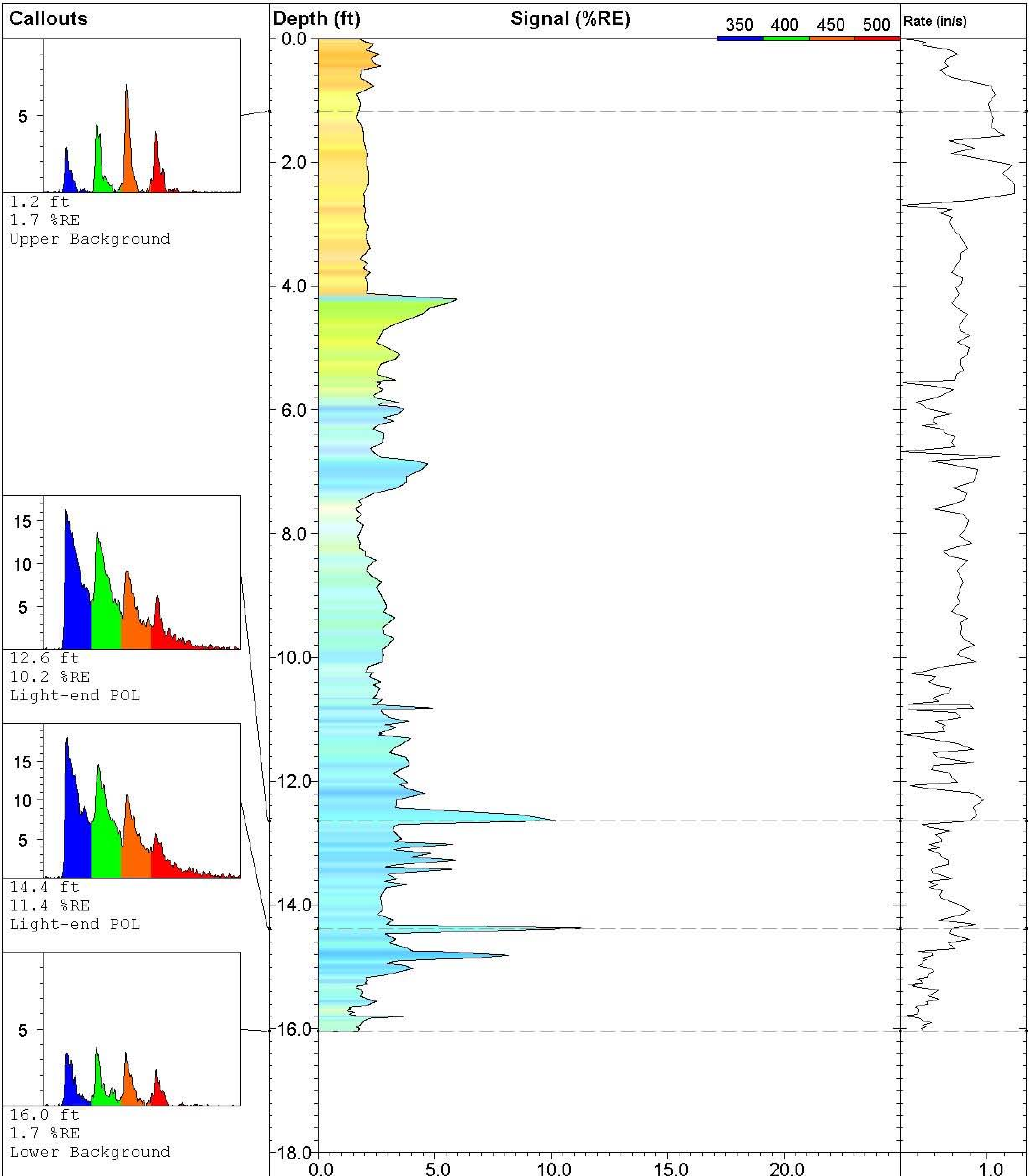
10NC11 UV-09

UVOST By Dakota
www.DakotaTechnologies.com

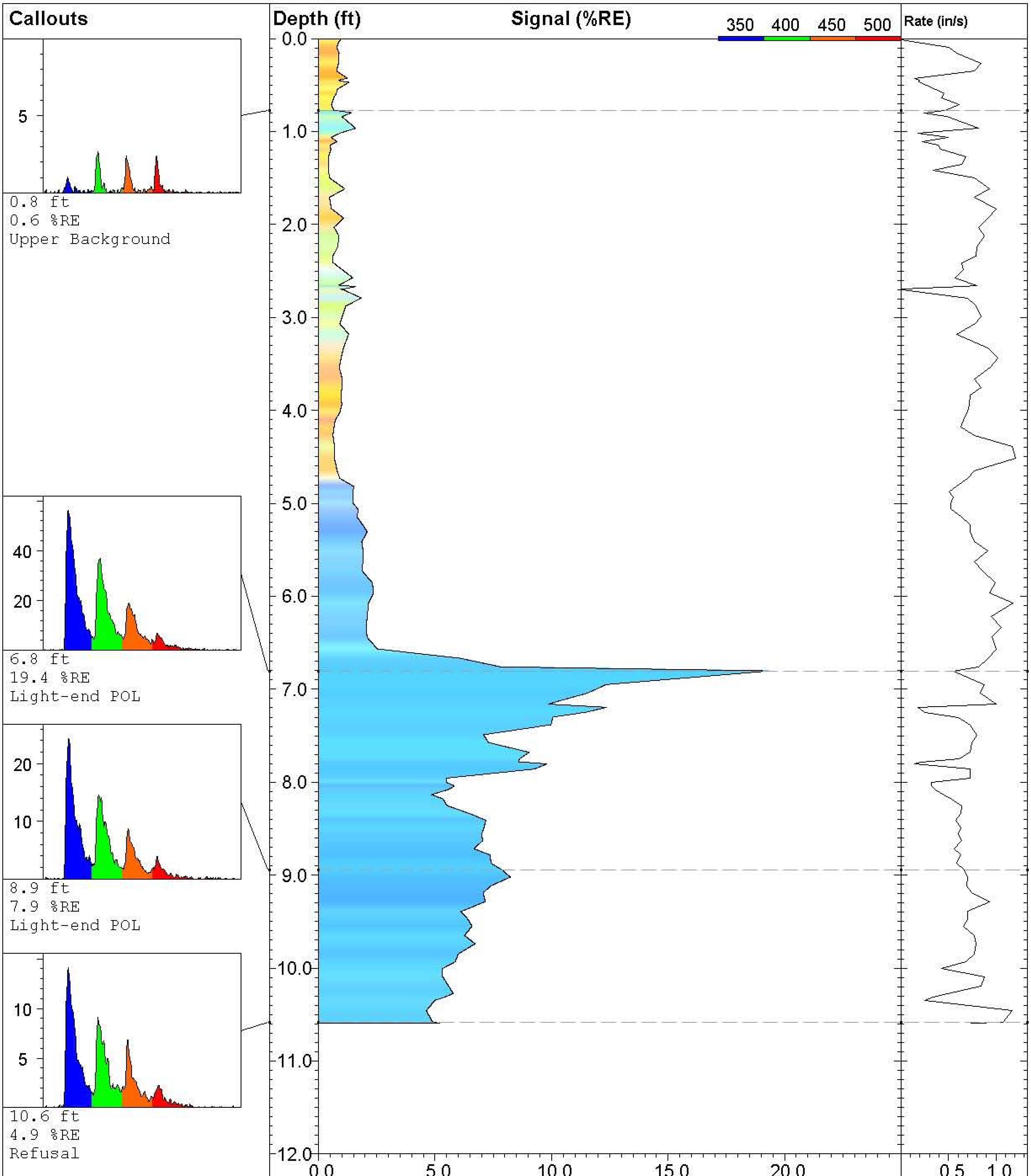
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.63 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.5 % @ 3.46 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-03 19:55 ADT**



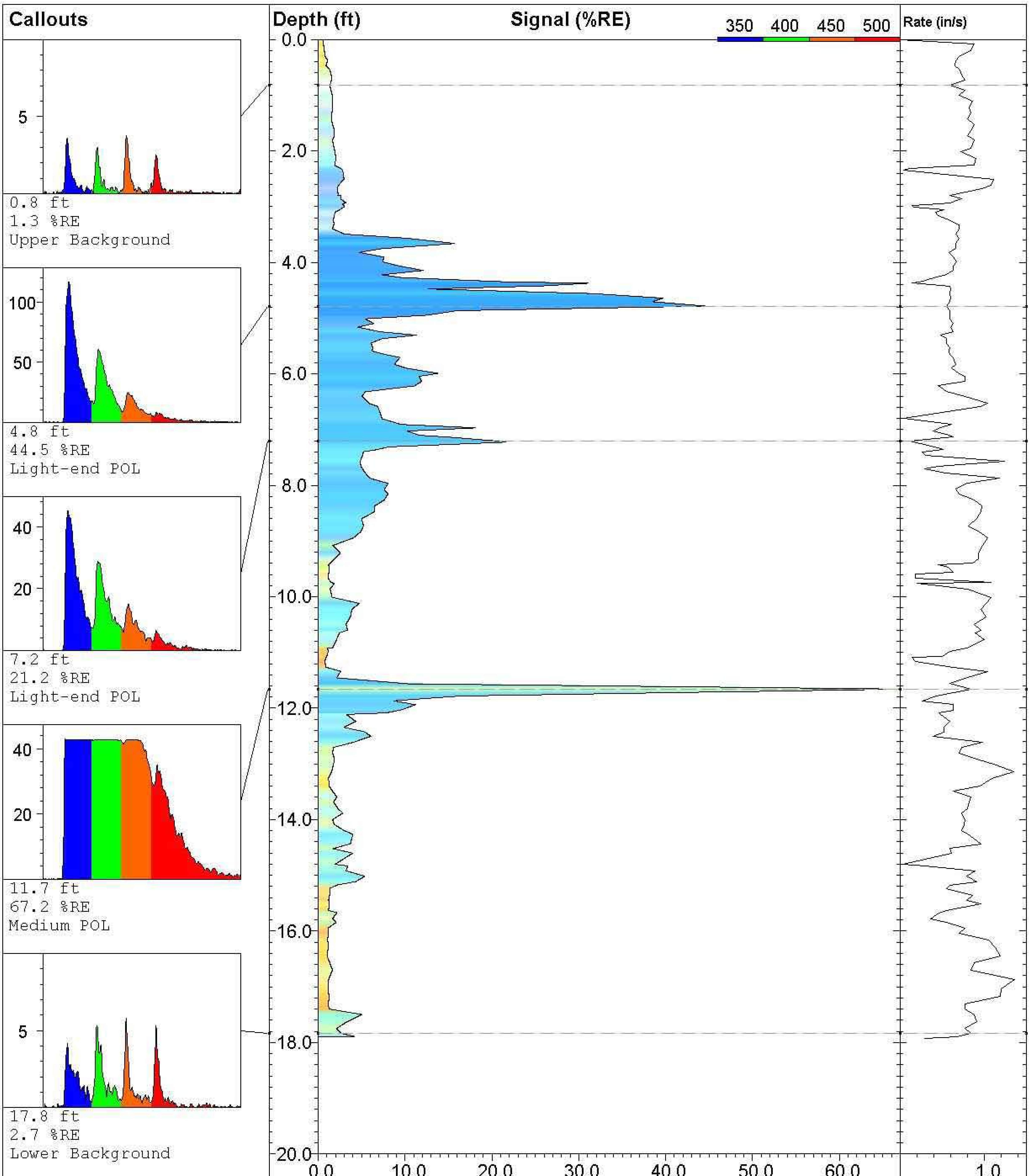
Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC11 UV-10**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.02 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **18.2 % @ 7.21 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-04 14:13 ADT**



Hammer Environmental Services	10NC11 UV-11		UVOST By Dakota www.DakotaTechnologies.com
PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	*Site:* **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.04 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **11.4 % @ 14.37 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-04 15:08 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC11 UV-12**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **10.60 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **19.4 % @ 6.80 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-04 18:01 ADT**



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10NC11 UV-13

UVOST By Dakota
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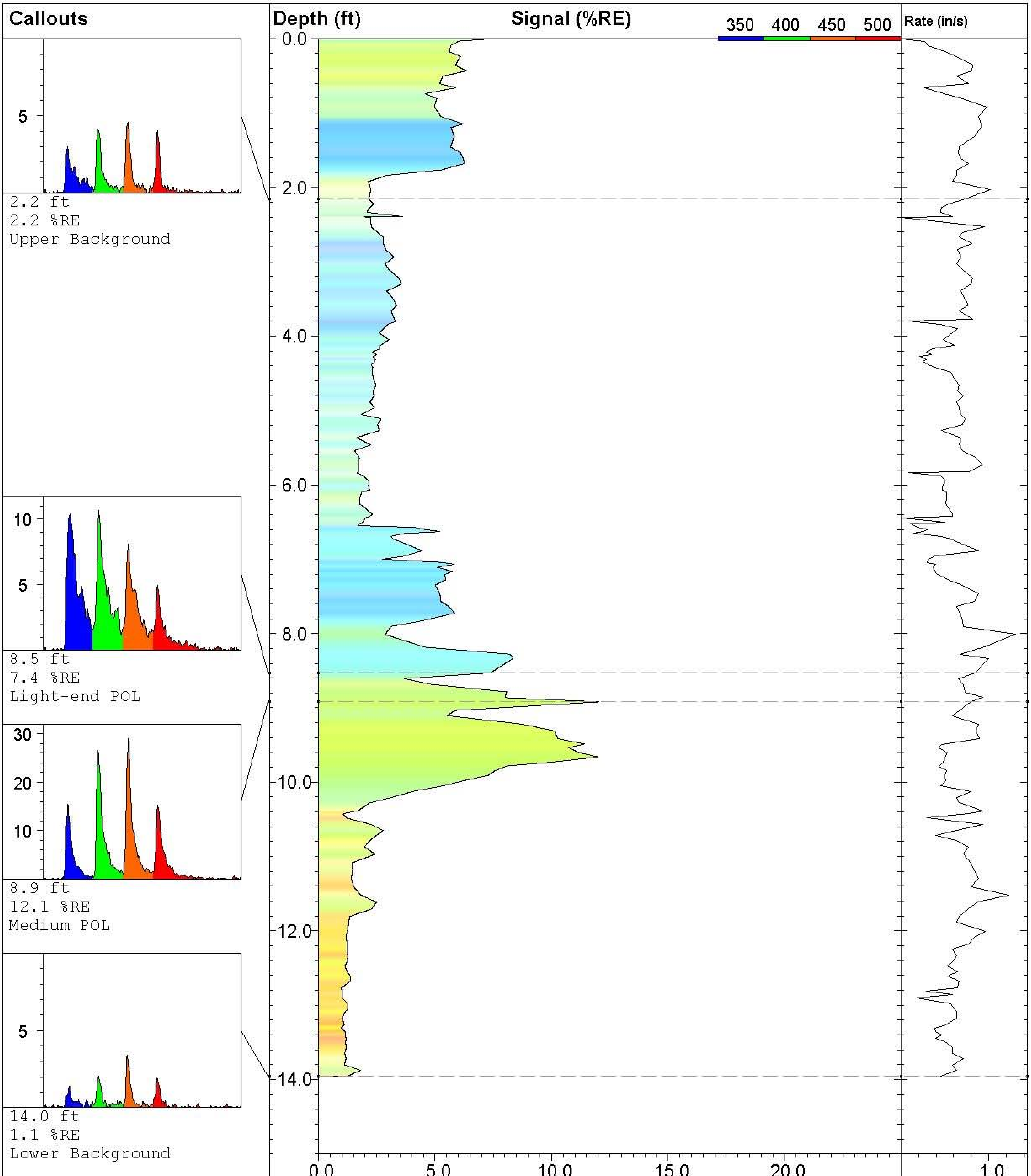
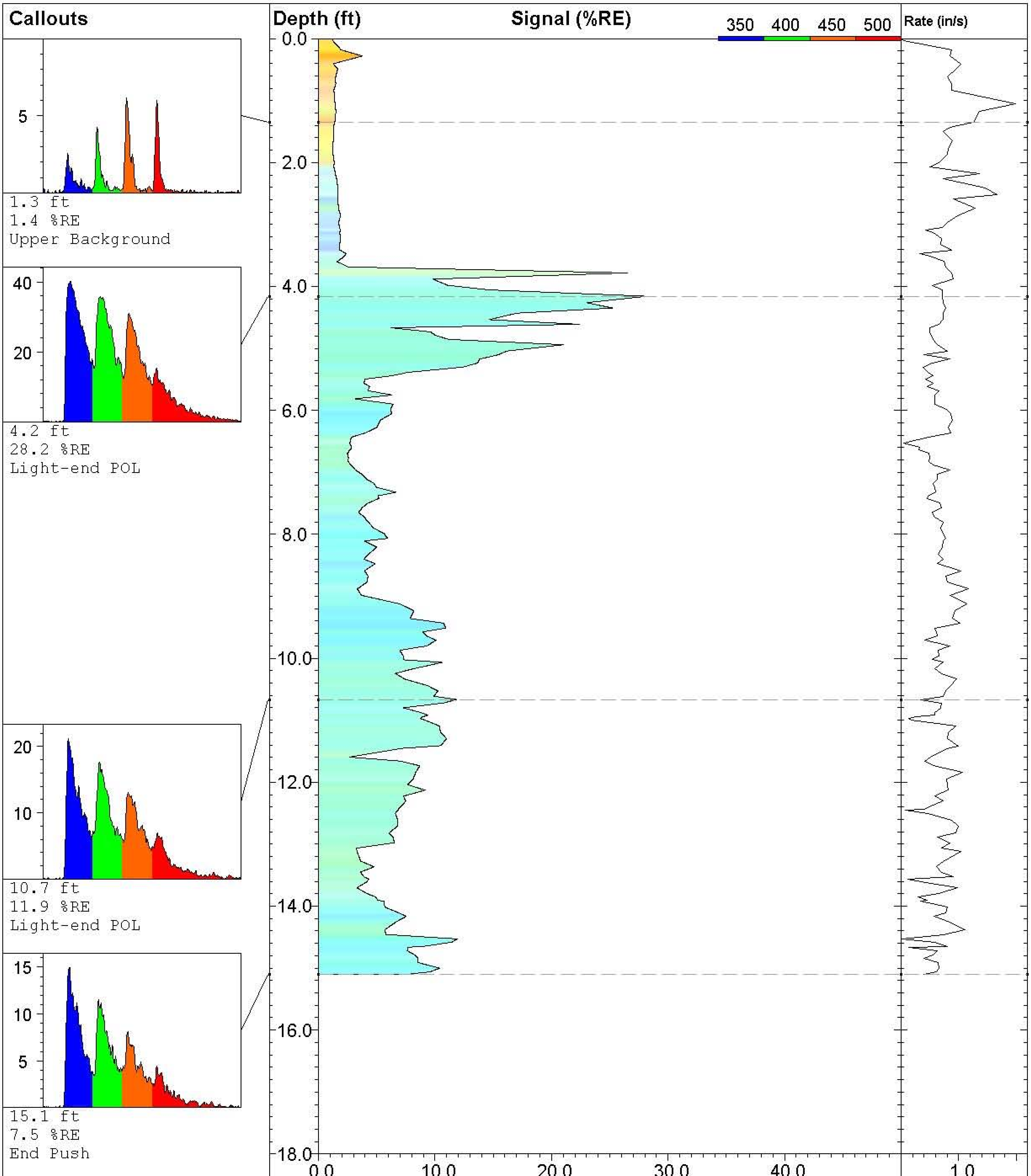
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.92 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **67.2 % @ 11.66 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-04 18:39 ADT**



Hammer Environmental Services	10NC11 UV-14		UVOST By Dakota www.DakotaTechnologies.com
PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	*Site:* **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **13.95 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **12.1 % @ 8.92 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-04 19:30 ADT**



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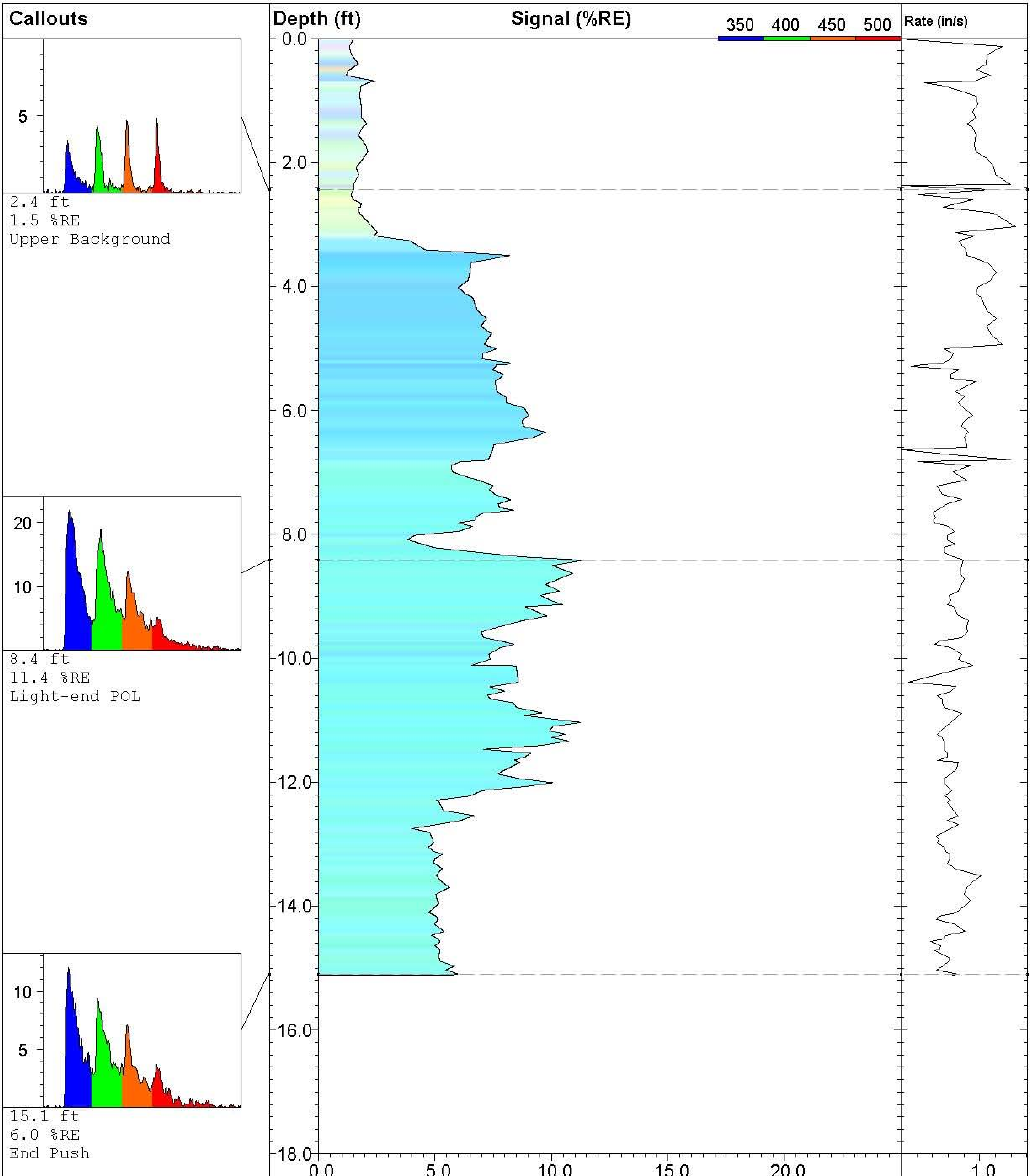
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.10 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **28.2 % @ 4.16 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-04 21:18 ADT**



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10NC11 UV-16

UVOST By Dakota
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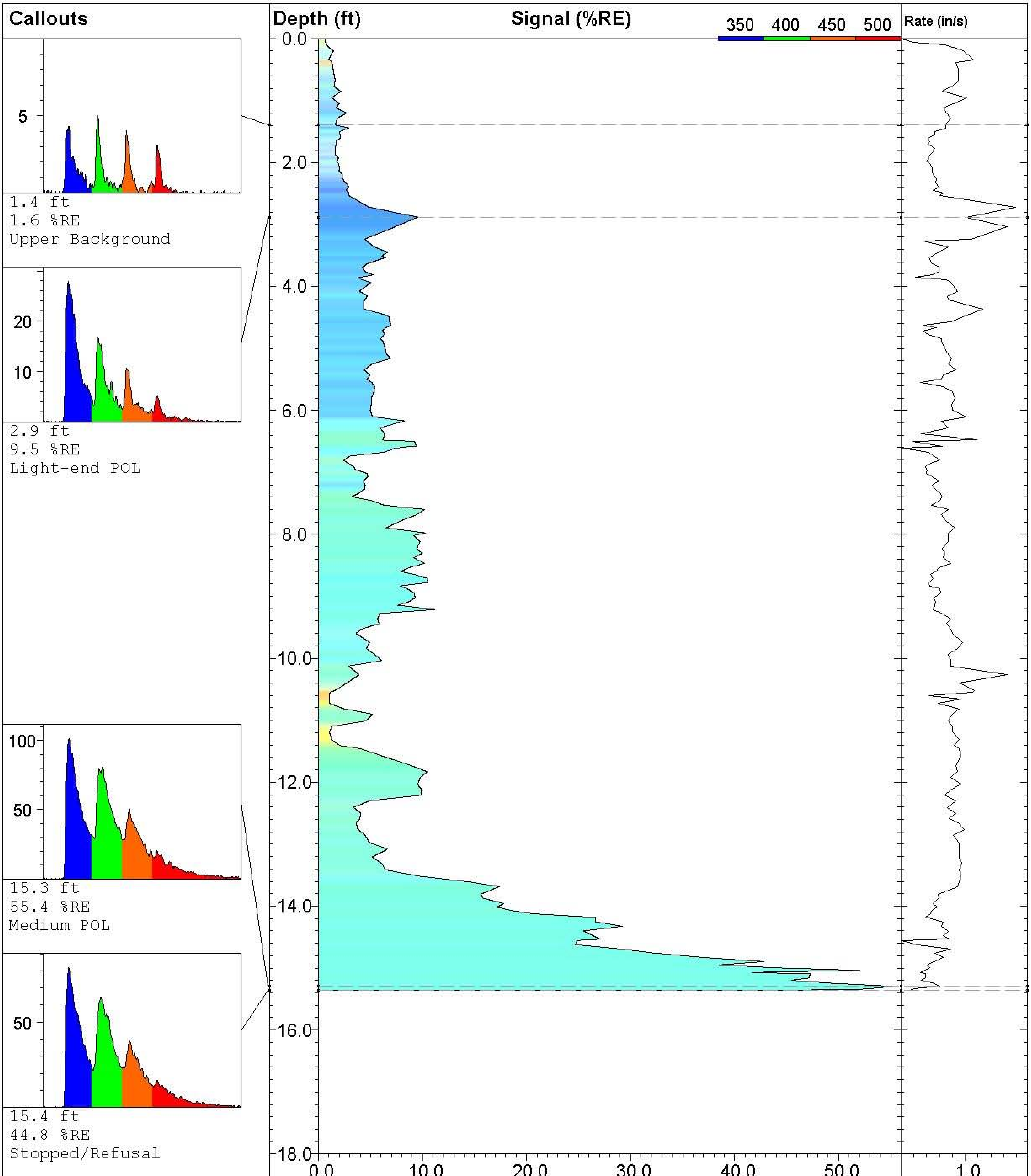
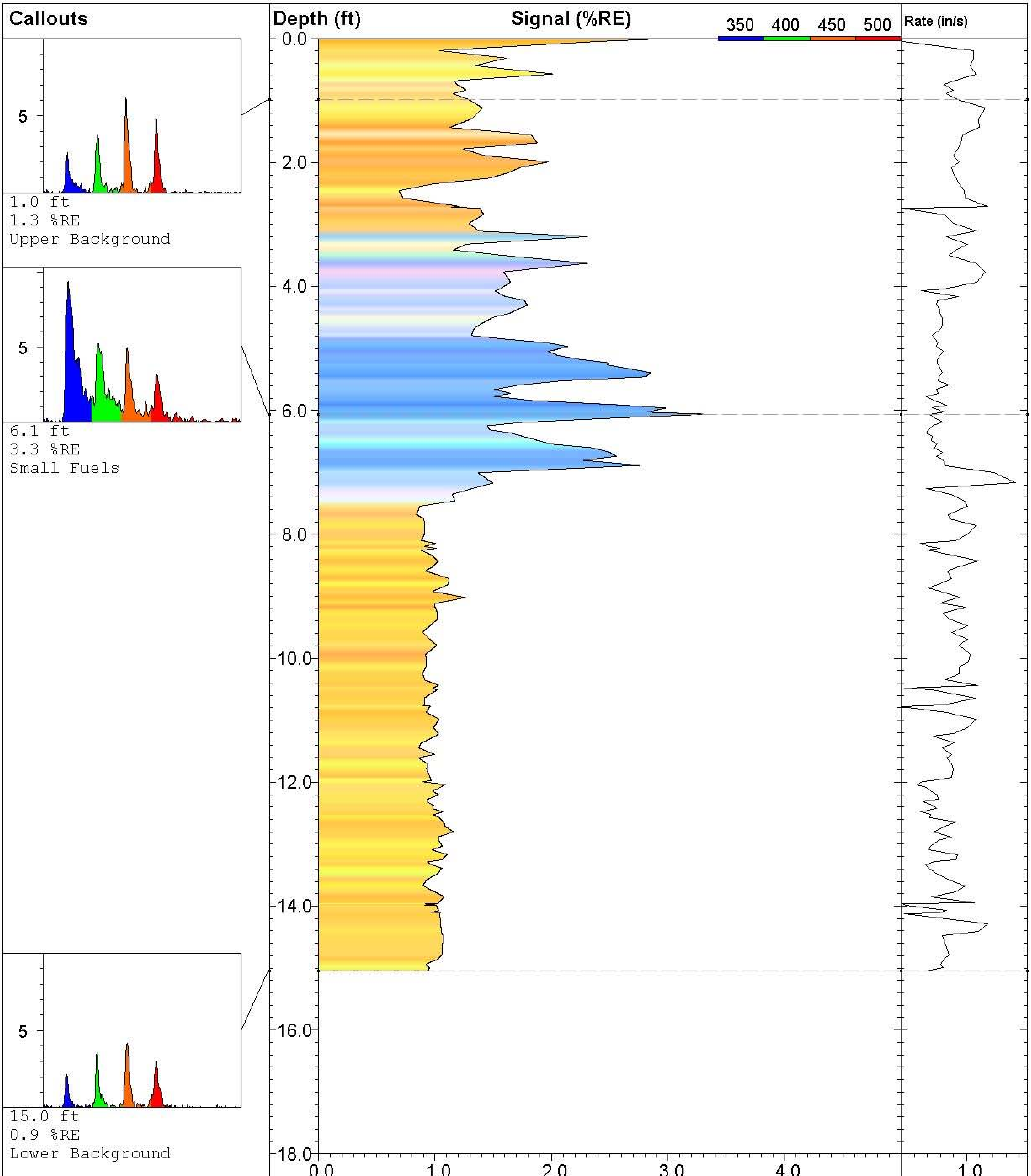
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.11 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **11.4 % @ 8.42 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-04 21:01 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC11 UV-17**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.35 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **55.4 % @ 15.30 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-04 20:40 ADT**



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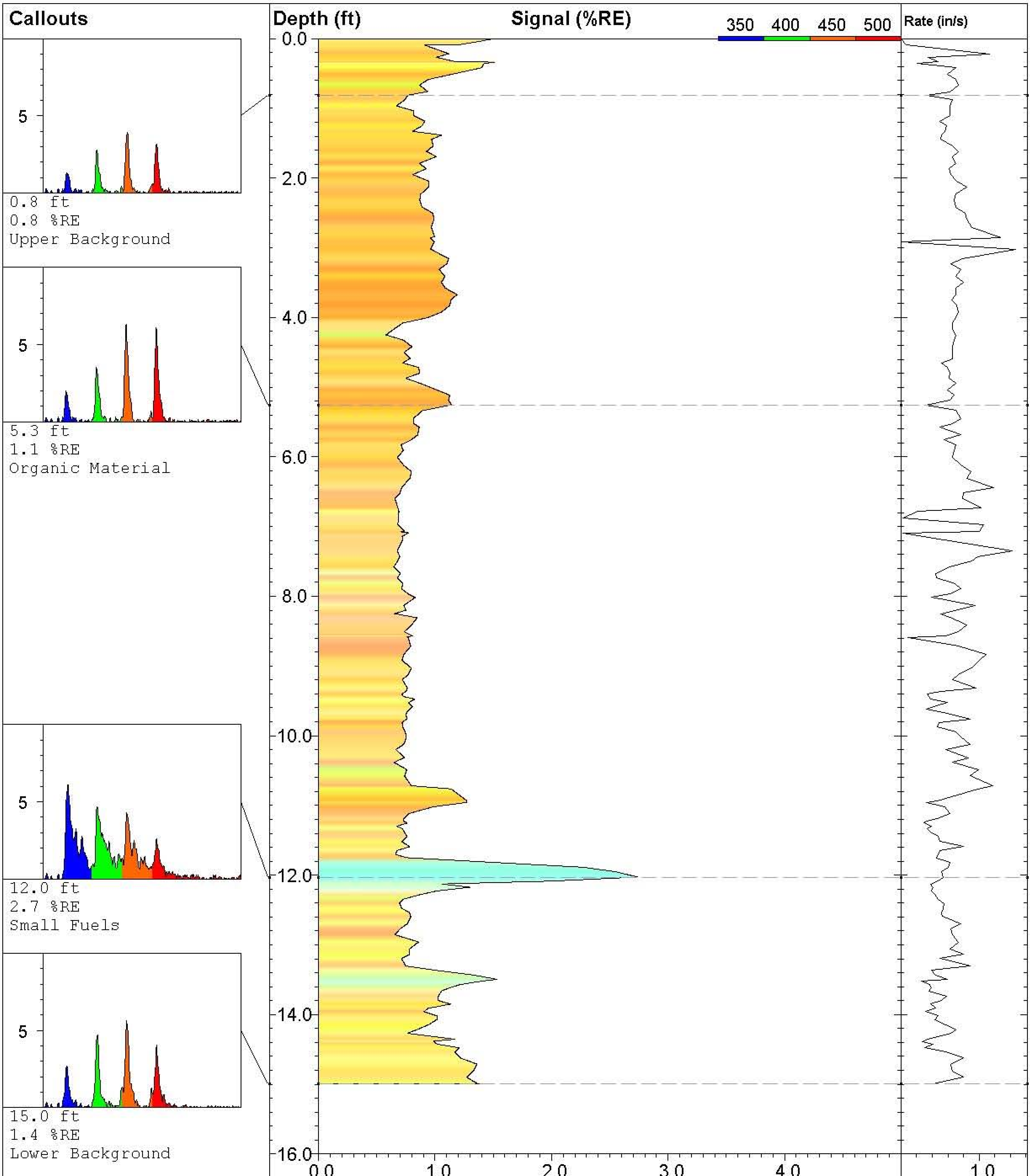
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.05 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **3.3 % @ 6.06 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-04 20:23 ADT**



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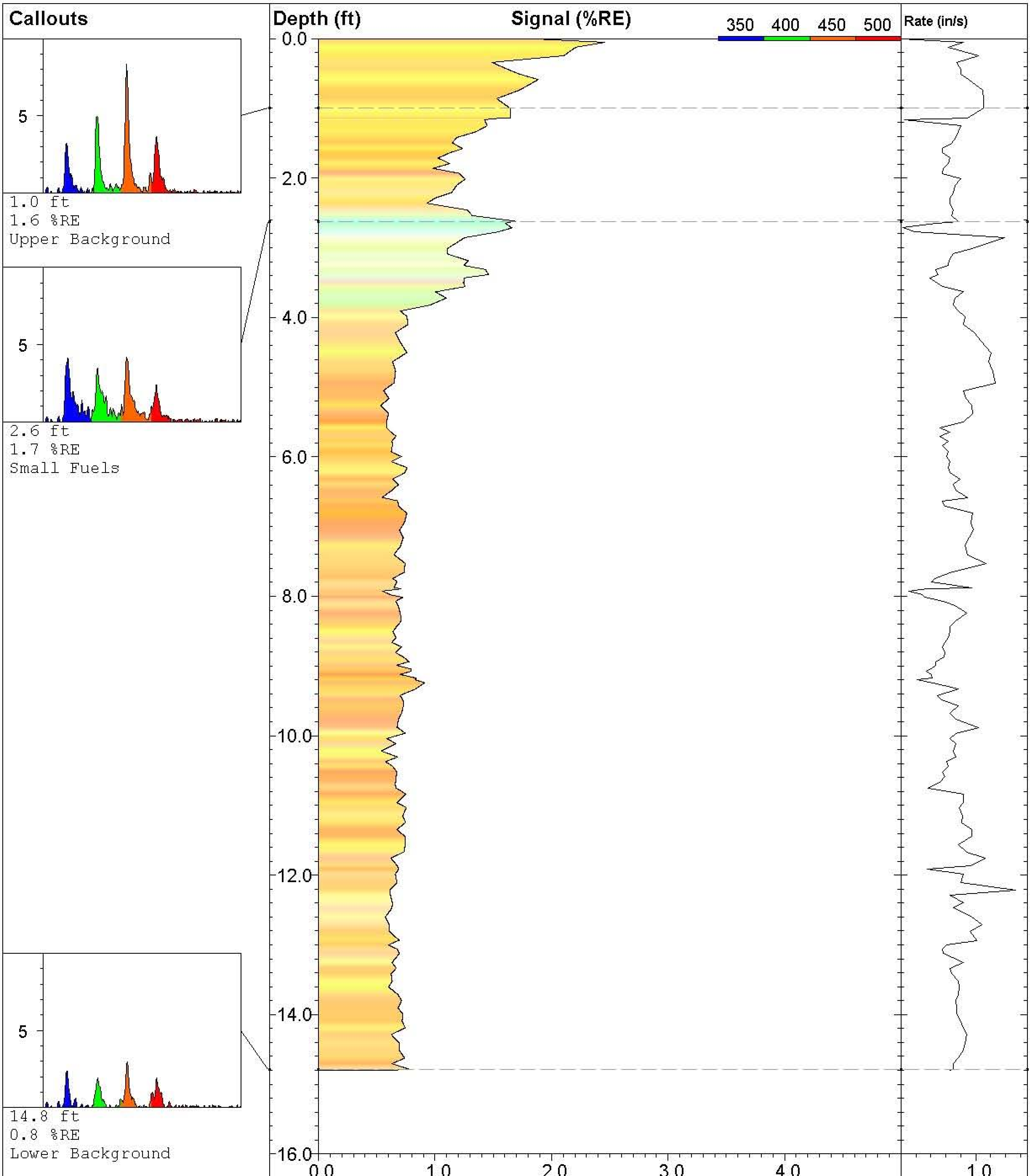
10NC11 UV-19

UVOST By Dakota
www.DakotaTechnologies.com

Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.00 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.7 % @ 12.03 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-05 11:20 ADT**



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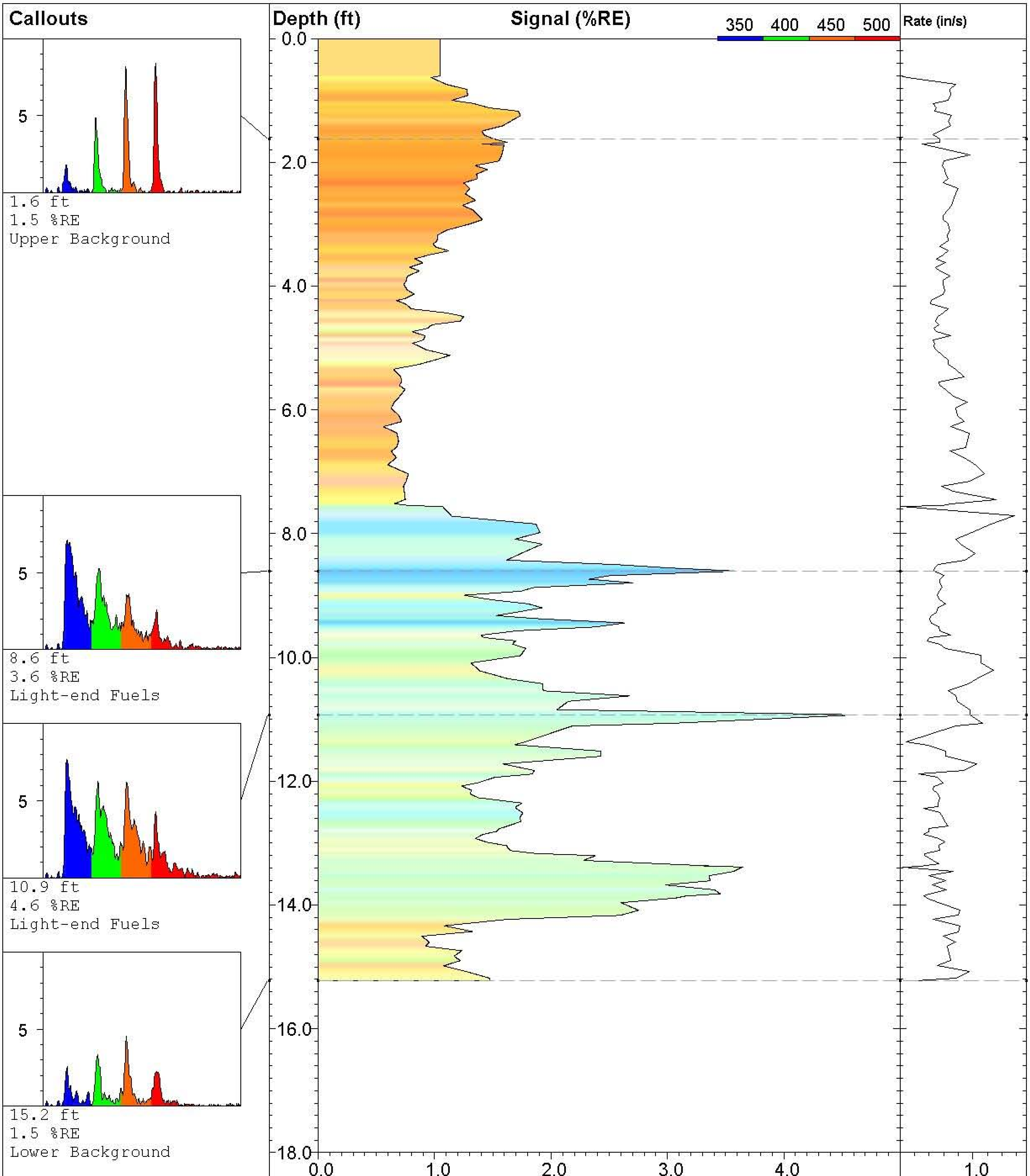
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **14.80 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.5 % @ 0.05 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-05 11:38 ADT**



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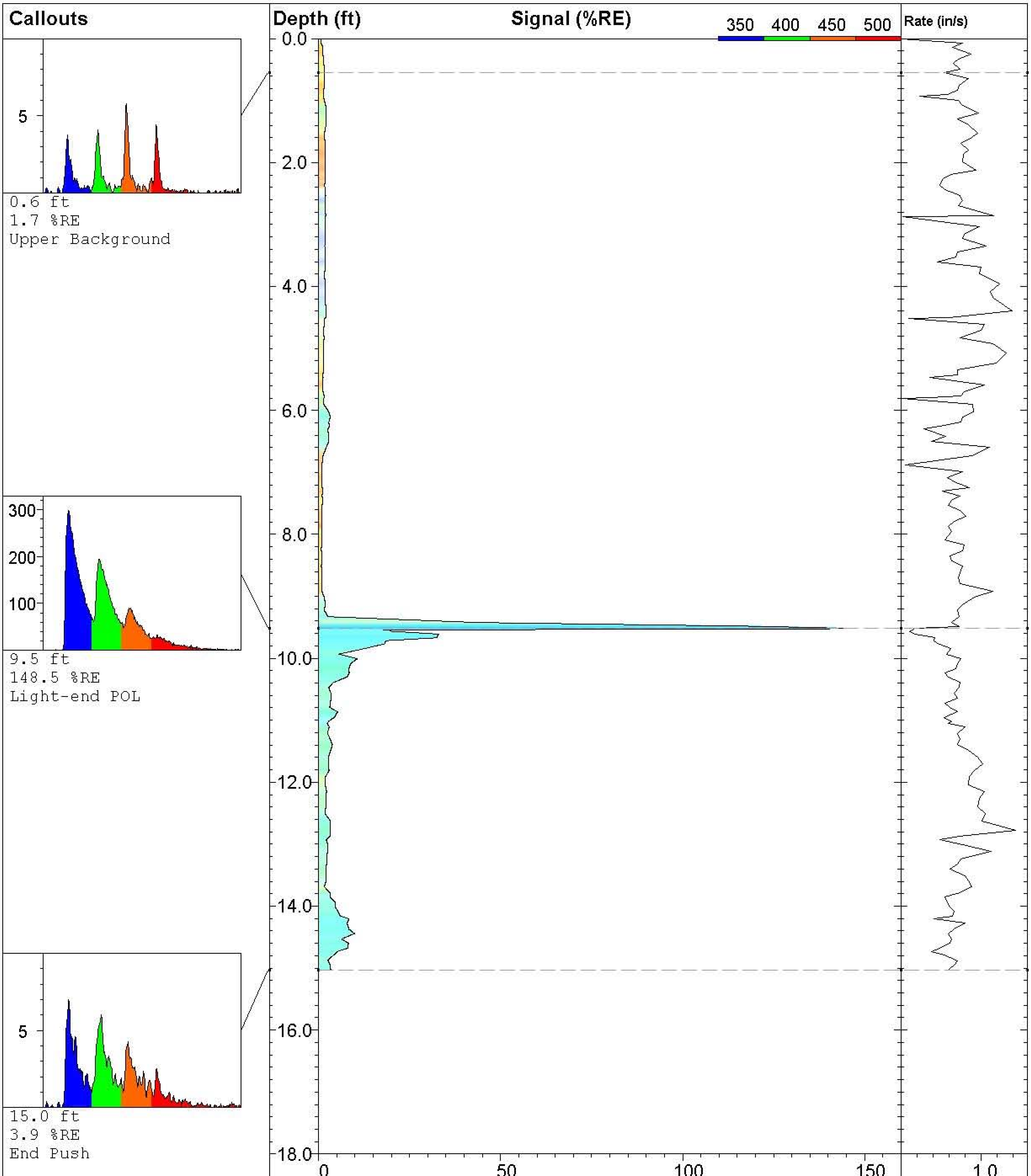
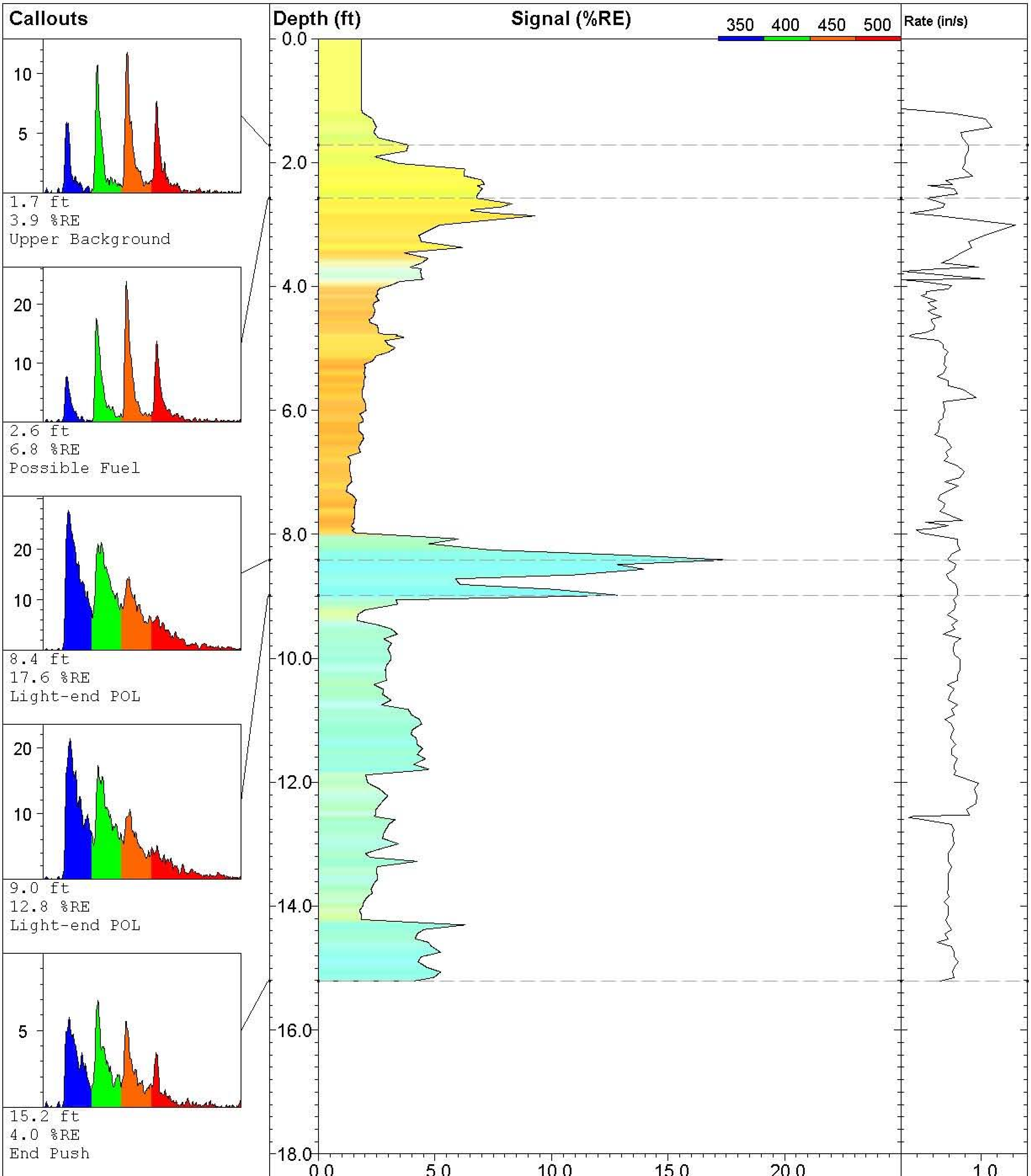
10NC11 UV-21

UVOST By Dakota
www.DakotaTechnologies.com

Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.23 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **4.6 % @ 10.93 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-05 11:54 ADT**



Hammer Environmental Services	10NC11 UV-22		UVOST By Dakota www.DakotaTechnologies.com
PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	*Site:* **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.03 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **148.5 % @ 9.52 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-05 13:28 ADT**



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10NC11 UV-23

UVOST By Dakota
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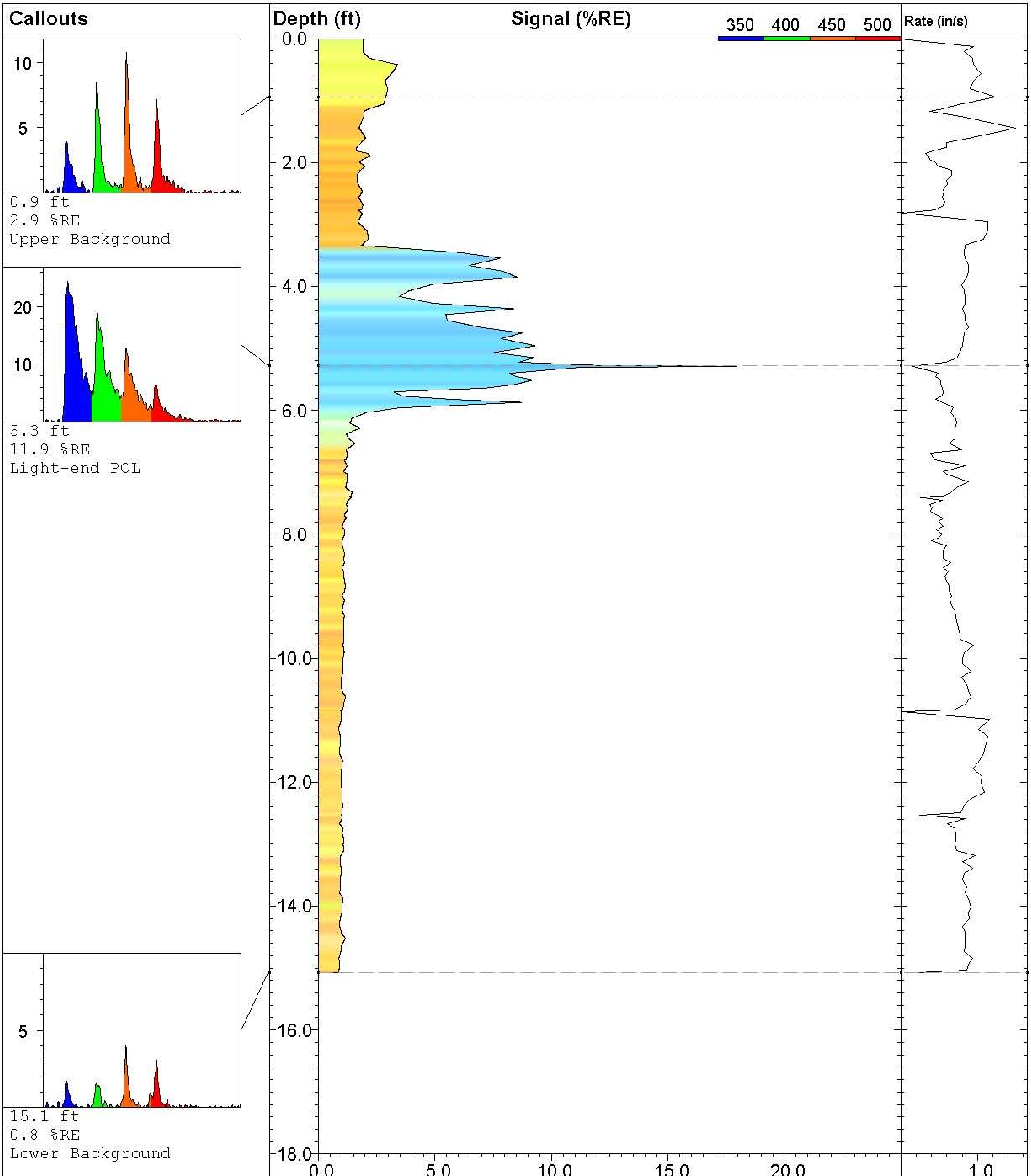
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.22 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **17.6 % @ 8.41 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-05 13:43 ADT**



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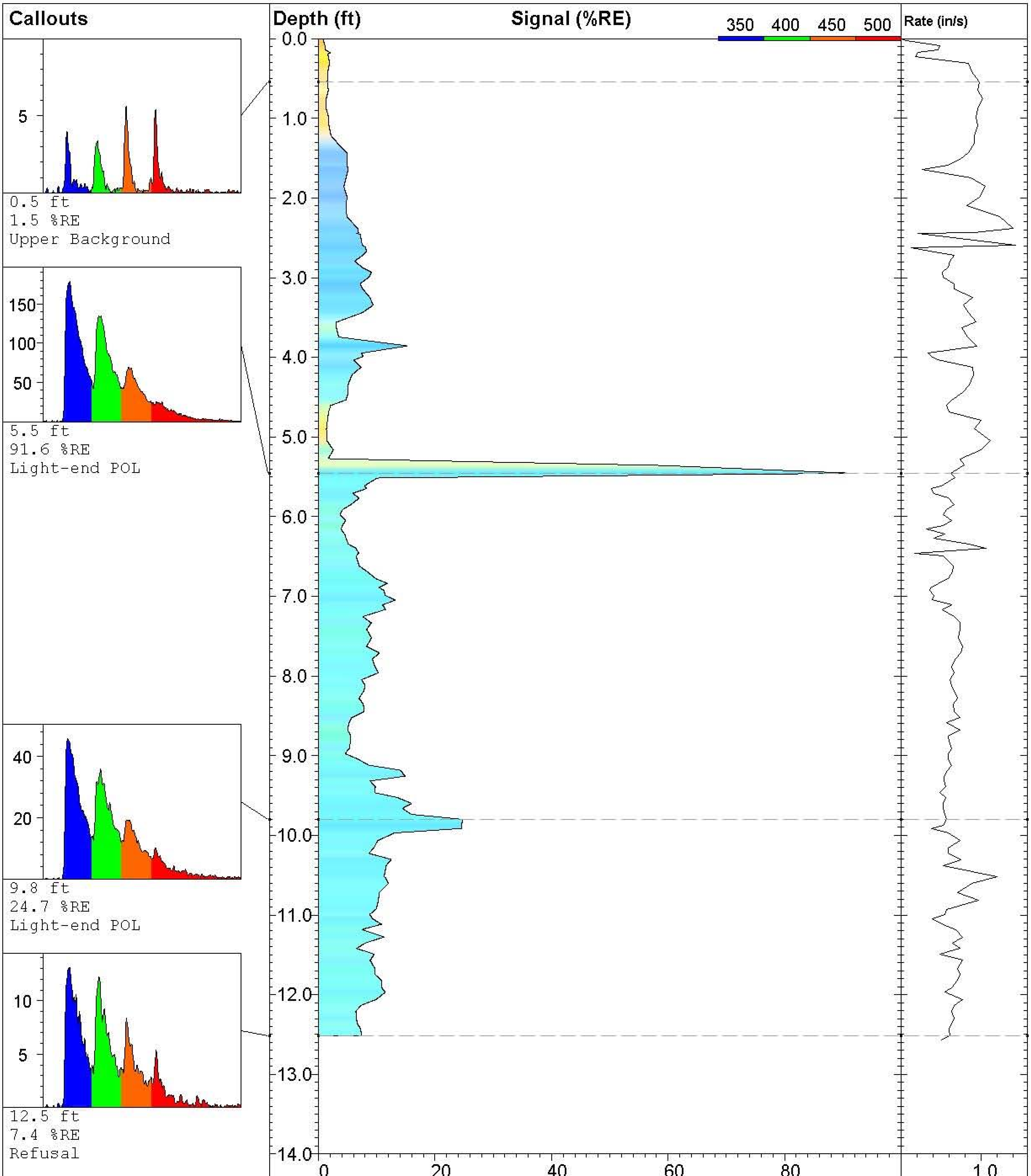
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.08 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **18.0 % @ 5.29 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-05 14:21 ADT**



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10NC11 UV-25

UVOST By Dakota
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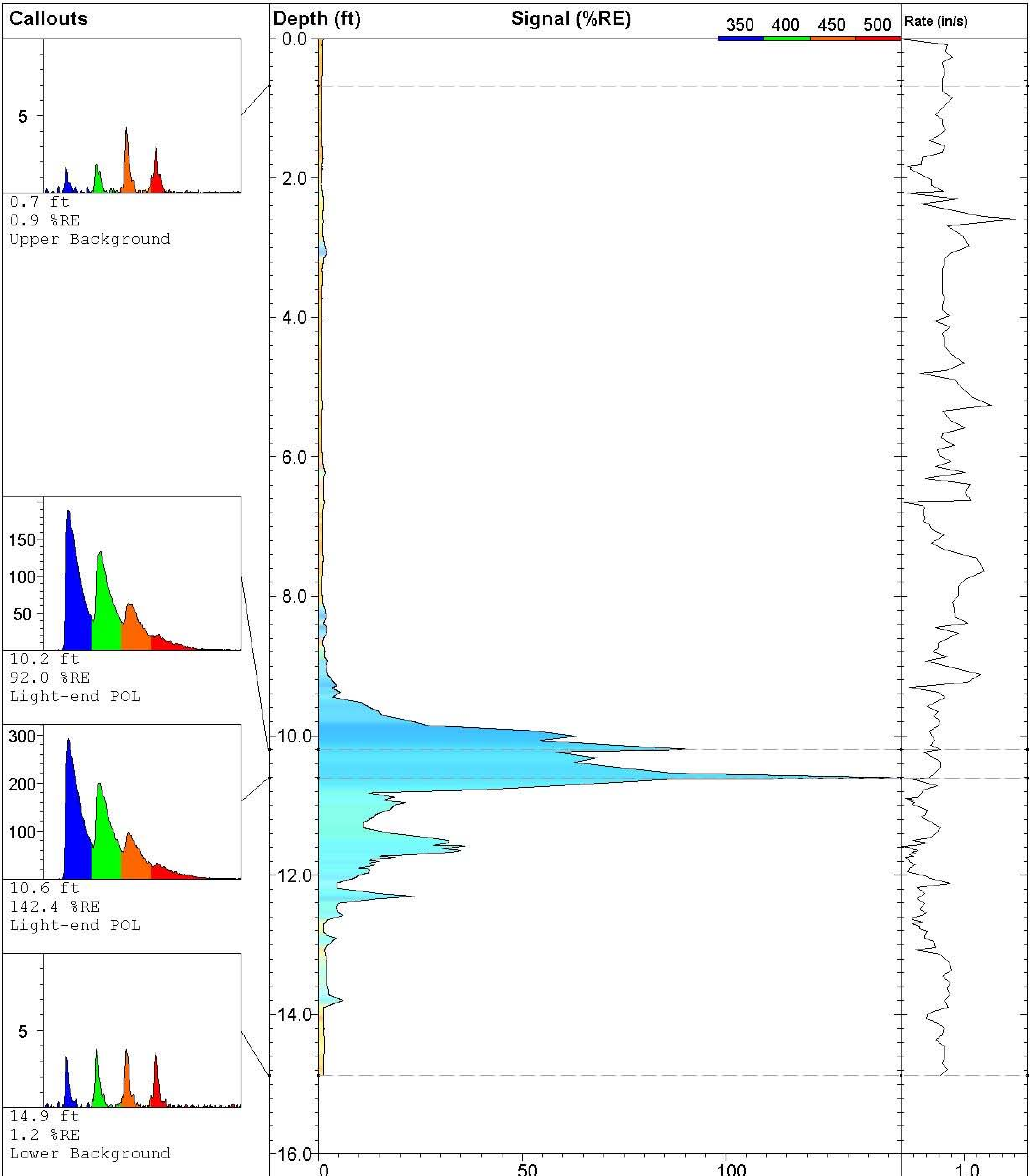
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **12.57 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **91.6 % @ 5.46 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-05 14:45 ADT**



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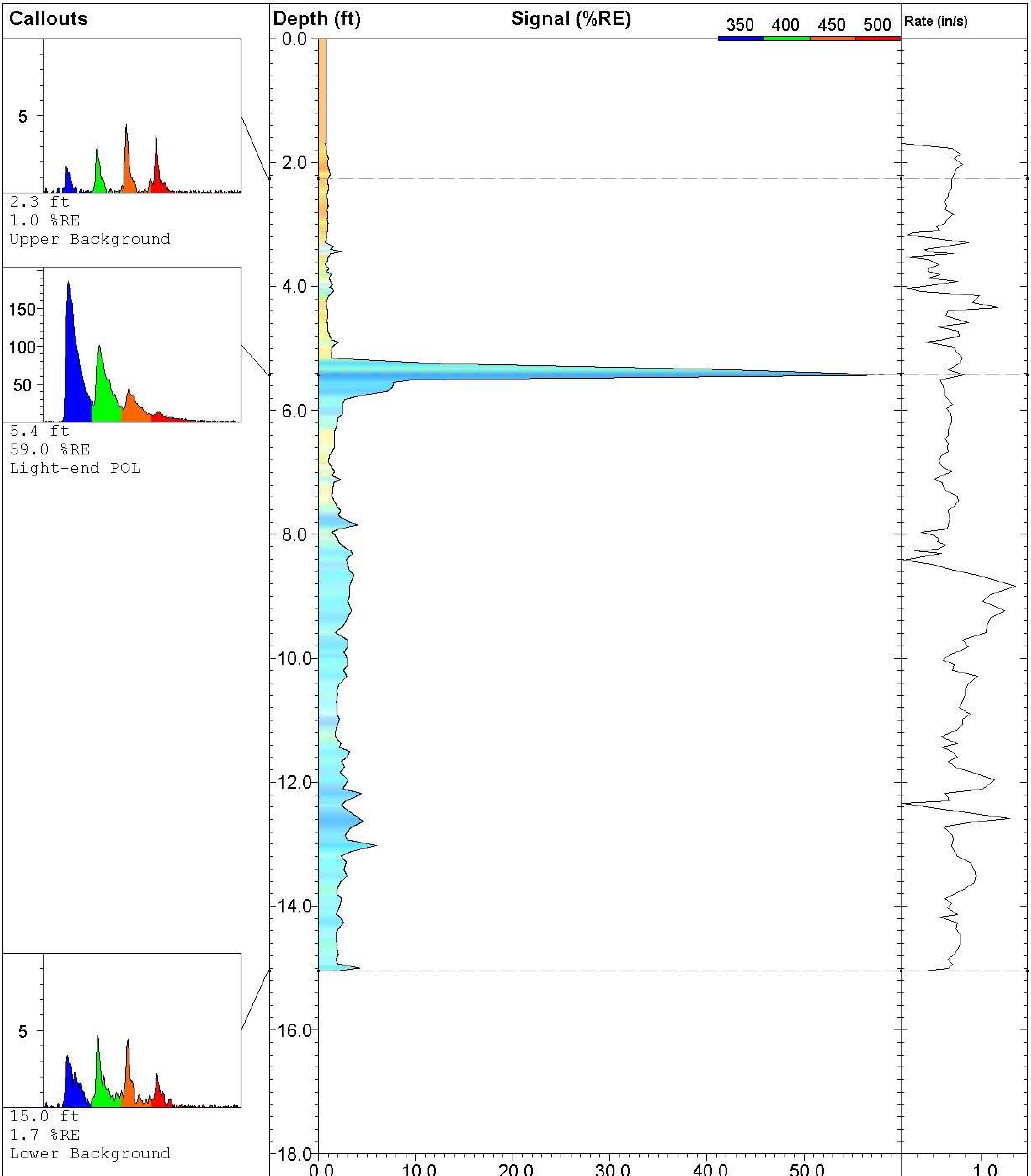
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **14.87 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **142.4 % @ 10.61 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-05 15:03 ADT**



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10NC11 UV-27

UVOST By Dakota
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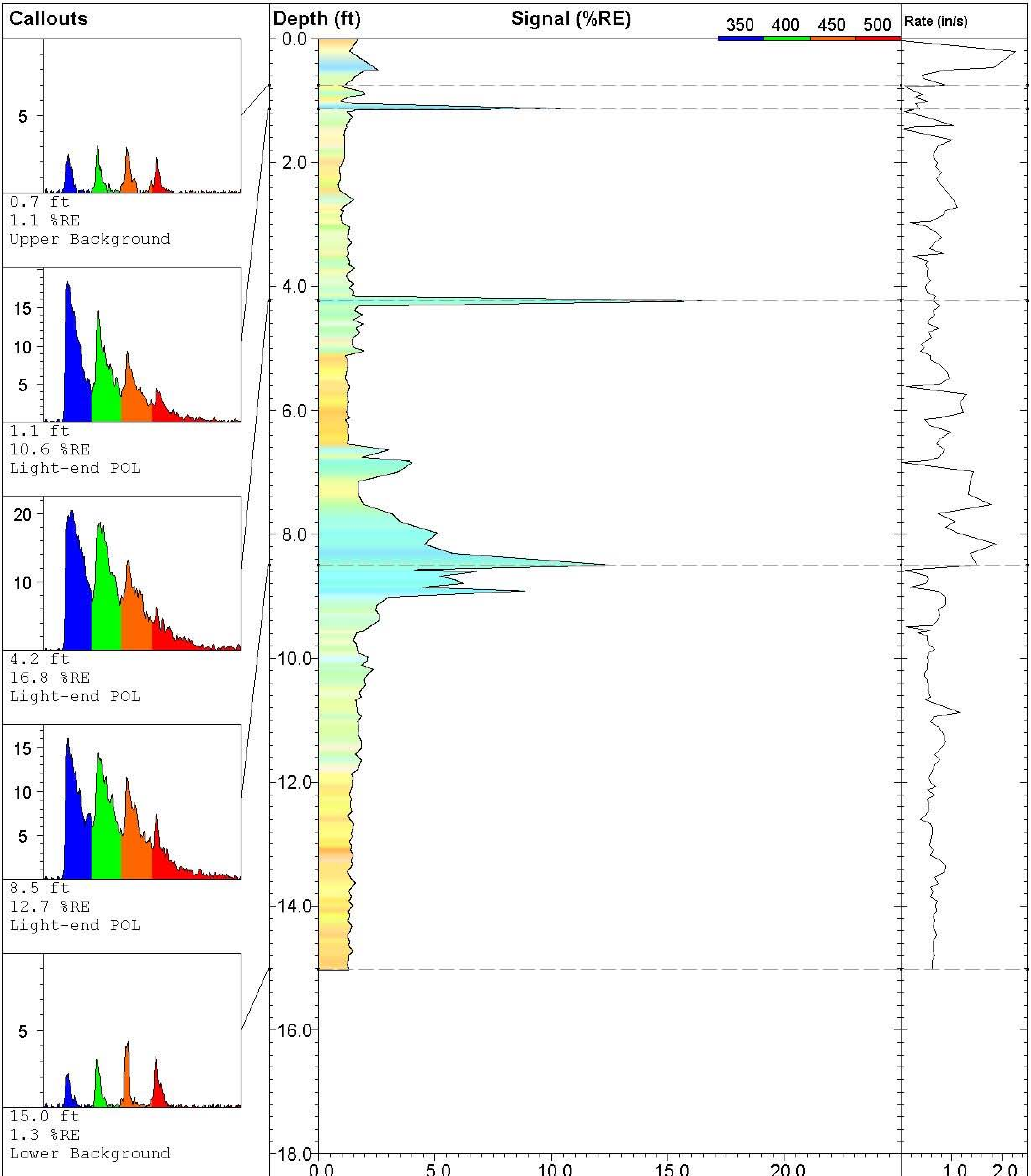
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.05 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **59.0 % @ 5.43 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-05 15:33 ADT**



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10NC11 UV-28

UVOST By Dakota
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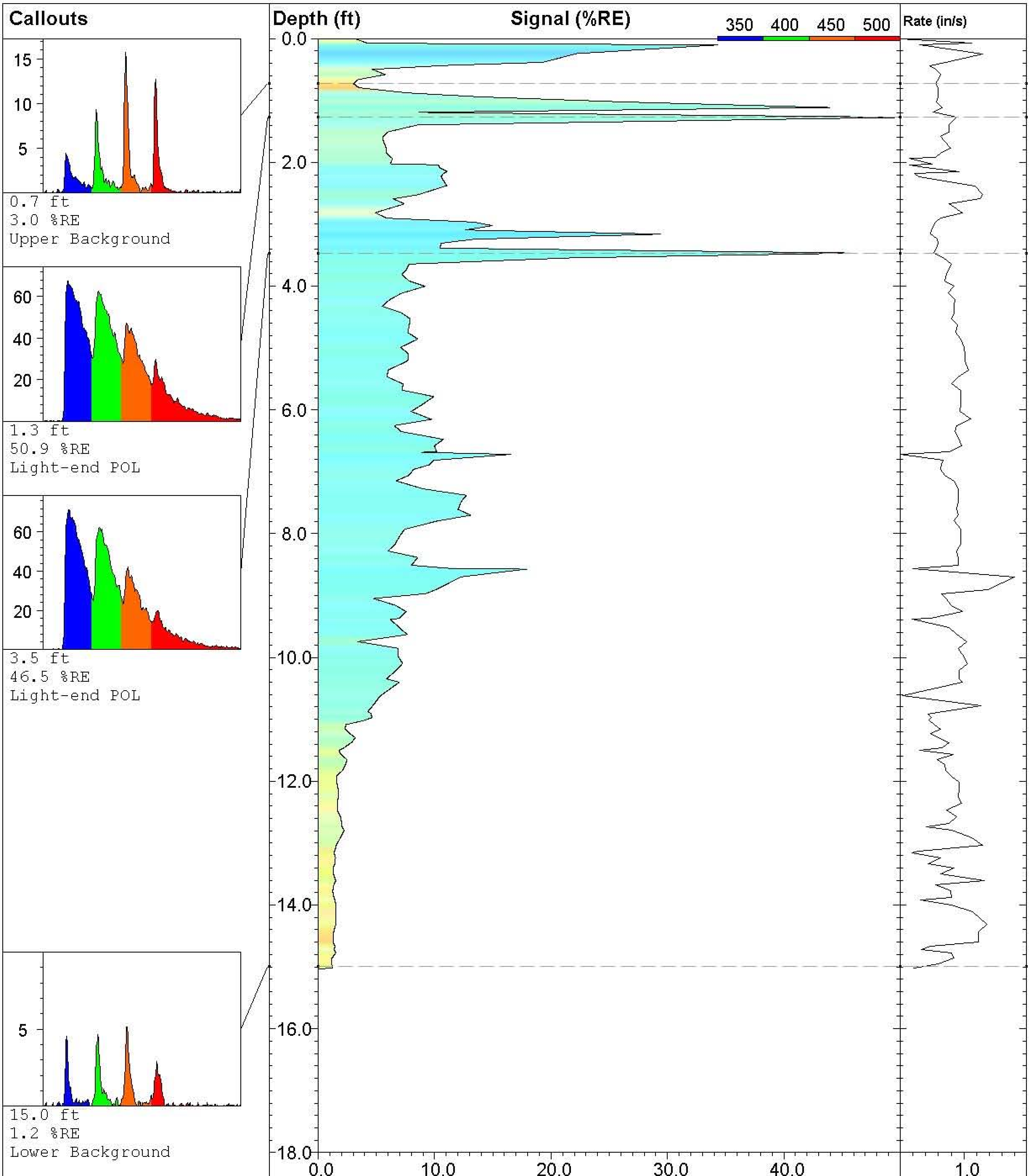
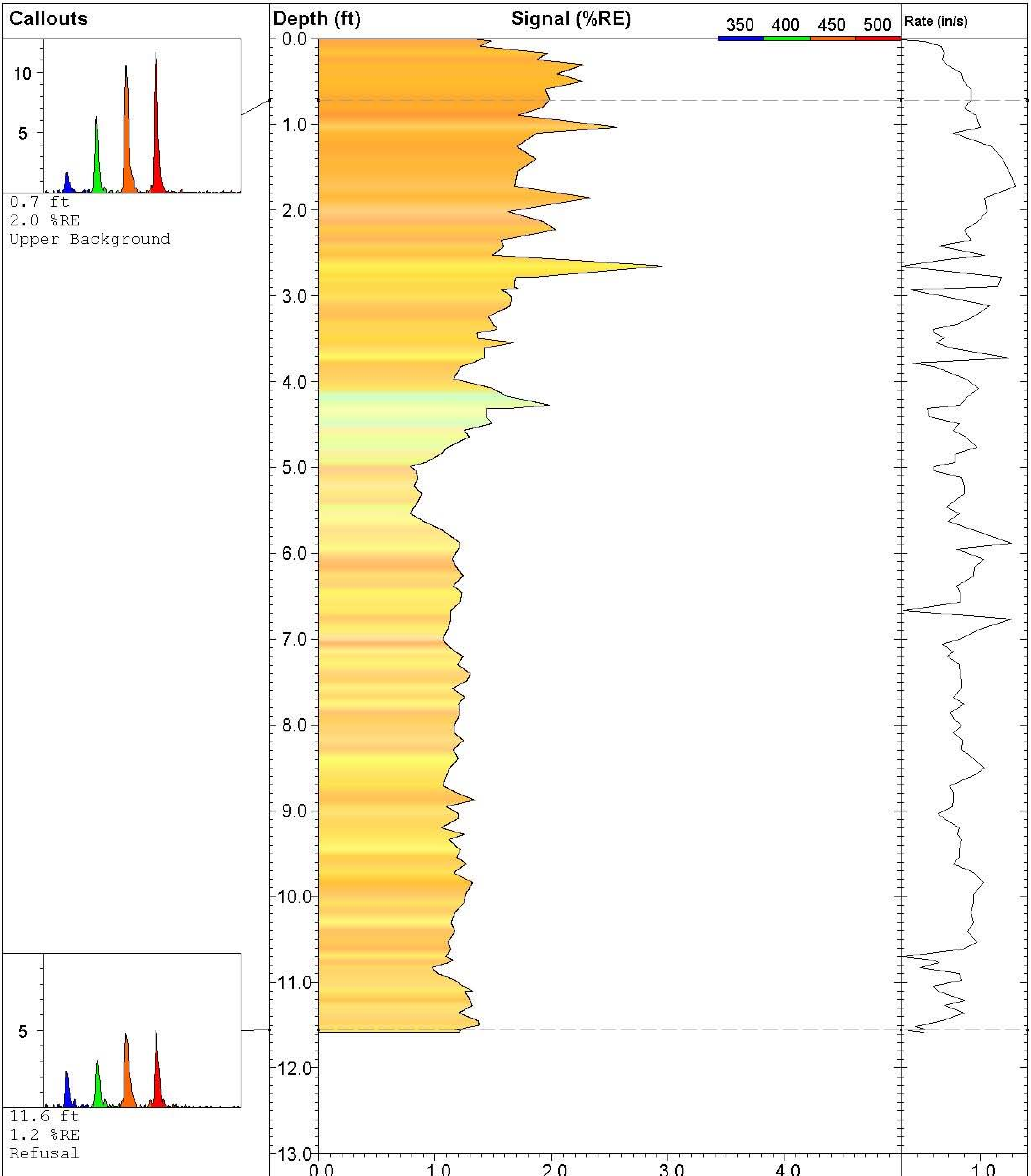
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.04 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **16.8 % @ 4.23 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-05 16:00 ADT**



Hammer Environmental Services	10NC11 UV-29		UVOST By Dakota www.DakotaTechnologies.com
PO Box 872804	*Site:* **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.03 ft**
Wasilla, Alaska 99687	*Client:* **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **50.9 % @ 1.27 ft**
(907) 841-2216 www.hammerenvironmental.com	*Job:*	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-05 16:27 ADT**



10NC11 UV-30		**UVOST By Dakota** www.DakotaTechnologies.com
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **11.58 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **3.0 % @ 2.65 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-05 17:19 ADT**

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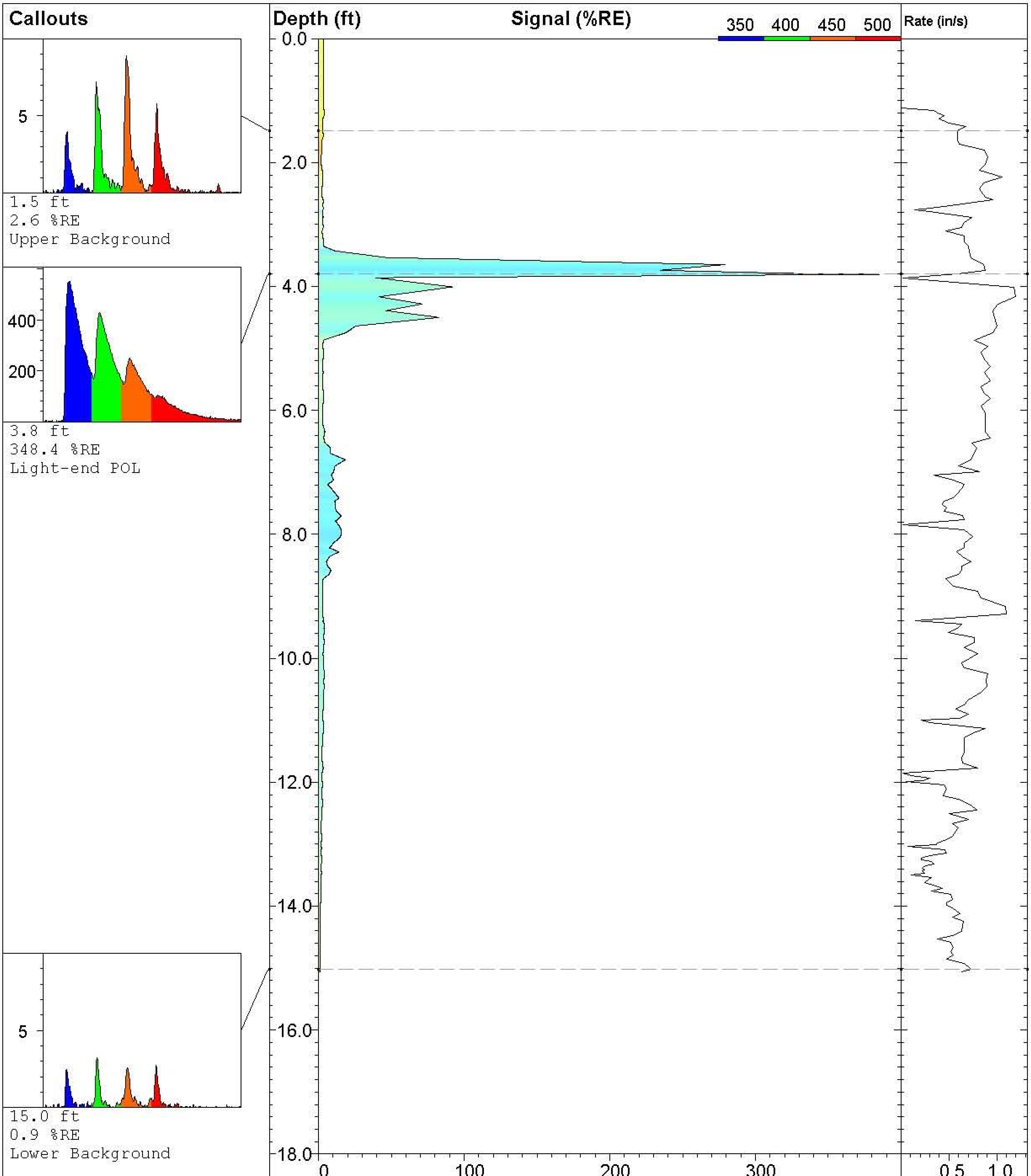

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10NC11 UV-31

UVOST By Dakota
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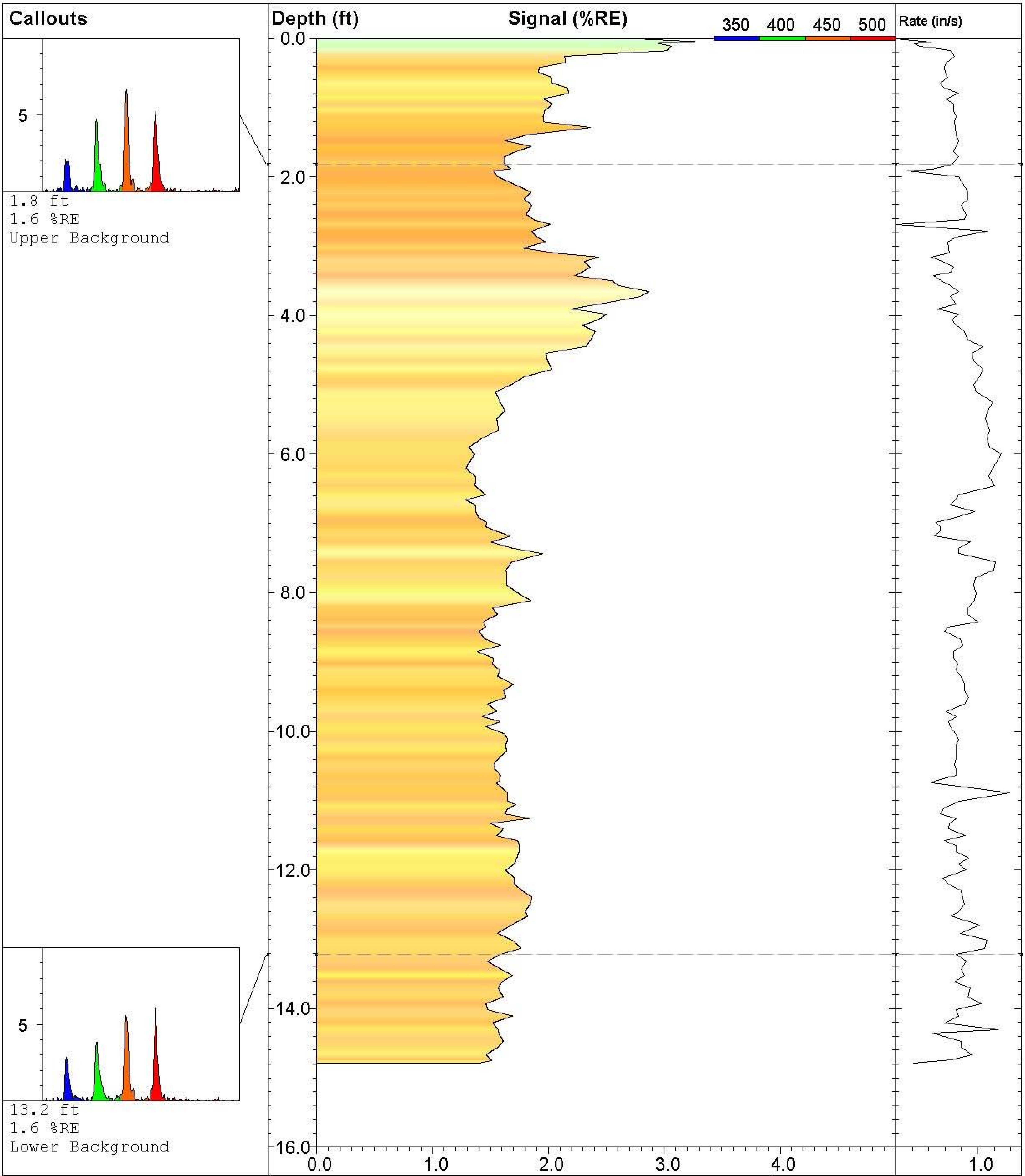
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.06 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **395.8 % @ 3.80 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-05 17:35 ADT**



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10NC11 UV-32

UVOST By Dakota
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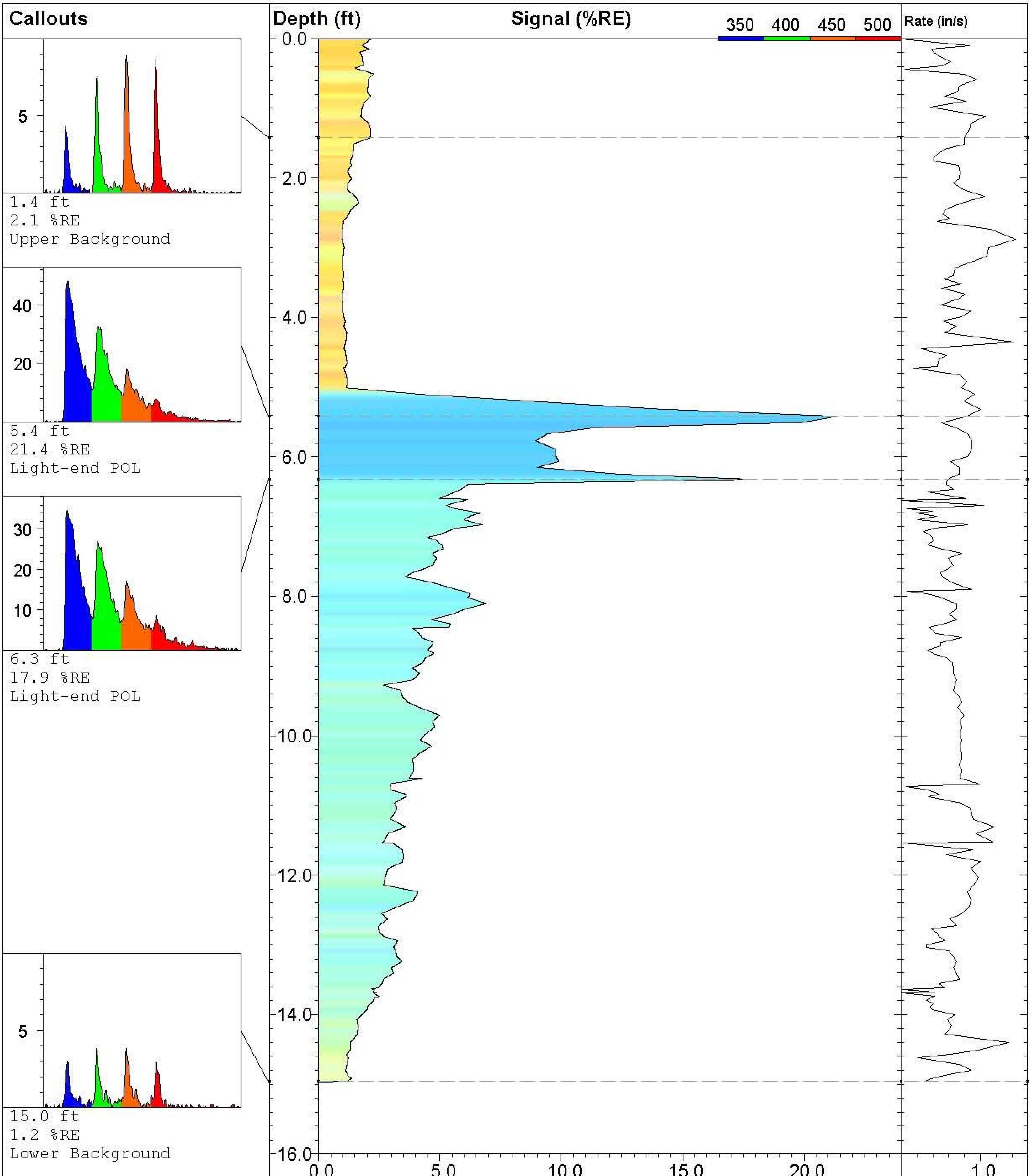
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **14.79 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **3.3 % @ 0.05 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-05 18:01 ADT**



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10NC11 UV-33

UVOST By Dakota
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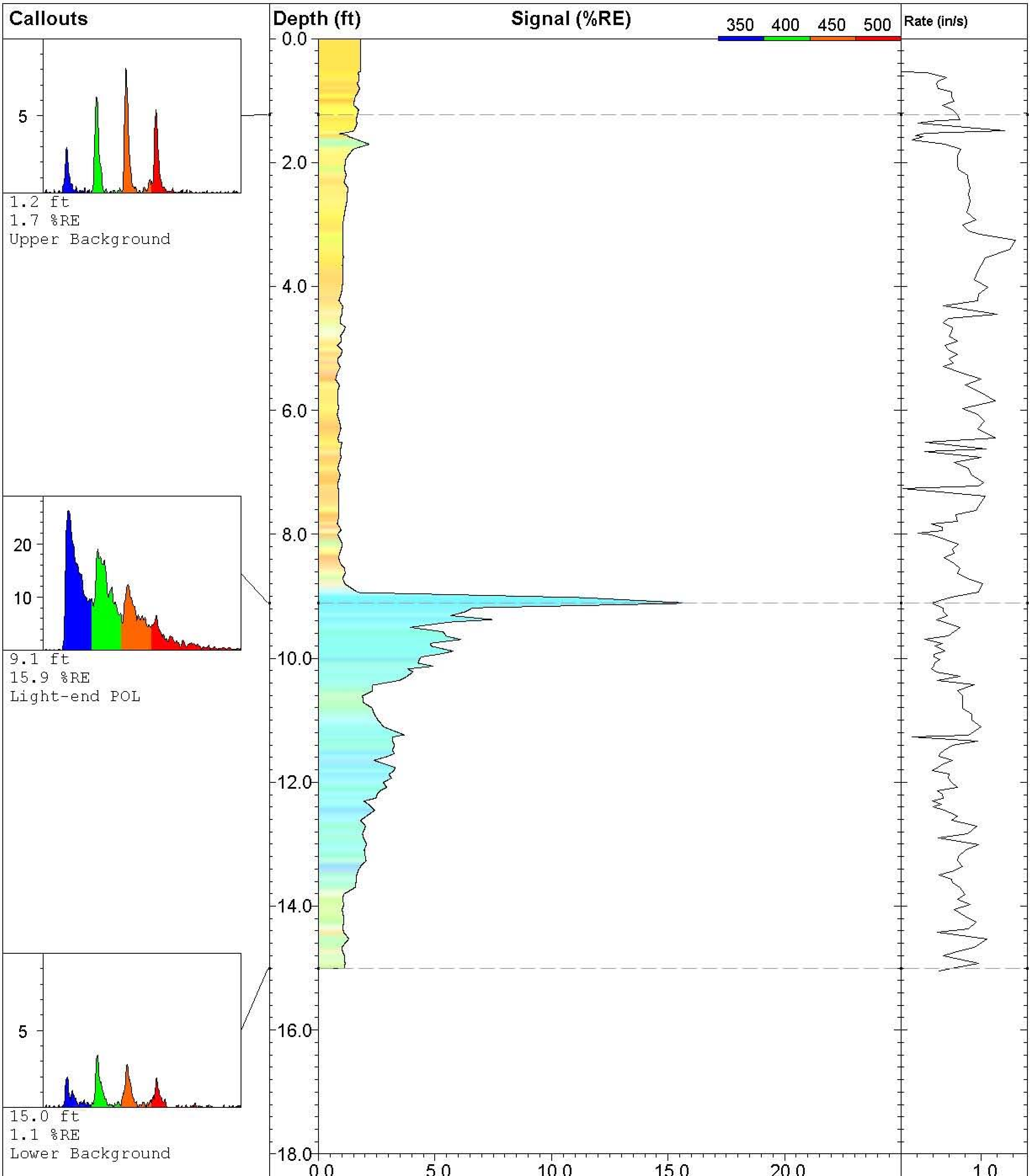
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **14.96 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **21.4 % @ 5.42 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-05 20:03 ADT**



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10NC11 UV-34

UVOST By Dakota
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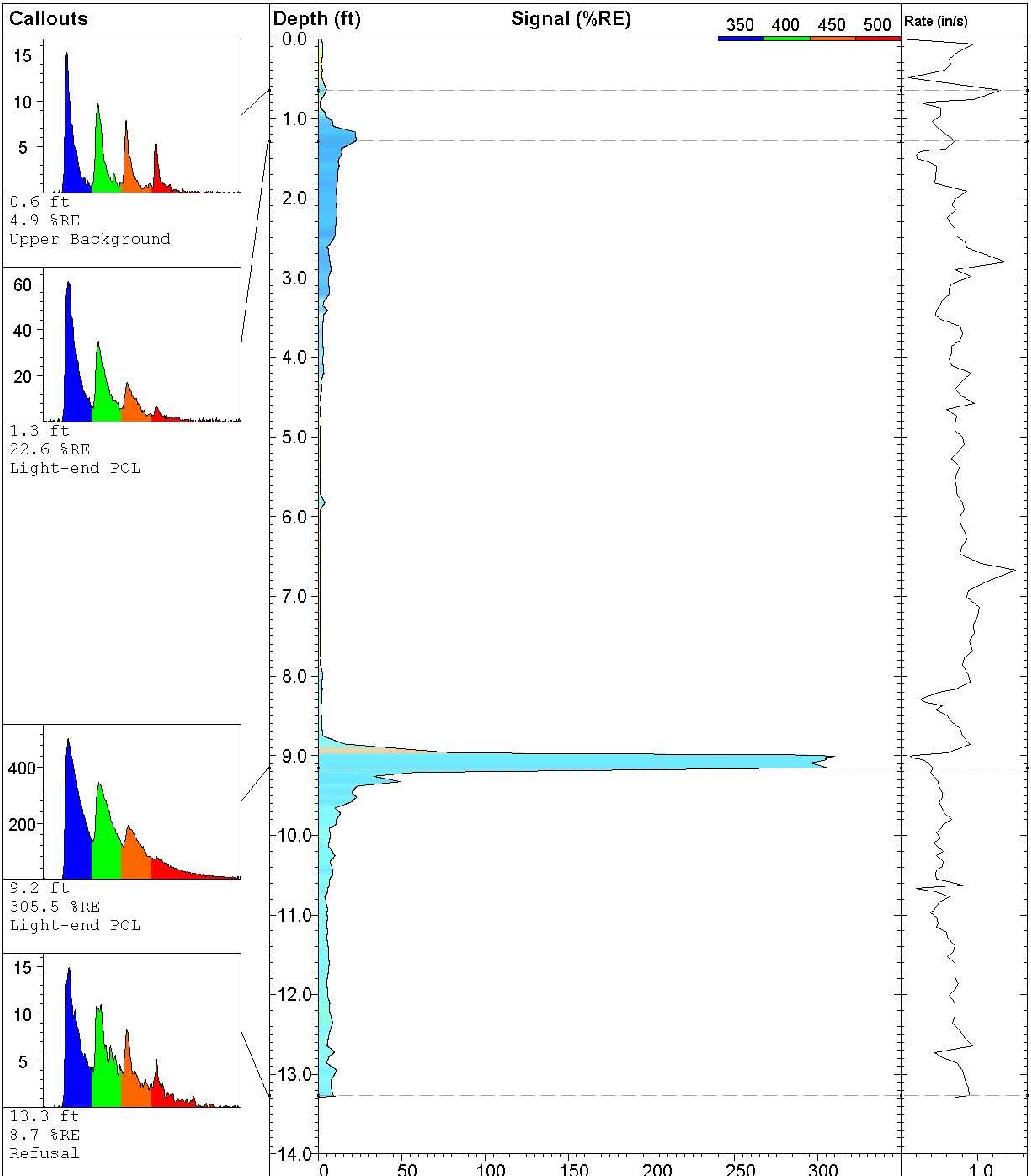
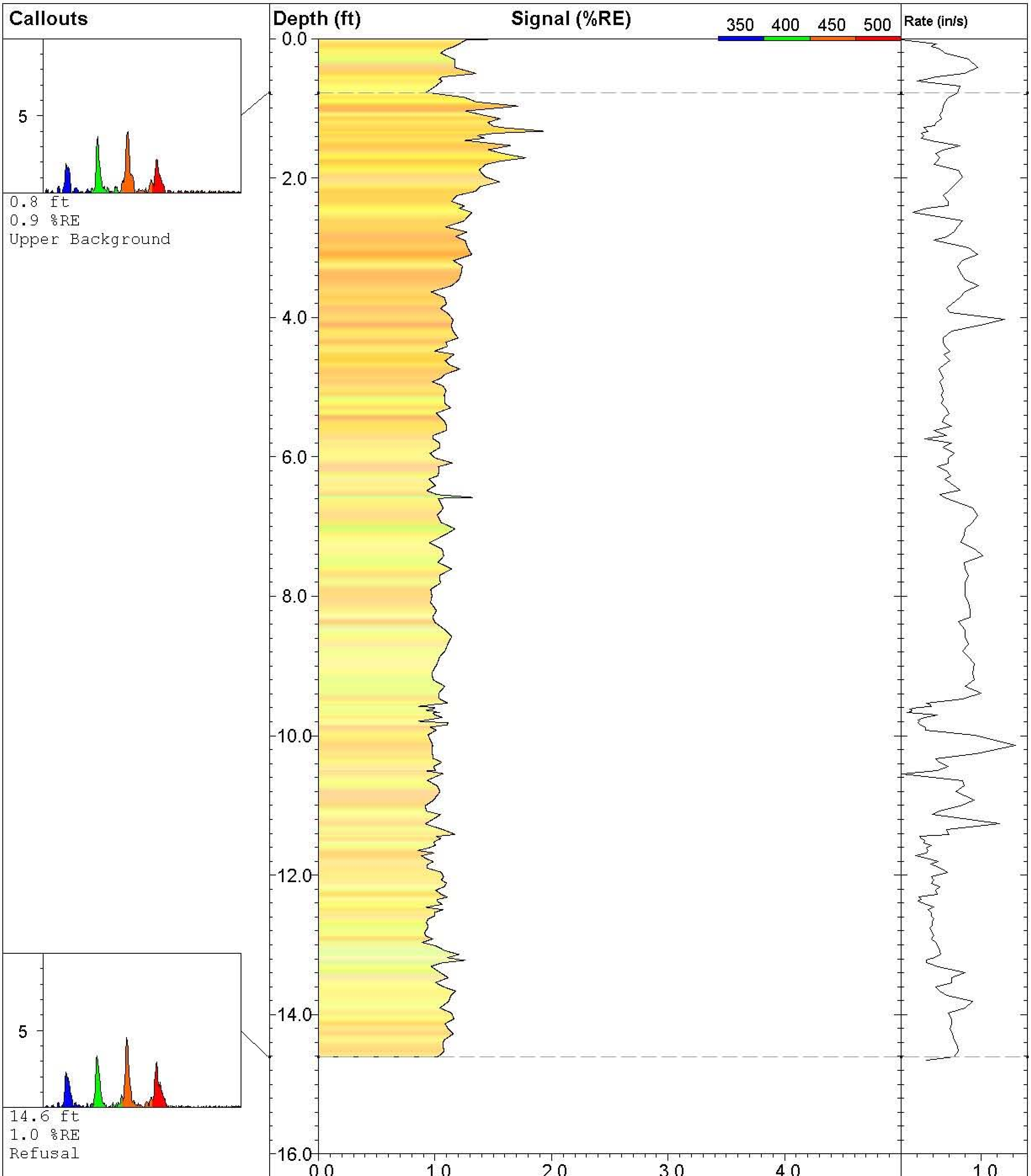
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.05 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **15.9 % @ 9.11 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-05 19:49 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC11 UV-35**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **13.28 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **310.2 % @ 9.01 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-05 19:31 ADT**



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10NC11 UV-36

UVOST By Dakota
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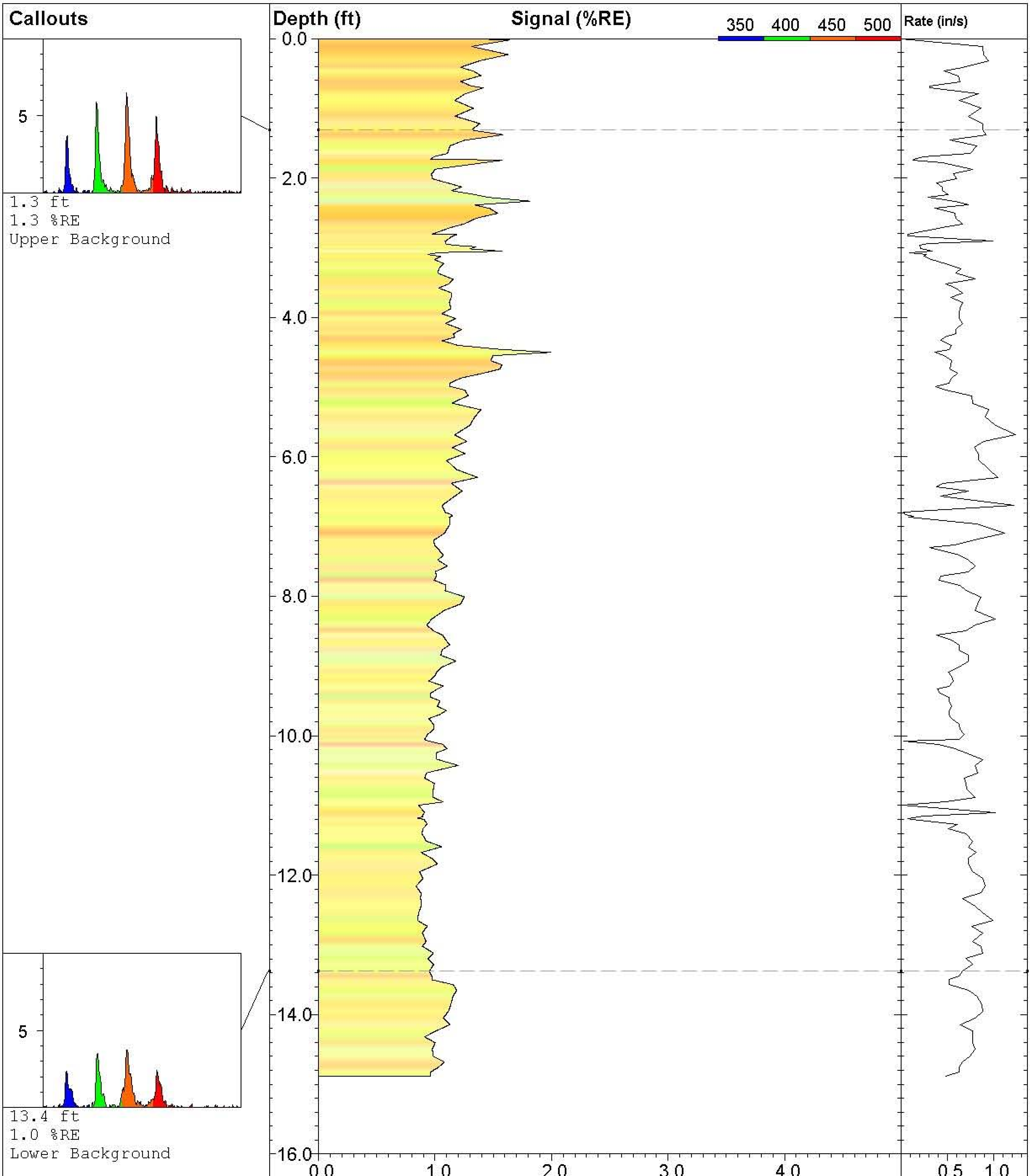
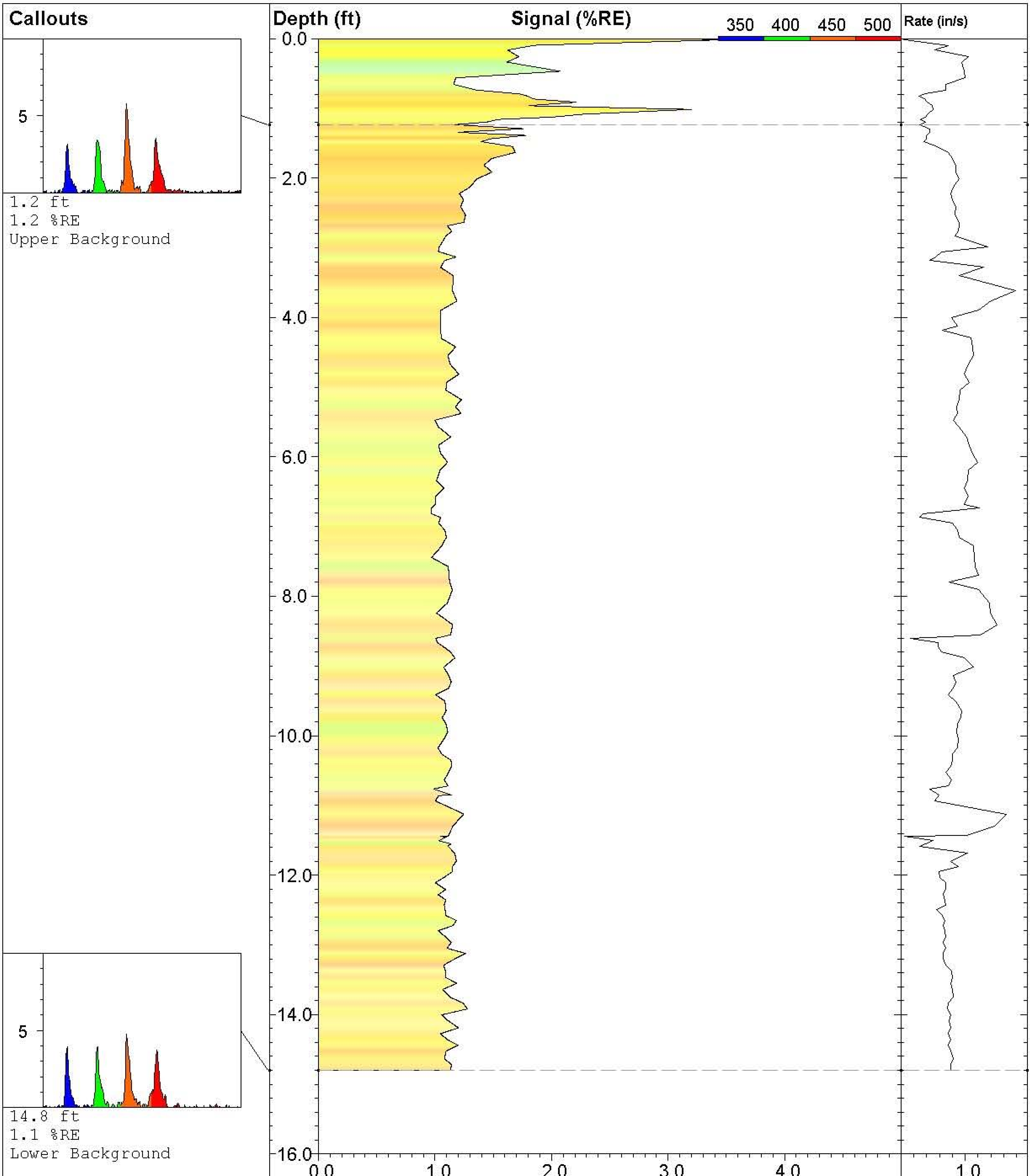
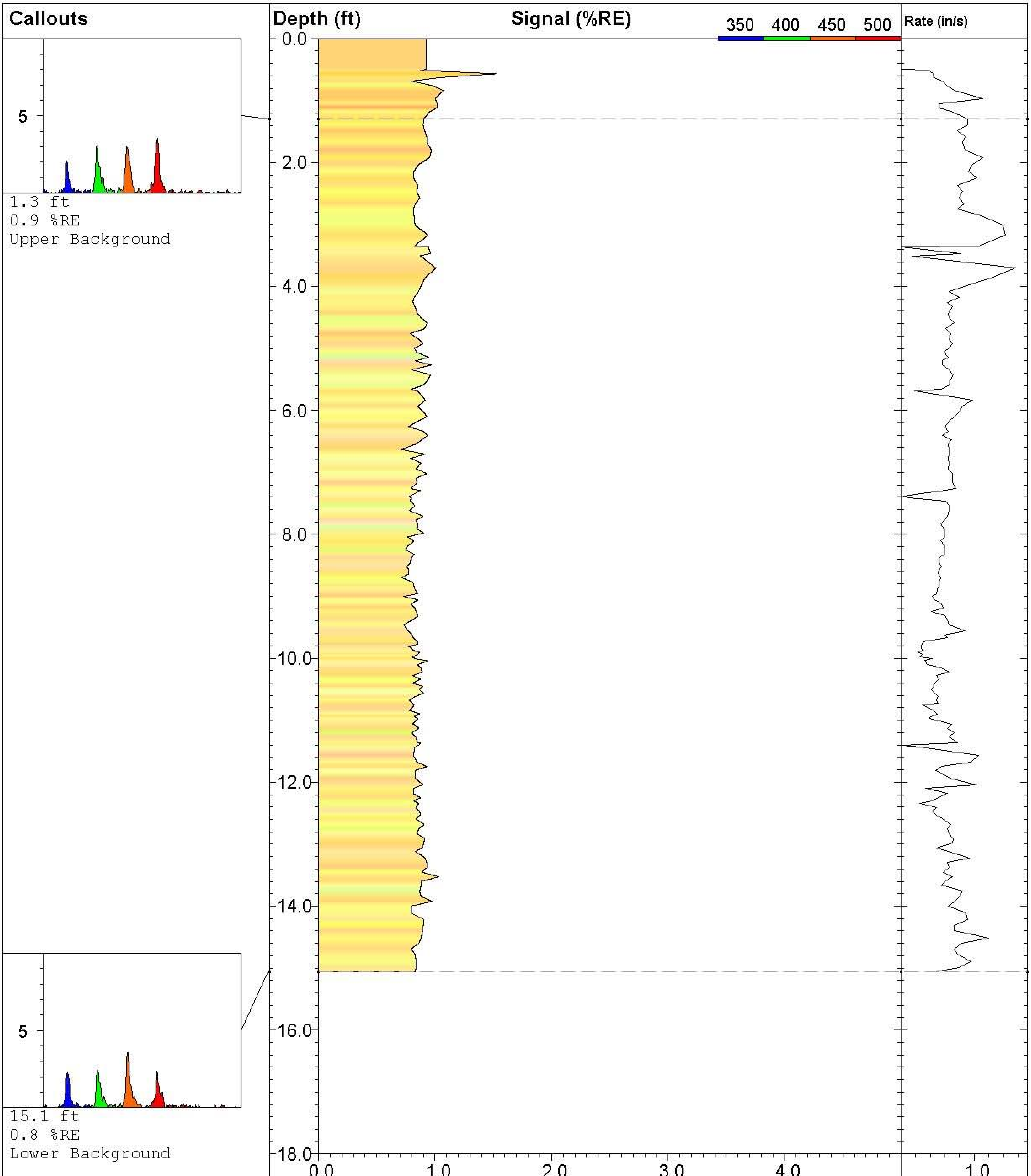
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **14.65 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.9 % @ 1.33 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-06 10:23 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC11 UV-37**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **14.88 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.0 % @ 4.50 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-06 10:48 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC11 UV-38**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **14.80 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **3.7 % @ 0.02 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-06 11:14 ADT**



10NC11 UV-39		**UVOST By Dakota** www.DakotaTechnologies.com
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.06 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.5 % @ 0.57 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-06 11:29 ADT**

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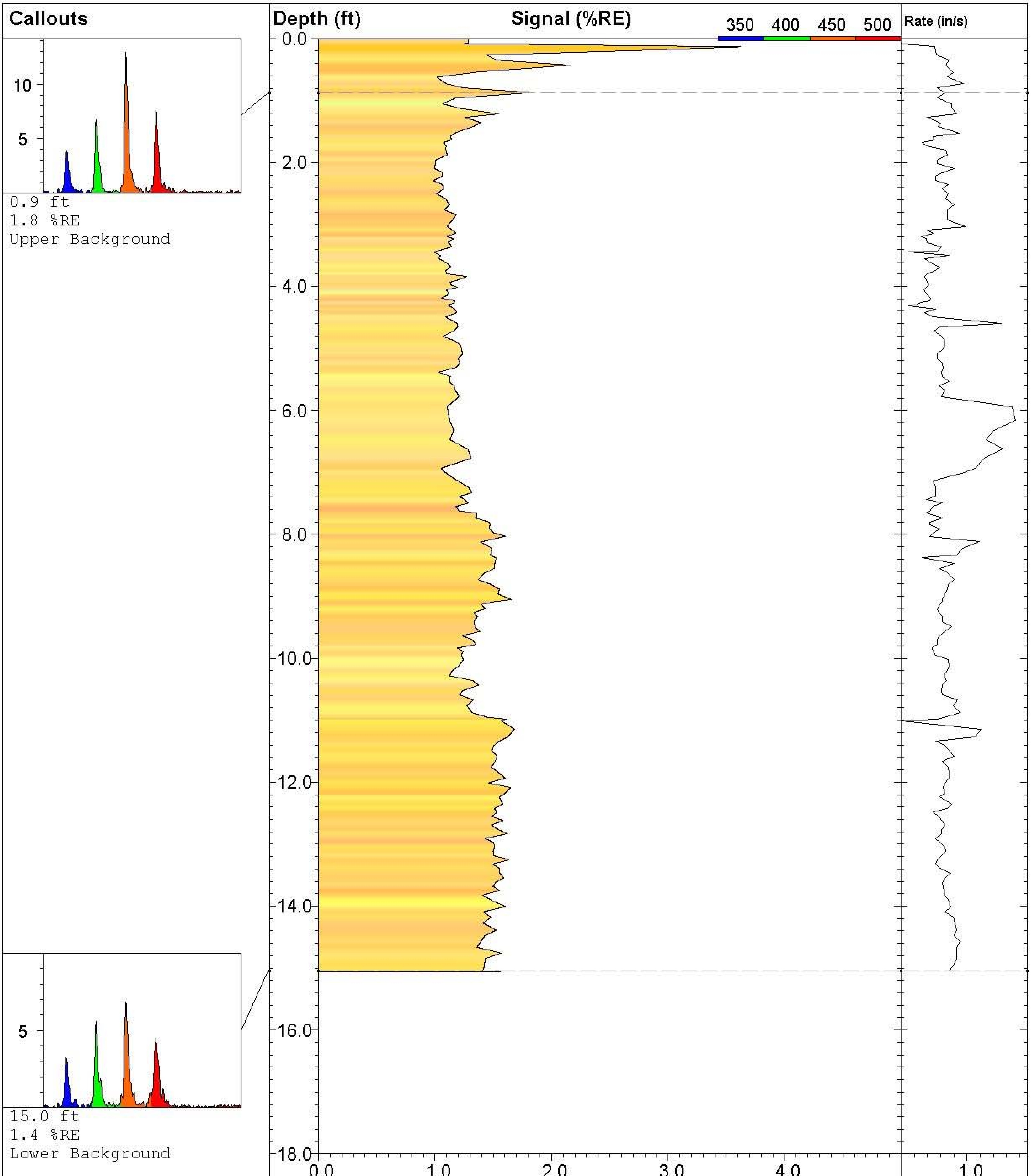
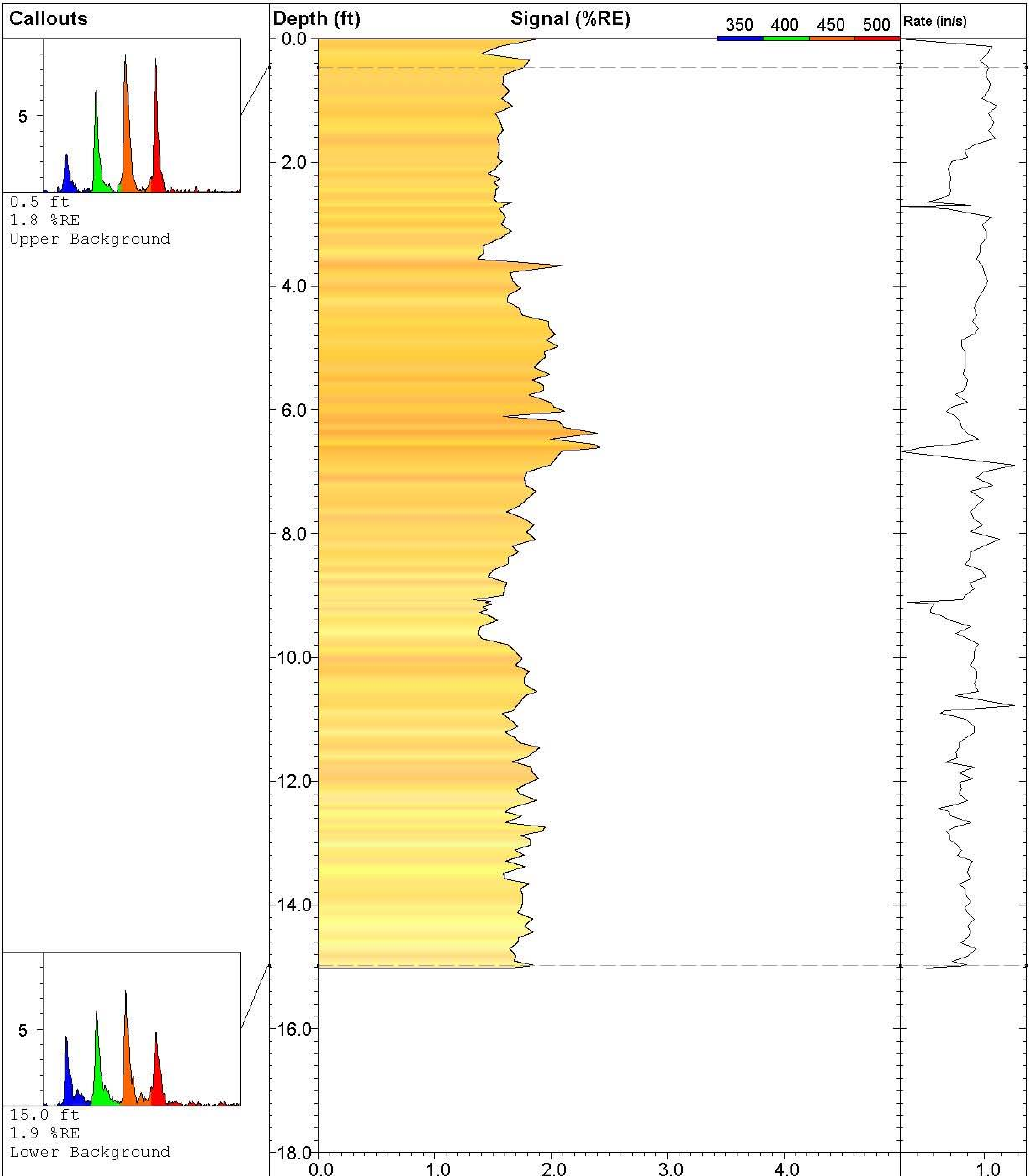


Hammer Environmental Services	10NC11 UV-40		UVOST By Dakota www.DakotaTechnologies.com
PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	*Site:* **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.06 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **3.6 % @ 0.13 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-06 13:39 ADT**



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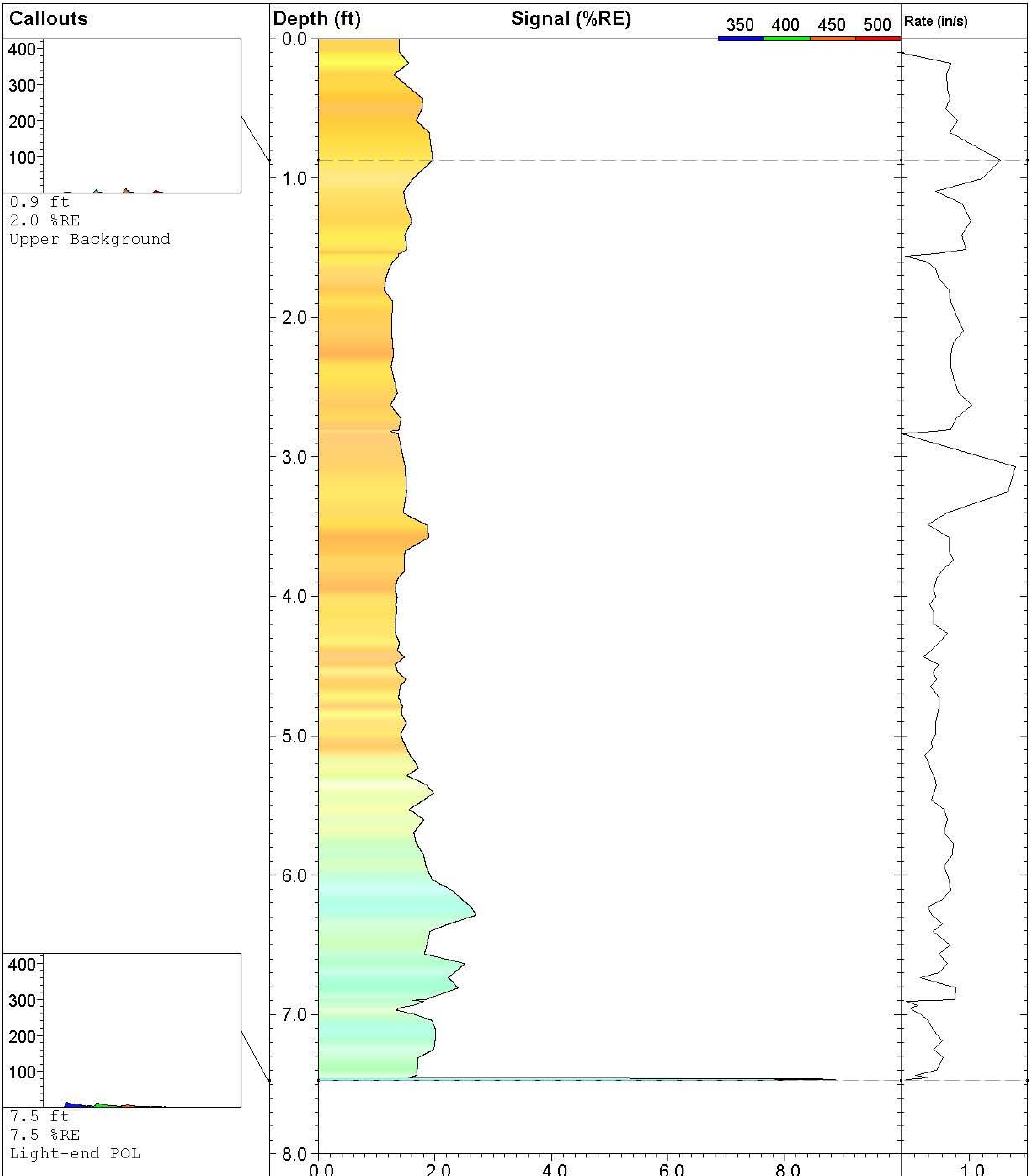
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.01 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.4 % @ 6.61 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-06 13:56 ADT**



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10NC11 UV-42

UVOST By Dakota
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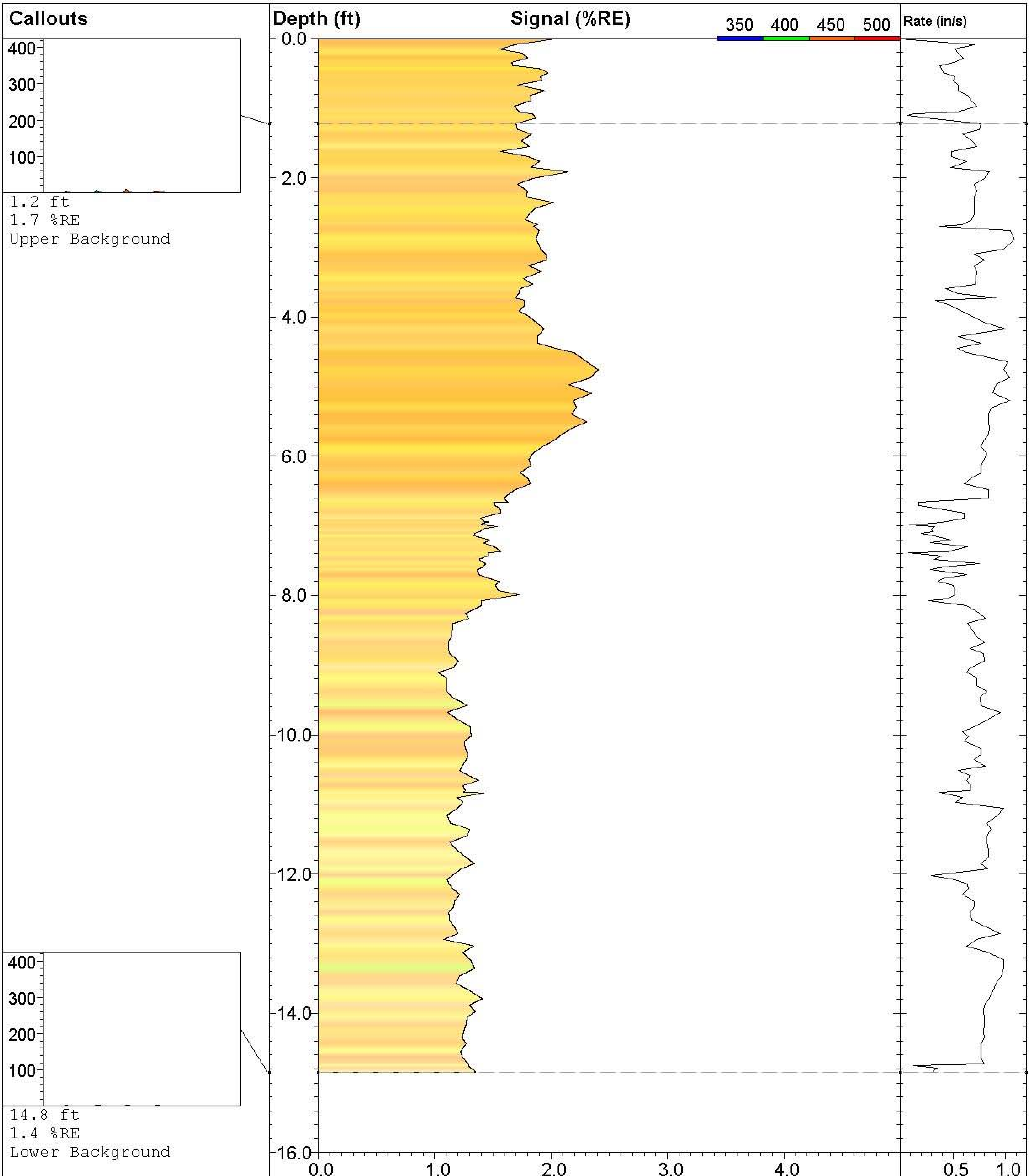
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **7.47 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **9.1 % @ 7.47 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-06 14:23 ADT**



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10NC11 UV-43

UVOST By Dakota
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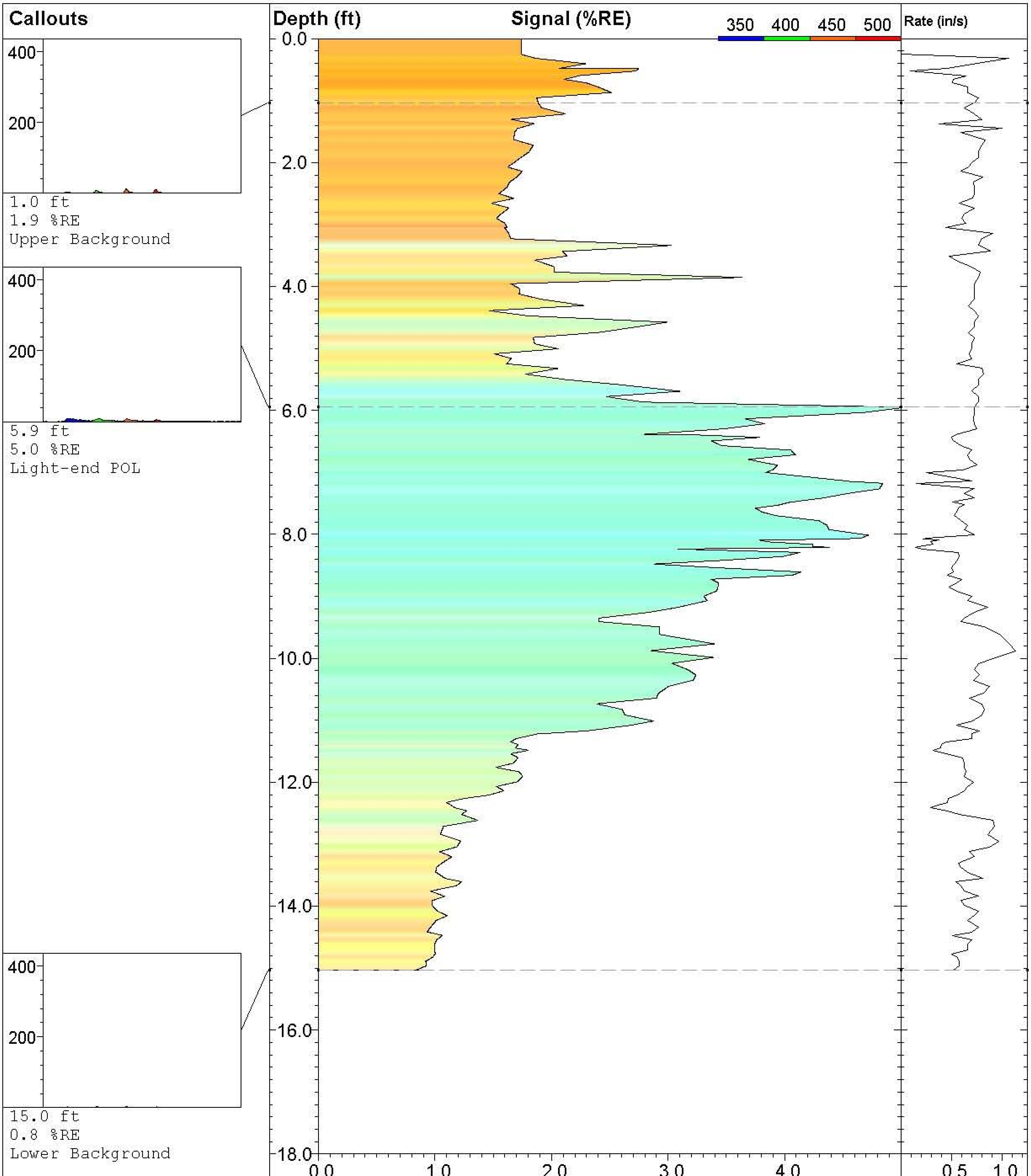
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **14.85 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.4 % @ 4.76 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-06 15:22 ADT**



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10NC11 UV-44

UVOST By Dakota
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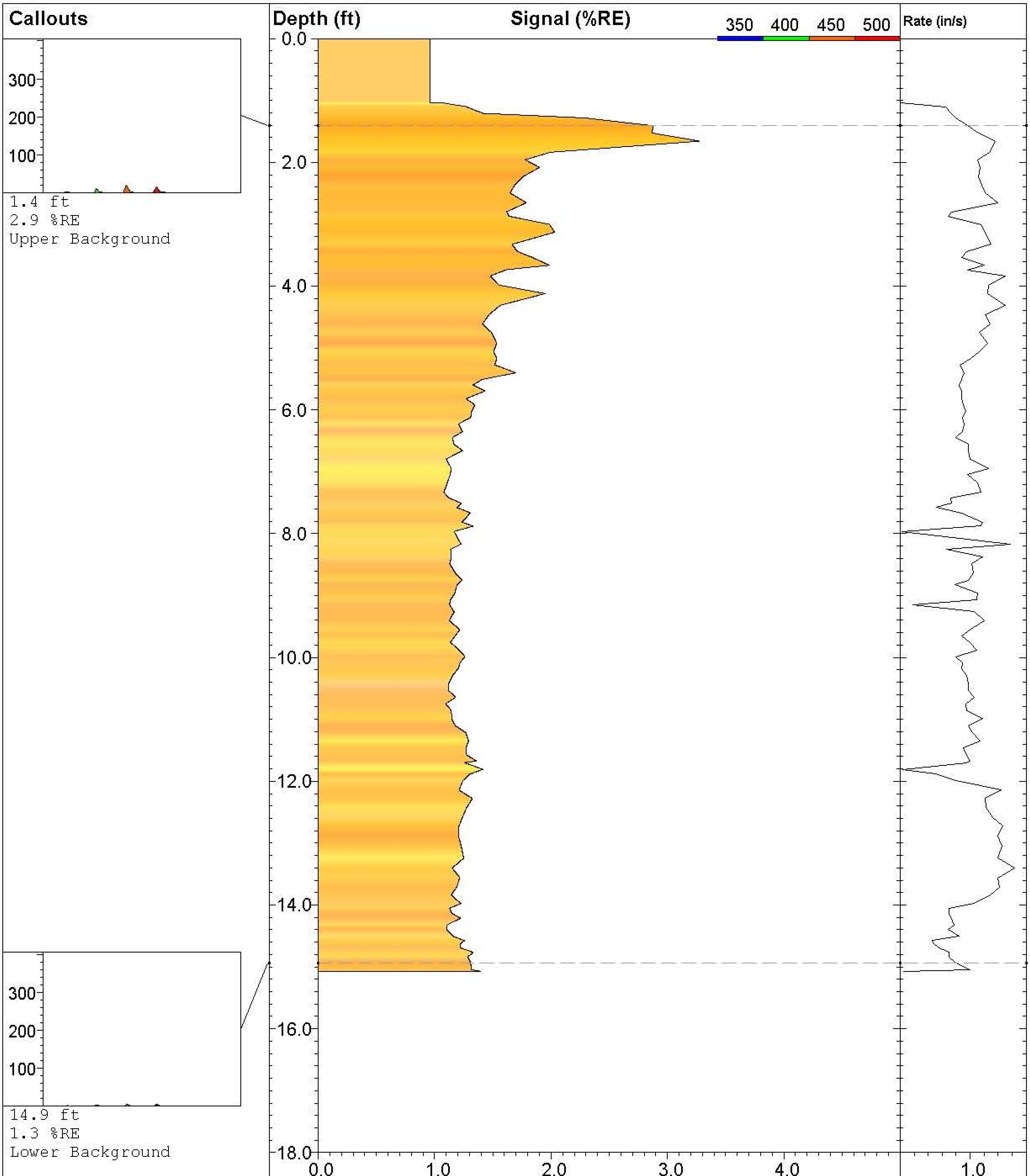
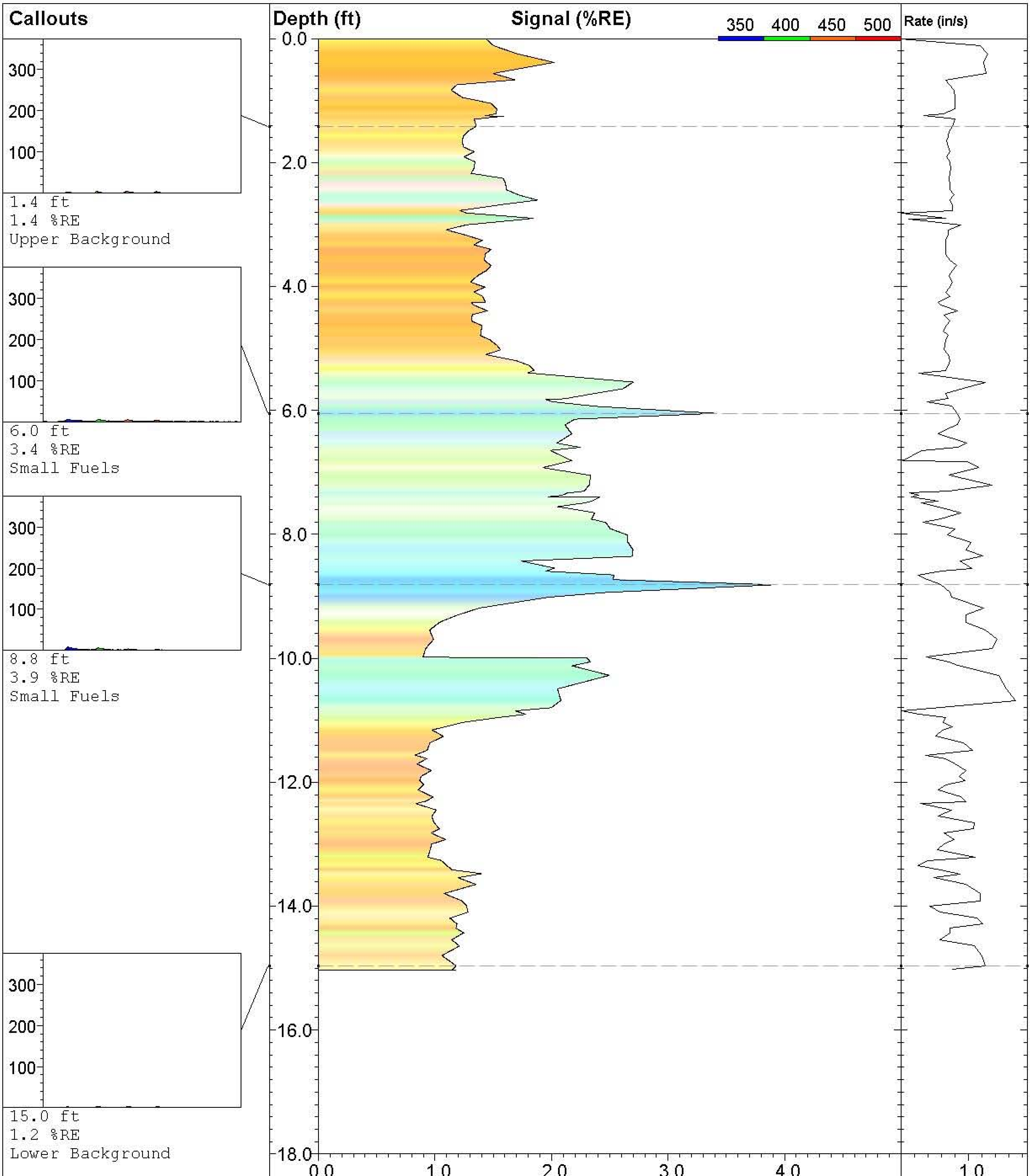
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.03 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **5.0 % @ 5.95 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-06 15:44 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC11 UV-45**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.07 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **3.3 % @ 1.66 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-06 16:07 ADT**



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10NC11 UV-46

UVOST By Dakota
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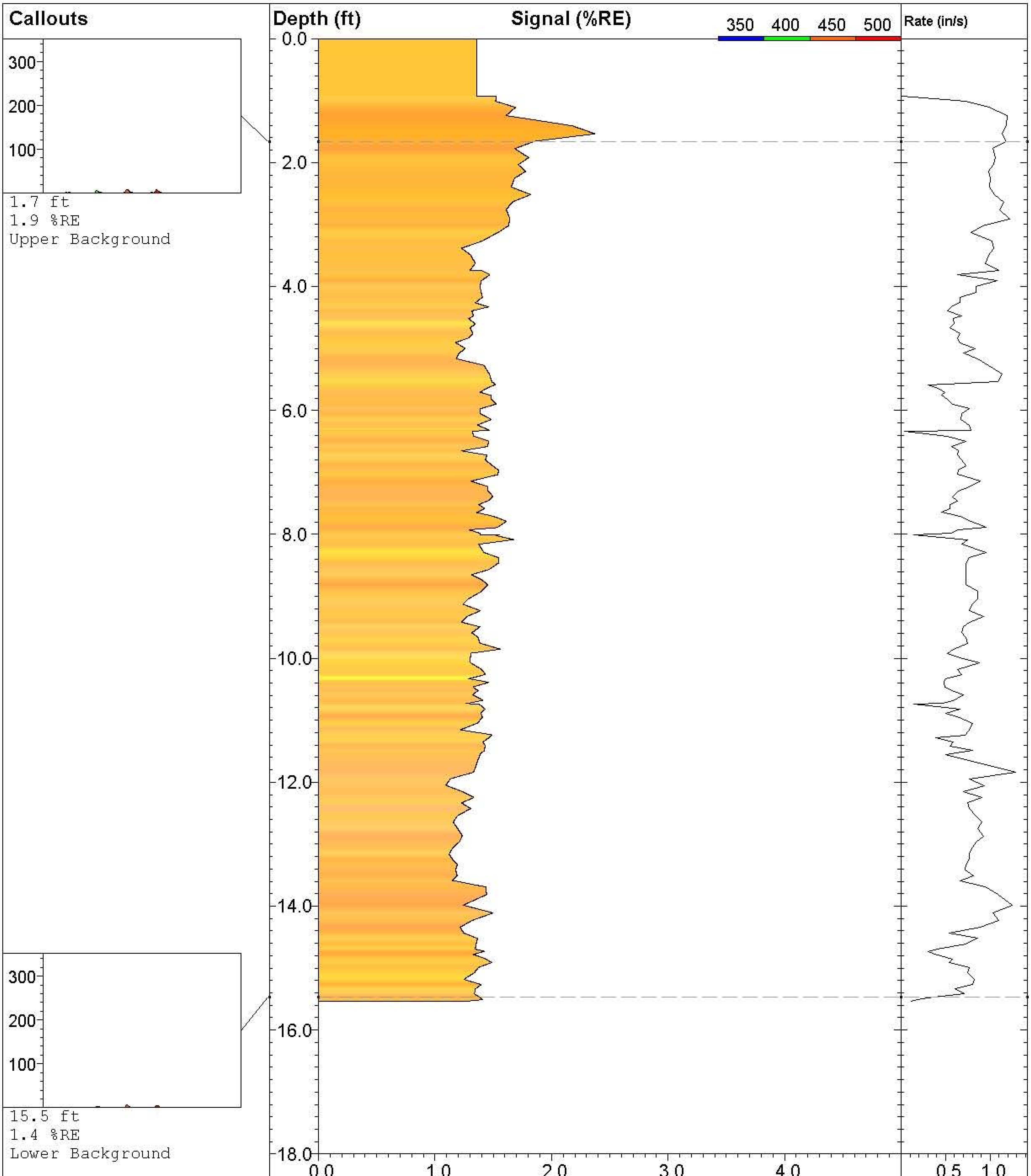
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.03 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **3.9 % @ 8.81 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-06 16:23 ADT**



10NC11 UV-47		**UVOST By Dakota** www.DakotaTechnologies.com
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.53 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.4 % @ 1.54 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-06 16:57 ADT**

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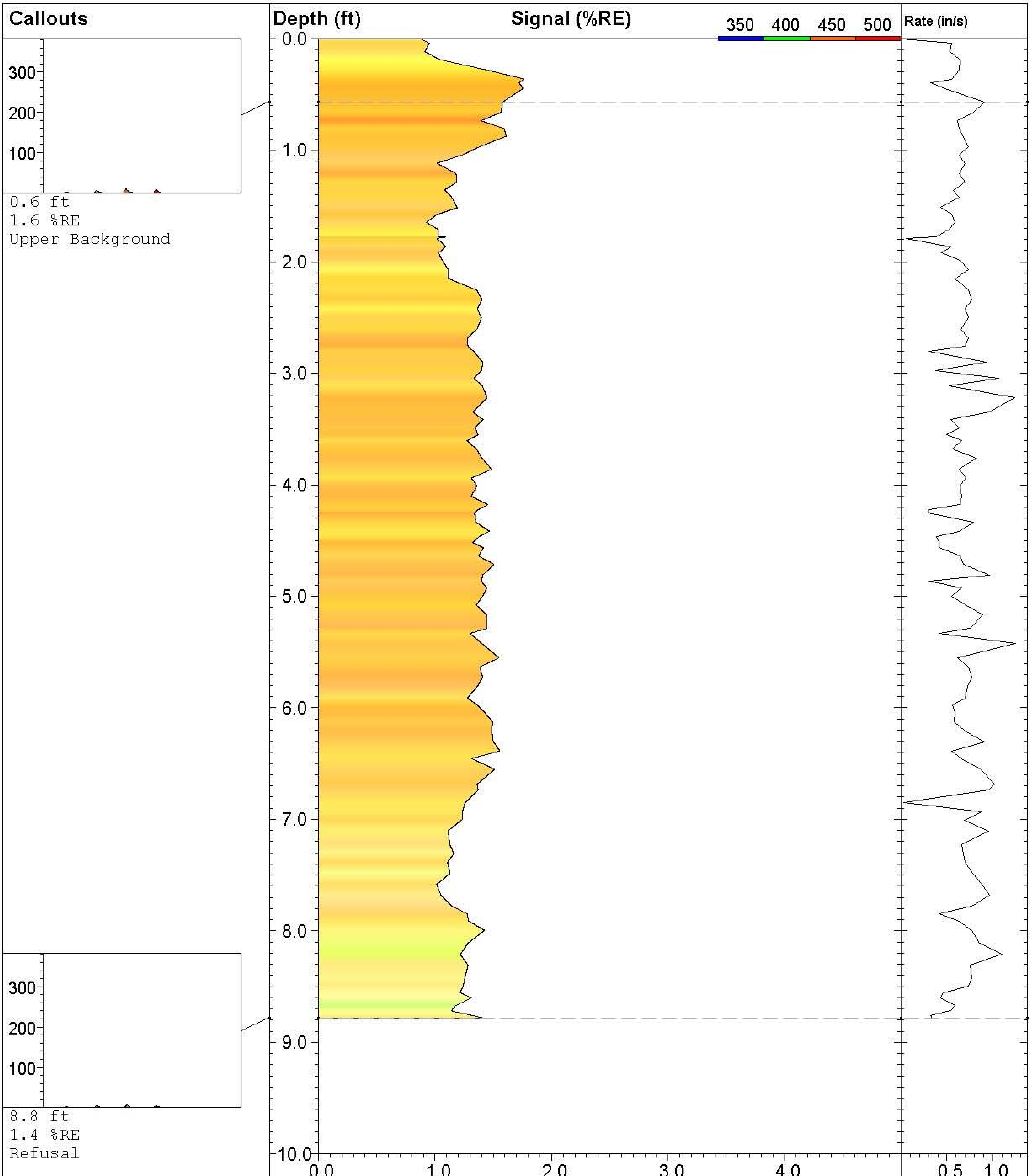

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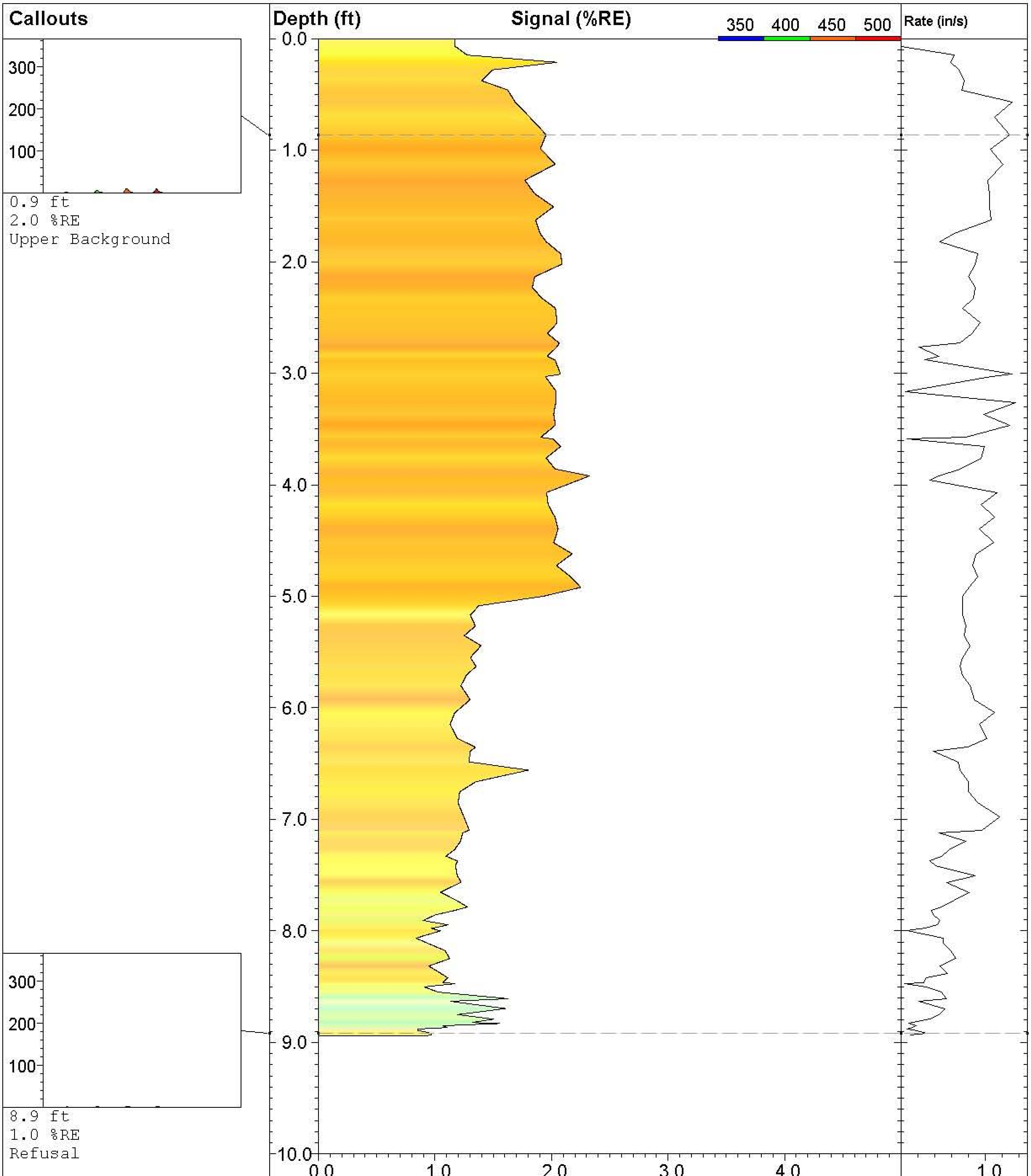
10NC11 UV-48

UVOST By Dakota
www.DakotaTechnologies.com

Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **8.78 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.8 % @ 0.36 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-06 19:02 ADT**



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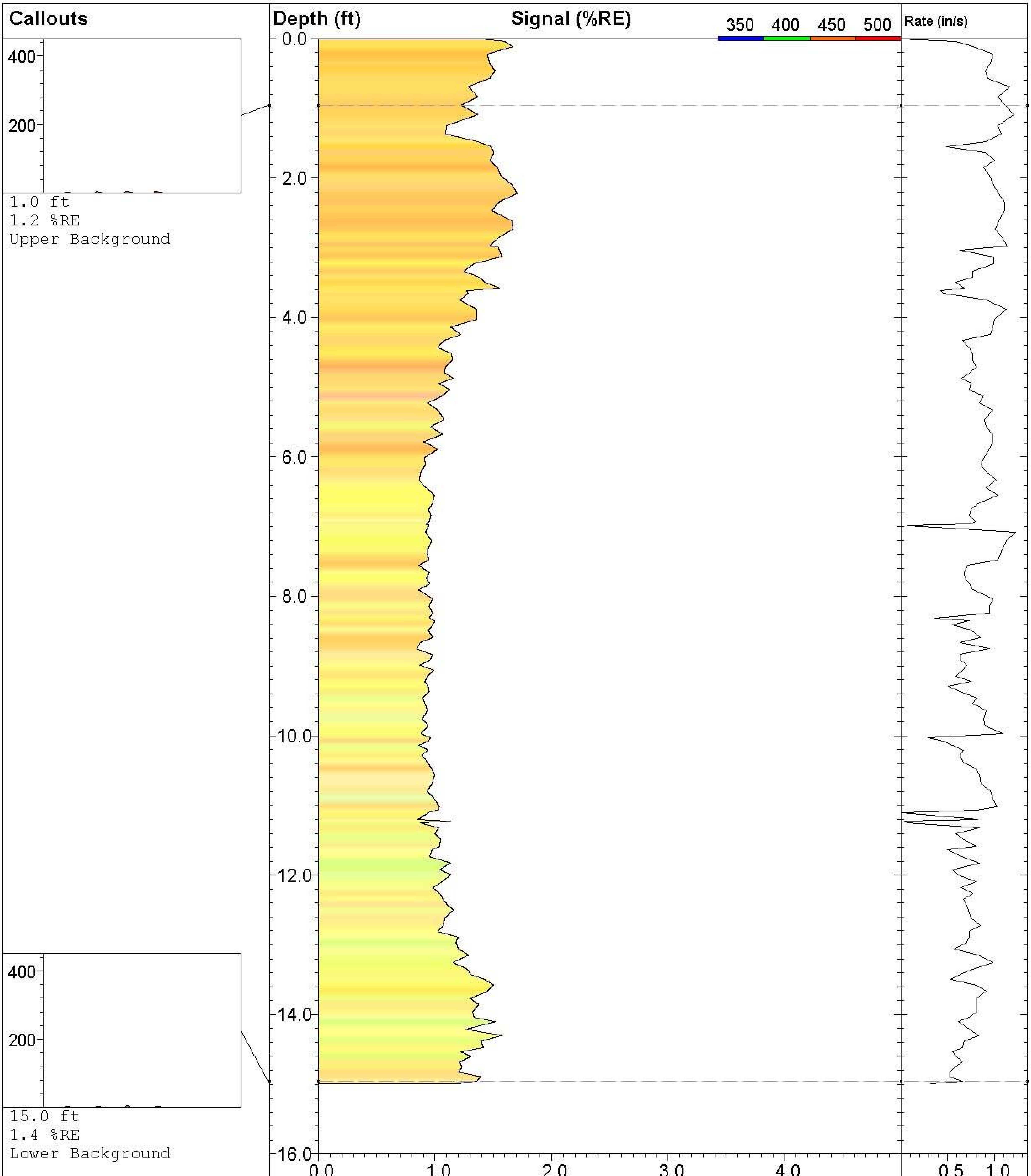
10NC11 UV-49

UVOST By Dakota
www.DakotaTechnologies.com

Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **8.94 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.3 % @ 3.92 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-06 18:12 ADT**



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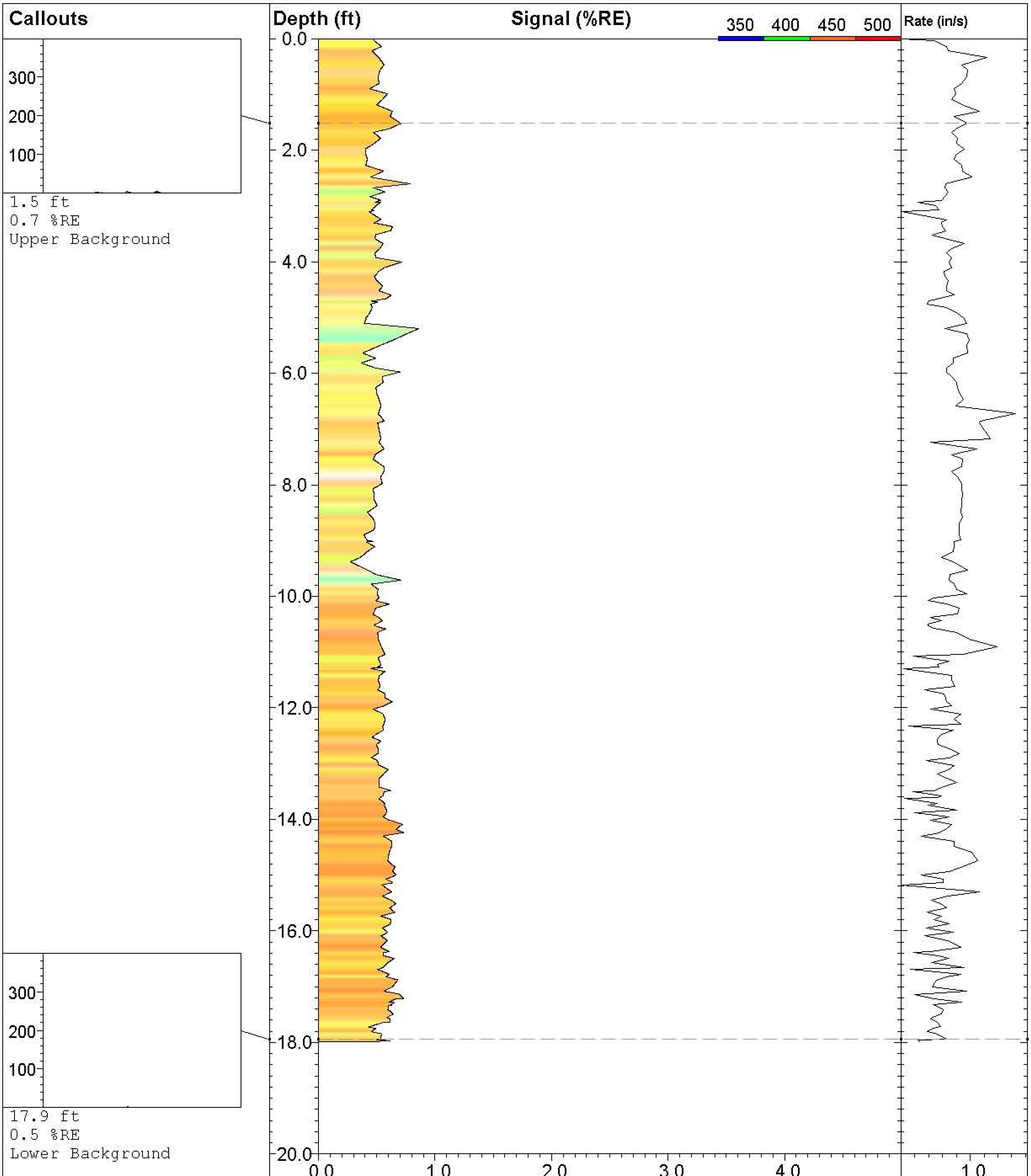
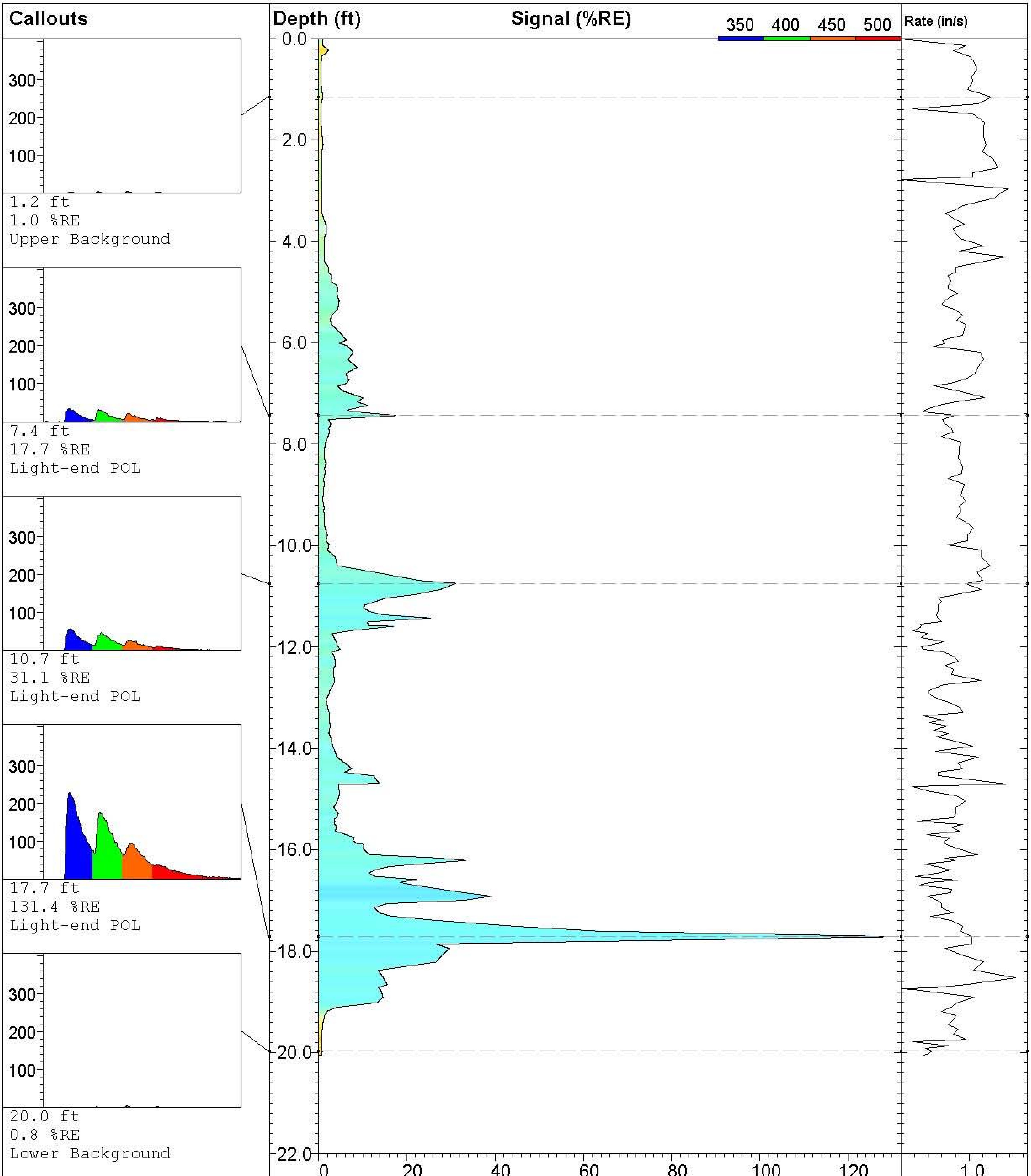
10NC11 UV-50

UVOST By Dakota
www.DakotaTechnologies.com

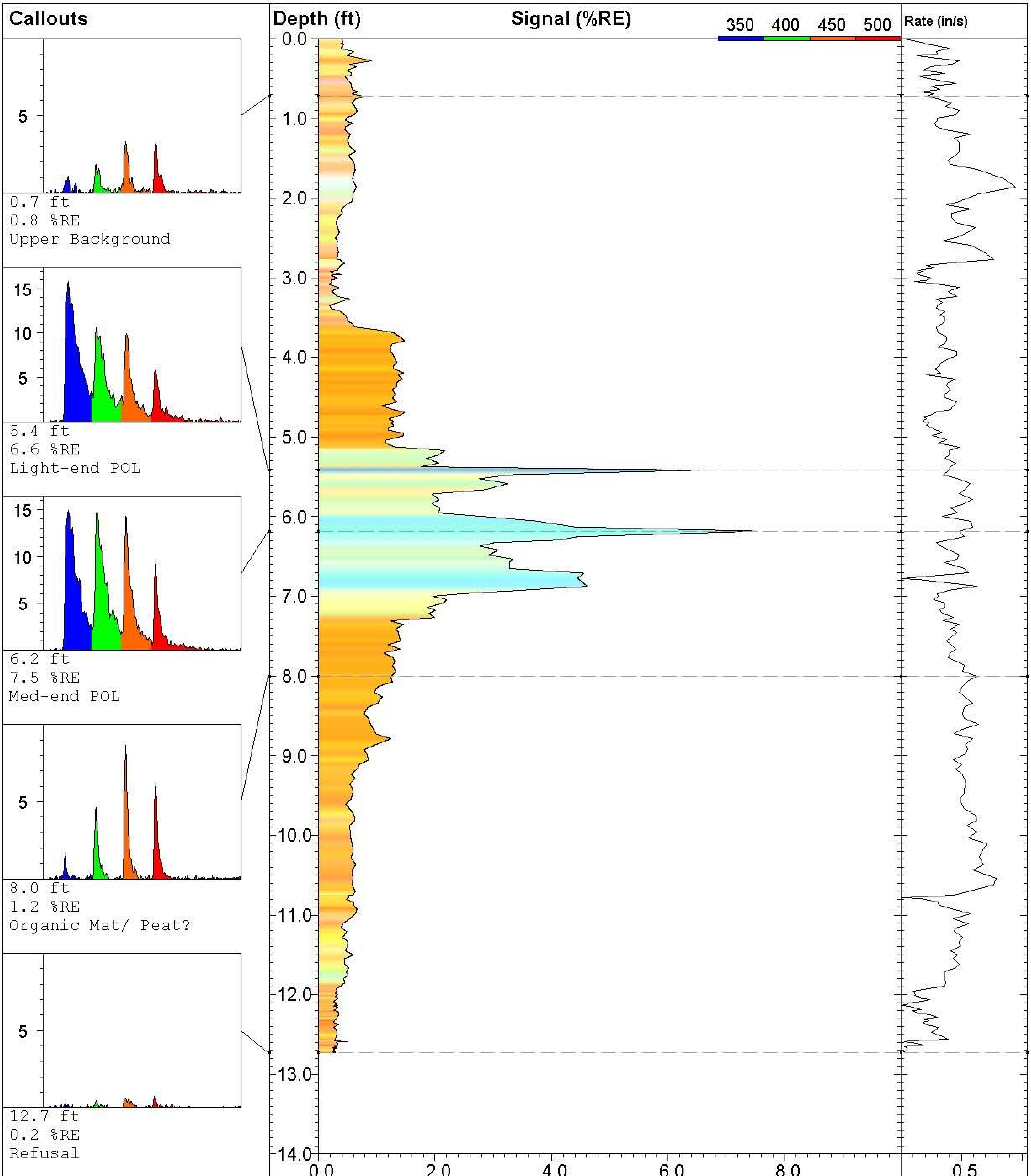
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **14.99 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.7 % @ 2.22 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-06 18:36 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC11 UV-51**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.98 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **0.9 % @ 5.20 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-07 20:05 ADT**



Hammer Environmental Services	10NC11 UV-52		UVOST By Dakota www.DakotaTechnologies.com
PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	*Site:* **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.05 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **131.4 % @ 17.71 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-07 20:30 ADT**



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10NC27 UV-001

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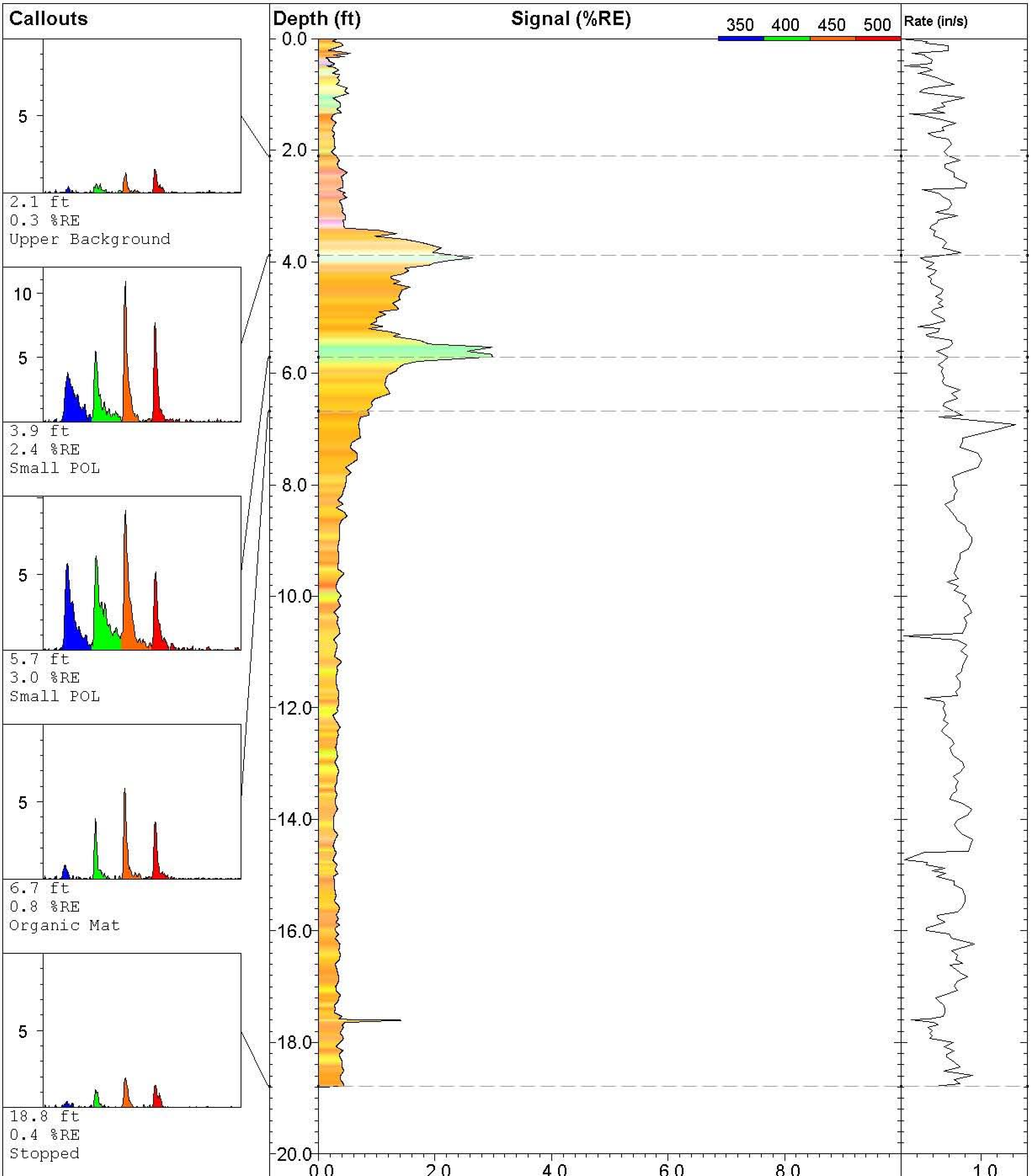
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **12.73 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **7.5 % @ 6.18 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-21 14:35 ADT**



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10NC27 UV-002

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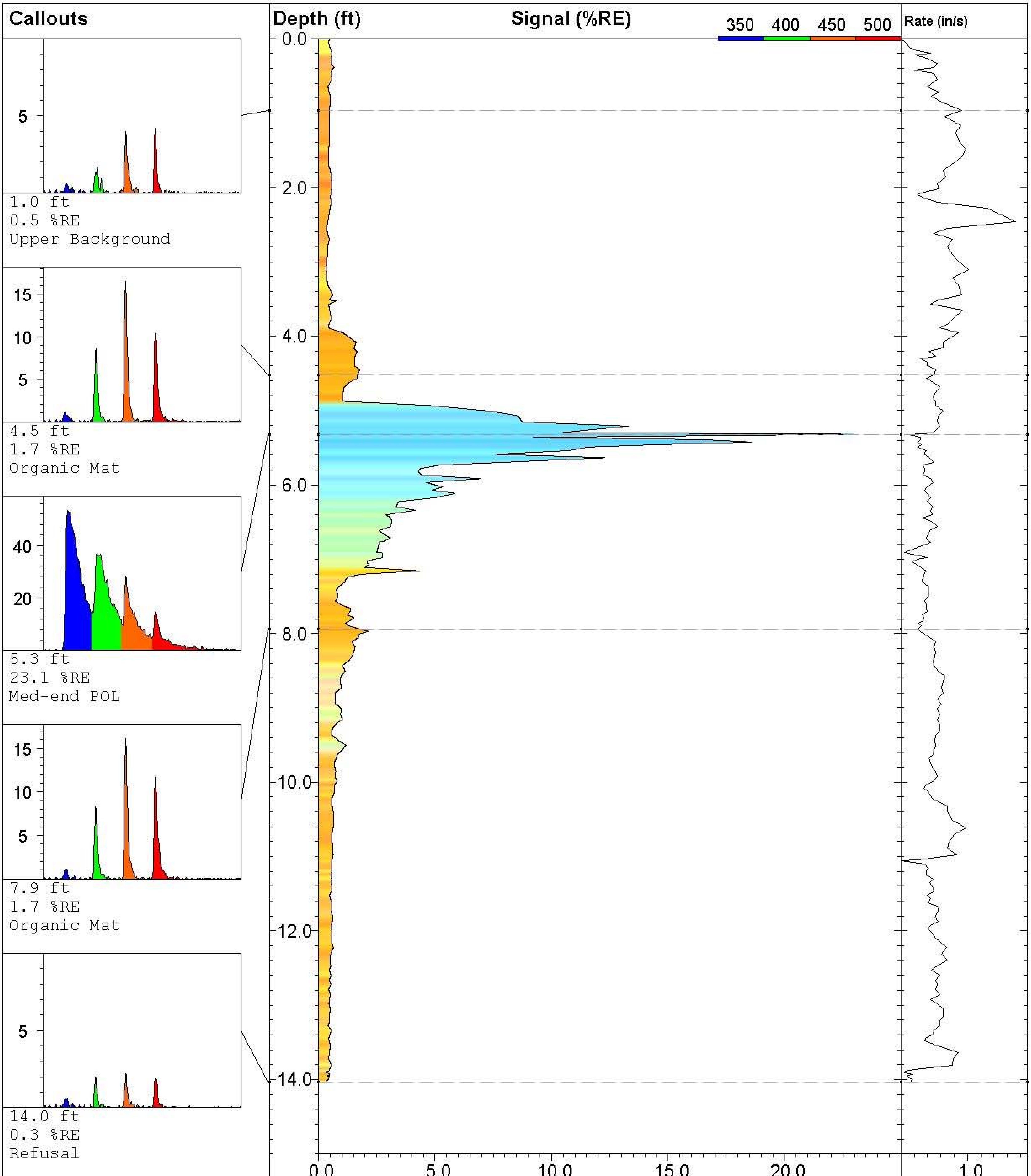
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **18.79 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **3.0 % @ 5.53 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-21 15:00 ADT**



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10NC27 UV-003

UVOST By Dakota
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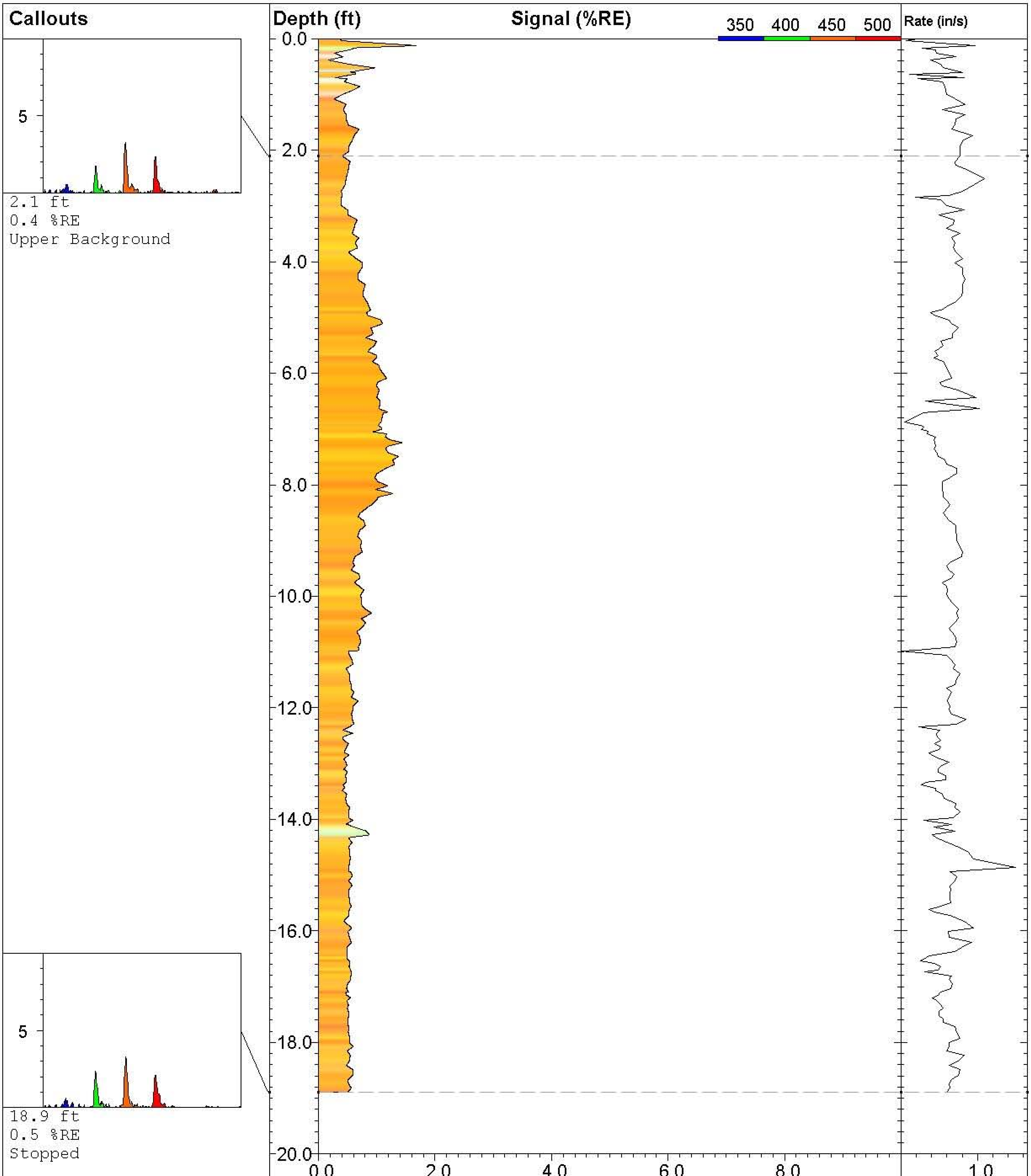
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **14.03 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **23.1 % @ 5.32 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-21 15:37 ADT**



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10NC27 UV-004

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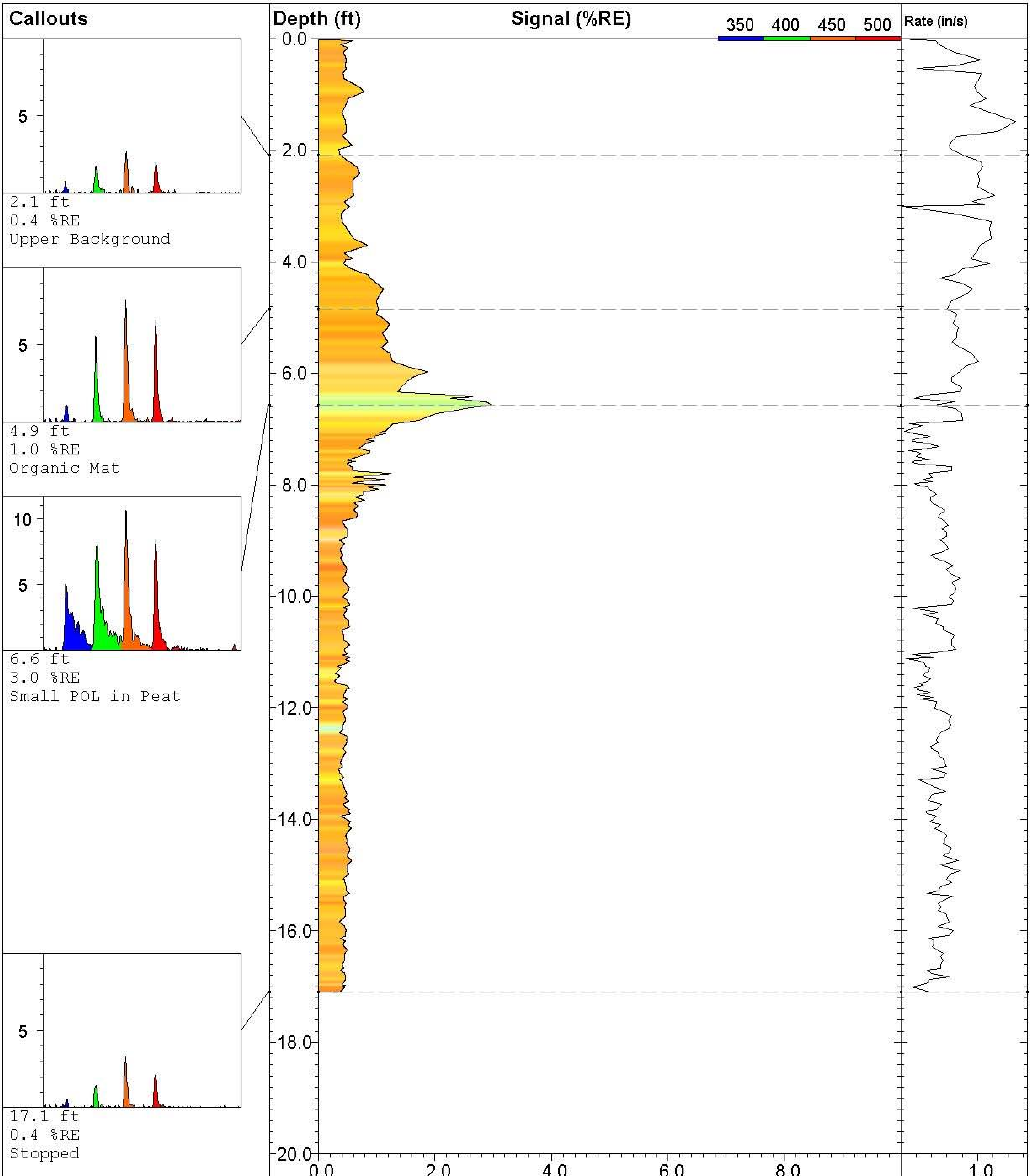
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **18.90 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.7 % @ 0.13 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-21 16:04 ADT**



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10NC27 UV-005

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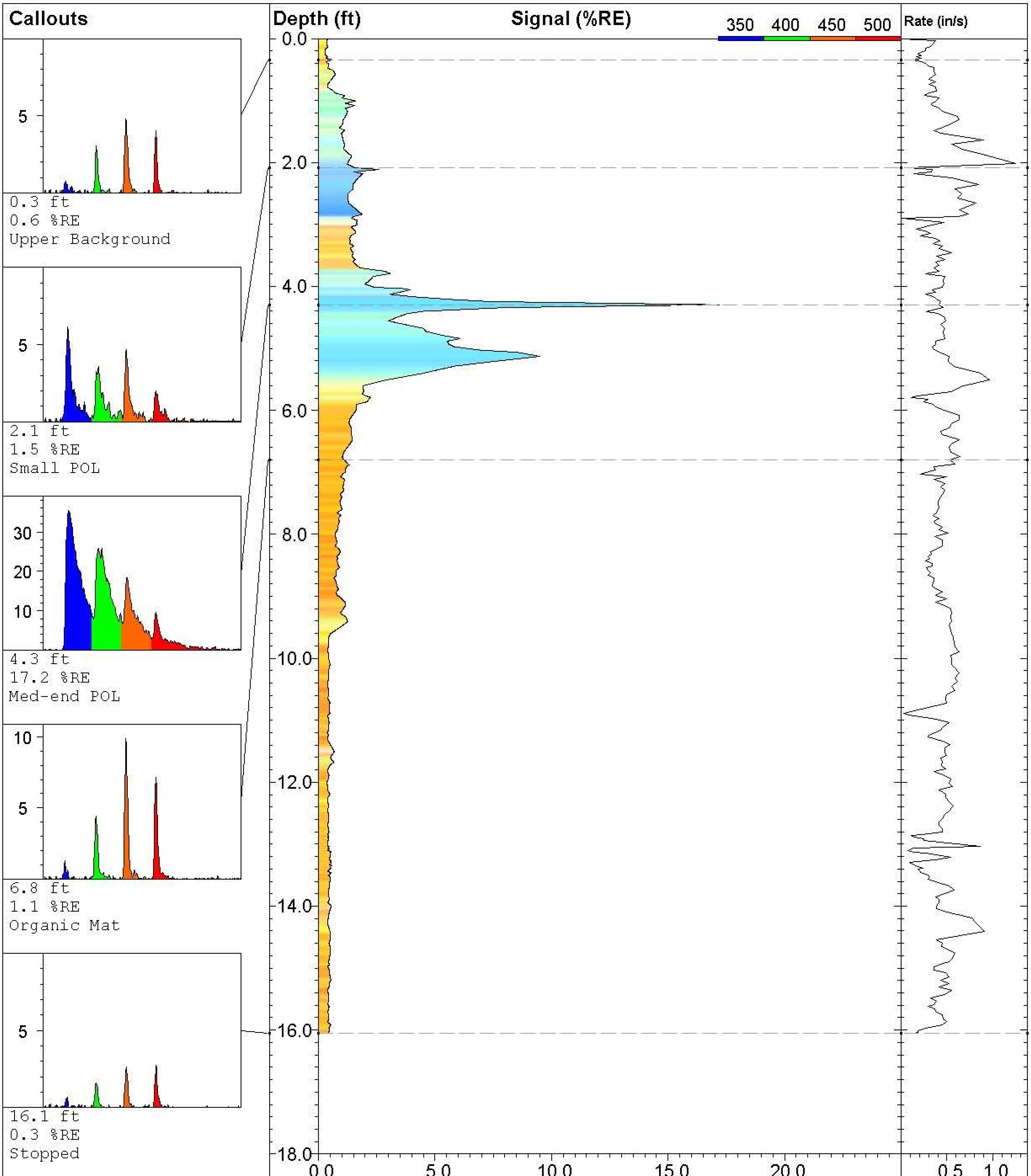
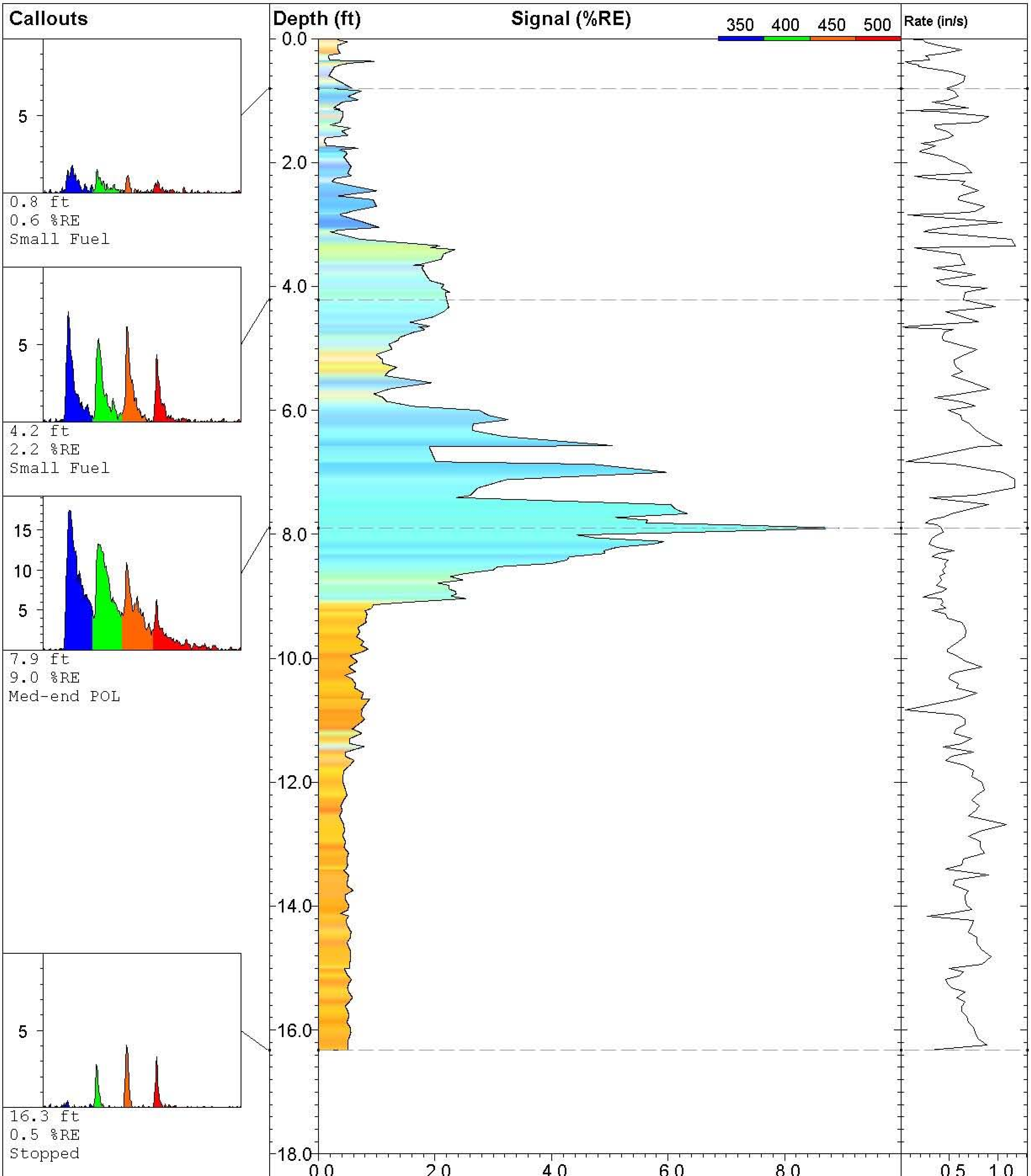
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.09 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **3.0 % @ 6.57 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-21 17:03 ADT**



Hammer Environmental Services	10NC27 UV-006		UVOST By Dakota www.DakotaTechnologies.com
PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	*Site:* **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.06 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **17.2 % @ 4.30 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-21 17:25 ADT**



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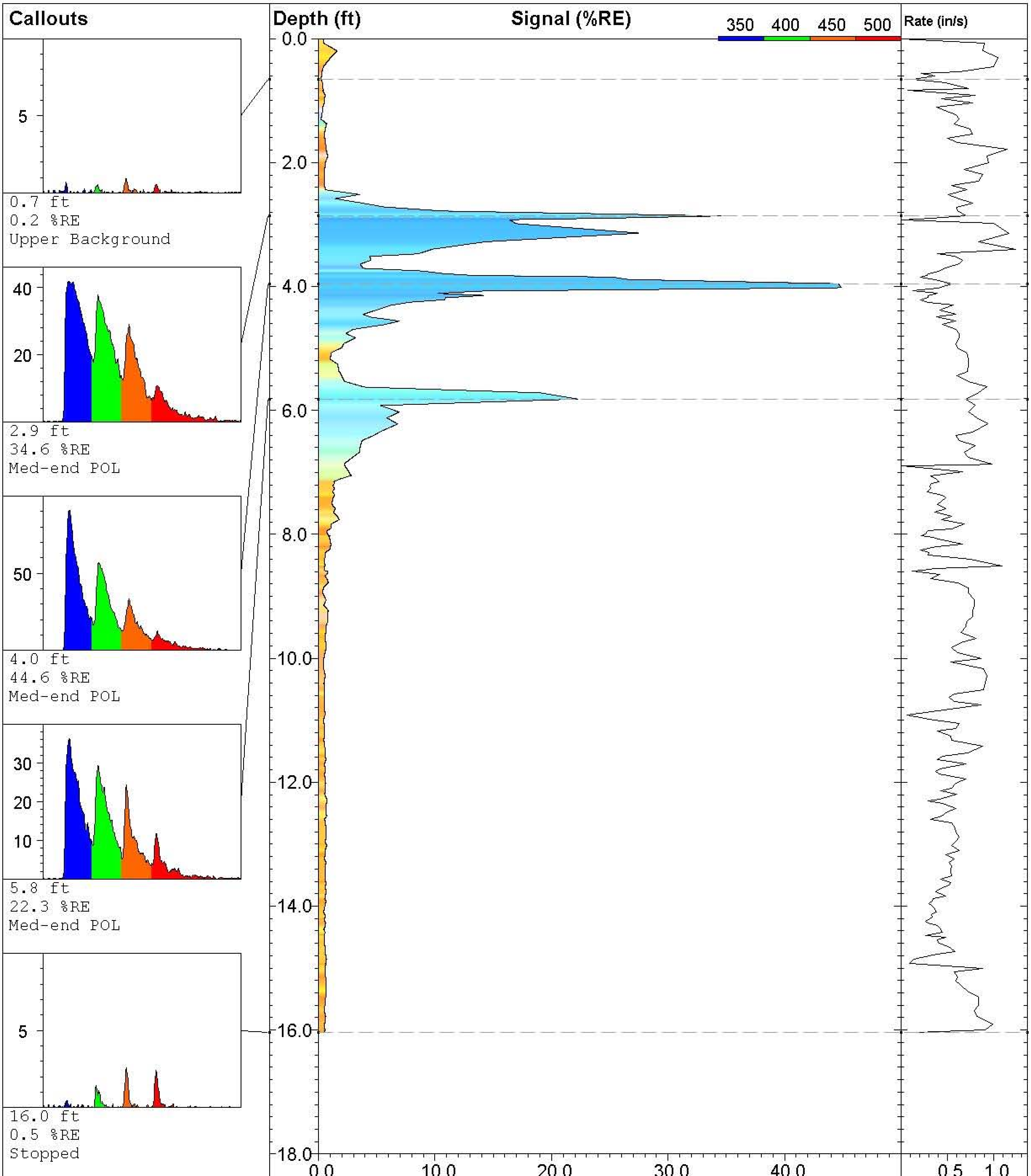
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.32 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **9.0 % @ 7.90 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-21 17:55 ADT**



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10NC27 UV-008

UVOST By Dakota
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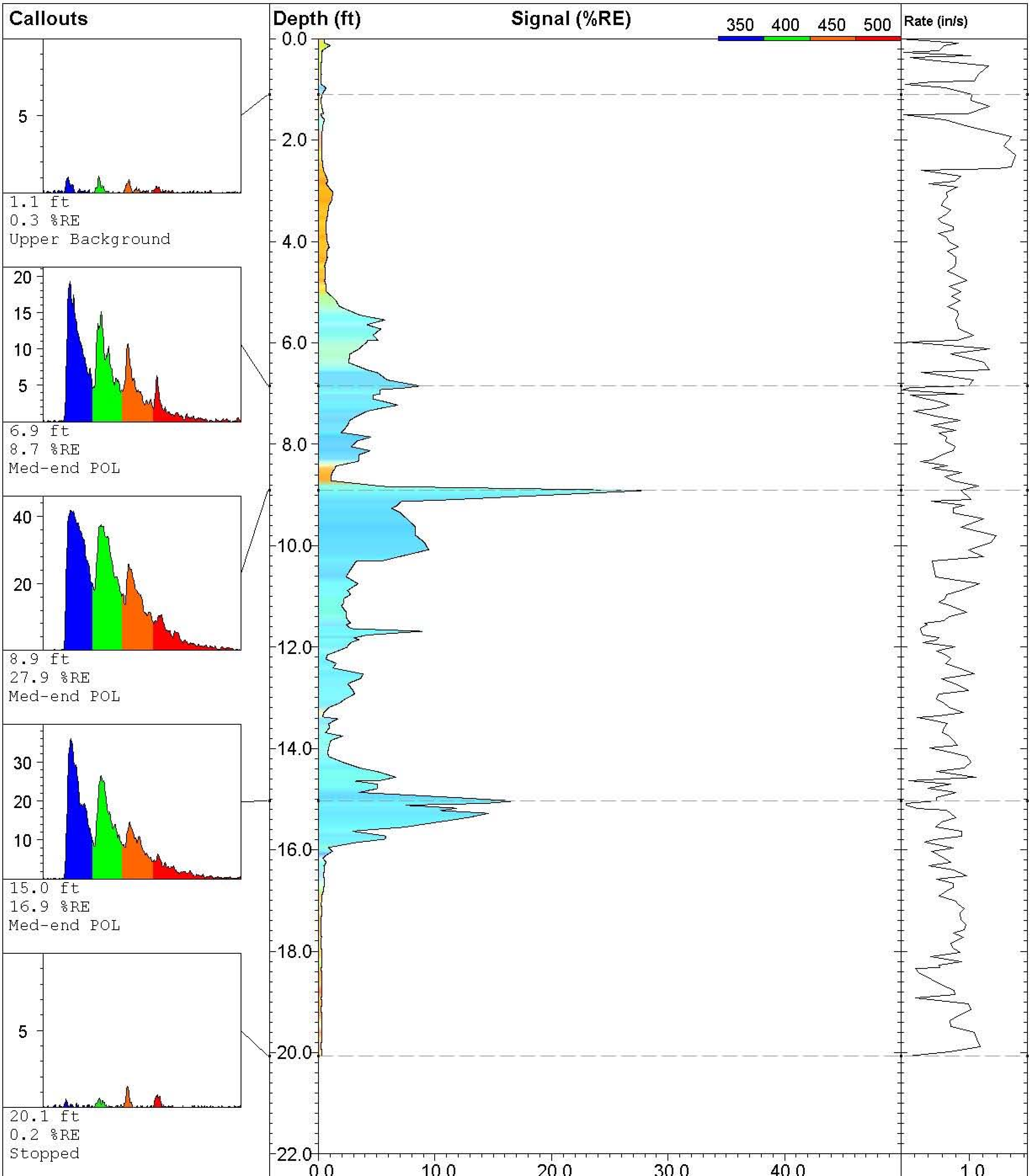
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.03 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **44.9 % @ 4.02 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-21 18:25 ADT**



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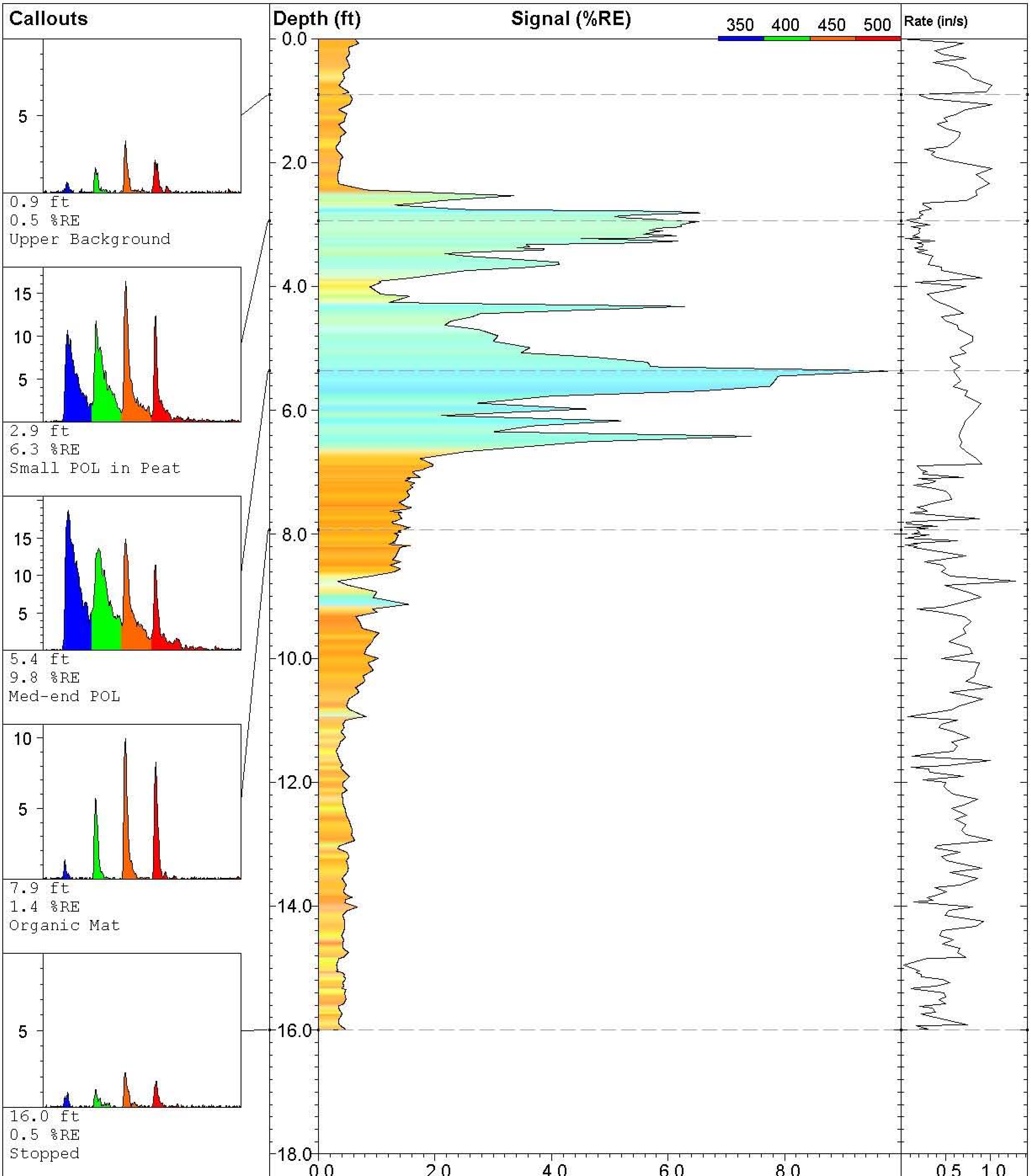
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**

Final depth: **20.07 ft**

Max signal: **27.9 % @ 8.91 ft**

Date & Time: **2010-07-21 18:44 ADT**



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10NC27 UV-010

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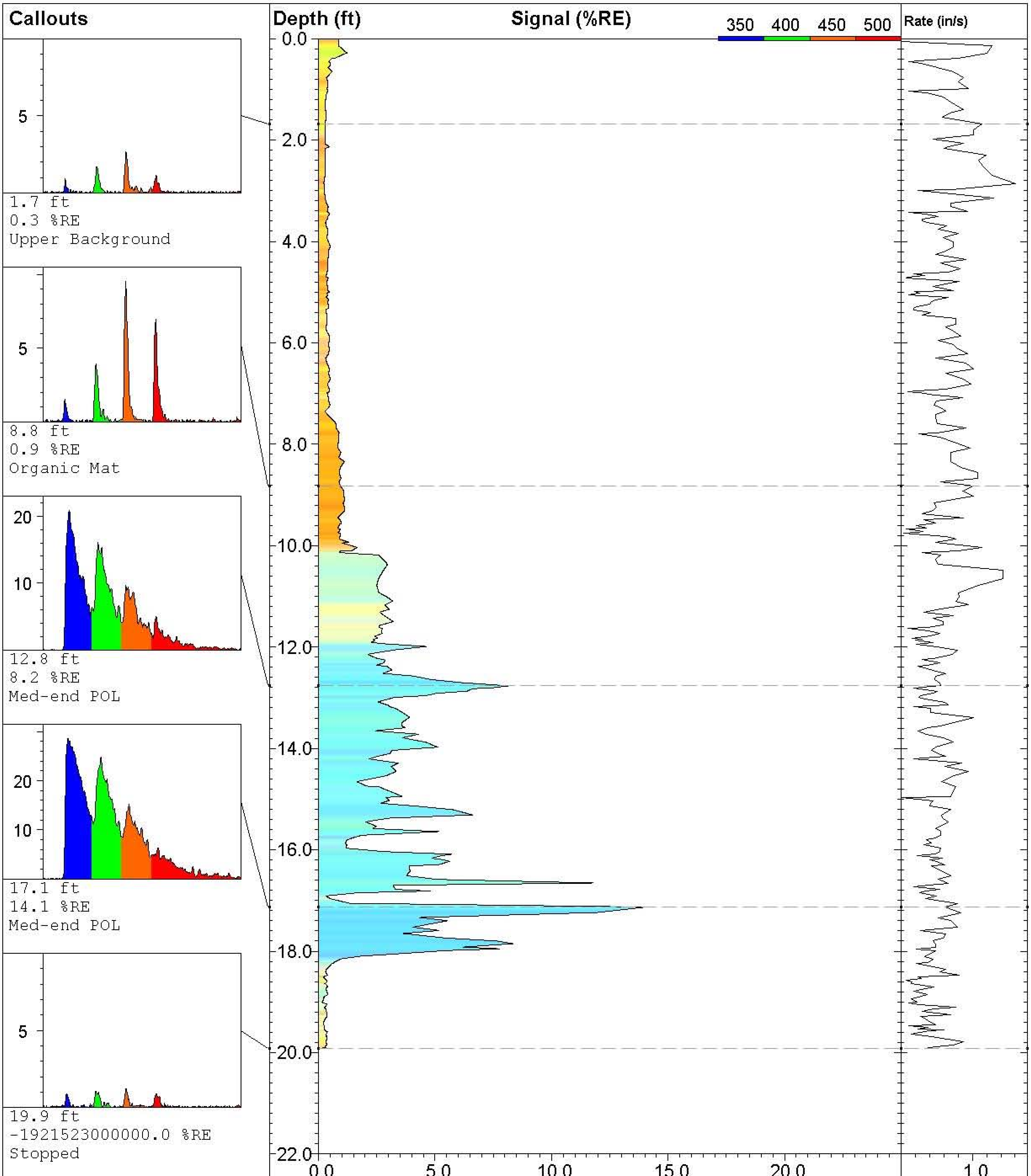
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.00 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **9.8 % @ 5.36 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-22 10:06 ADT**



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10NC27 UV-011

UVOST By Dakota
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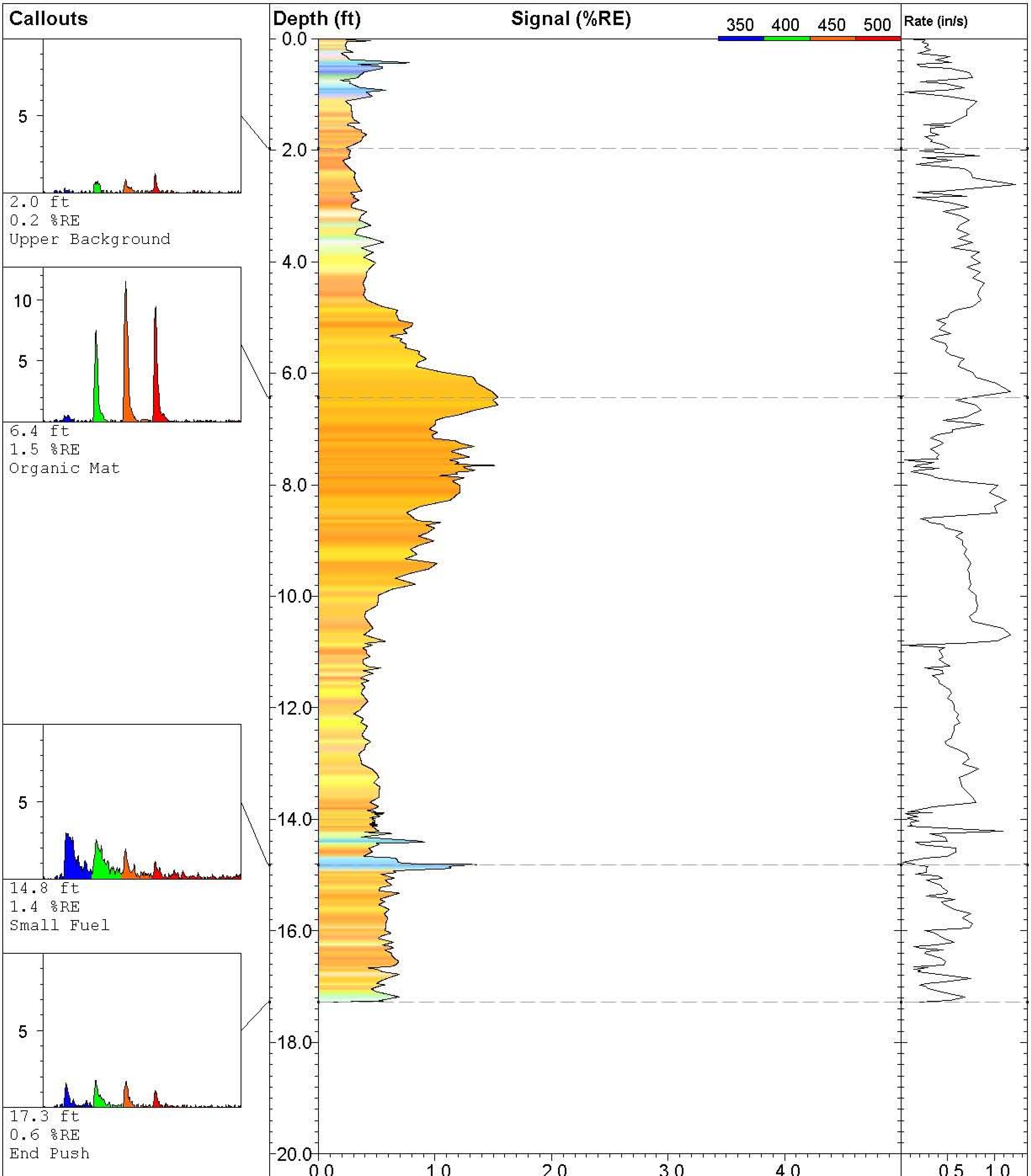
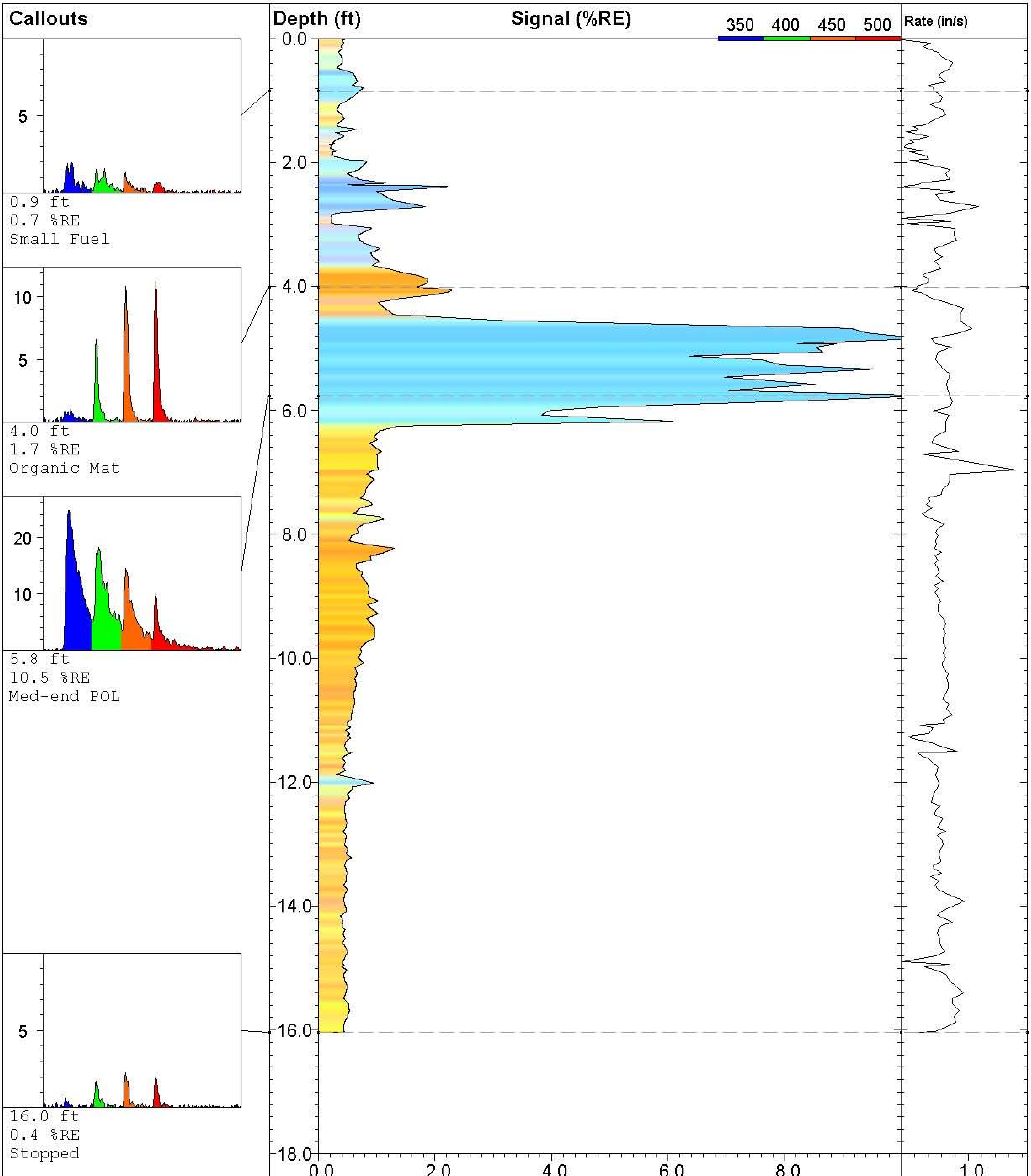
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **19.91 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **14.1 % @ 17.13 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-22 11:14 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-012**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.27 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.5 % @ 6.43 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-23 09:13 ADT**



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10NC27 UV-013

UVOST By Dakota
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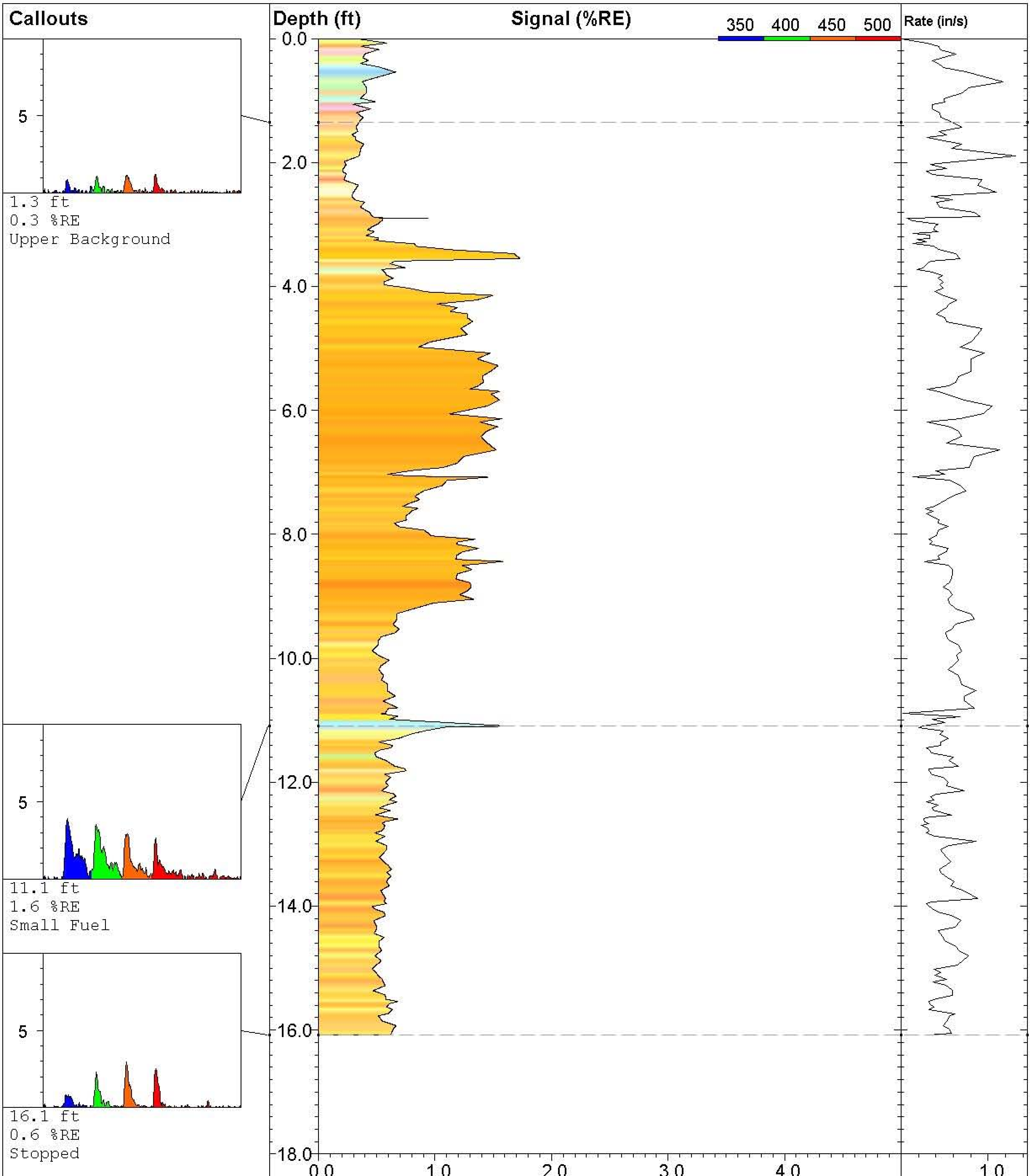
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.04 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **10.5 % @ 5.76 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-23 09:43 ADT**



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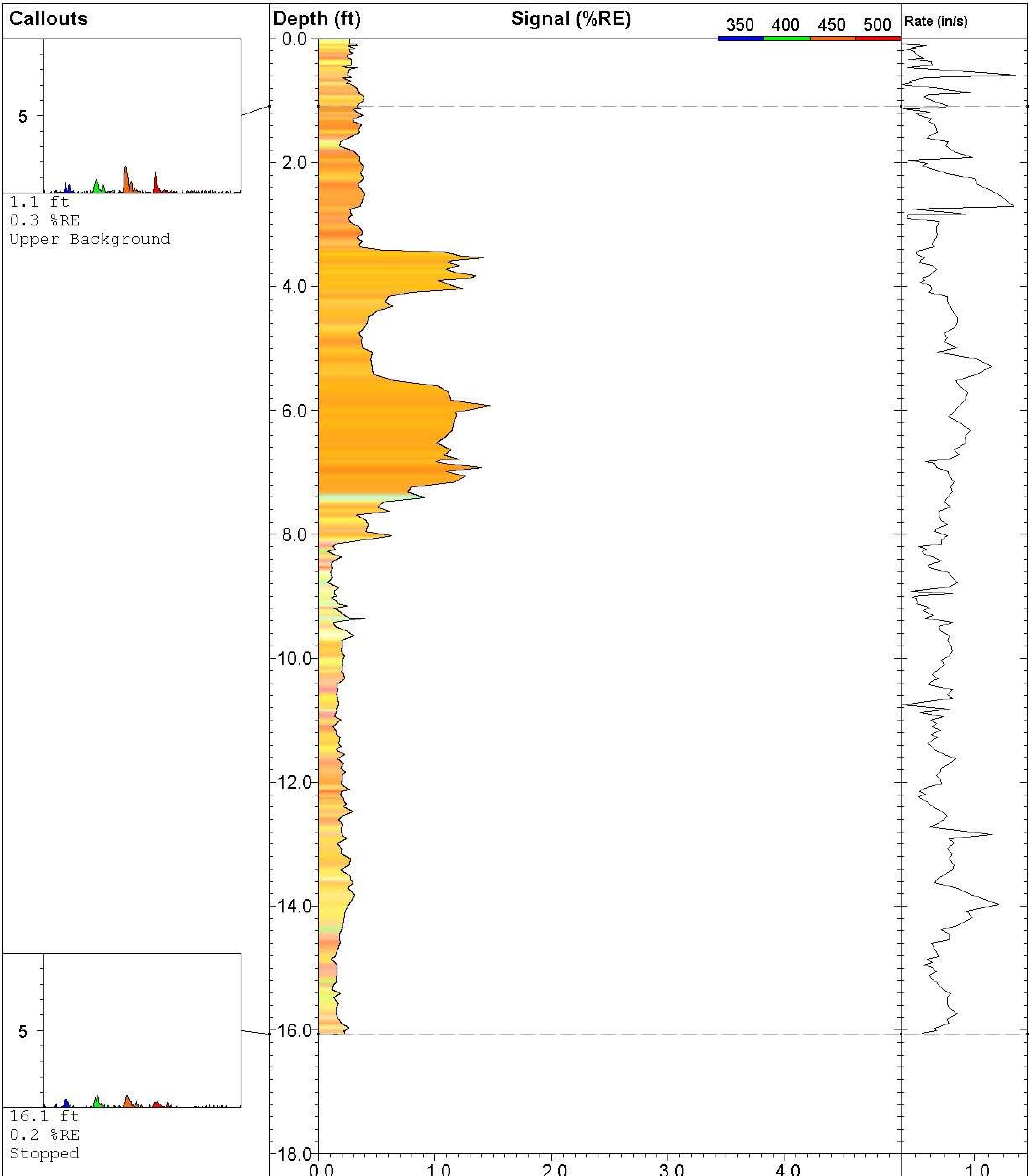
10NC27 UV-014		**UVOST By Dakota** www.DakotaTechnologies.com
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.08 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.7 % @ 3.55 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-23 10:08 ADT**



10NC27 UV-015

UVOST By Dakota
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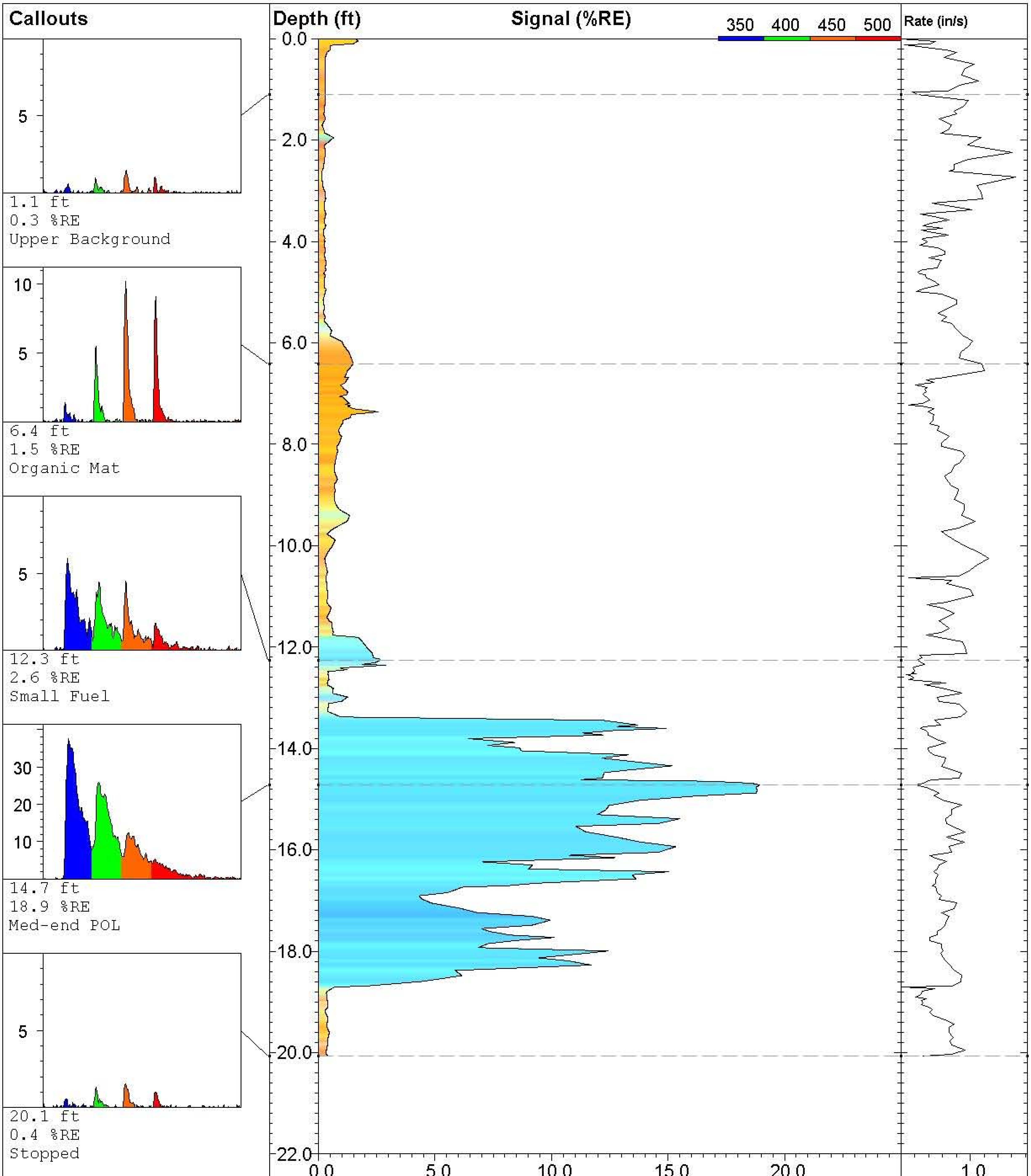
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.06 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.5 % @ 5.92 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-23 11:00 ADT**



10NC27 UV-016		UVOST By Dakota www.DakotaTechnologies.com
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.07 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **18.9 % @ 14.73 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-23 11:21 ADT**

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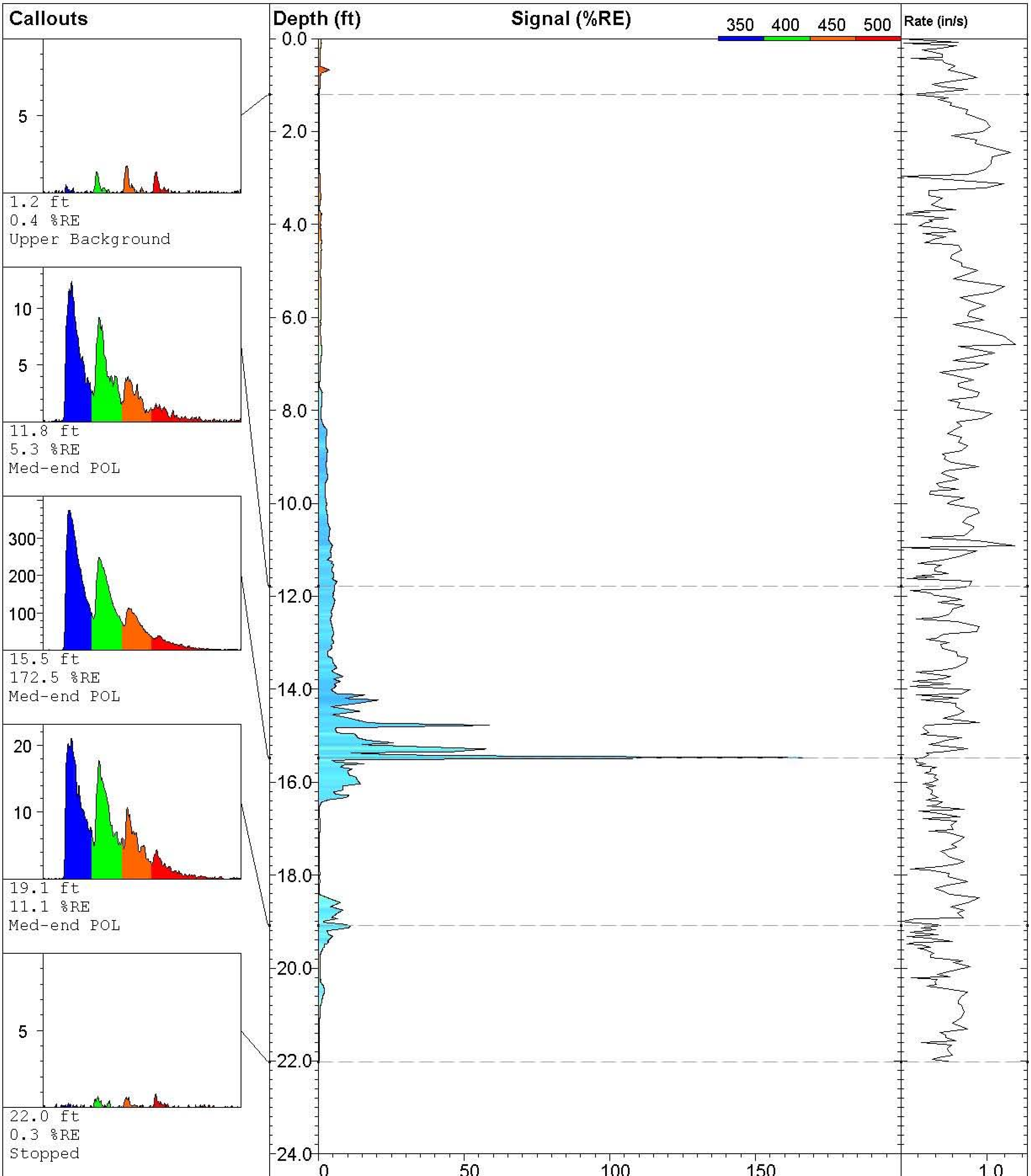

10NC27 UV-017		**UVOST By Dakota** www.DakotaTechnologies.com
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **22.02 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **172.5 % @ 15.47 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-23 11:47 ADT**

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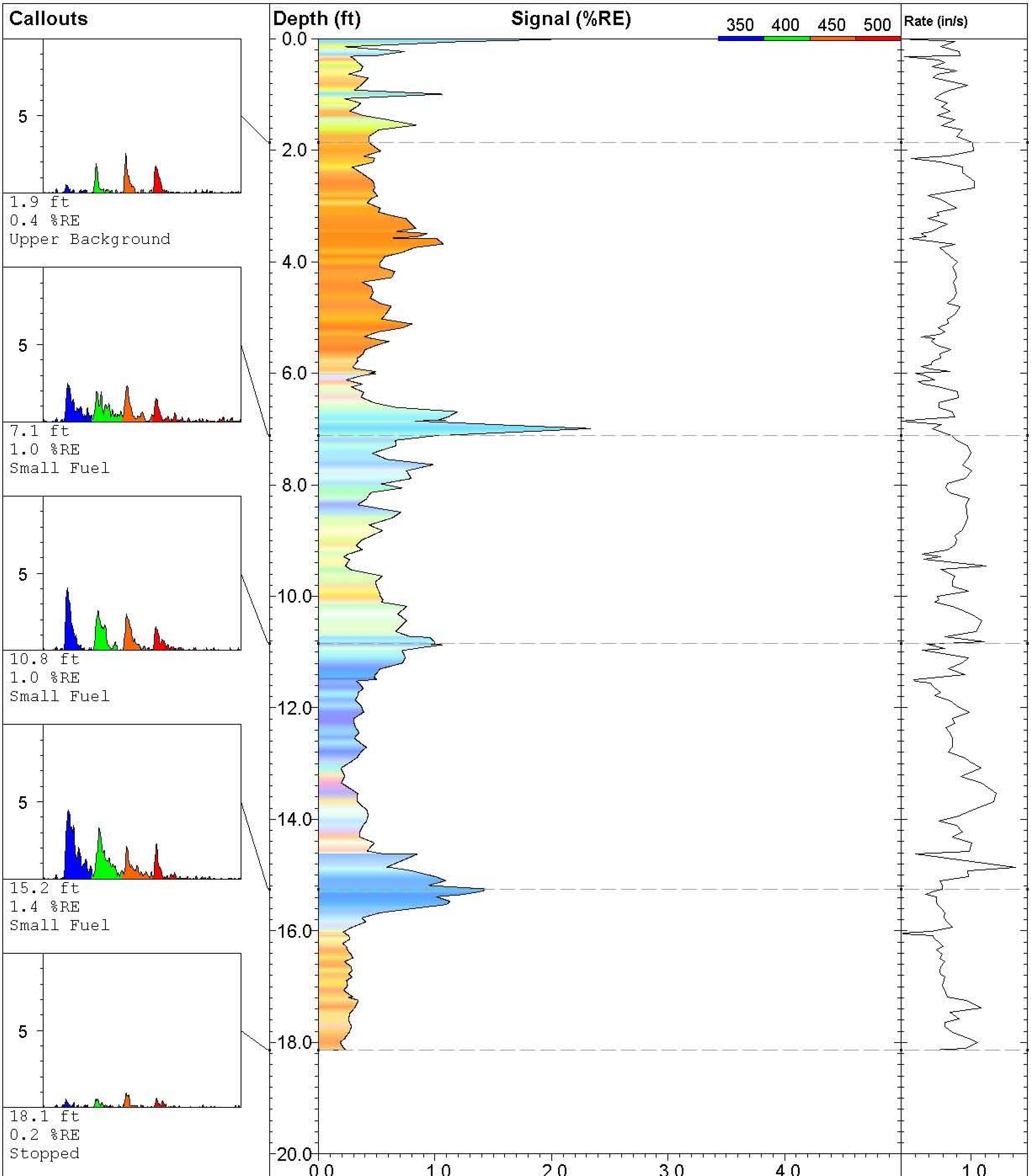

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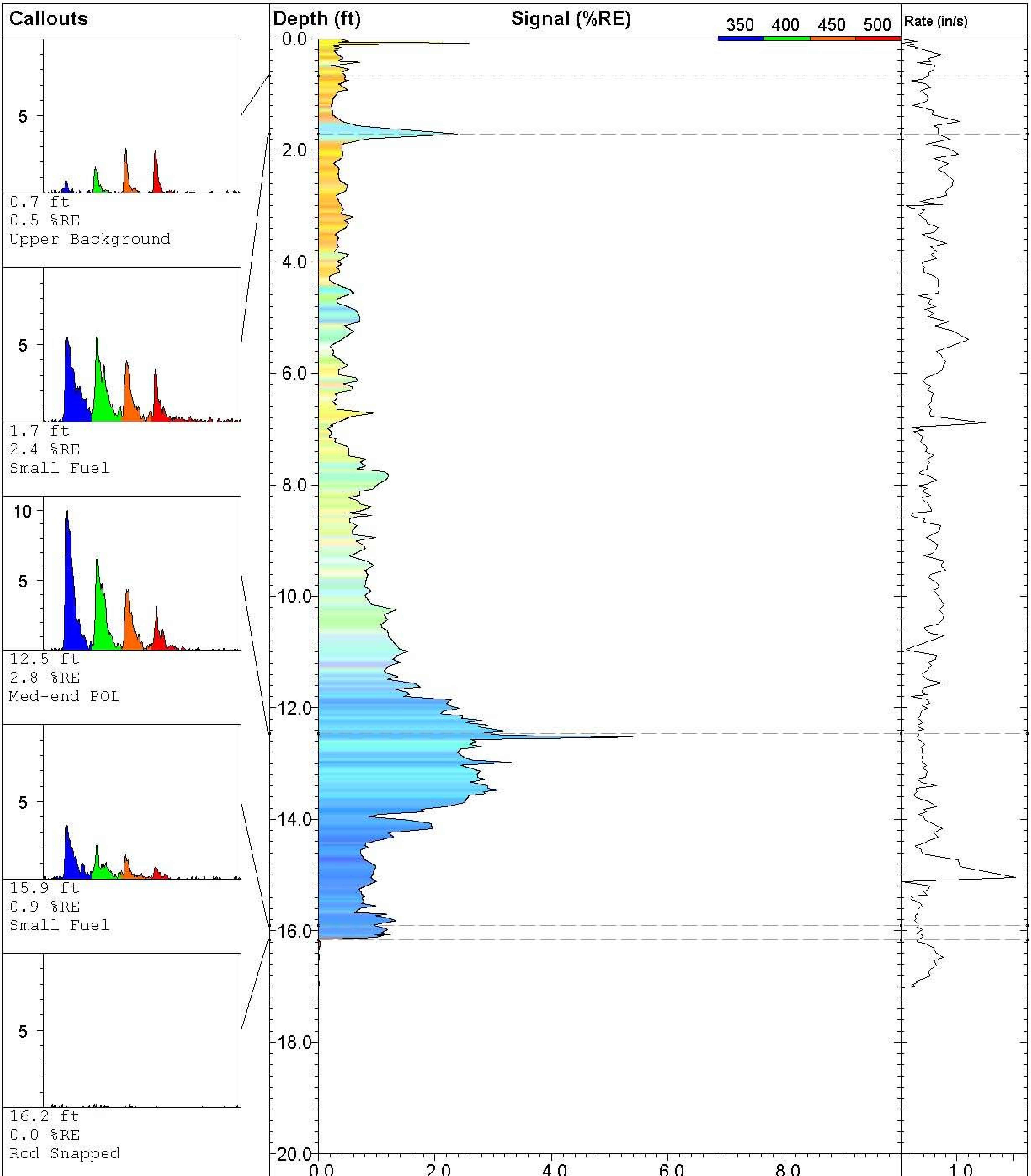
10NC27 UV-018		**UVOST By Dakota** www.DakotaTechnologies.com
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **18.14 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.3 % @ 6.99 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-23 12:12 ADT**

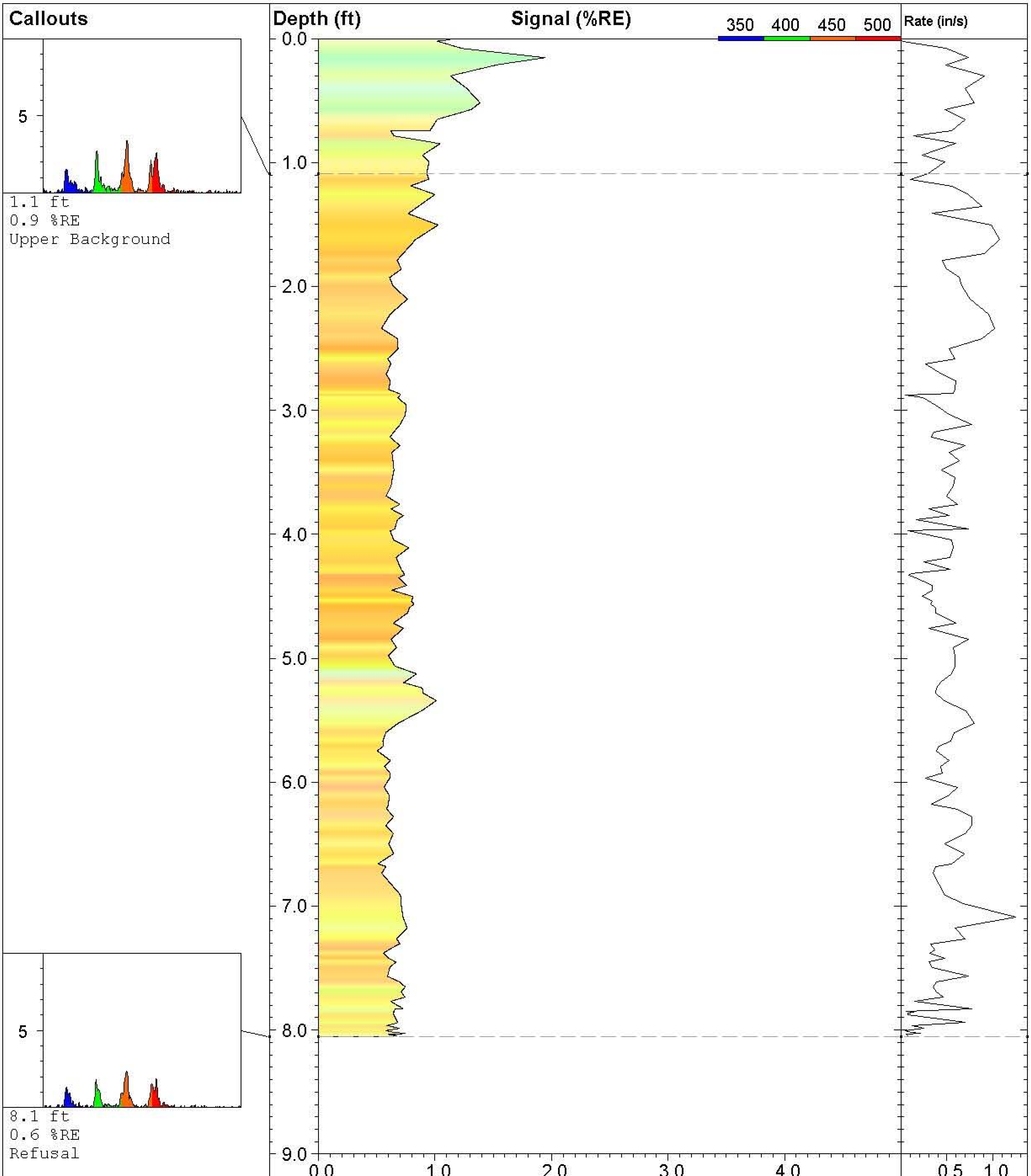


Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-019**	**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**

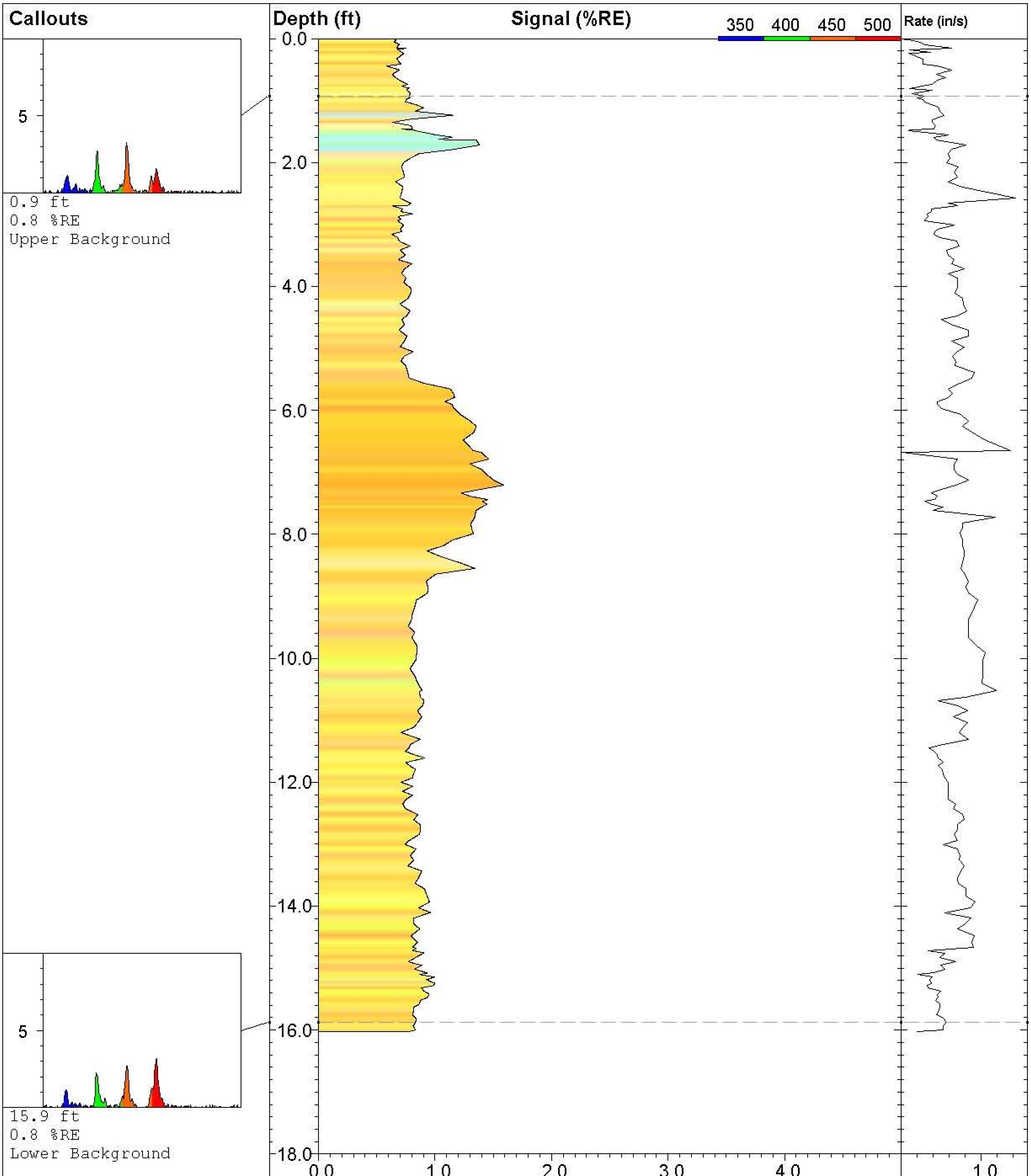
Final depth: **17.02 ft**

Max signal: **5.4 % @ 12.53 ft**

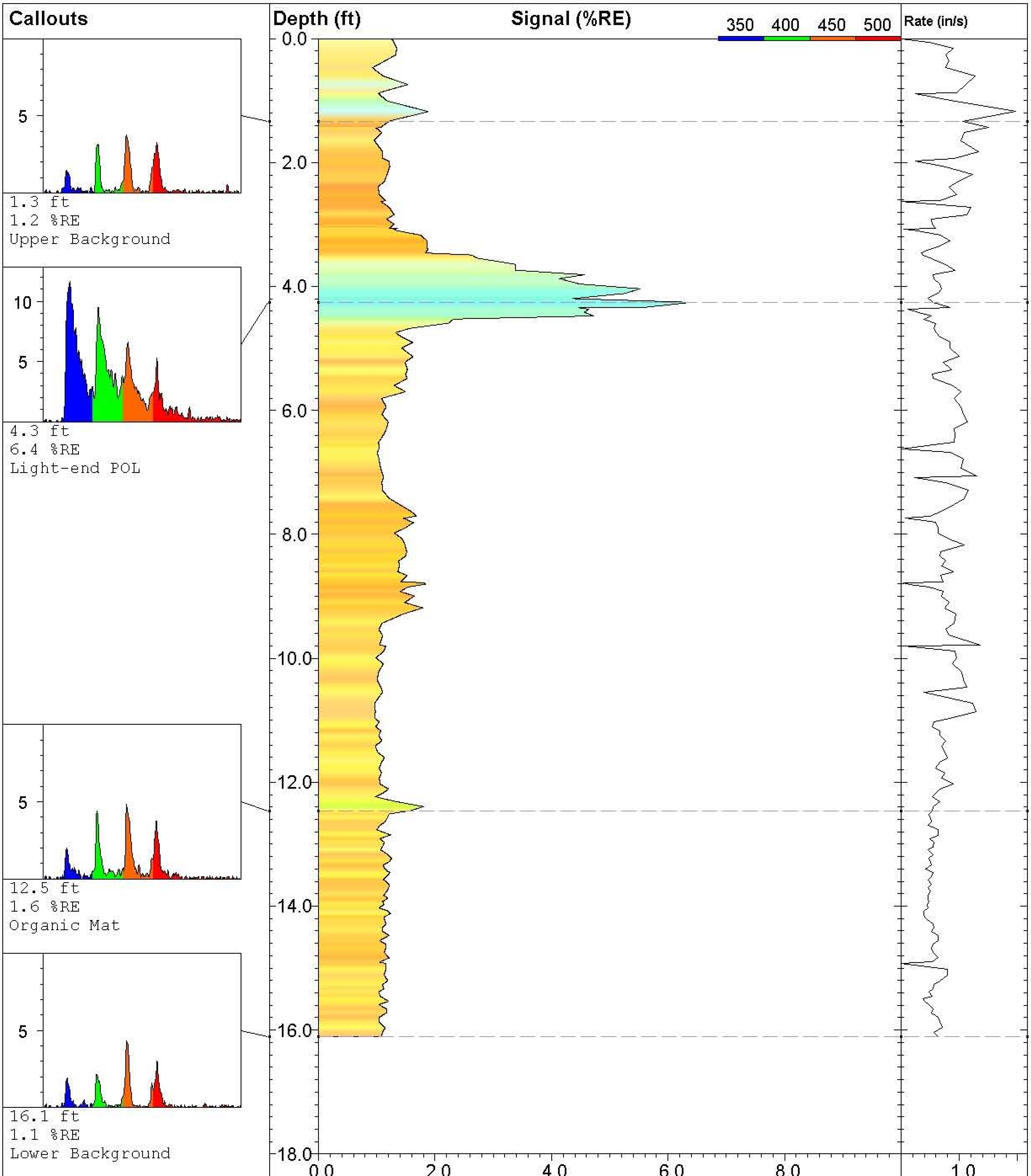
Date & Time: **2010-07-23 14:34 ADT**



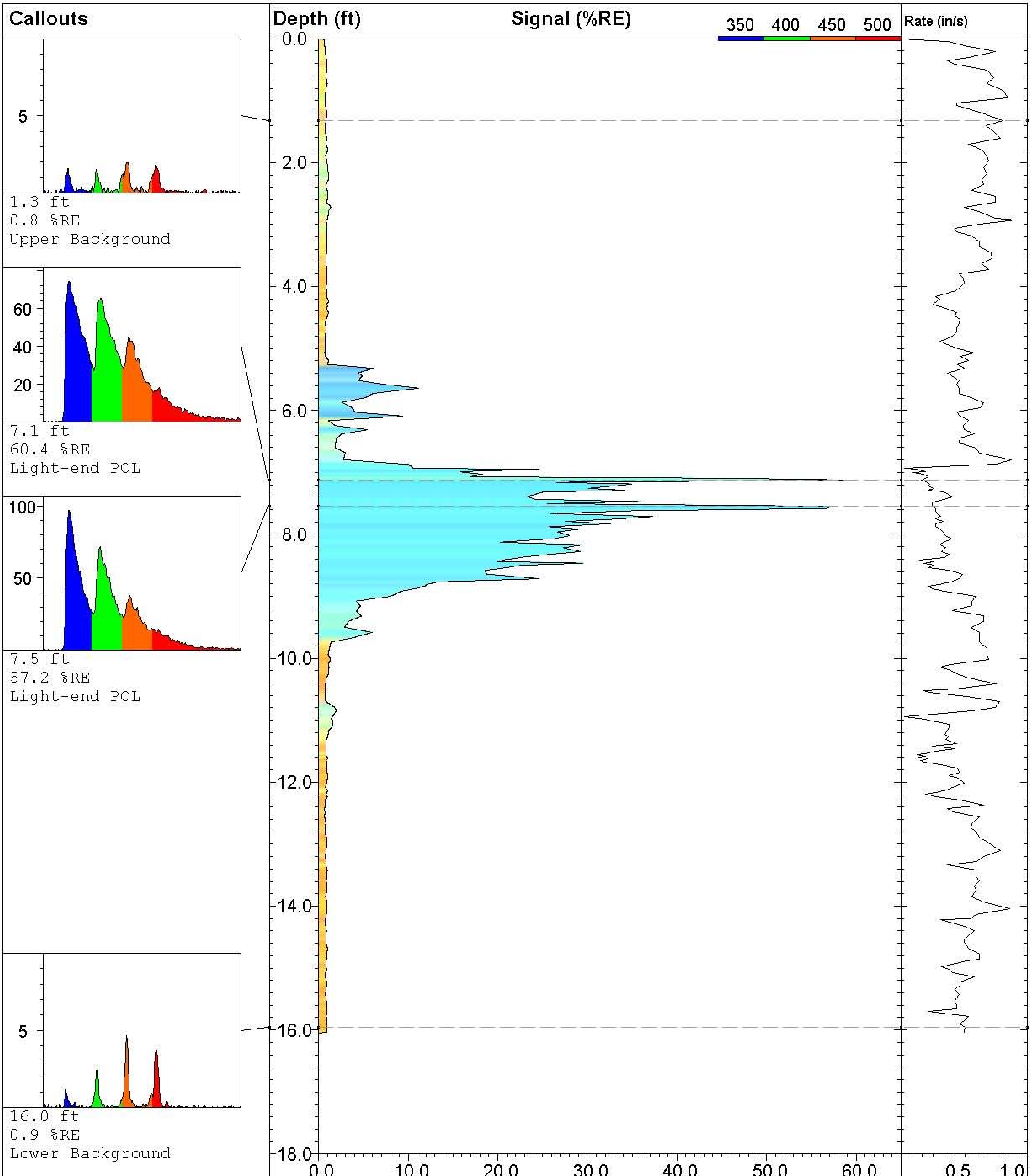
Hammer Environmental Services	10NC27 UV-020		UVOST By Dakota www.DakotaTechnologies.com
PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	*Site:* **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **8.05 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.9 % @ 0.15 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-23 15:24 ADT**



Hammer Environmental Services	10NC27 UV-021		UVOST By Dakota www.DakotaTechnologies.com
PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	*Site:* **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.02 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.6 % @ 7.21 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-23 15:49 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-022**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.10 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **6.4 % @ 4.26 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-23 16:20 ADT**



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10NC27 UV-023

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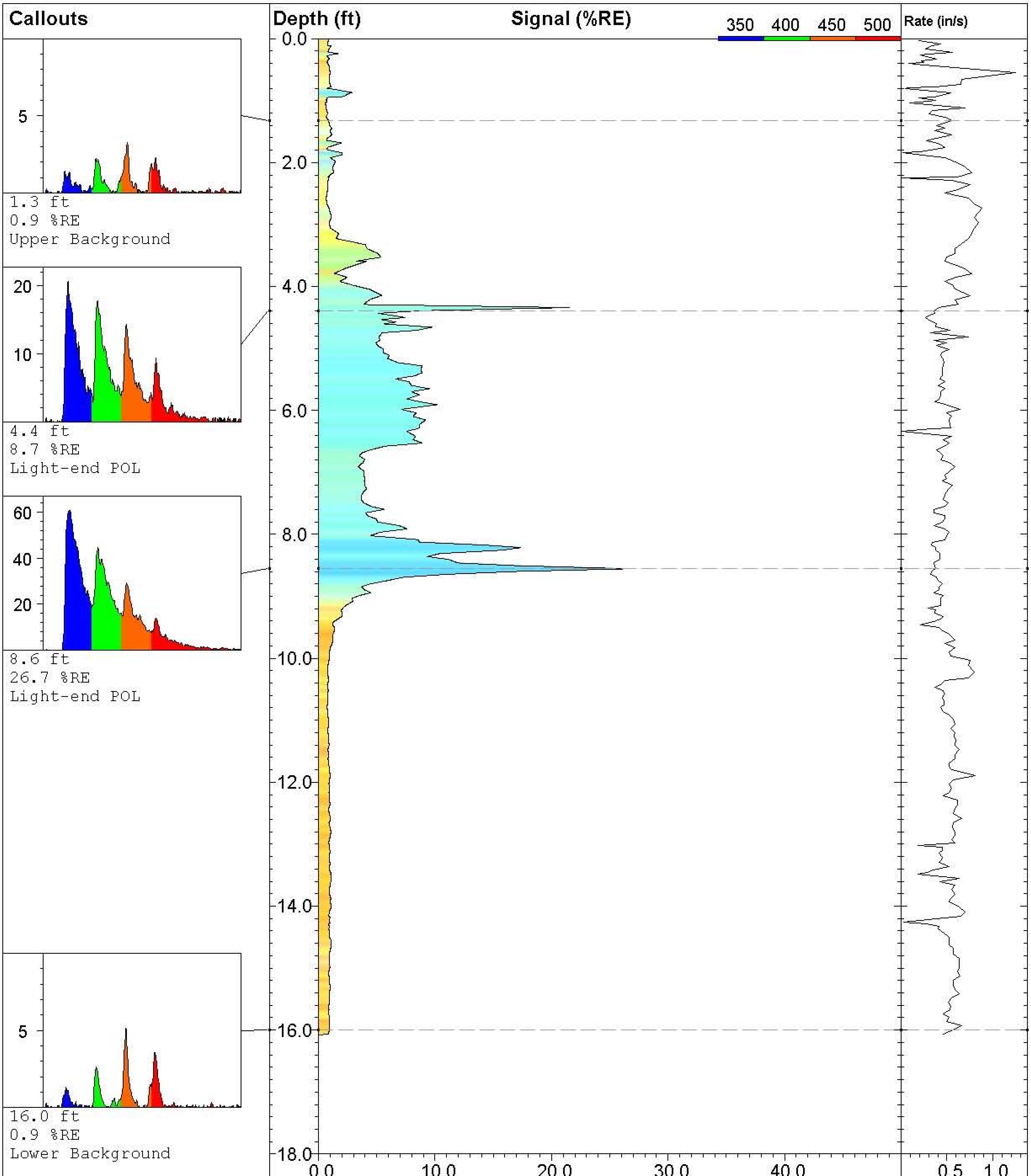
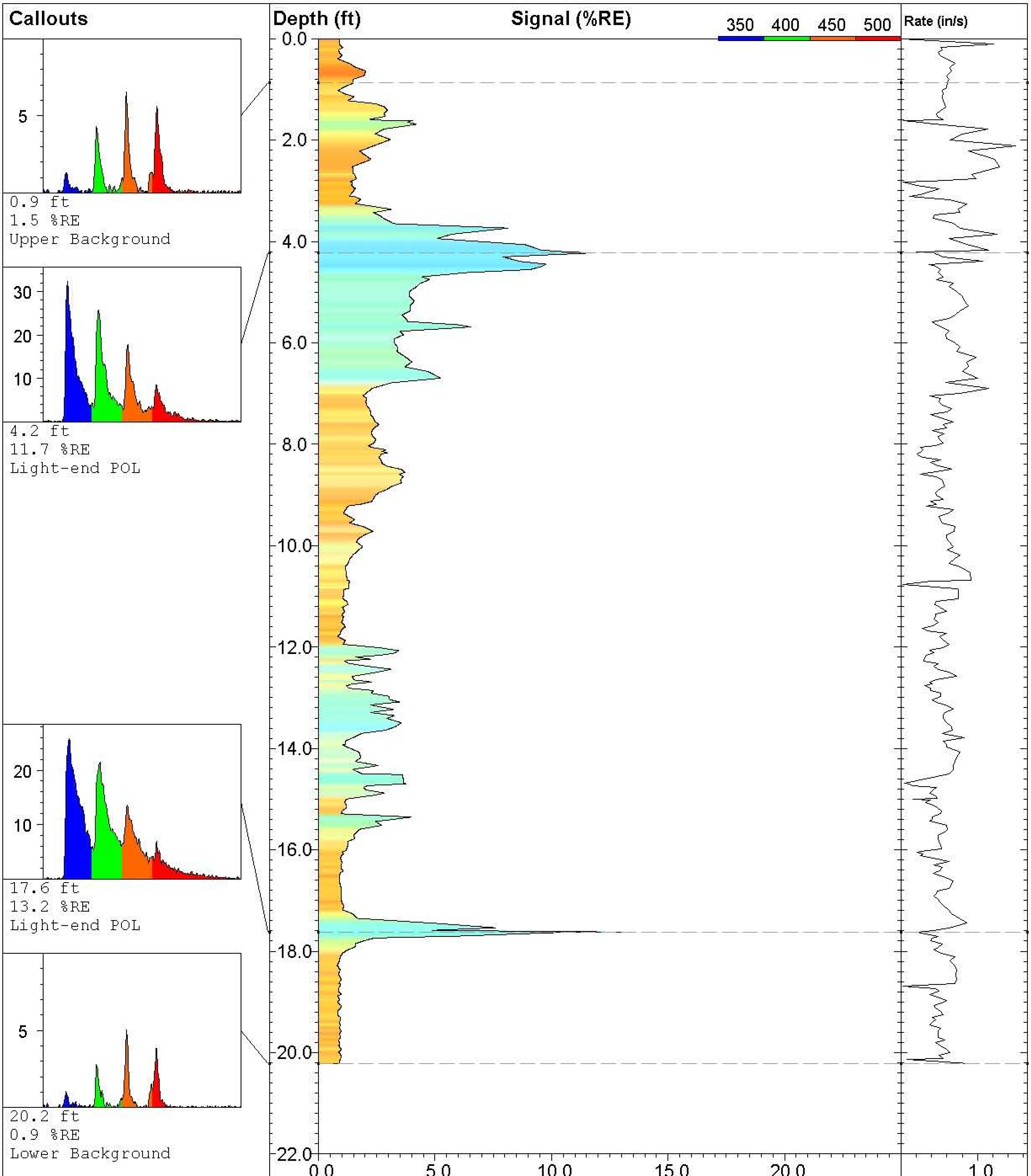
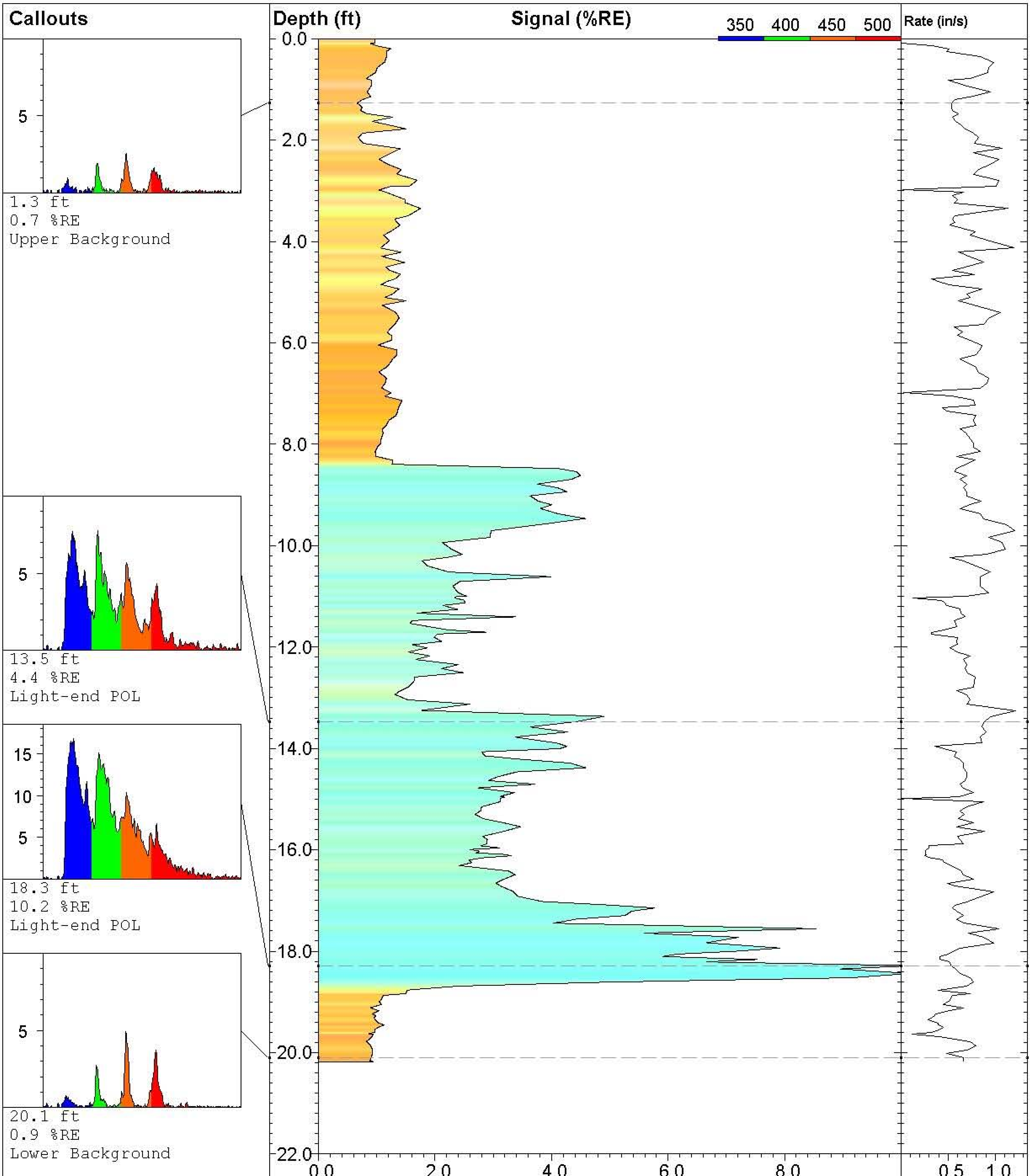
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.05 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **60.4 % @ 7.13 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-23 16:54 ADT**



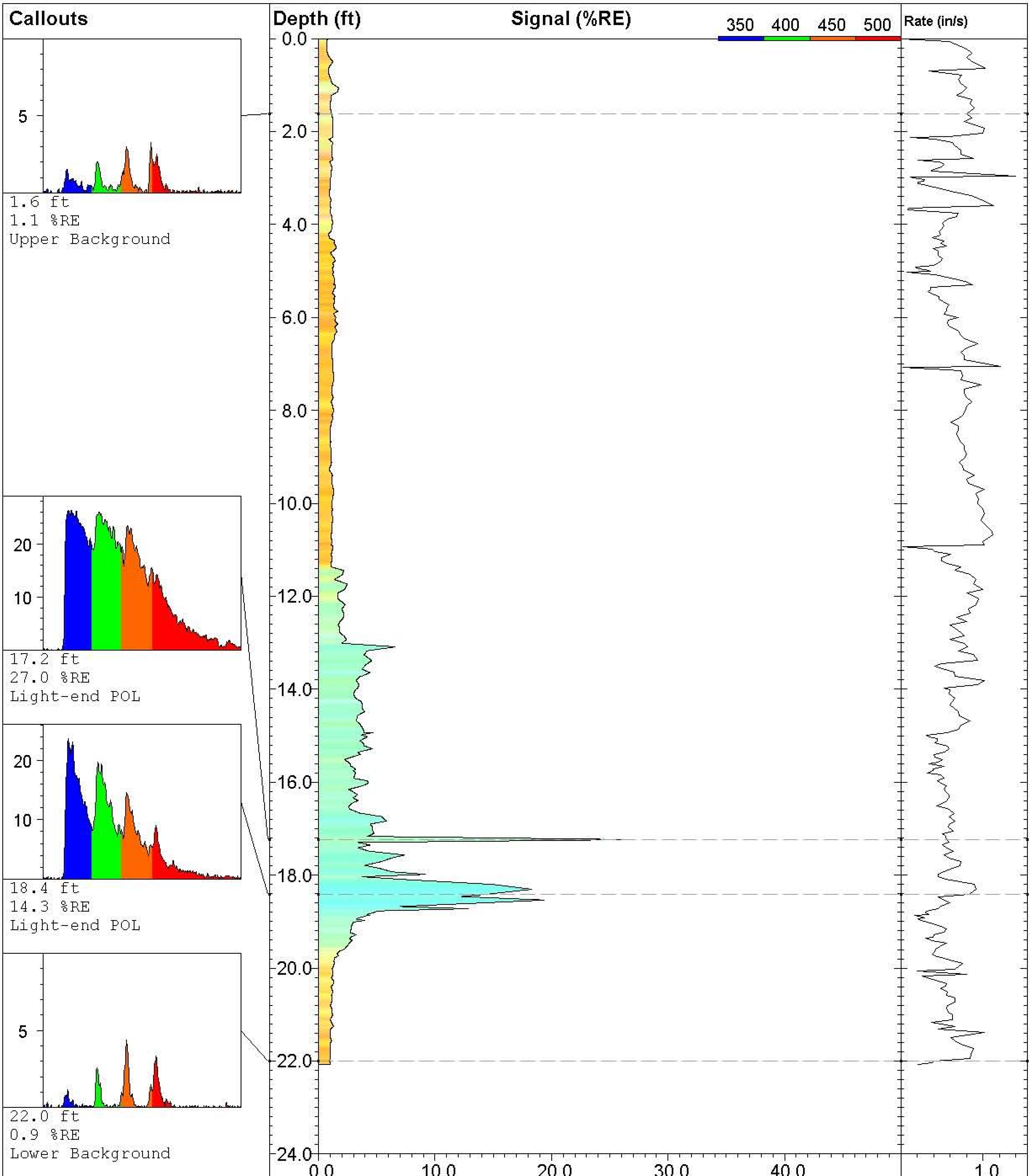
Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-024**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.07 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **26.7 % @ 8.56 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-24 09:26 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-025**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.21 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **13.2 % @ 17.62 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-24 10:16 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-026**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.18 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **10.2 % @ 18.29 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-24 10:45 ADT**



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10NC27 UV-027

UVOST By Dakota
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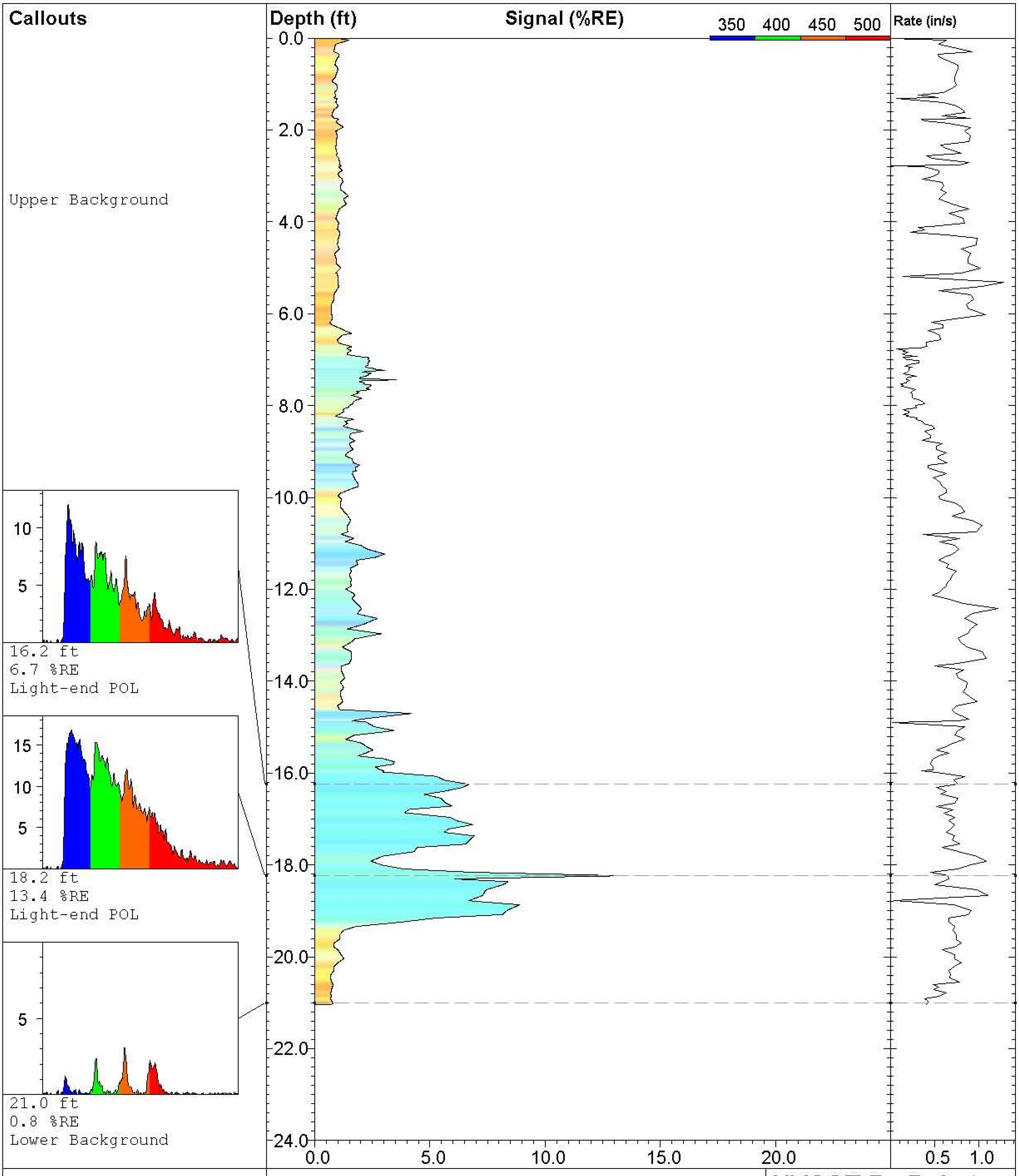
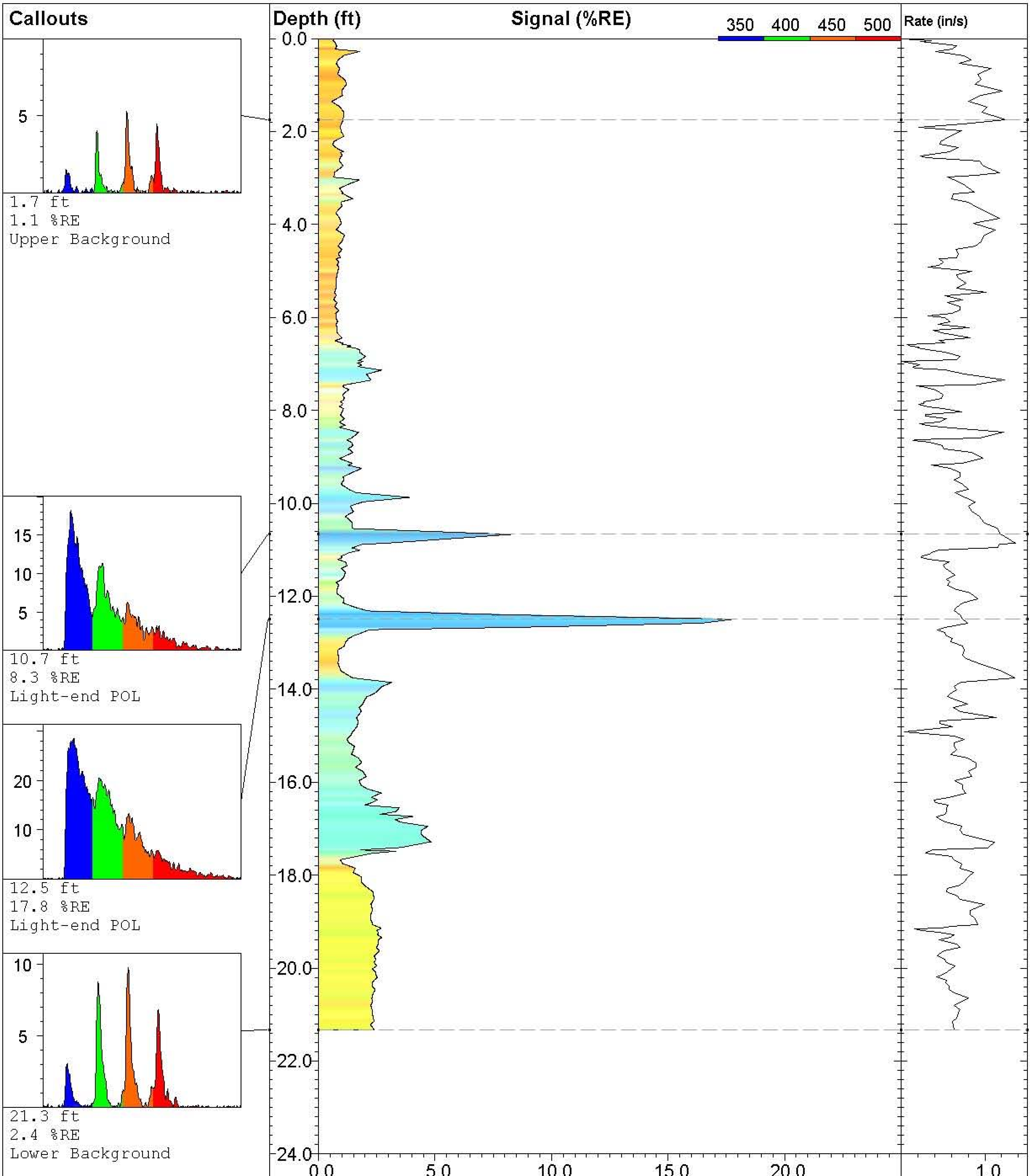
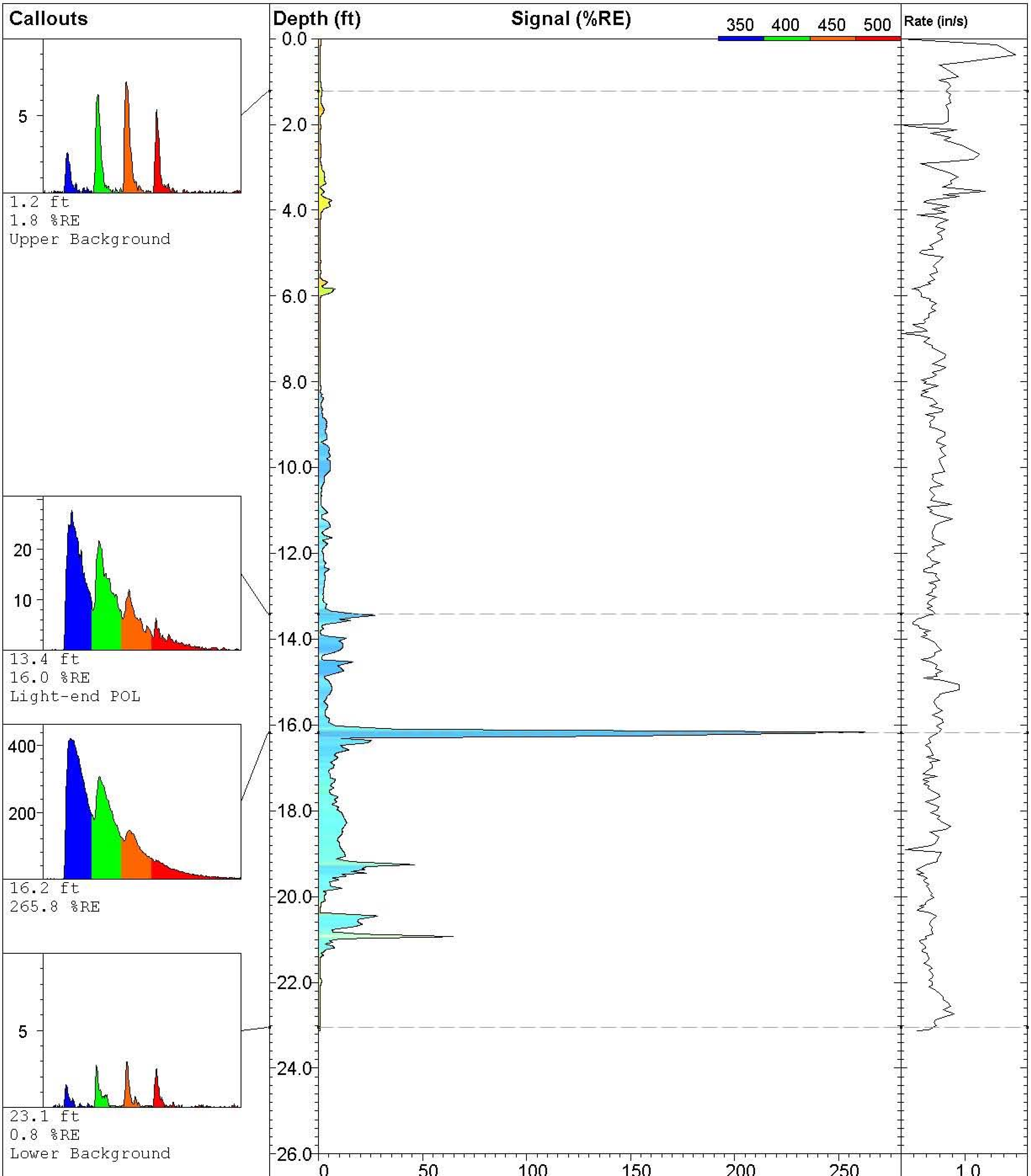
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **22.07 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **27.0 % @ 17.24 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-24 11:12 ADT**



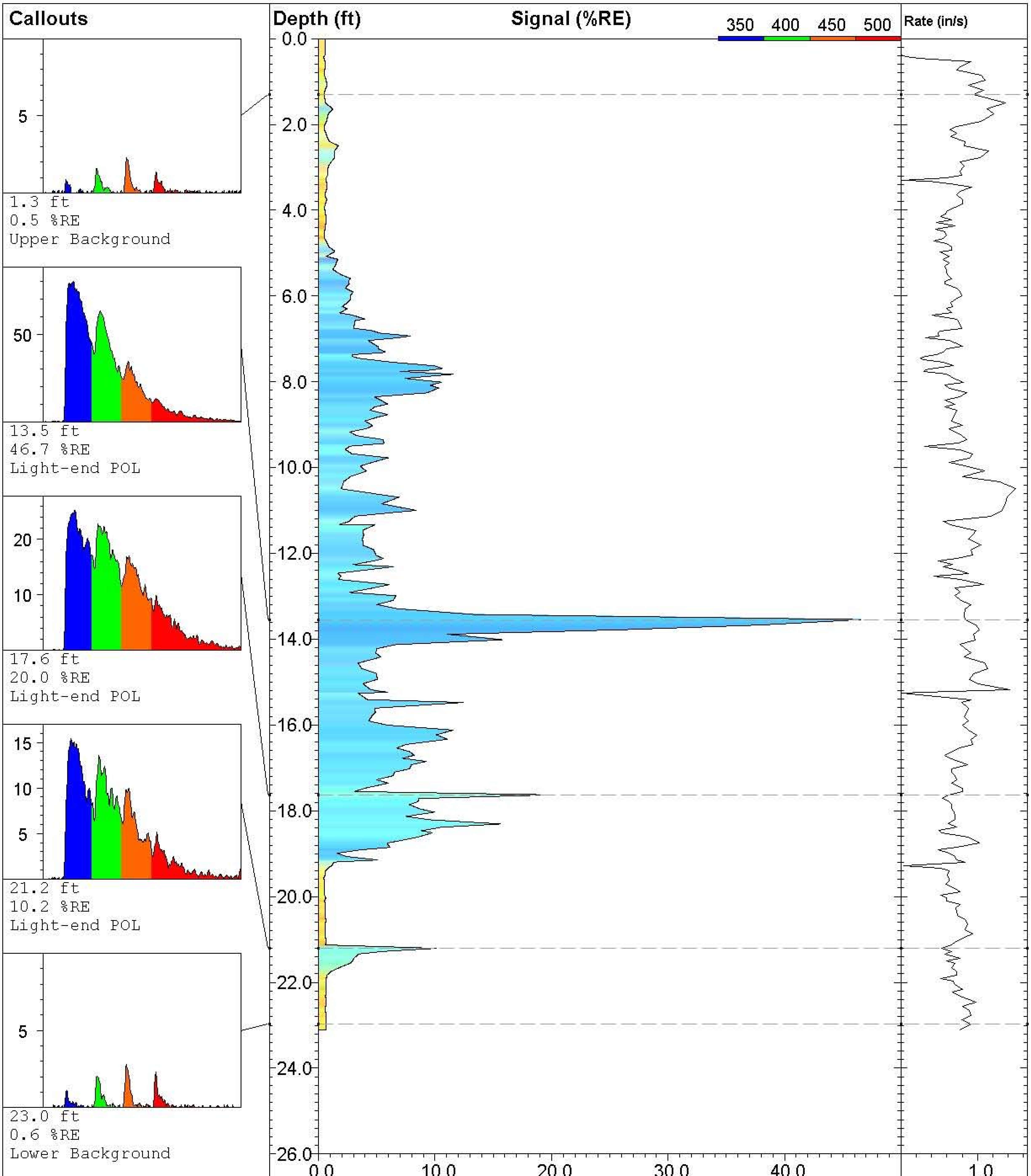
Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-028**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **21.04 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **13.4 % @ 18.24 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-24 11:35 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-029**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **21.33 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **17.8 % @ 12.49 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-24 13:37 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-030**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **23.14 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **265.8 % @ 16.17 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-24 15:28 ADT**



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10NC27 UV-031

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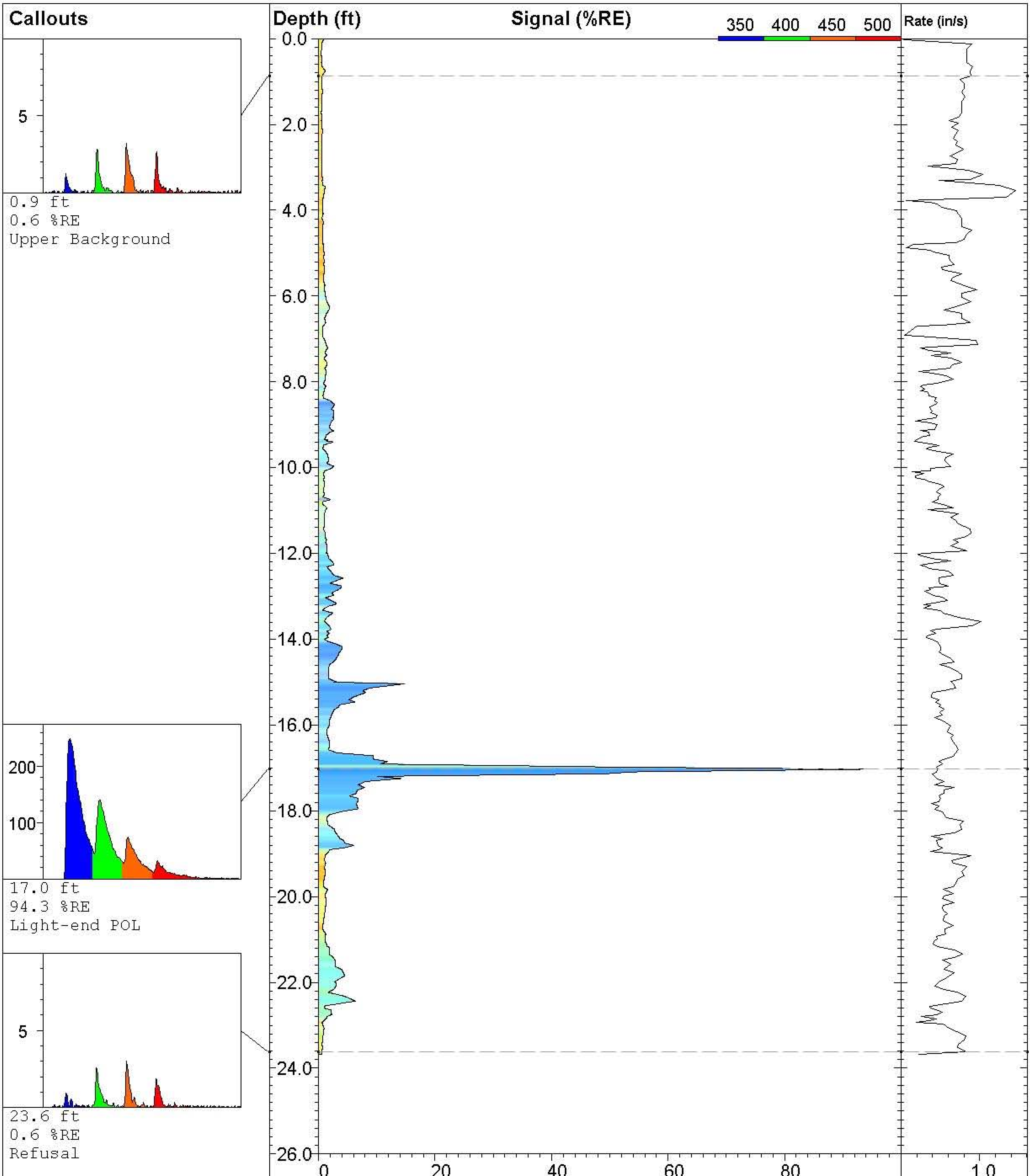
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **23.11 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **46.7 % @ 13.54 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-24 15:55 ADT**



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10NC27 UV-032

UVOST By Dakota
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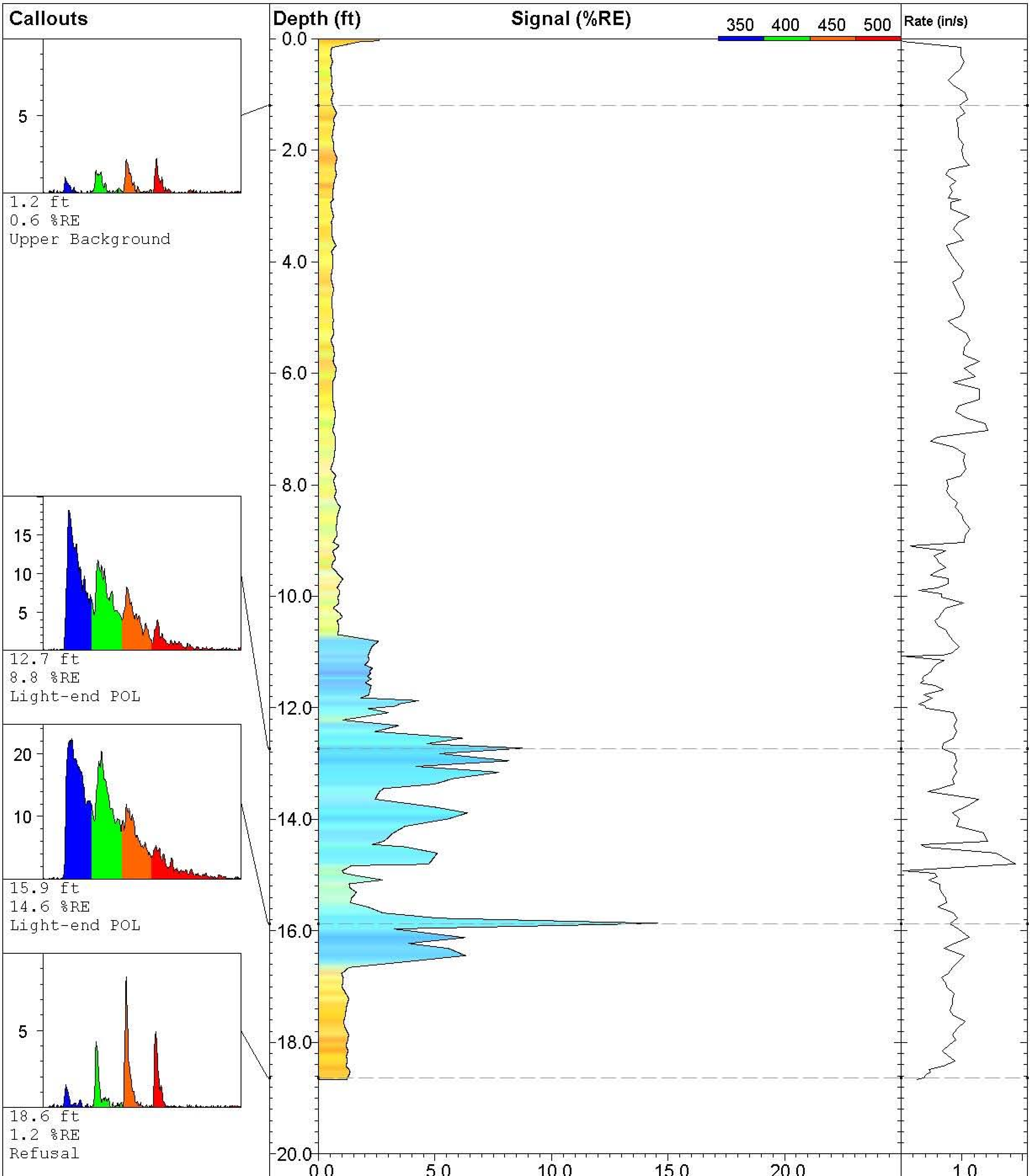
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **23.68 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **94.3 % @ 17.03 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-24 16:35 ADT**



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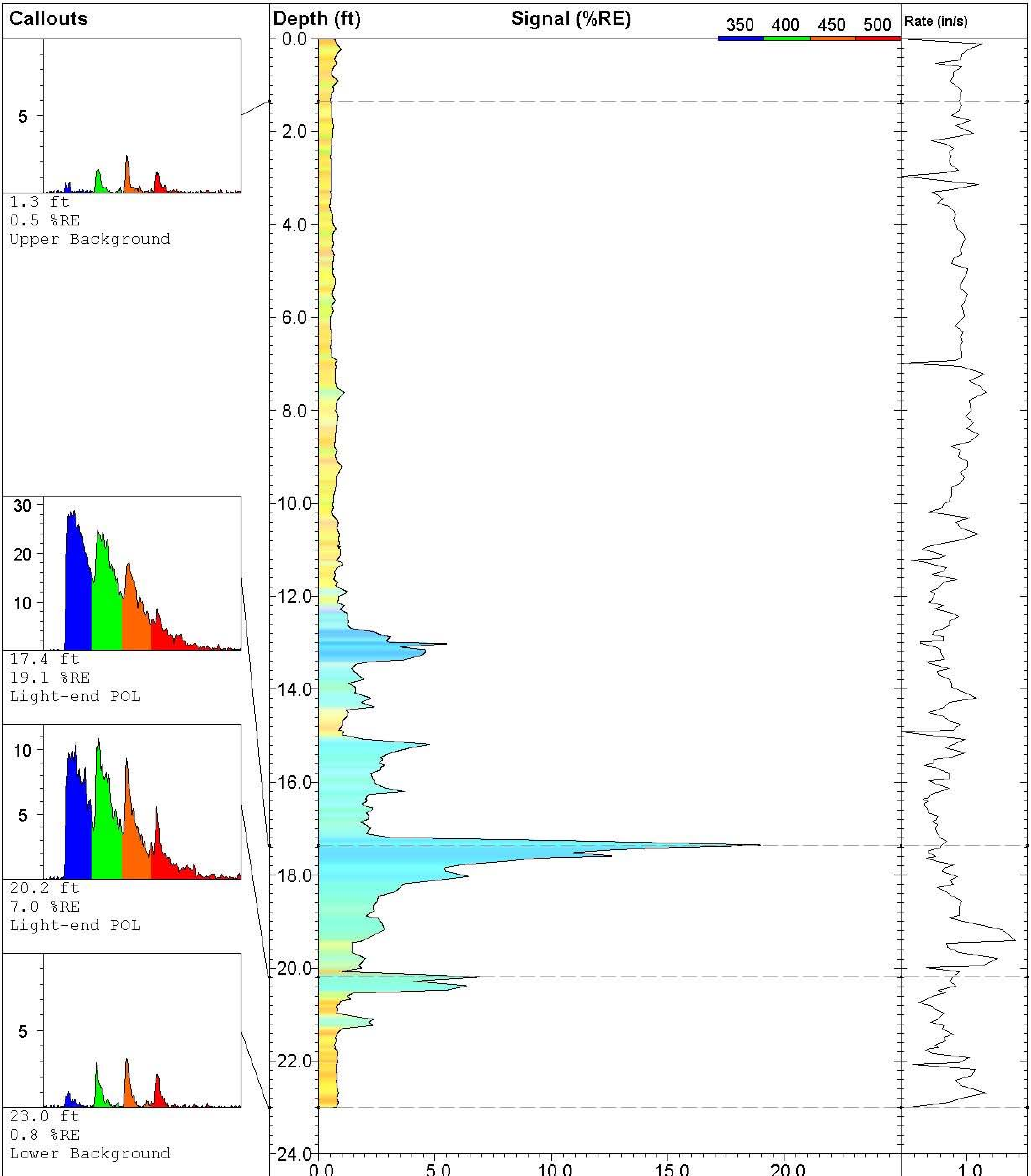
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**
	Final depth: **18.67 ft**	
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**
	Max signal: **14.6 % @ 15.87 ft**	
	Job:	*Operator/Unit:* **PCaron/UVOST1016**
	Date & Time: **2010-07-24 17:55 ADT**	



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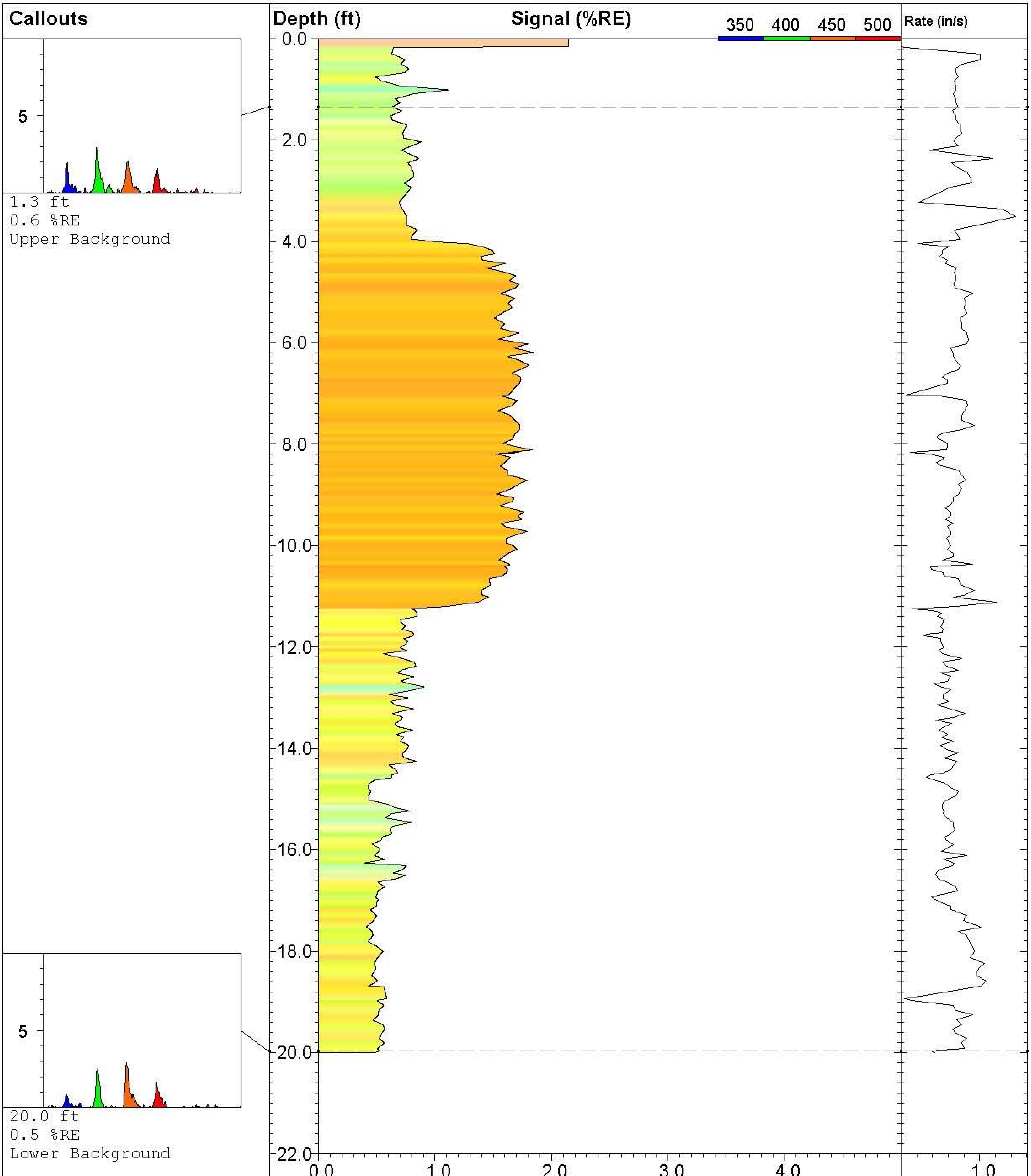
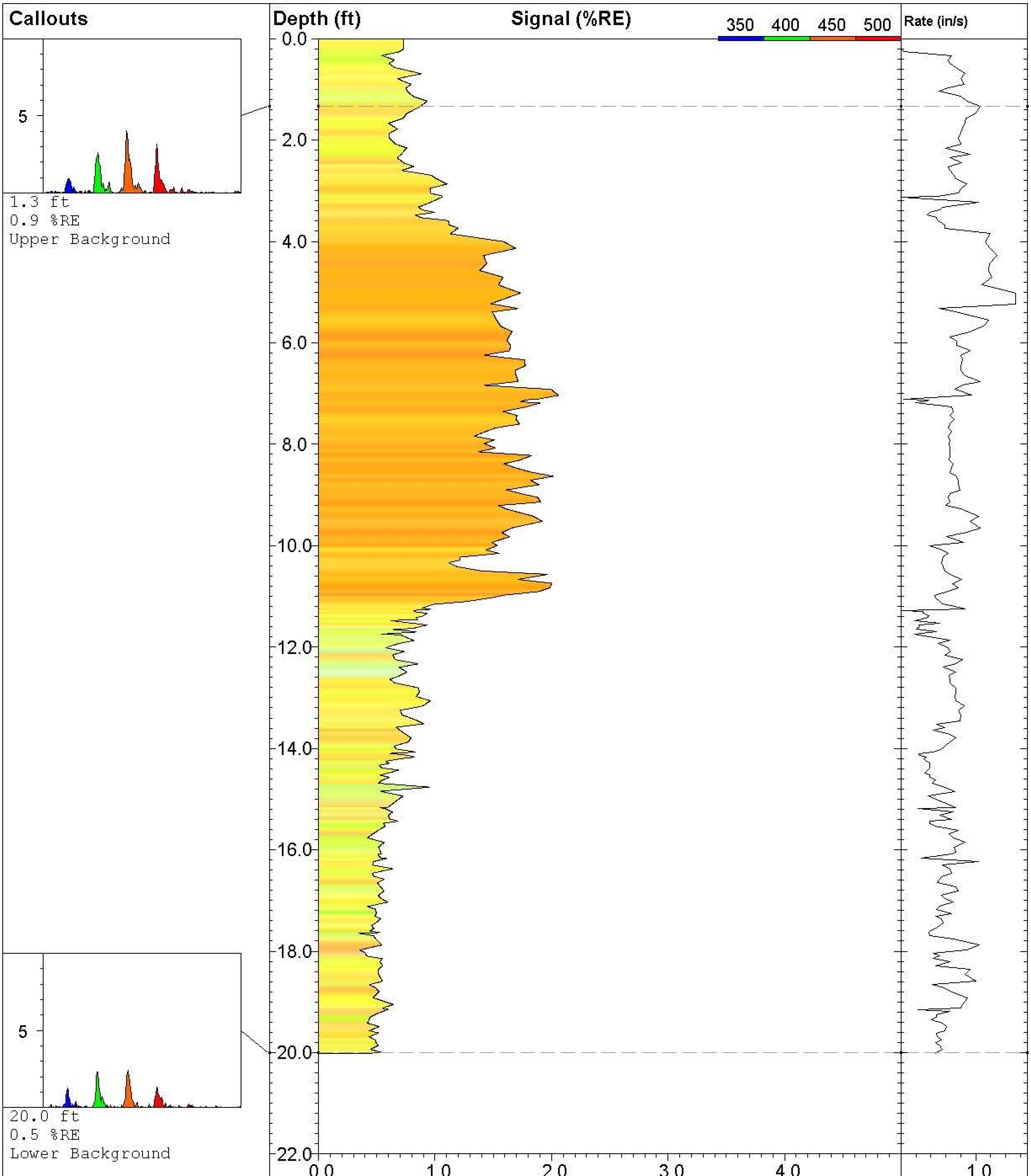
10NC27 UV-034

UVOST By Dakota
www.DakotaTechnologies.com

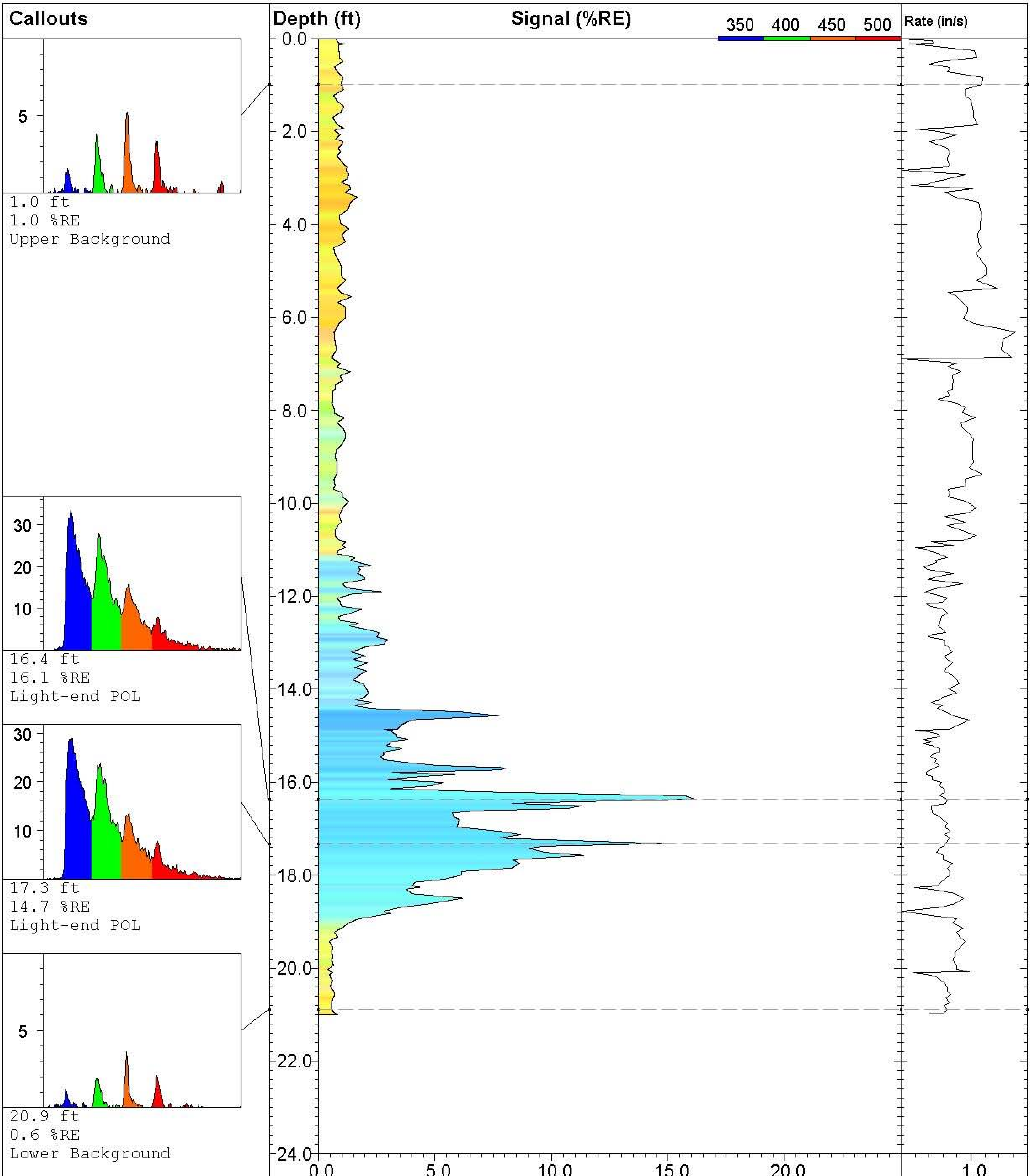
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **22.99 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **19.1 % @ 17.35 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-24 18:14 ADT**



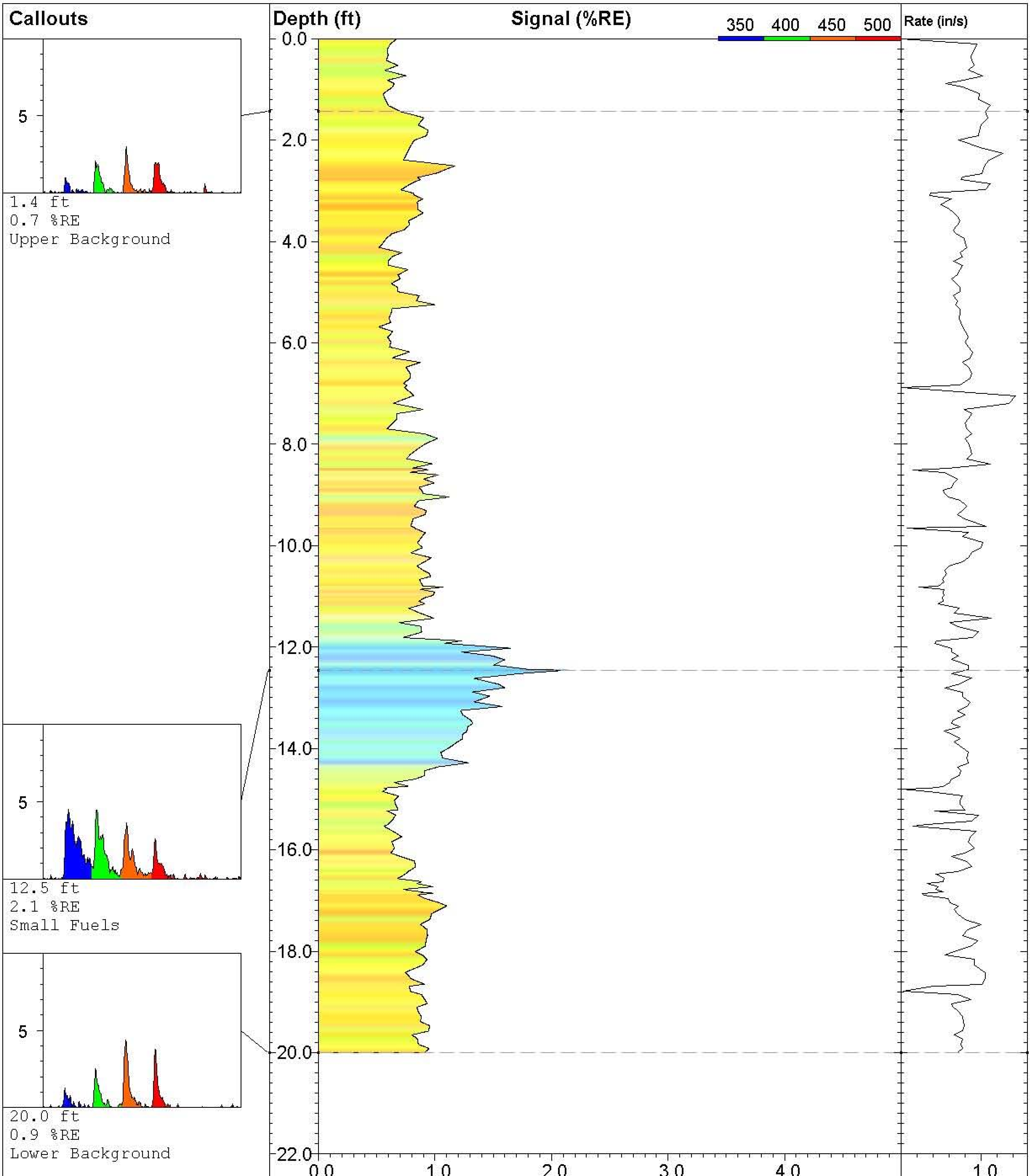
Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-035**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.00 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.1 % @ 0.15 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-25 08:32 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-036**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.02 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.1 % @ 7.04 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-25 09:20 ADT**



Hammer Environmental Services	10NC27 UV-037		UVOST By Dakota www.DakotaTechnologies.com
PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	*Site:* **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **21.01 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **16.1 % @ 16.36 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-25 10:44 ADT**



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10NC27 UV-038

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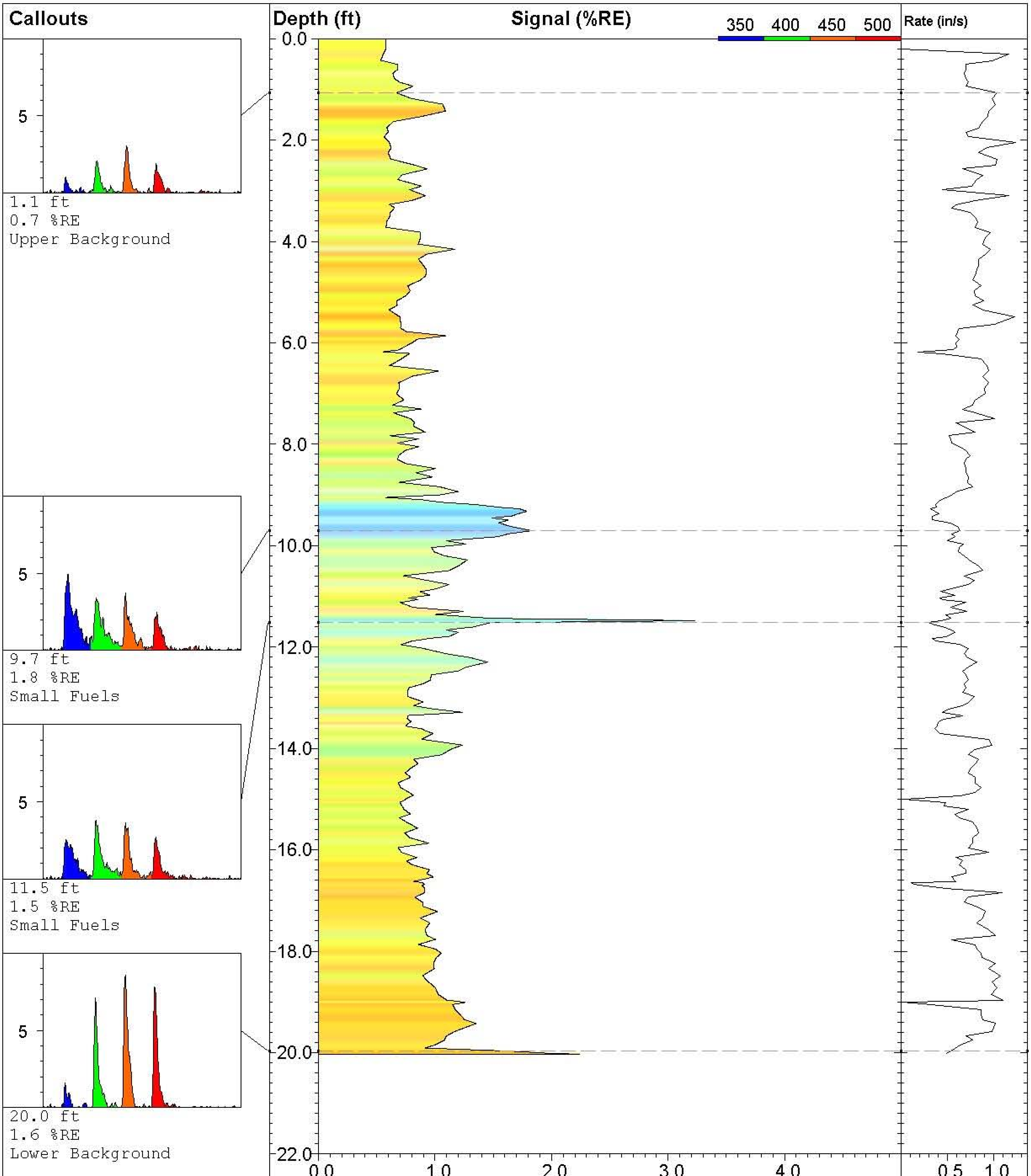
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.00 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.1 % @ 12.46 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-25 11:30 ADT**



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10NC27 UV-039

UVOST By Dakota
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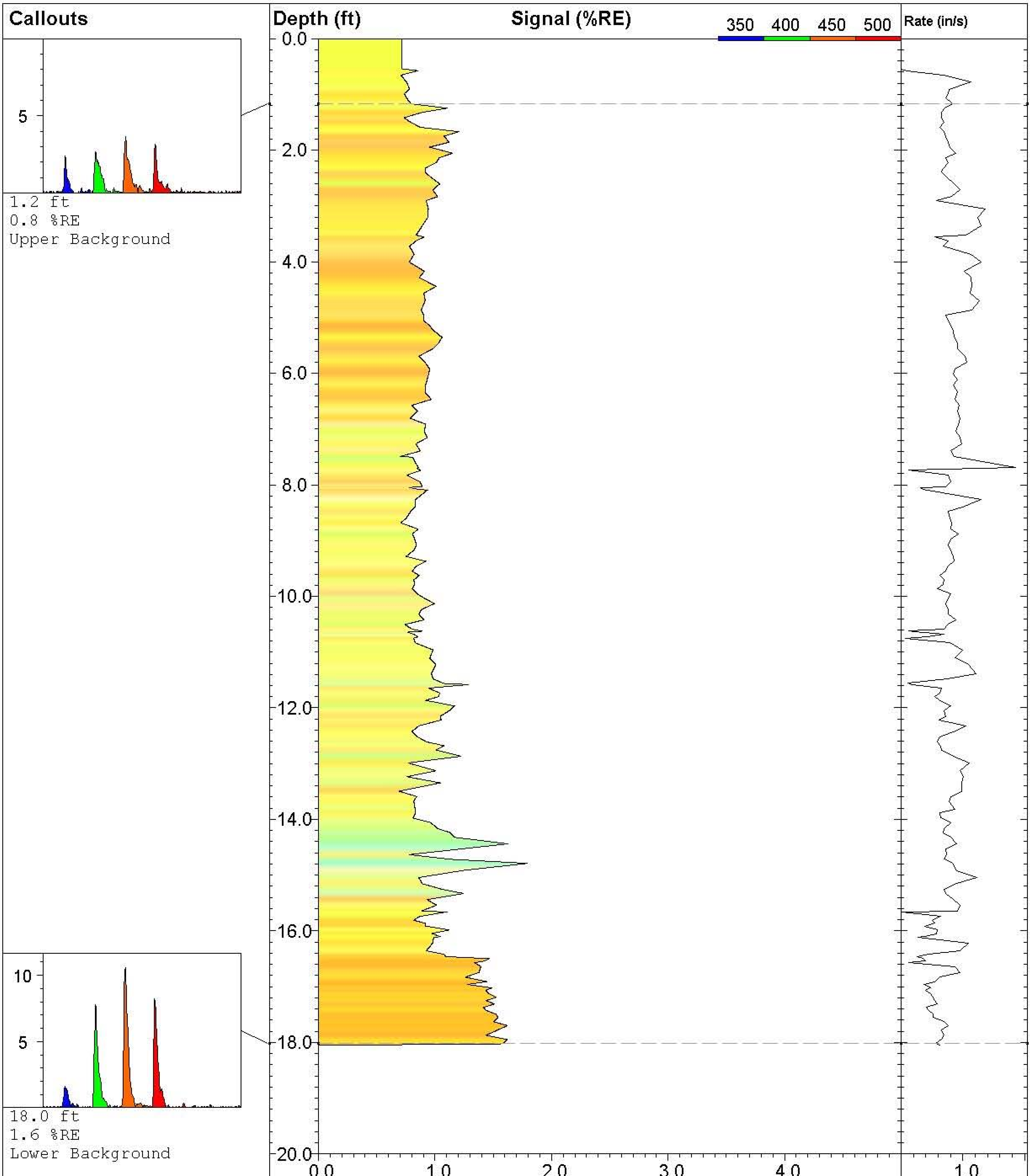
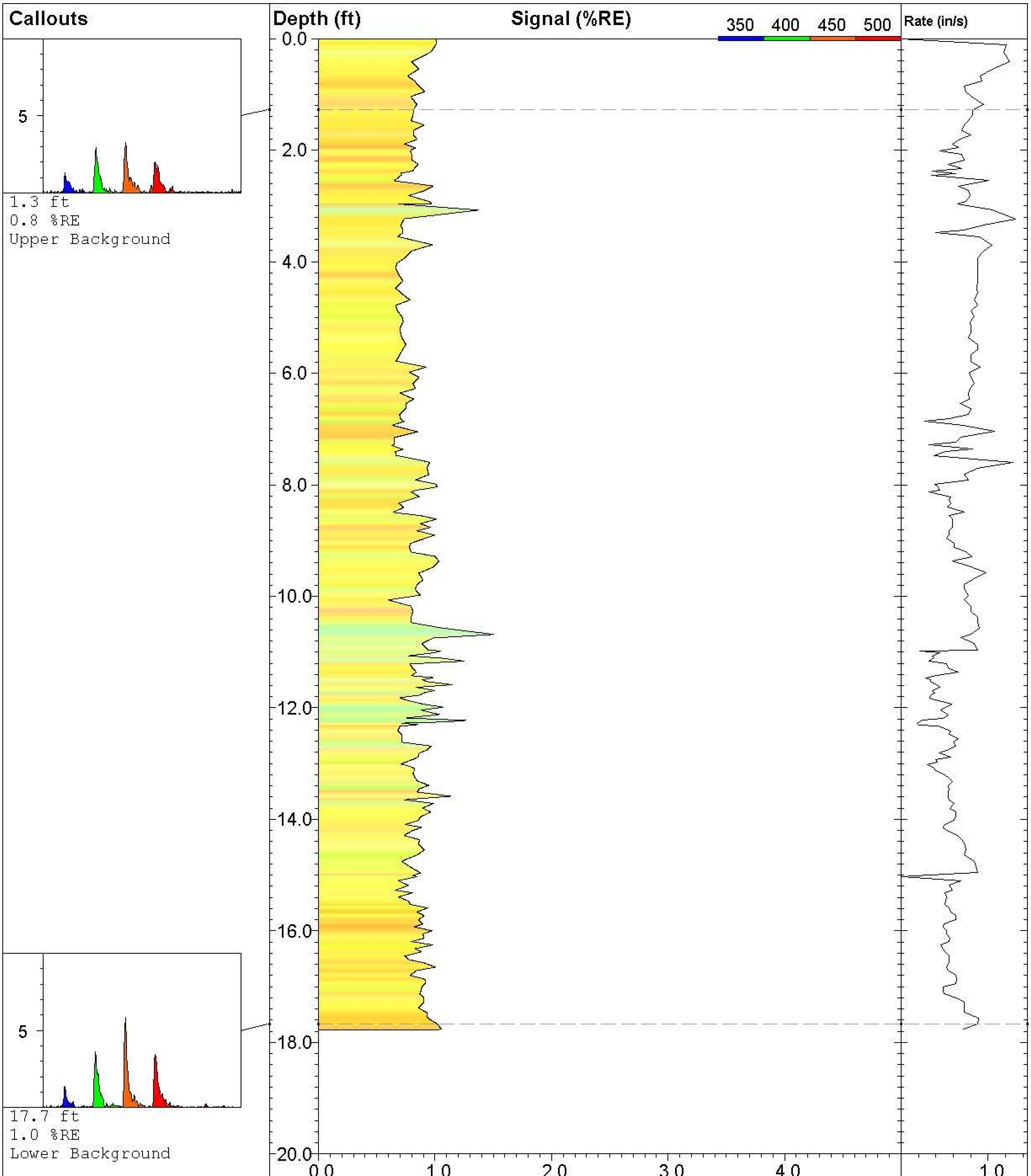
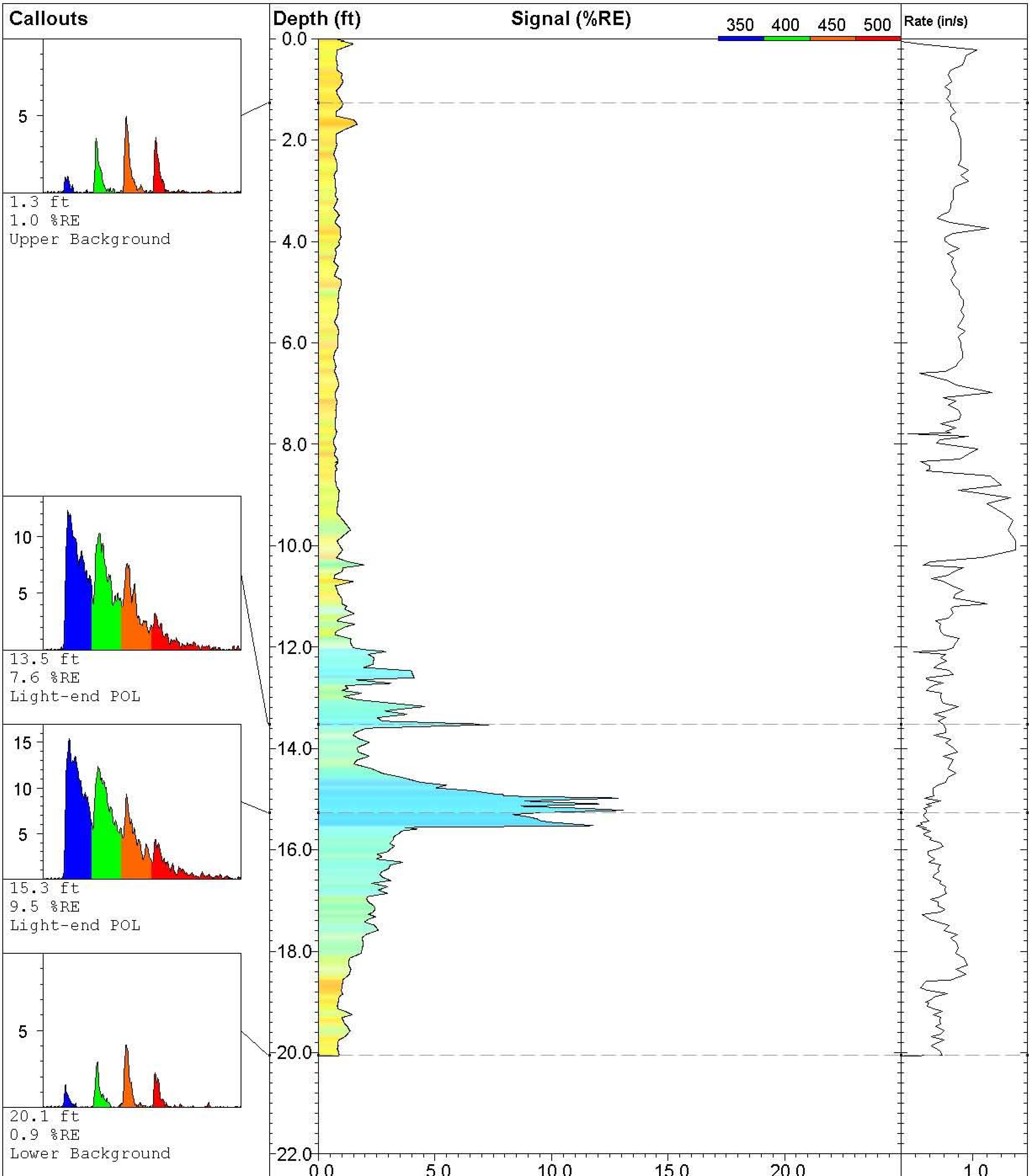
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.03 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **3.3 % @ 11.48 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-25 11:55 ADT**



Hammer Environmental Services	10NC27 UV-040		UVOST By Dakota www.DakotaTechnologies.com
PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	*Site:* **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **18.04 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.8 % @ 14.79 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-25 13:38 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-041**	**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**
	Final depth: **17.78 ft**	
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**
	Max signal: **1.5 % @ 10.68 ft**	
	Job:	*Operator/Unit:* **PCaron/UVOST1016**
	Date & Time: **2010-07-25 14:00 ADT**	



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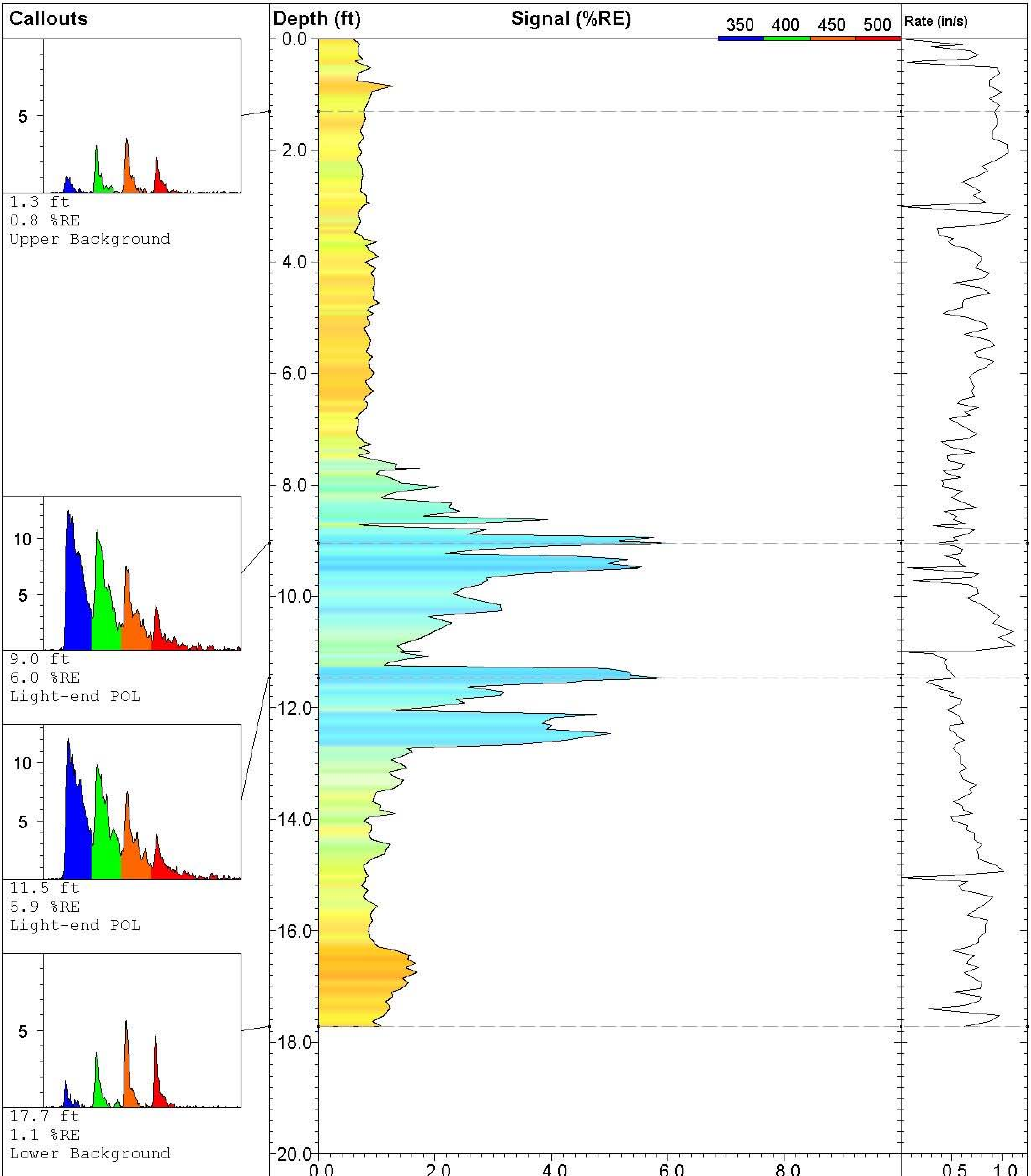
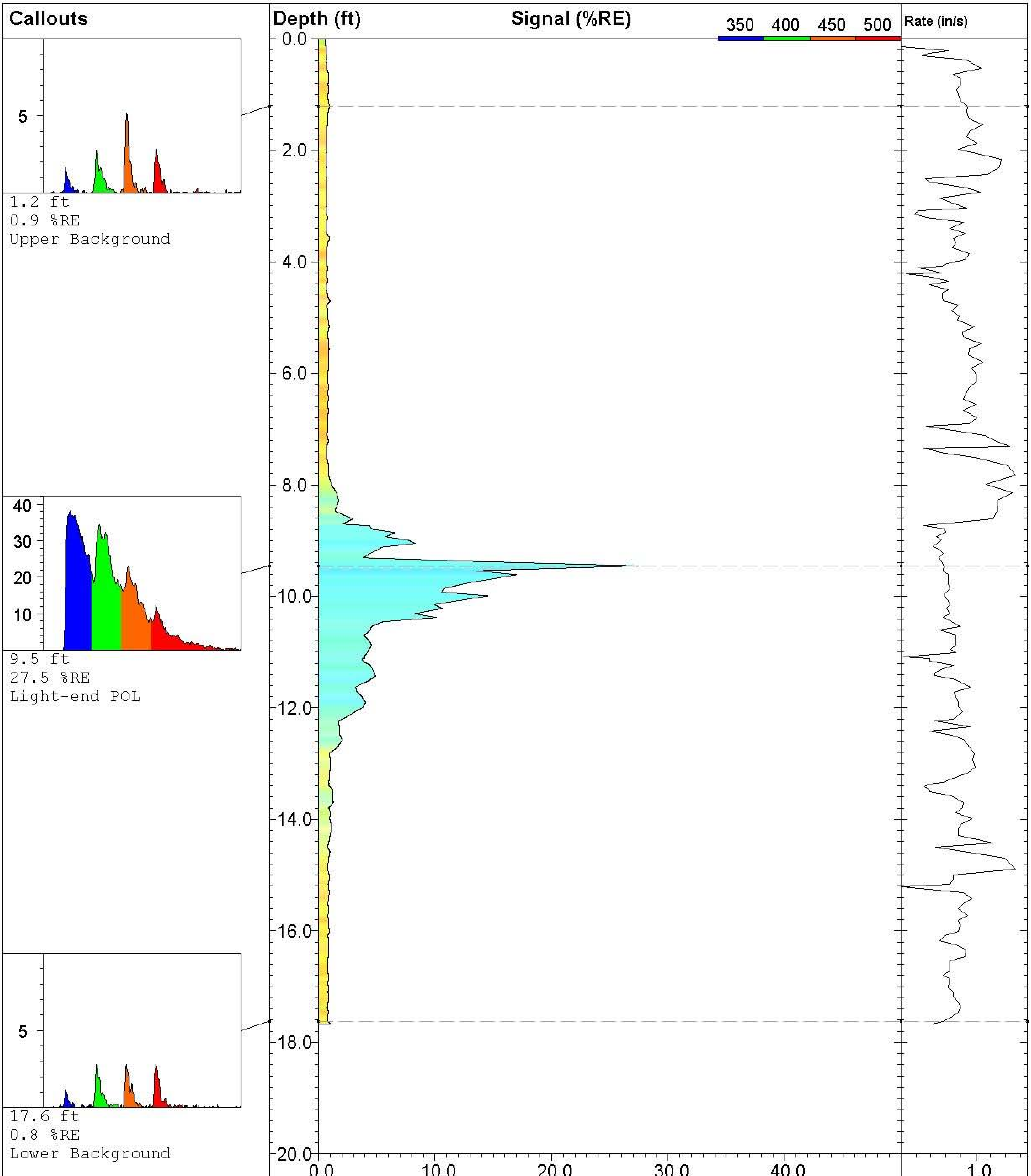
10NC27 UV-042

UVOST By Dakota
www.DakotaTechnologies.com

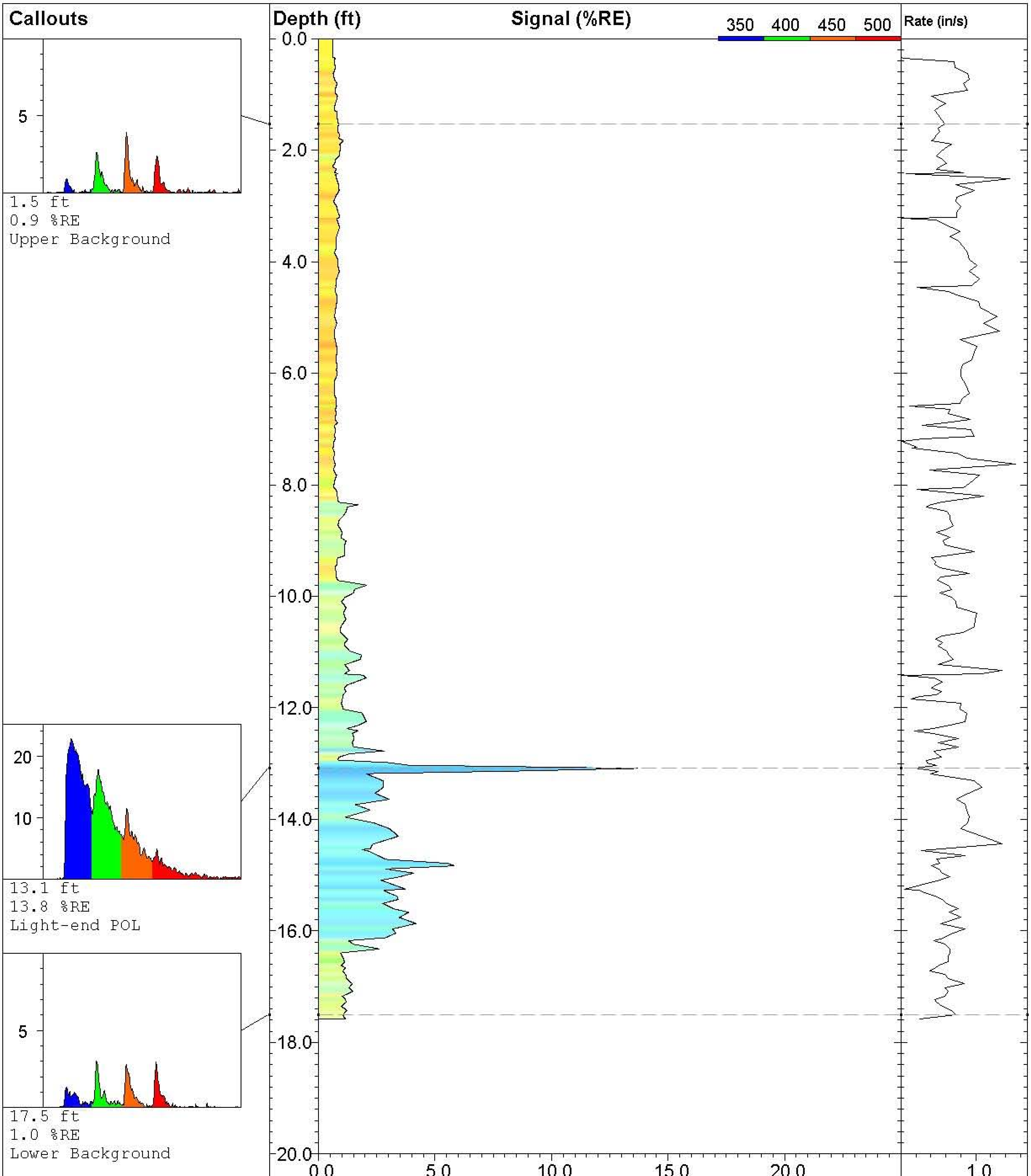
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.07 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **13.1 % @ 15.22 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-25 14:58 ADT**



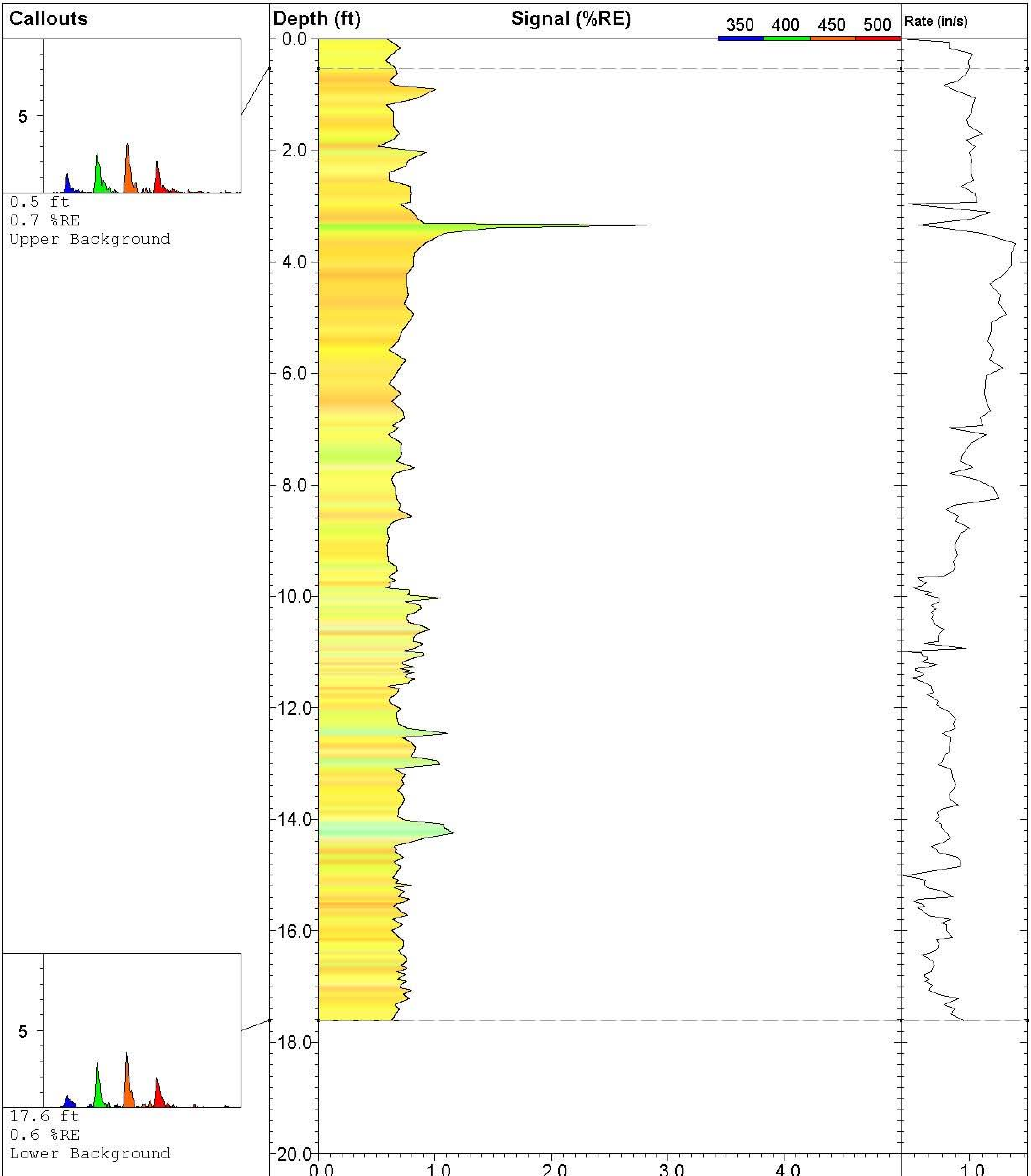
Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-043**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.71 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **6.0 % @ 9.05 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-25 15:22 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-044**	**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**
	Final depth: **17.67 ft**	
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**
	Max signal: **27.5 % @ 9.45 ft**	
	Job:	*Operator/Unit:* **PCaron/UVOST1016**
	Date & Time: **2010-07-25 16:07 ADT**	



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-045**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.58 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **13.8 % @ 13.09 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-25 16:24 ADT**



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10NC27 UV-046

UVOST By Dakota
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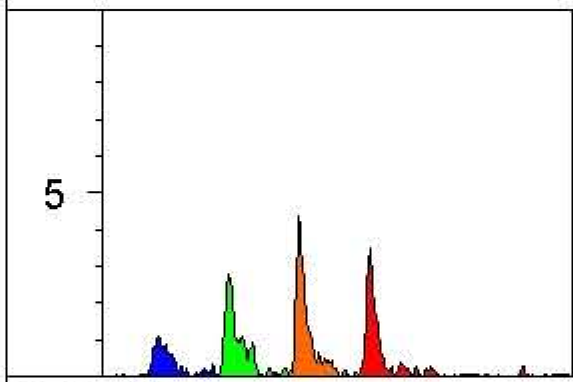
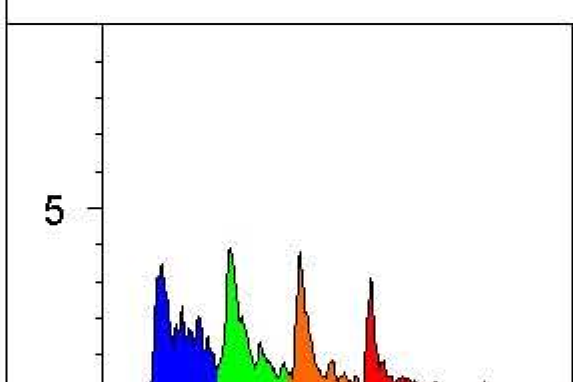
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.61 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.8 % @ 3.35 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-25 16:49 ADT**

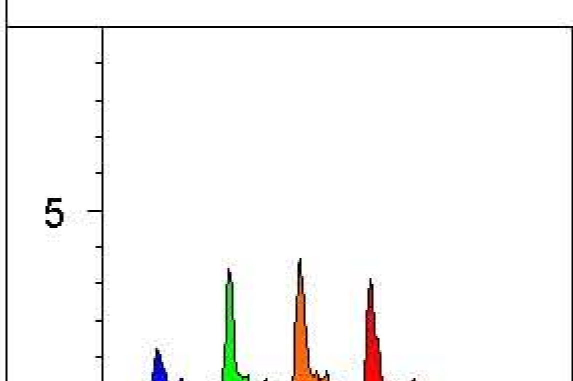
Callouts



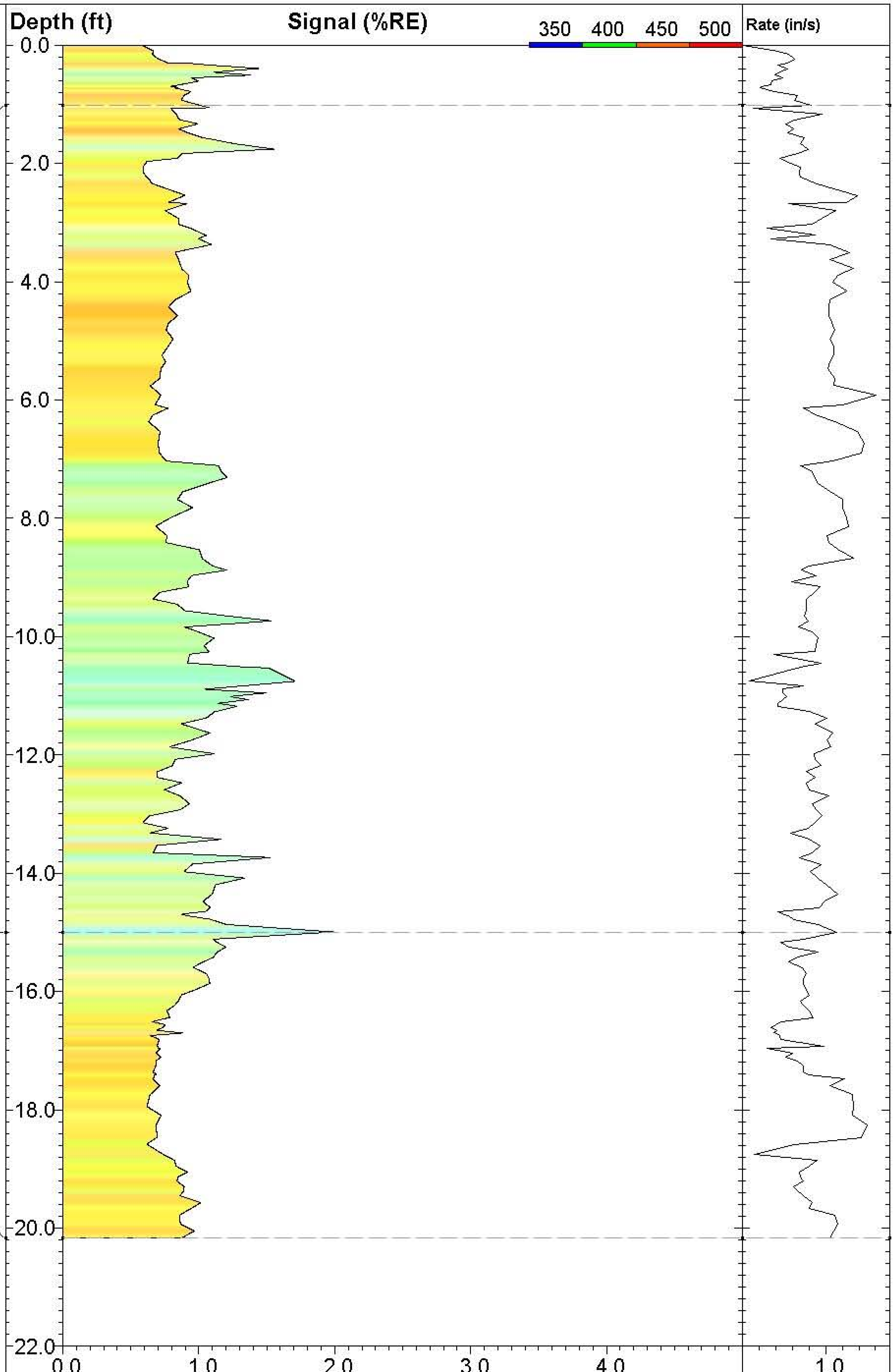
1.0 ft
1.0 %RE
Upper Background



15.0 ft
2.0 %RE
Small Fuels



20.2 ft
0.9 %RE
Lower Background



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10NC27 UV-047

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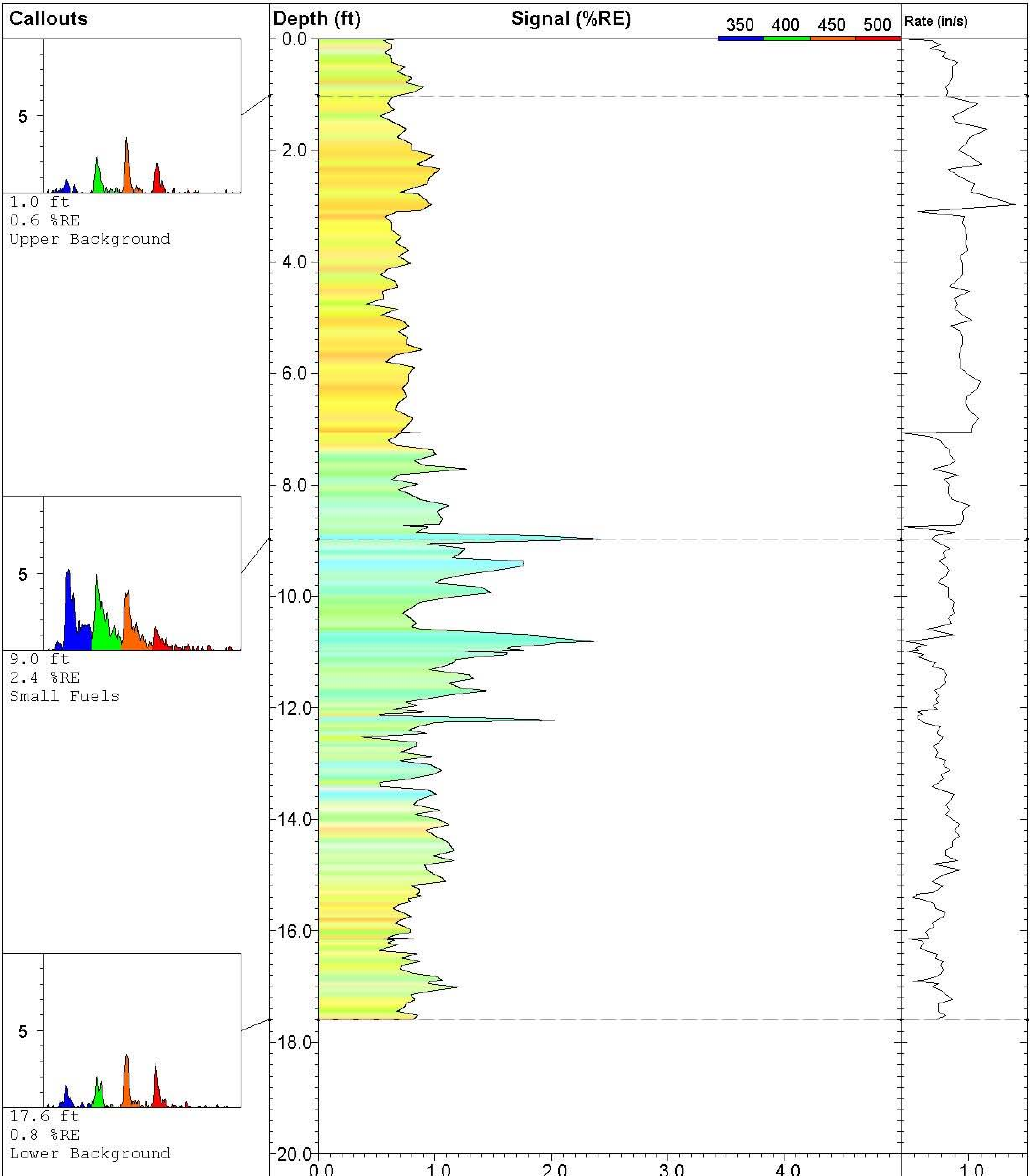
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.17 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.0 % @ 15.00 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-25 17:27 ADT**



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10NC27 UV-048

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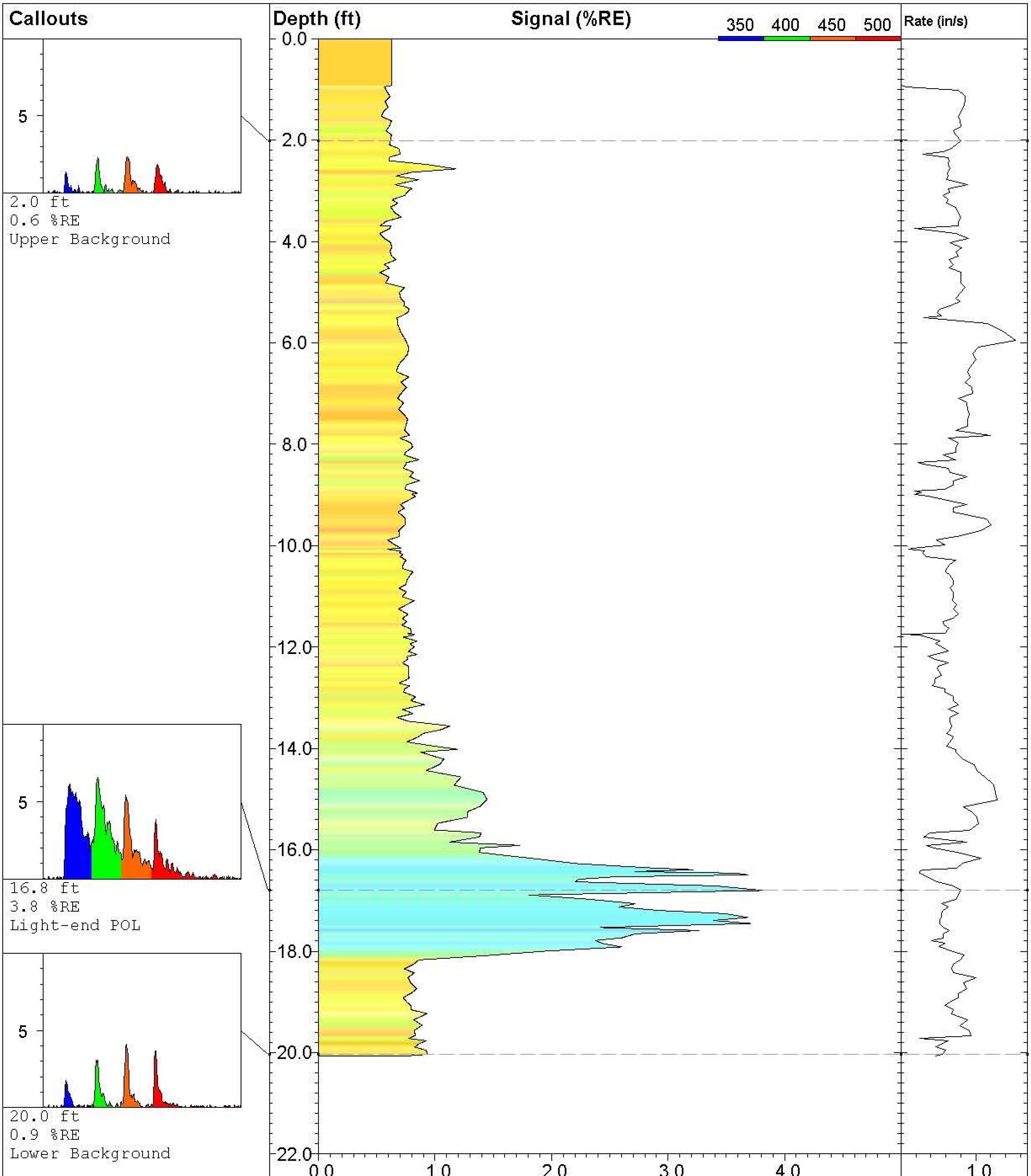
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.60 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.4 % @ 8.98 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-26 08:58 ADT**



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10NC27 UV-049

UVOST By Dakota
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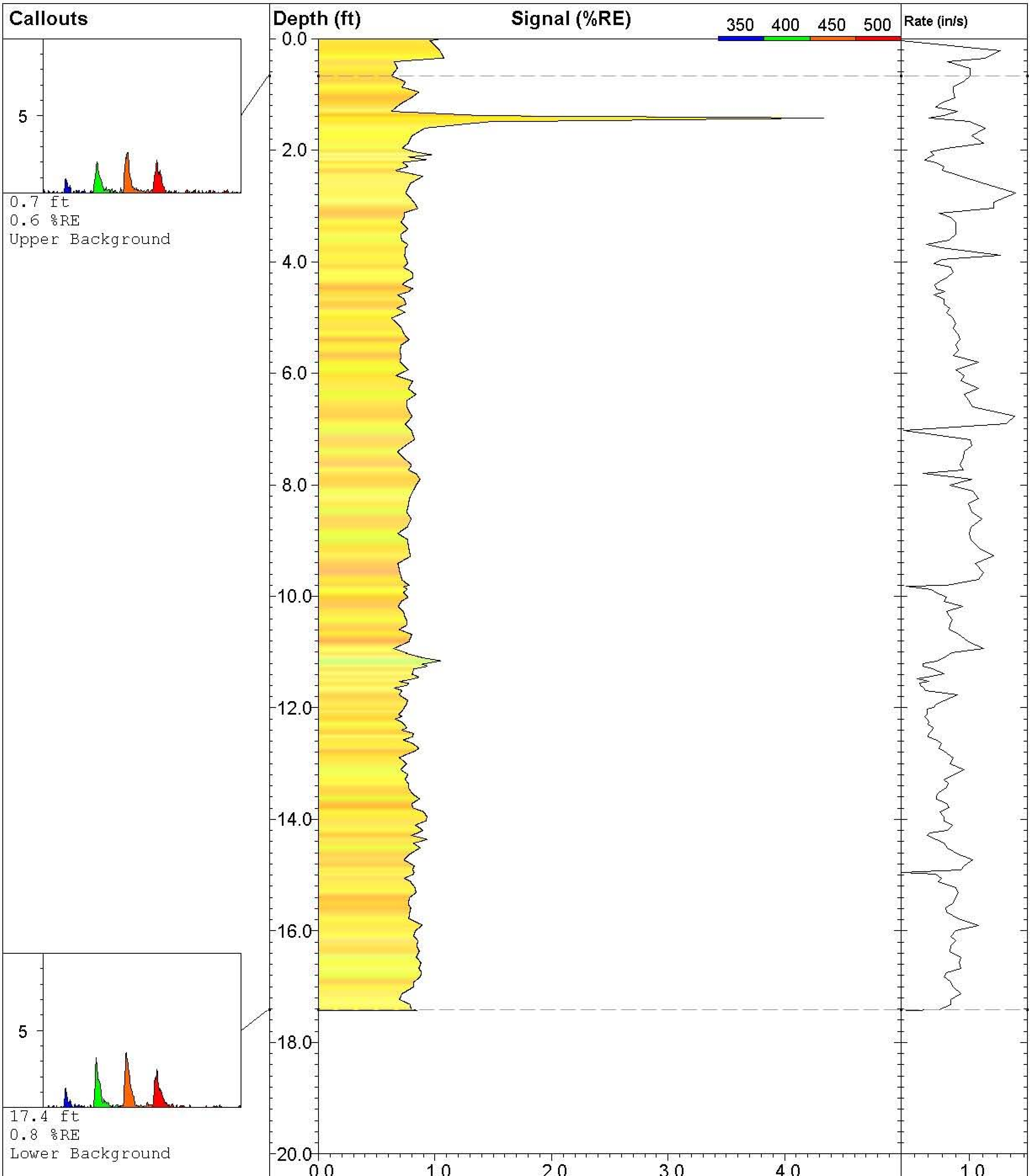
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.06 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **3.8 % @ 16.80 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-26 10:49 ADT**



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10NC27 UV-050

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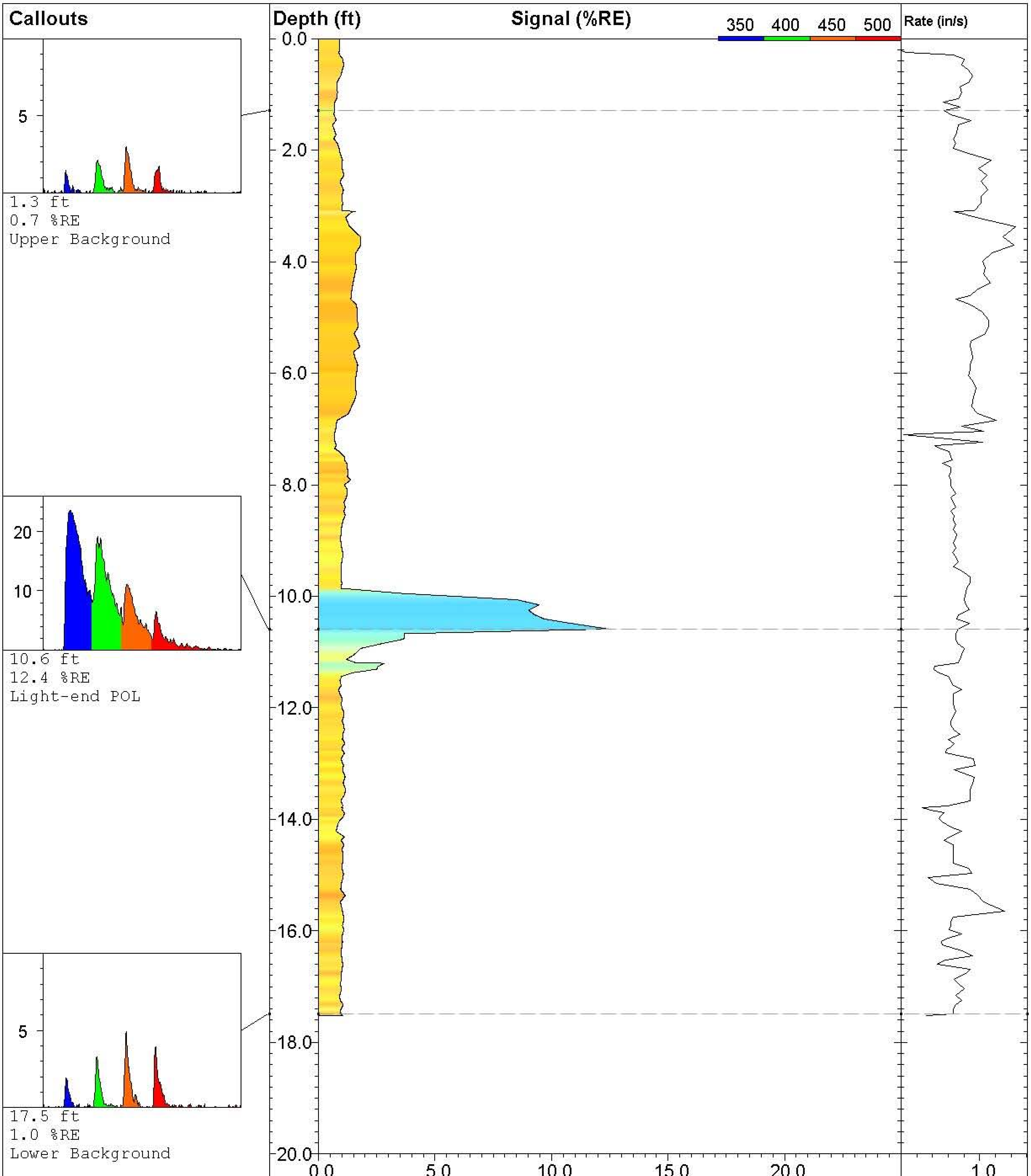
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.43 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **4.3 % @ 1.42 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-26 11:08 ADT**



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10NC27 UV-051

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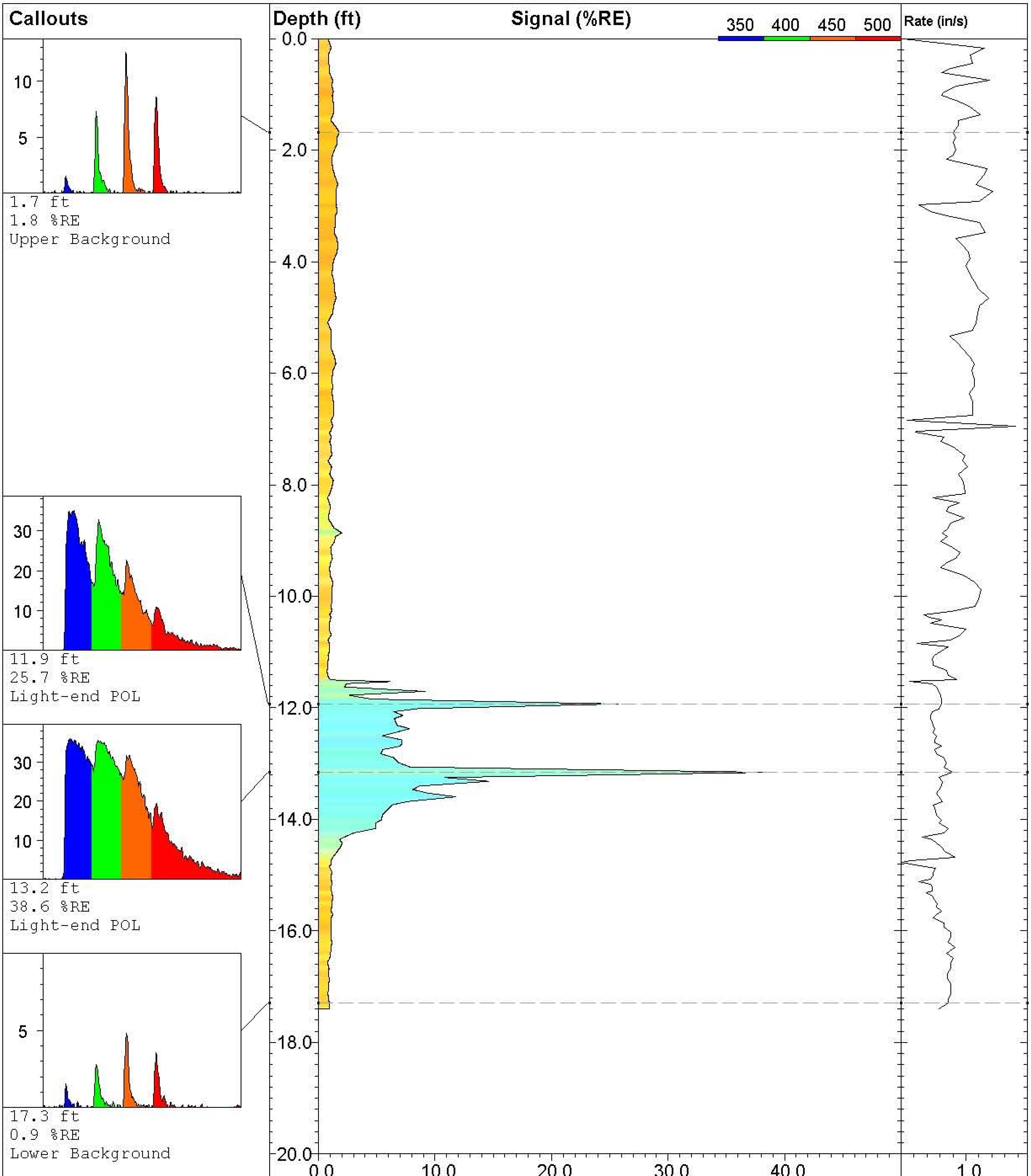
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.52 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **12.4 % @ 10.59 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-26 11:35 ADT**



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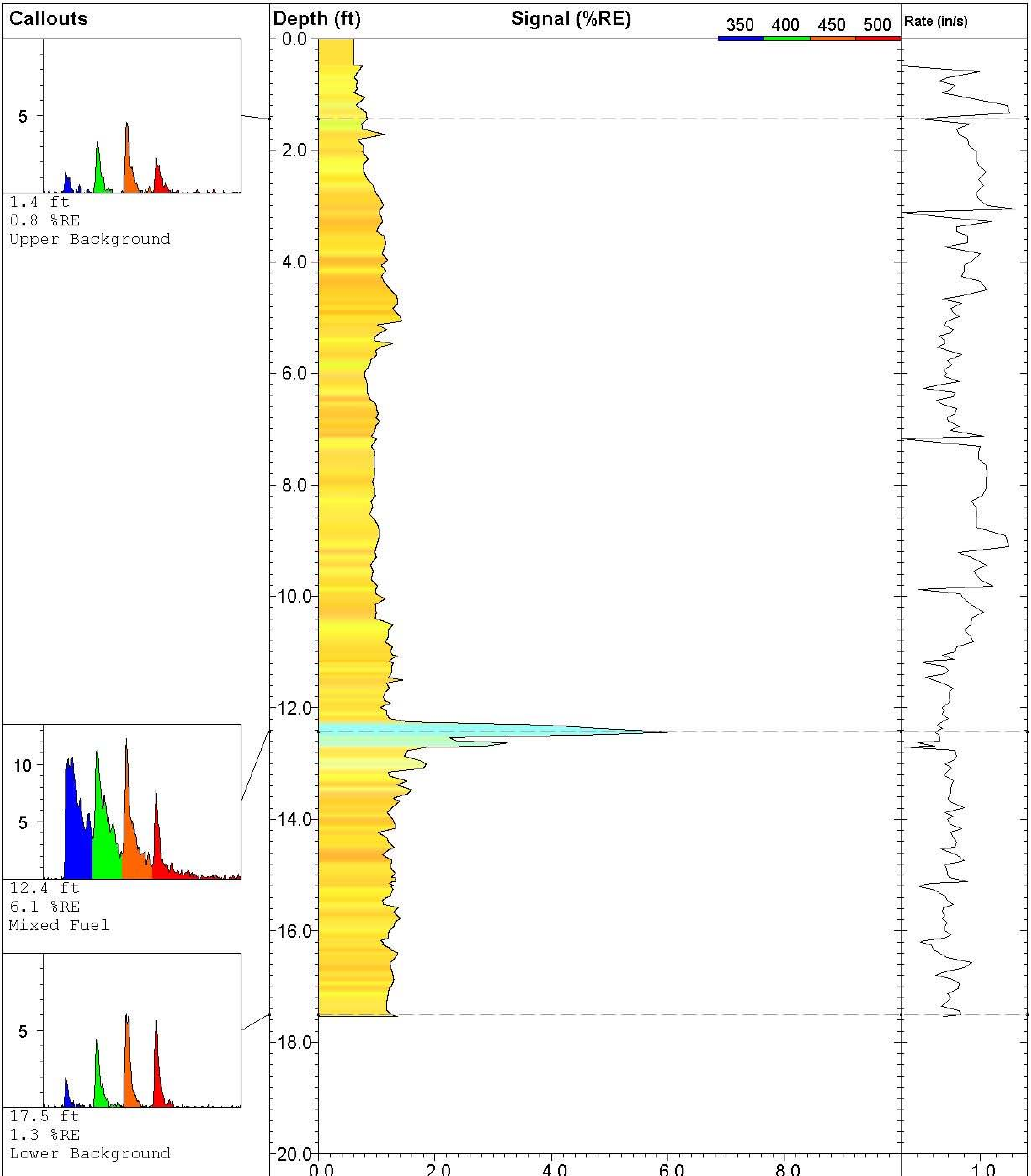
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.40 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **38.6 % @ 13.16 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-26 11:55 ADT**



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10NC27 UV-053

UVOST By Dakota
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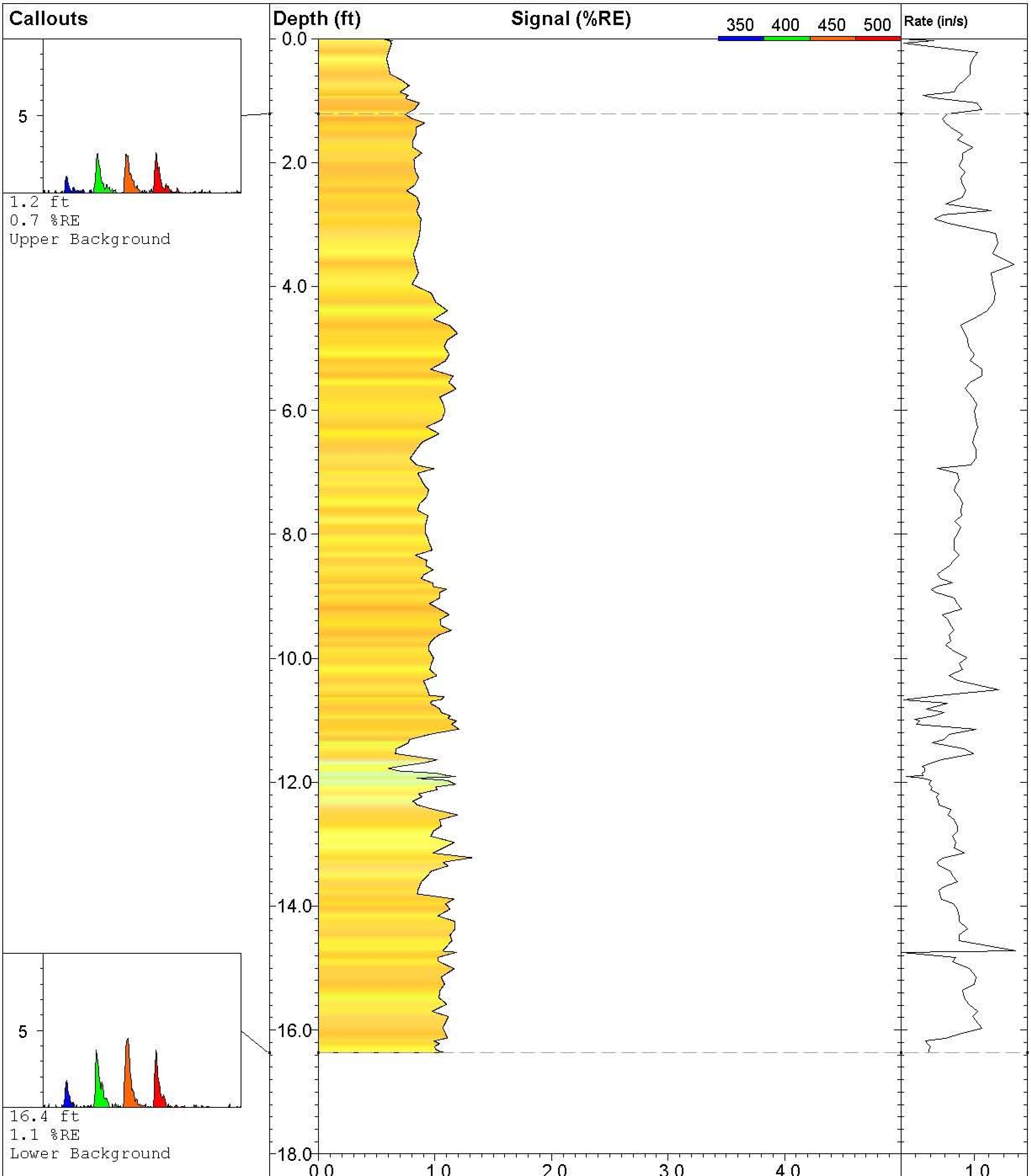
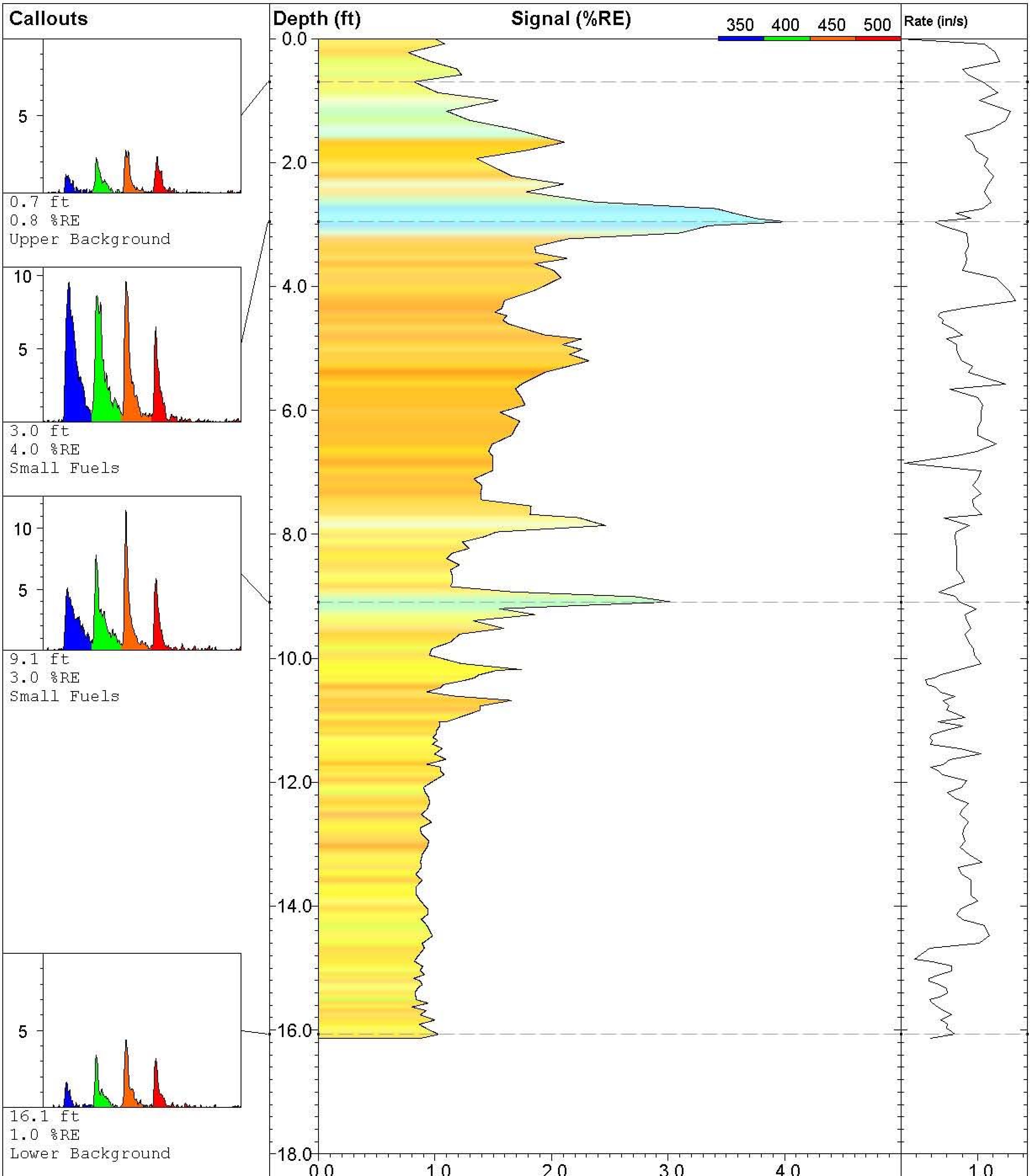
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.54 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **6.1 % @ 12.44 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-26 13:11 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-054**	**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**

Final depth:	**16.36 ft**
Max signal:	**1.3 % @ 13.22 ft**
Date & Time:	**2010-07-26 13:29 ADT**



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10NC27 UV-055

UVOST By Dakota
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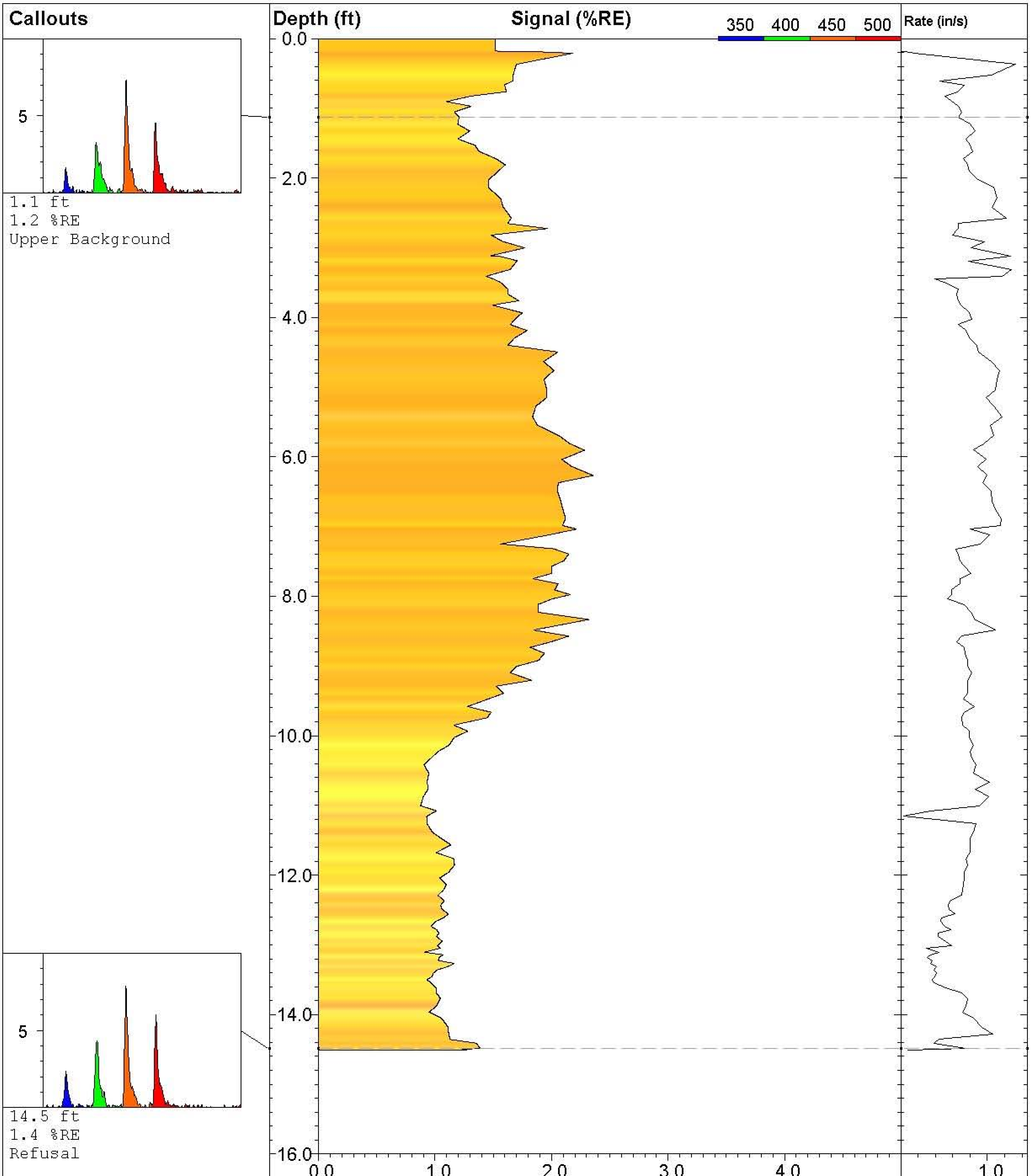
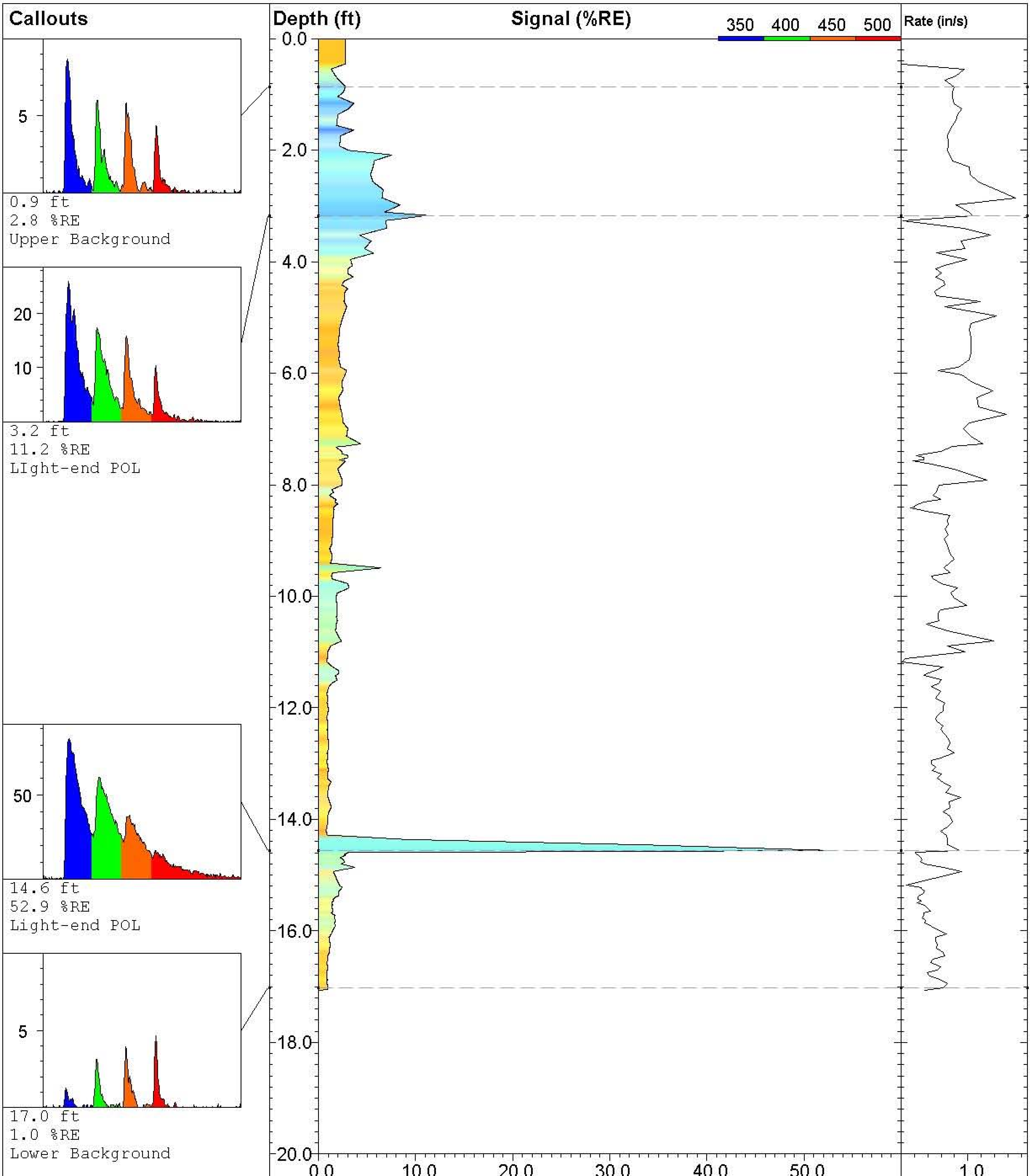
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.13 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **4.0 % @ 2.96 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-26 14:16 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-056**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **14.51 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.4 % @ 6.27 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-26 14:40 ADT**



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10NC27 UV-057

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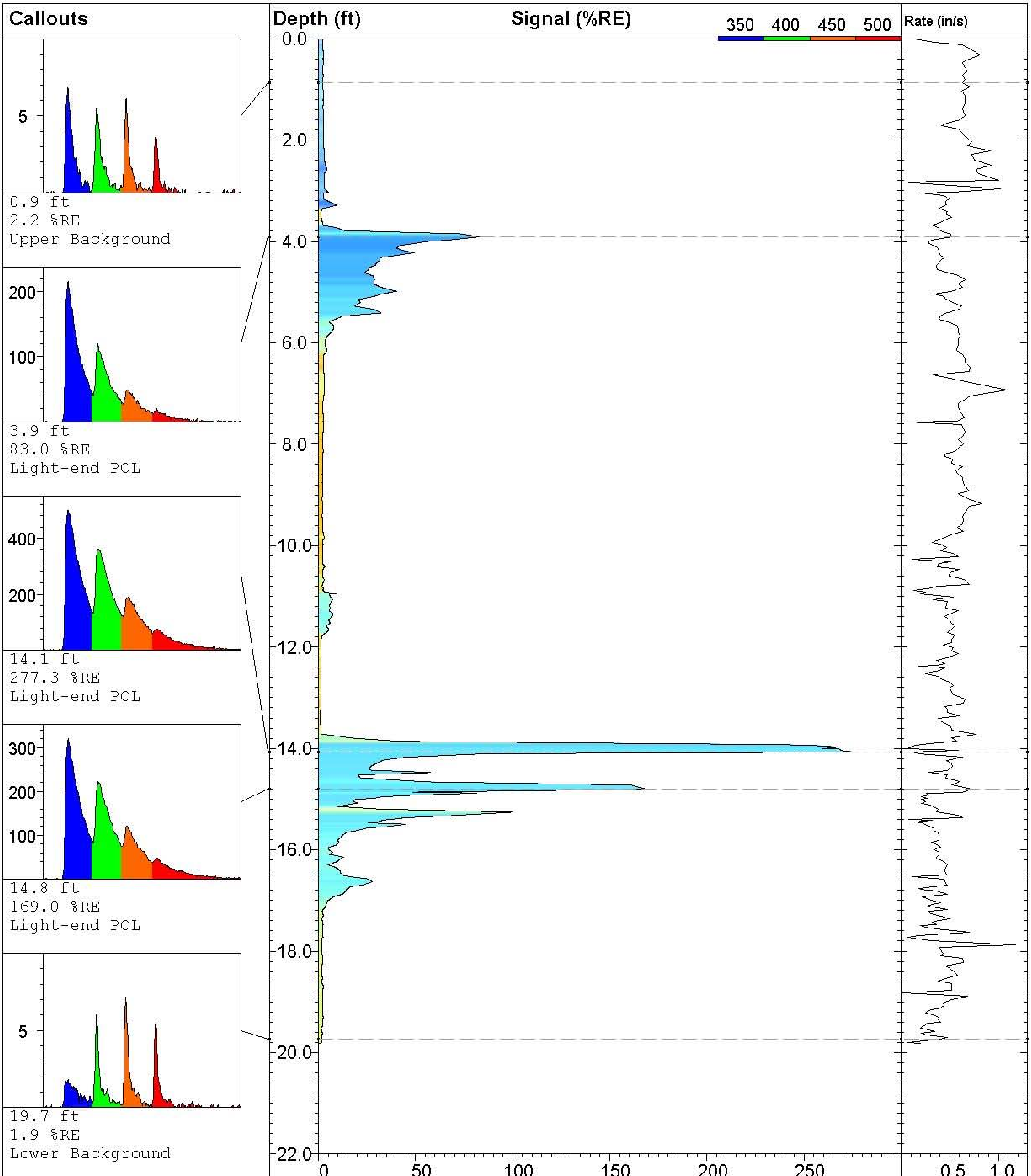
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.06 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **52.9 % @ 14.56 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-26 15:01 ADT**



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10NC27 UV-058

UVOST By Dakota
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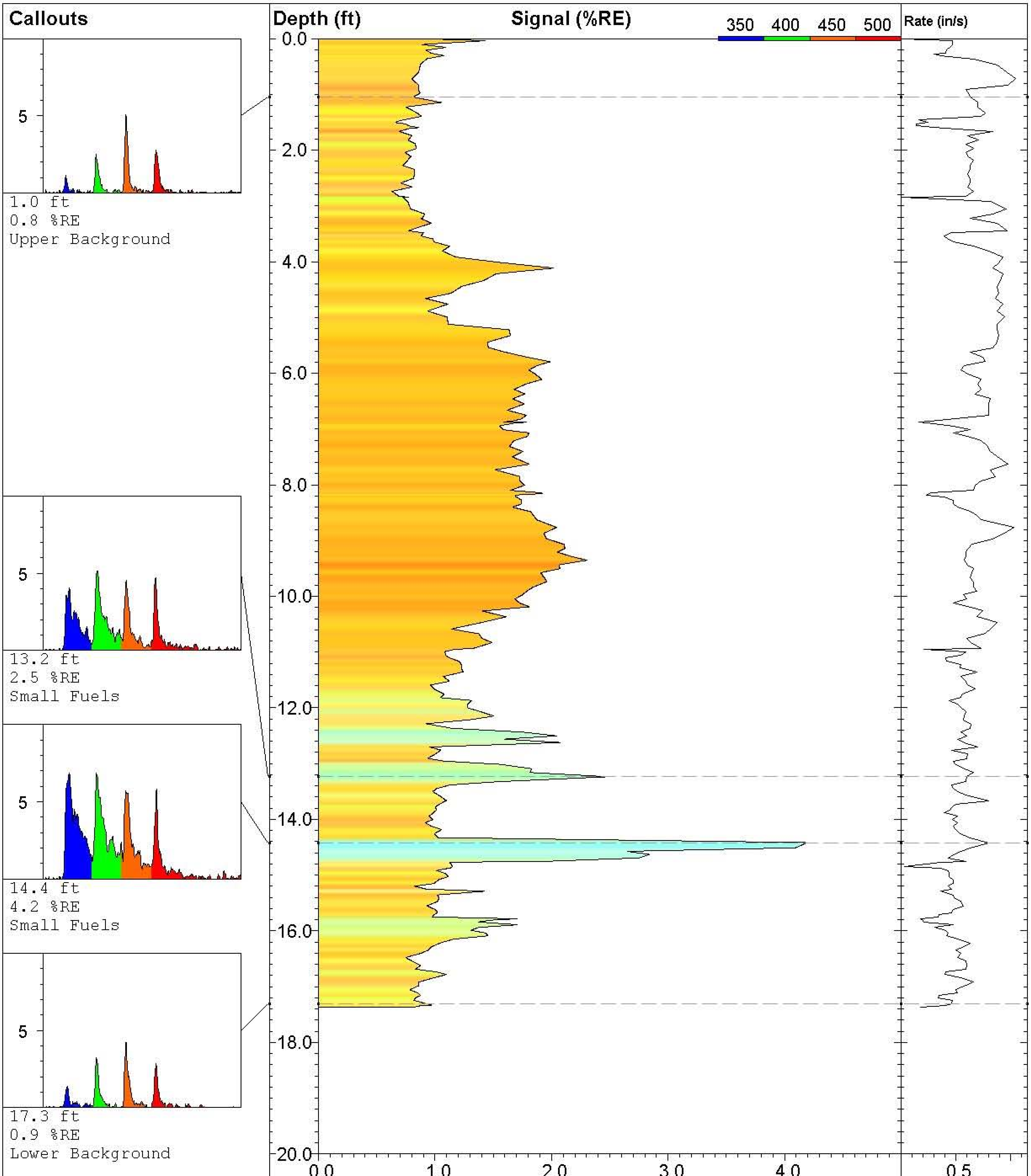
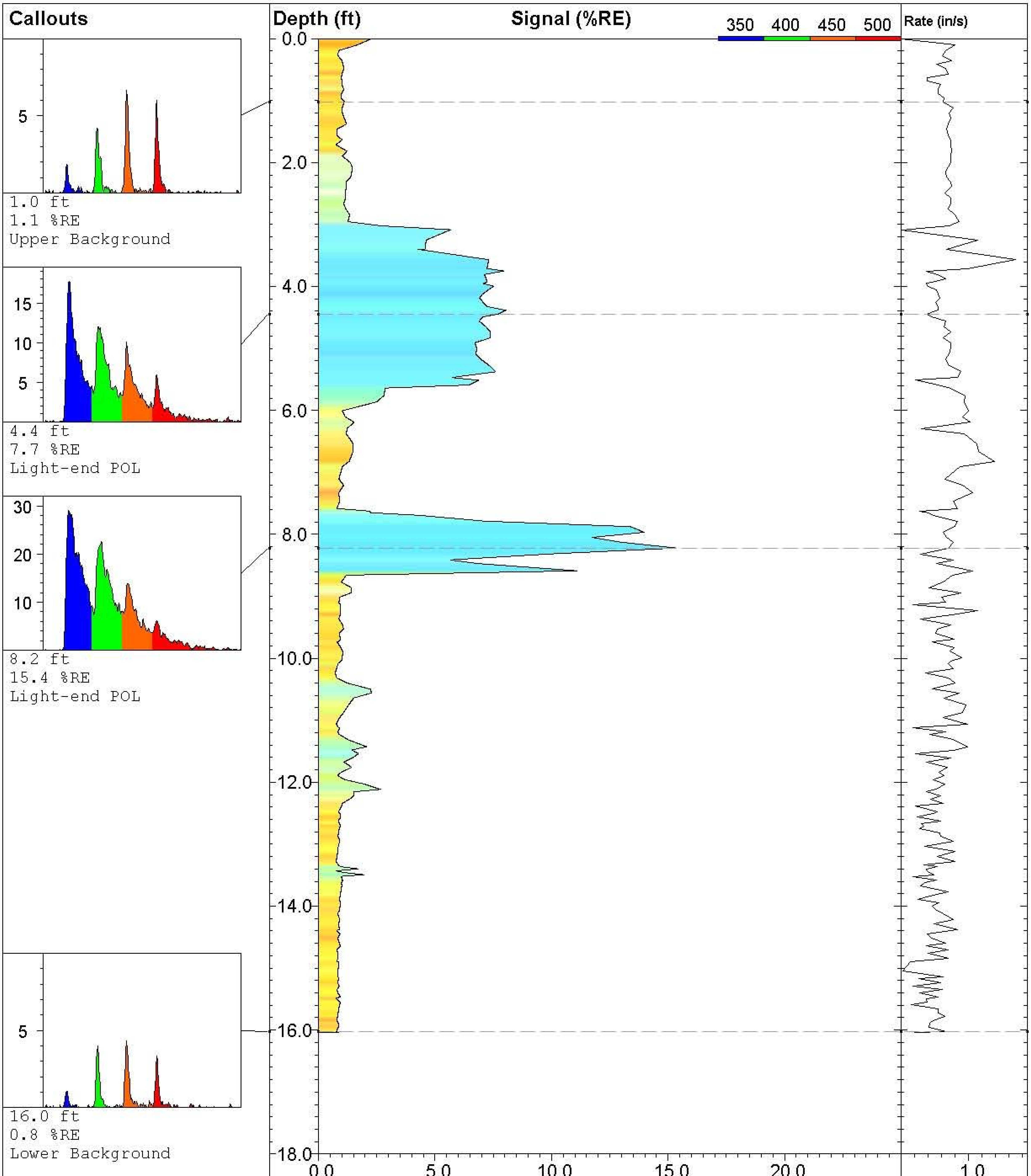
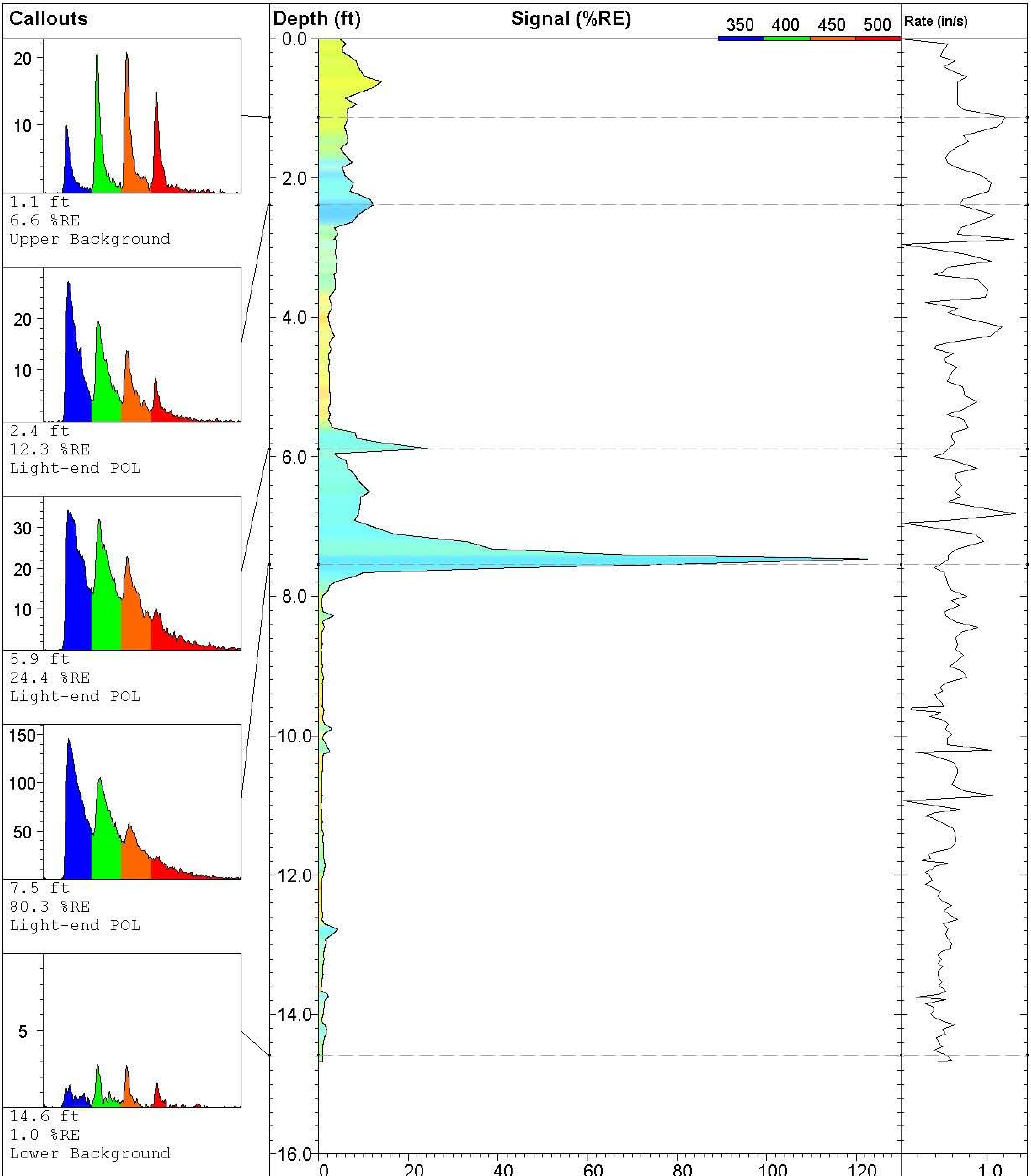
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **19.82 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **277.3 % @ 14.07 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-26 16:12 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-059**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.37 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **4.2 % @ 14.42 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-26 16:38 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-060**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.04 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **15.4 % @ 8.22 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-26 17:15 ADT**



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10NC27 UV-061

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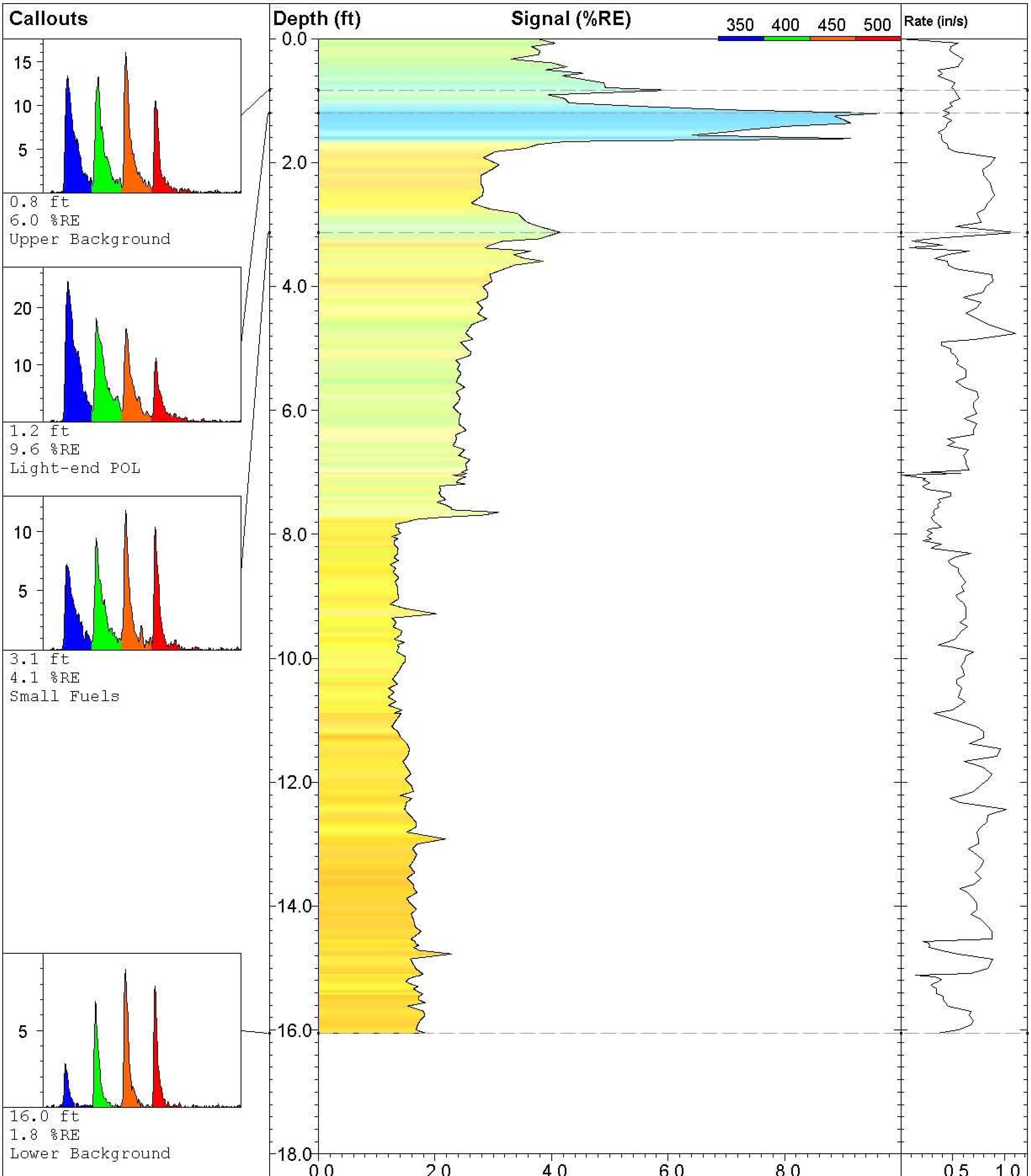
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **14.68 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **122.8 % @ 7.46 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-26 17:37 ADT**



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10NC27 UV-062

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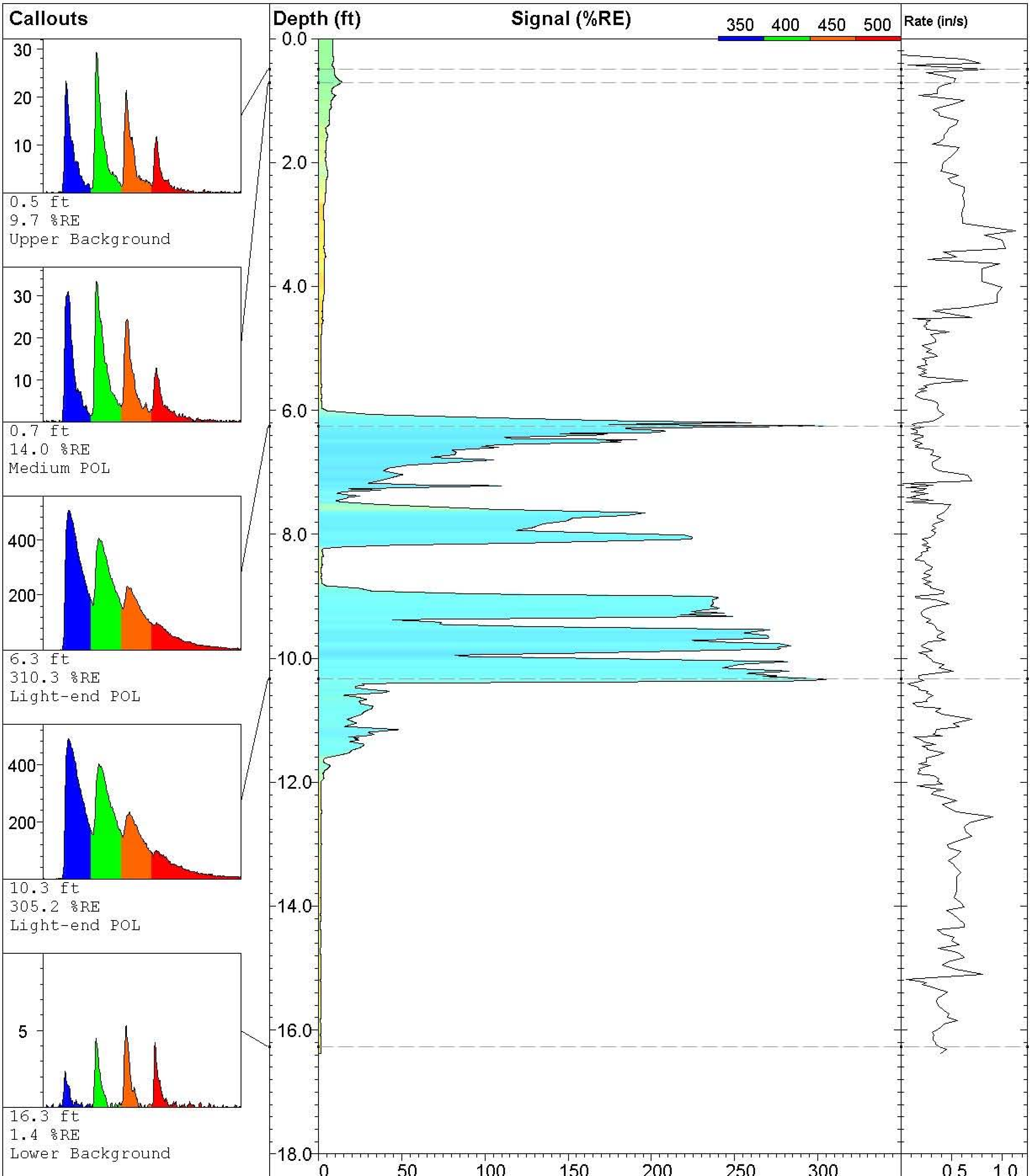
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.05 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **9.6 % @ 1.21 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-27 13:35 ADT**



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10NC27 UV-063

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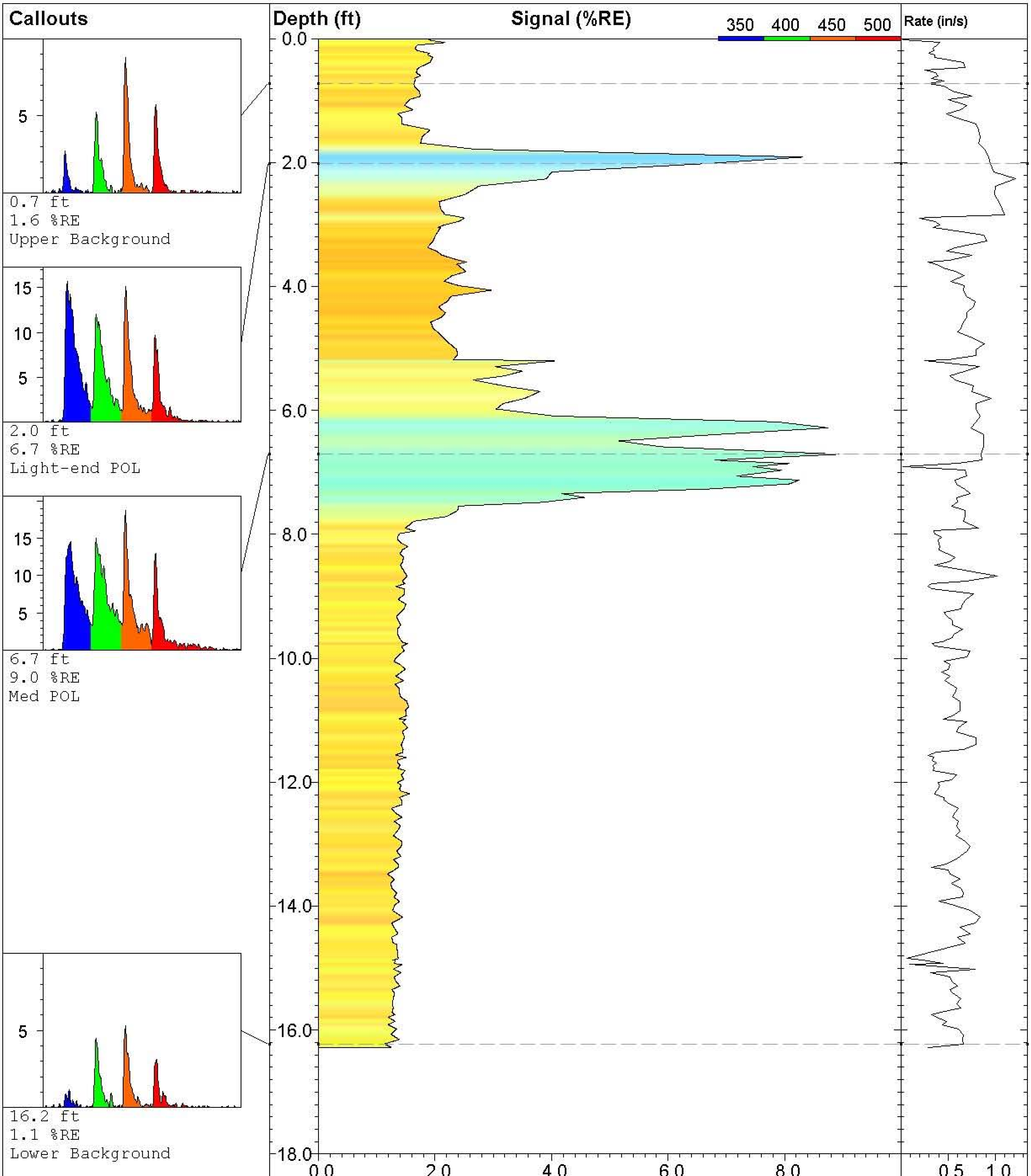
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.38 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **310.3 % @ 6.25 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-27 13:58 ADT**



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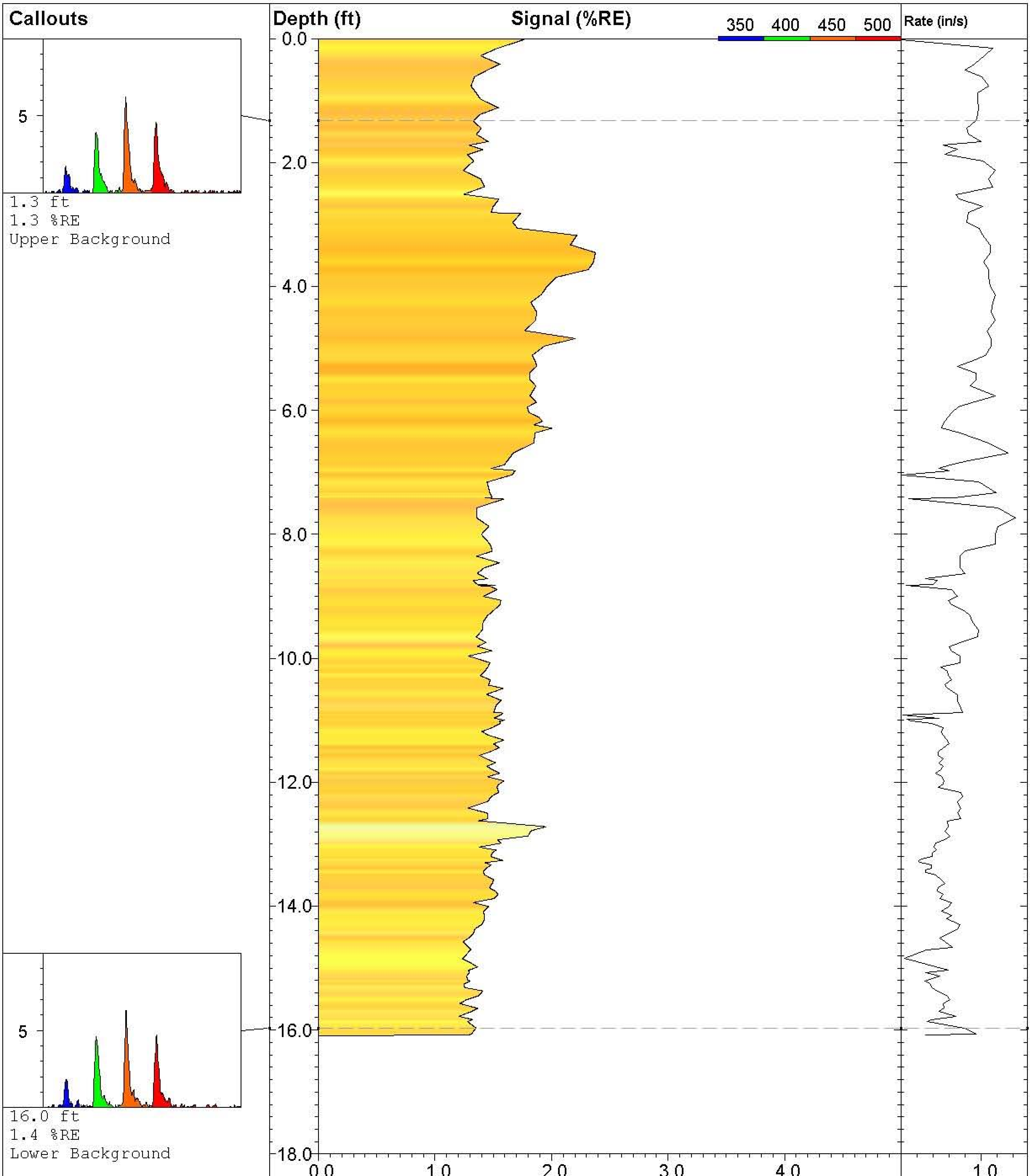
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.28 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **9.0 % @ 6.71 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-27 14:32 ADT**



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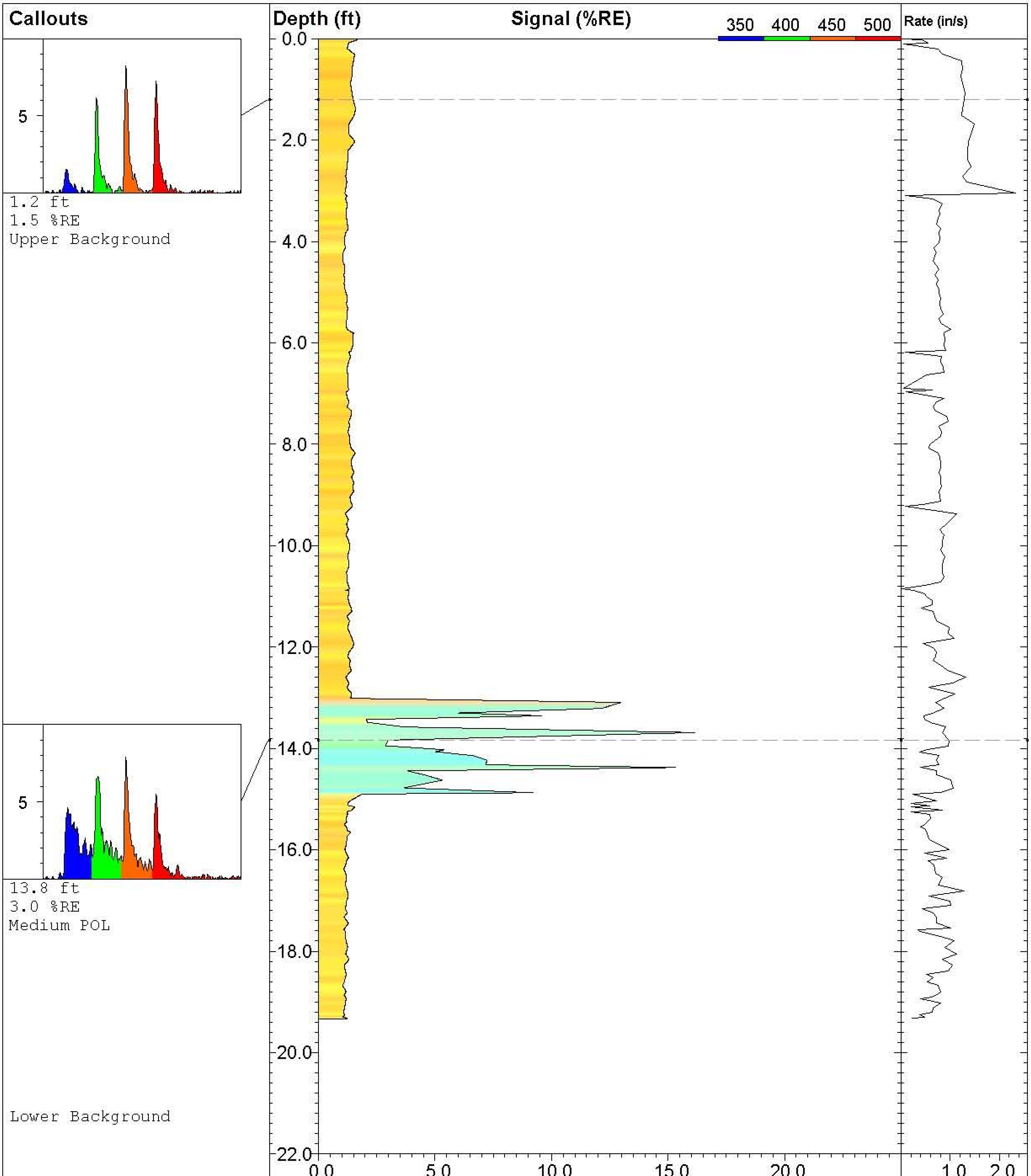
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**

Final depth:	**16.09 ft**
Max signal:	**2.4 % @ 3.45 ft**
Date & Time:	**2010-07-27 14:59 ADT**



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10NC27 UV-066

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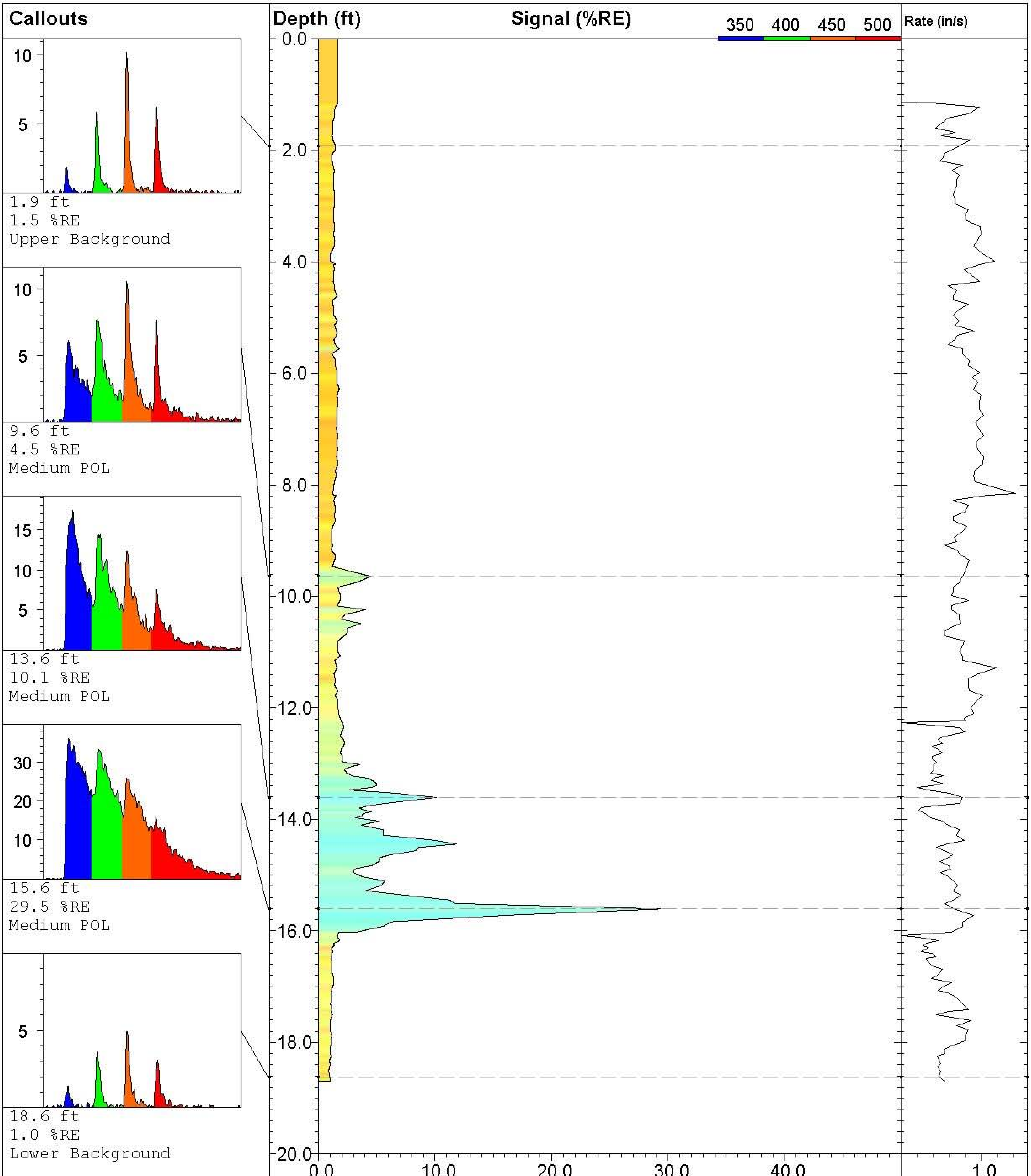
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **19.34 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **16.2 % @ 13.69 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-27 15:22 ADT**



10NC27 UV-067		**UVOST By Dakota** www.DakotaTechnologies.com
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **18.69 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **29.5 % @ 15.61 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-27 15:54 ADT**

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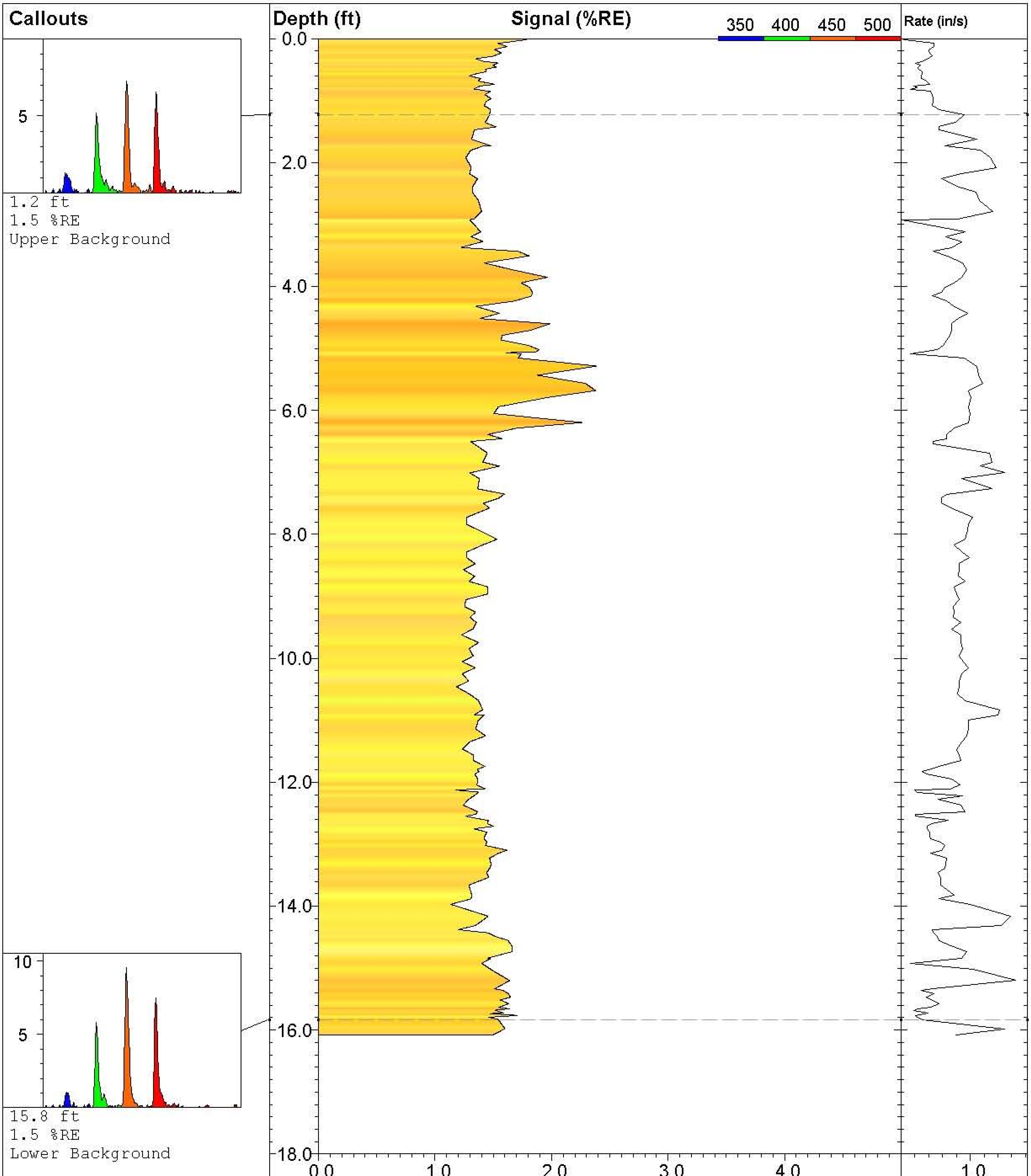

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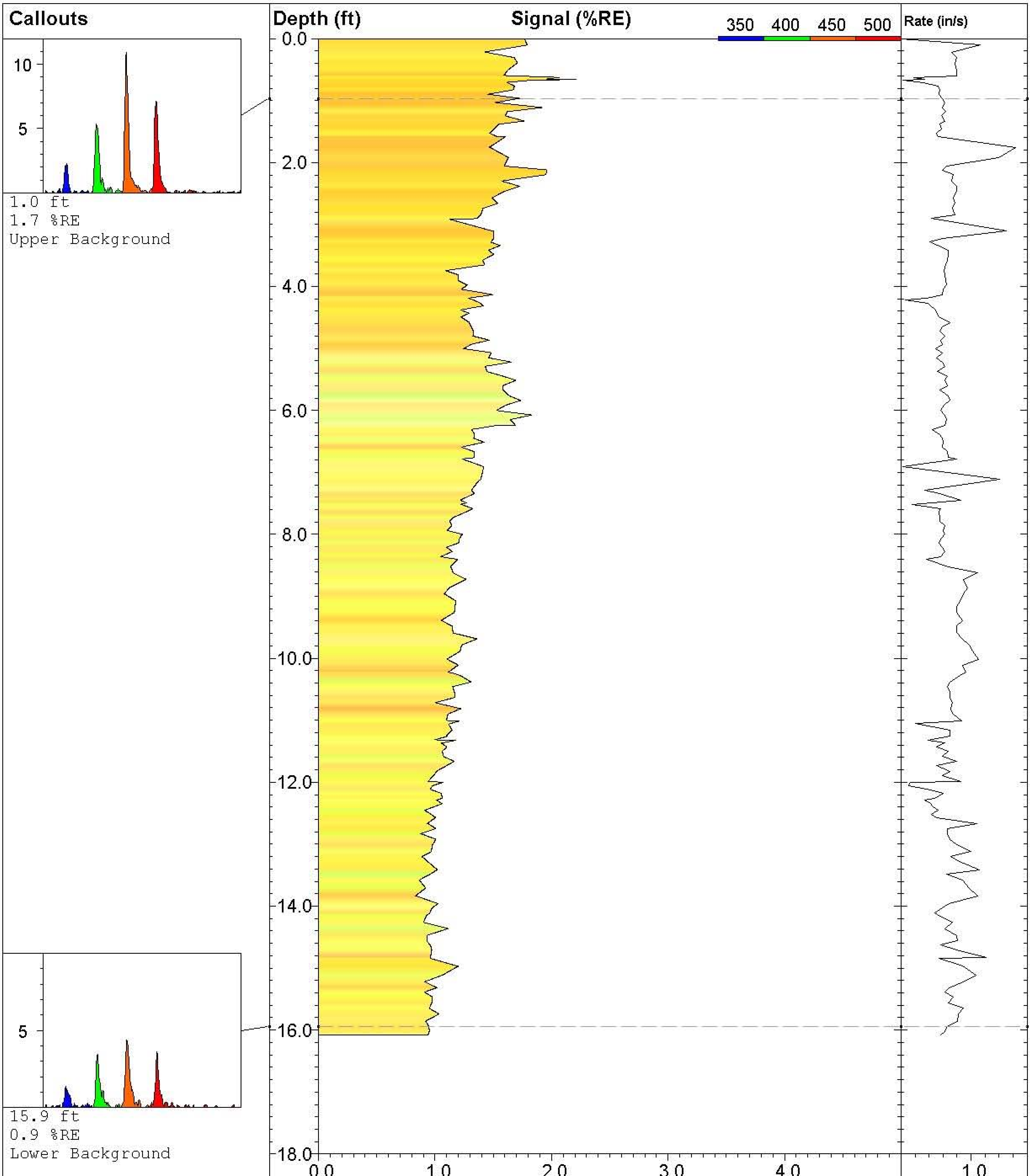
10NC27 UV-068

UVOST By Dakota
www.DakotaTechnologies.com

Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.08 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.4 % @ 5.28 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-27 16:24 ADT**



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10NC27 UV-069

UVOST By Dakota
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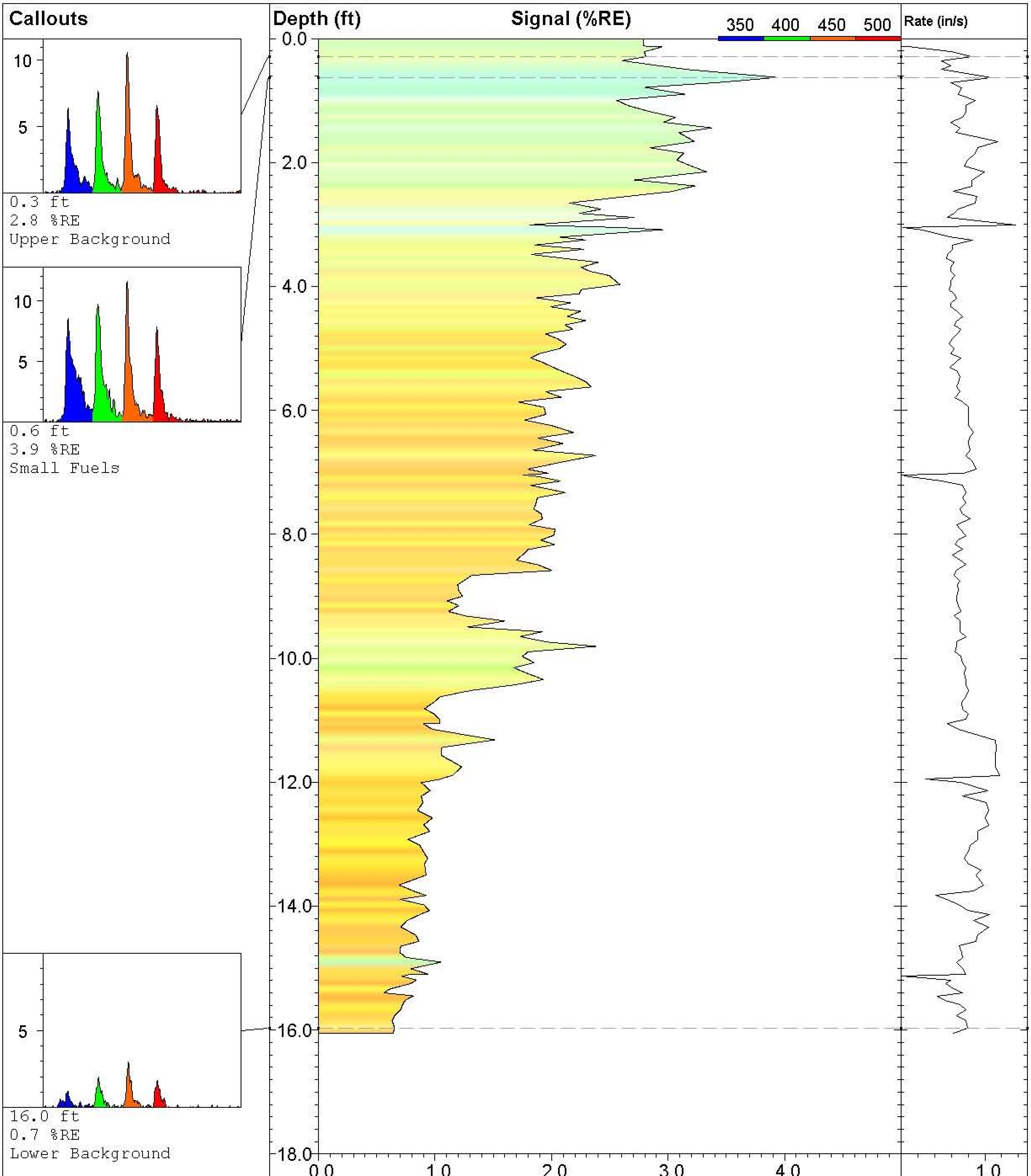
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.09 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.2 % @ 0.66 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-27 16:52 ADT**



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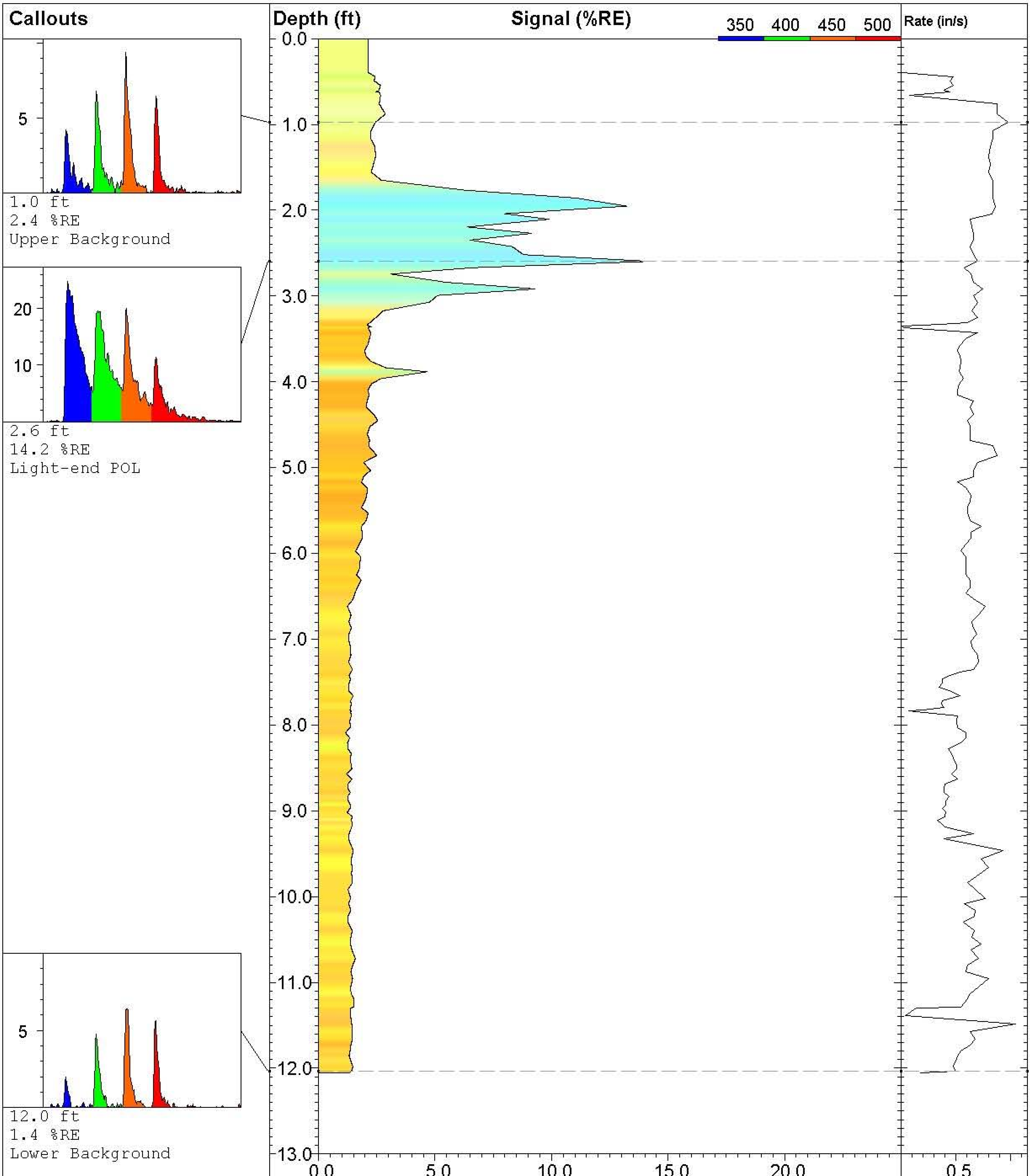
10NC27 UV-070

UVOST By Dakota
www.DakotaTechnologies.com

Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.06 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **3.9 % @ 0.63 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-27 17:13 ADT**



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10NC27 UV-071

UVOST By Dakota
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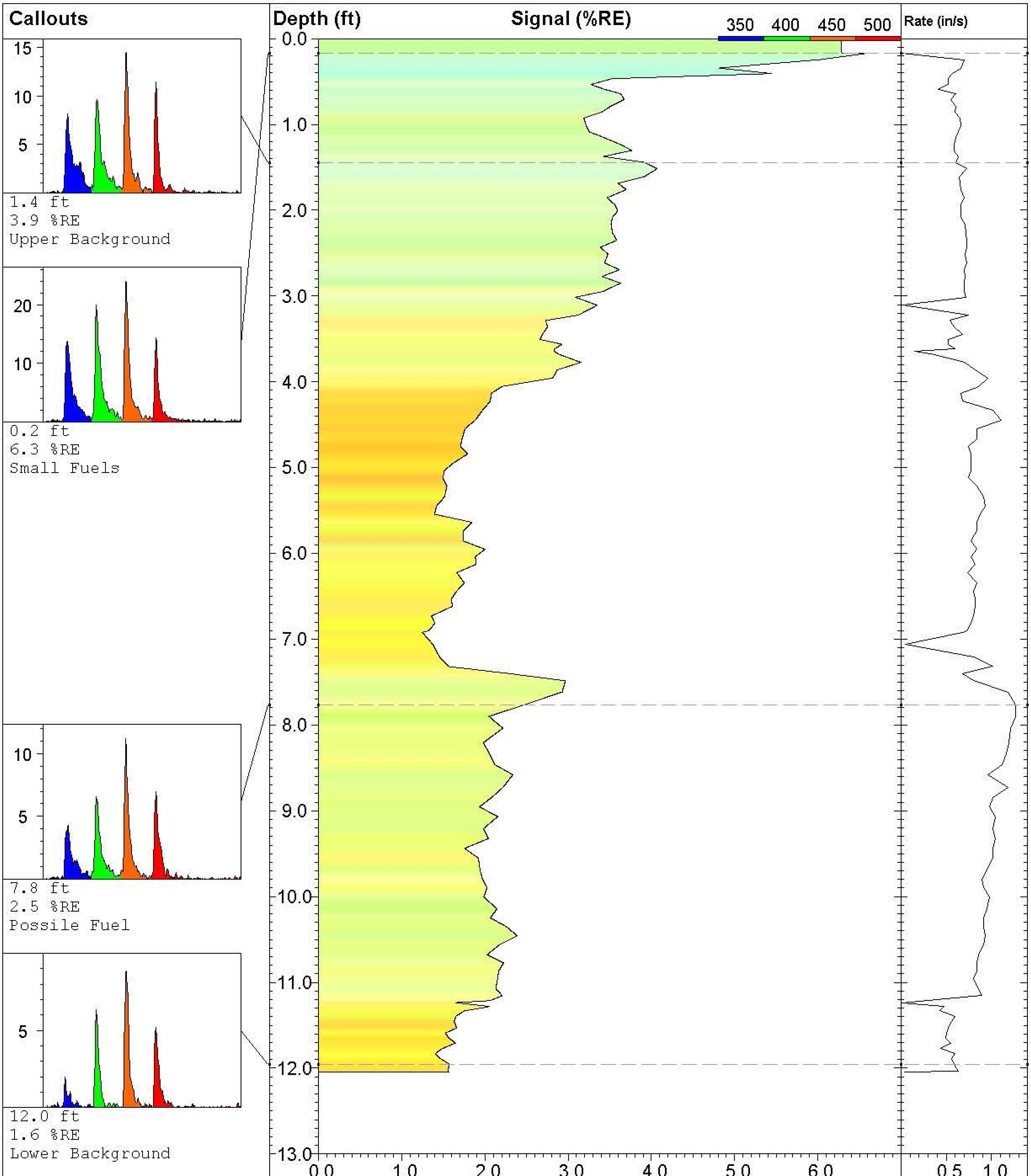
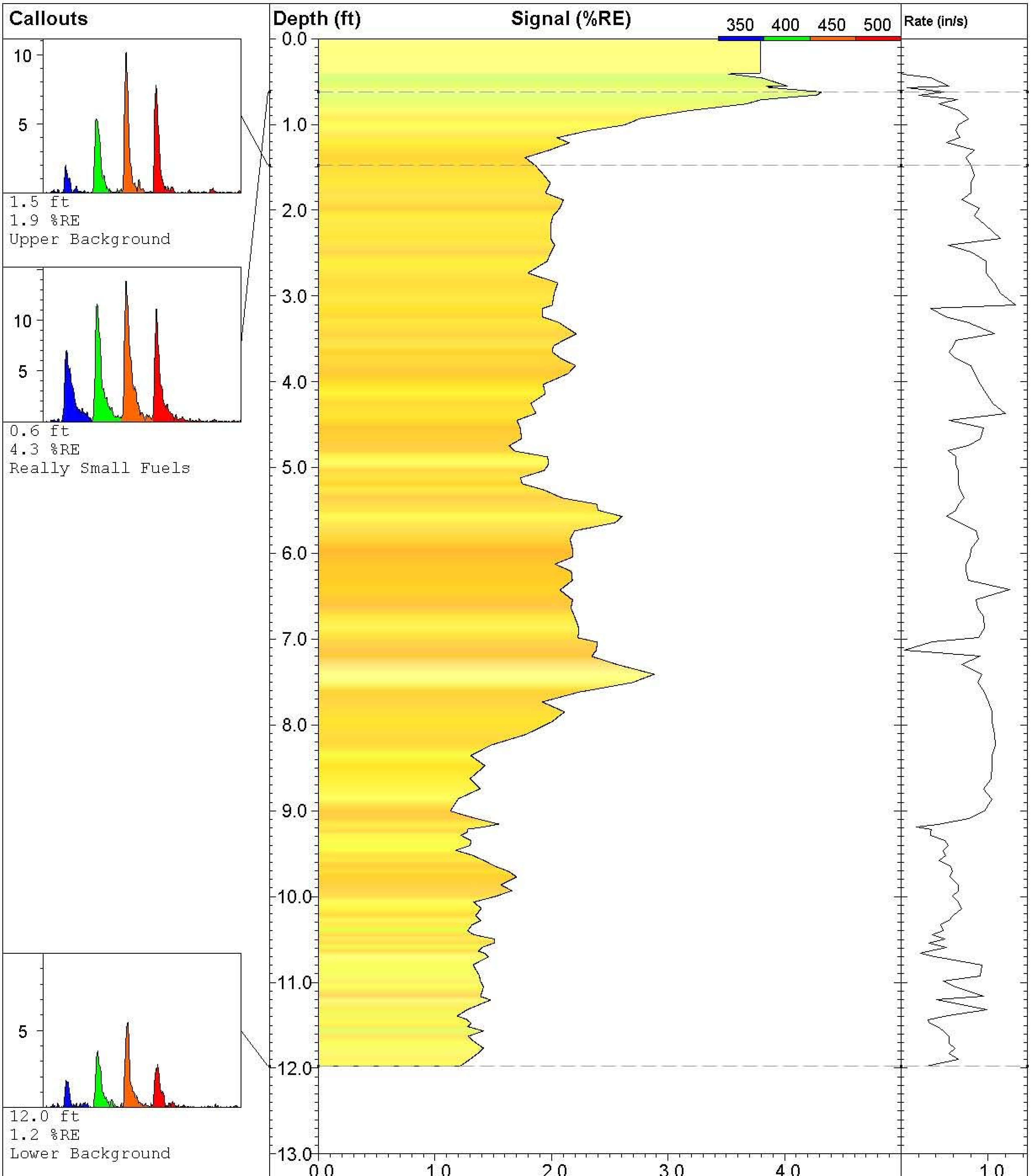
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **12.05 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **14.2 % @ 2.60 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-28 09:29 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-072**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **12.05 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **6.6 % @ 0.17 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-28 09:47 ADT**



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10NC27 UV-073

UVOST By Dakota
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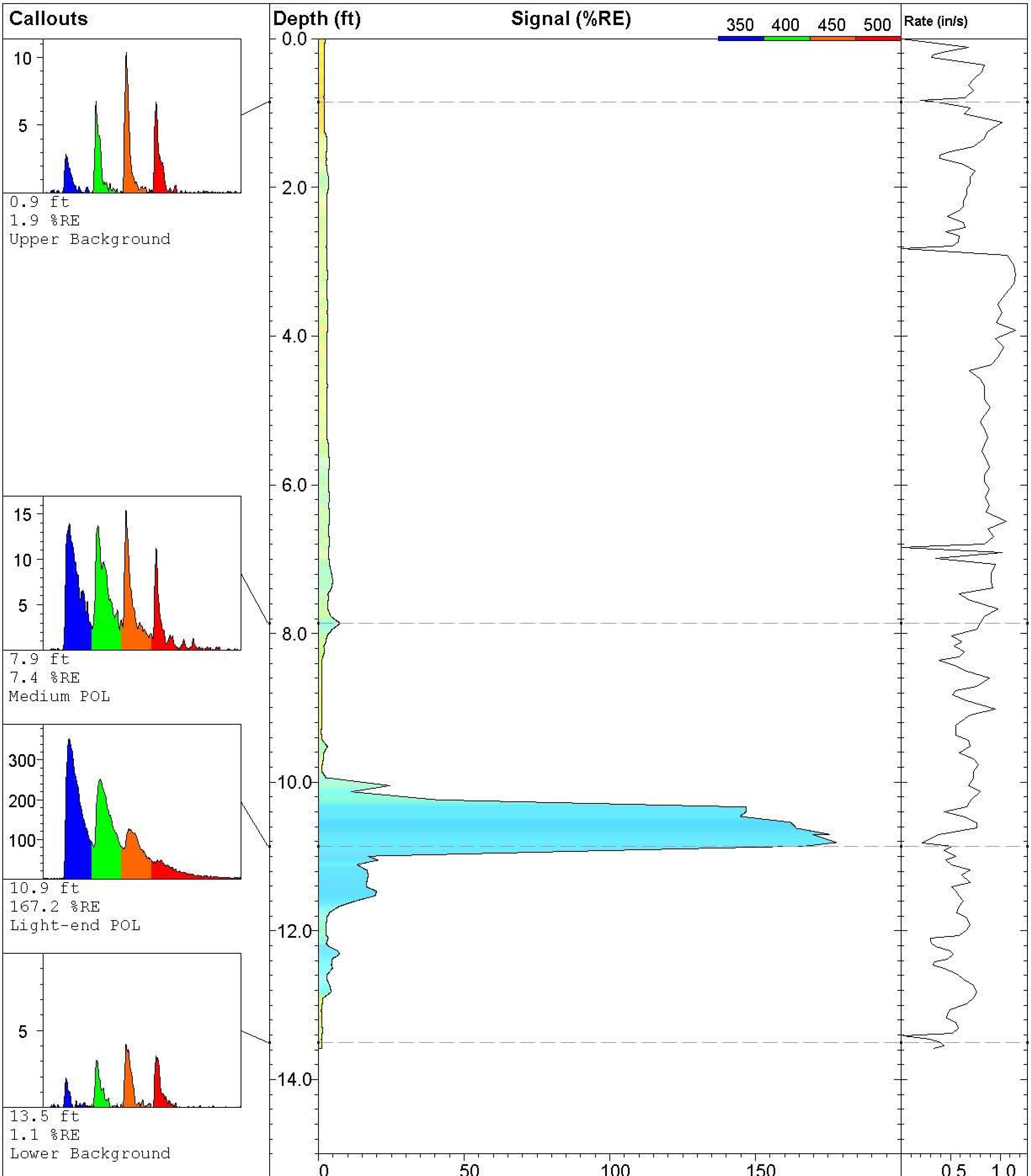
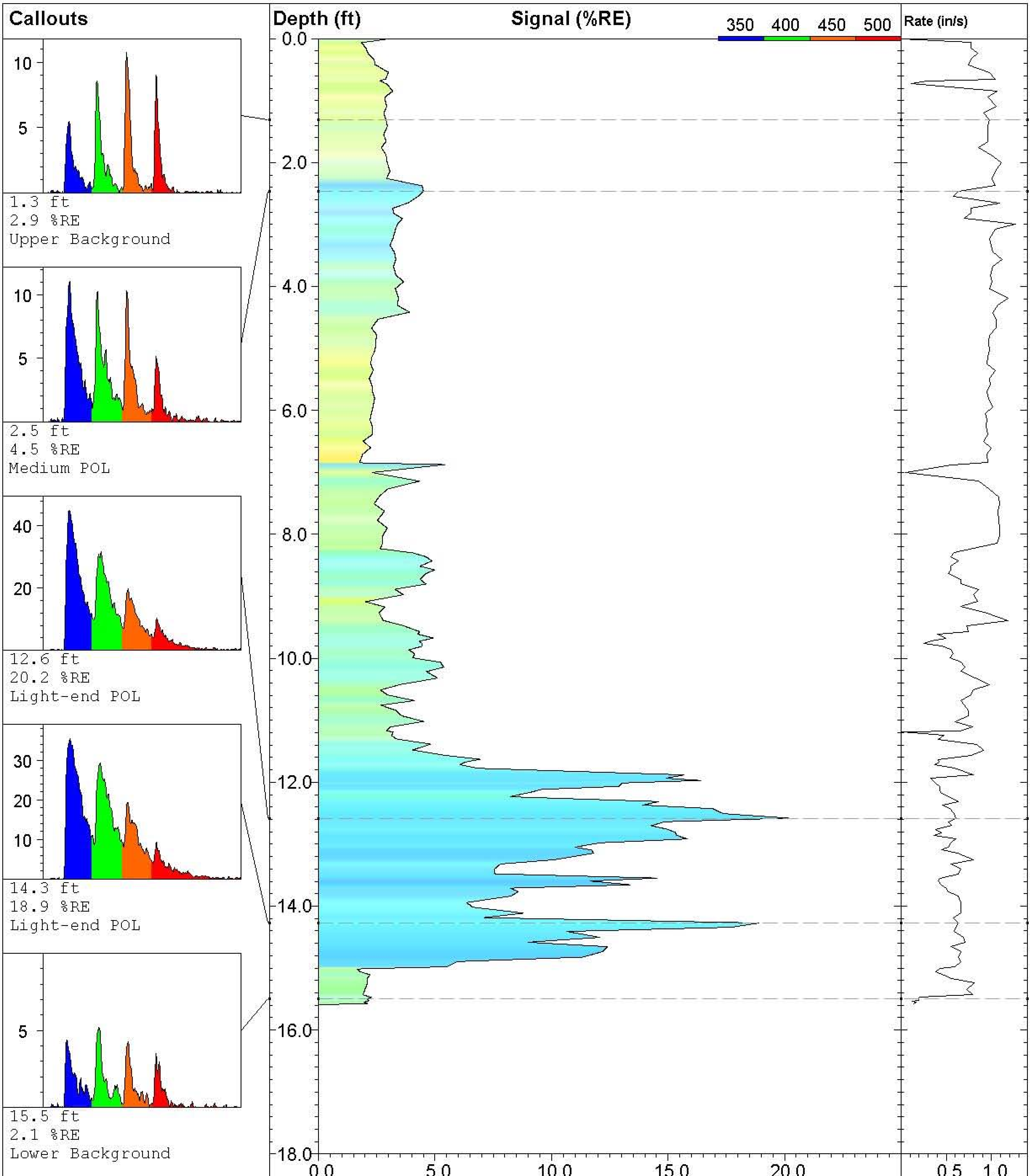
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **11.98 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **4.3 % @ 0.62 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-28 10:02 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-074**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **13.58 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **177.9 % @ 10.81 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-28 10:19 ADT**



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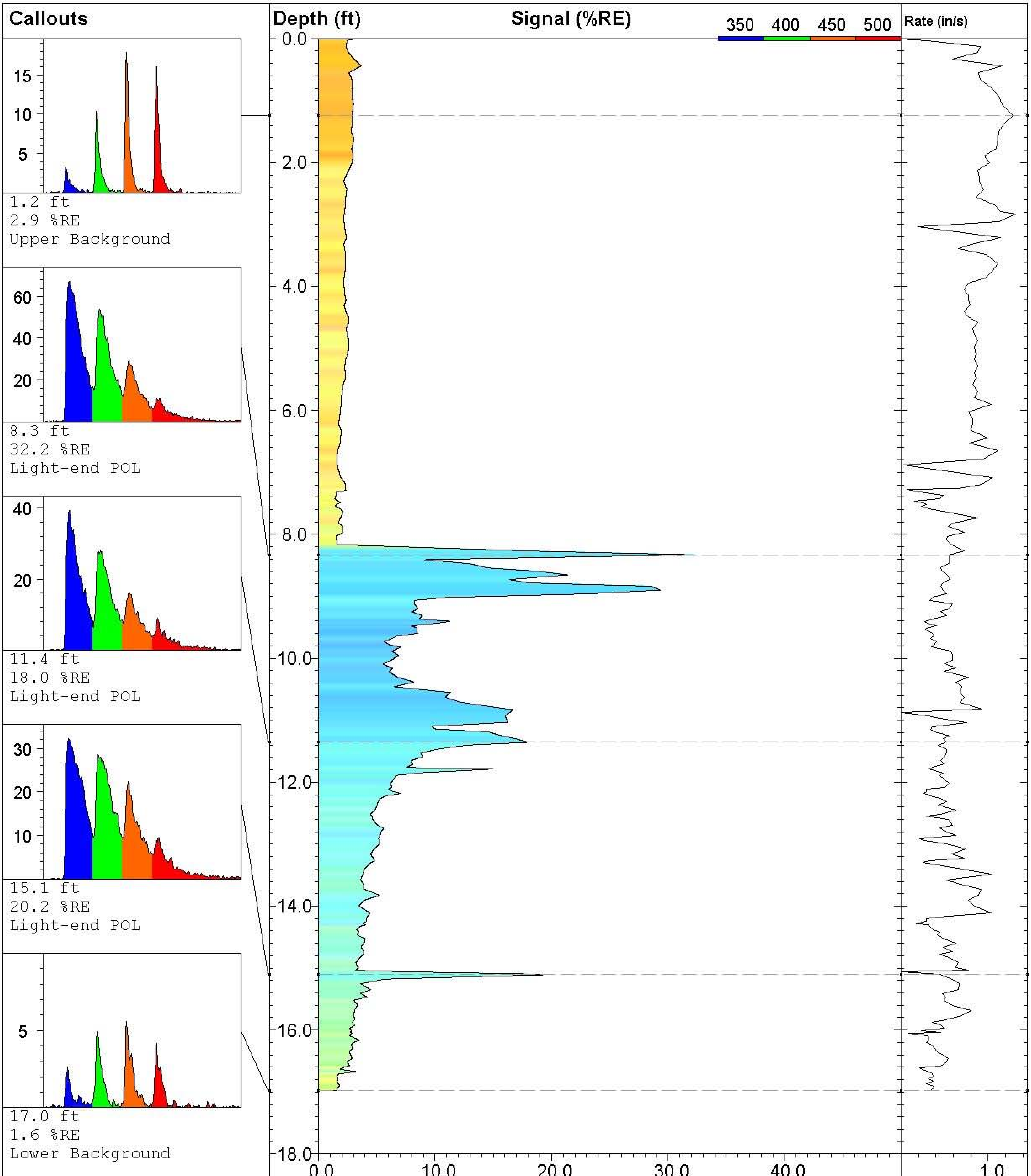
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.58 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **20.2 % @ 12.58 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-28 11:14 ADT**



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10NC27 UV-076

UVOST By Dakota
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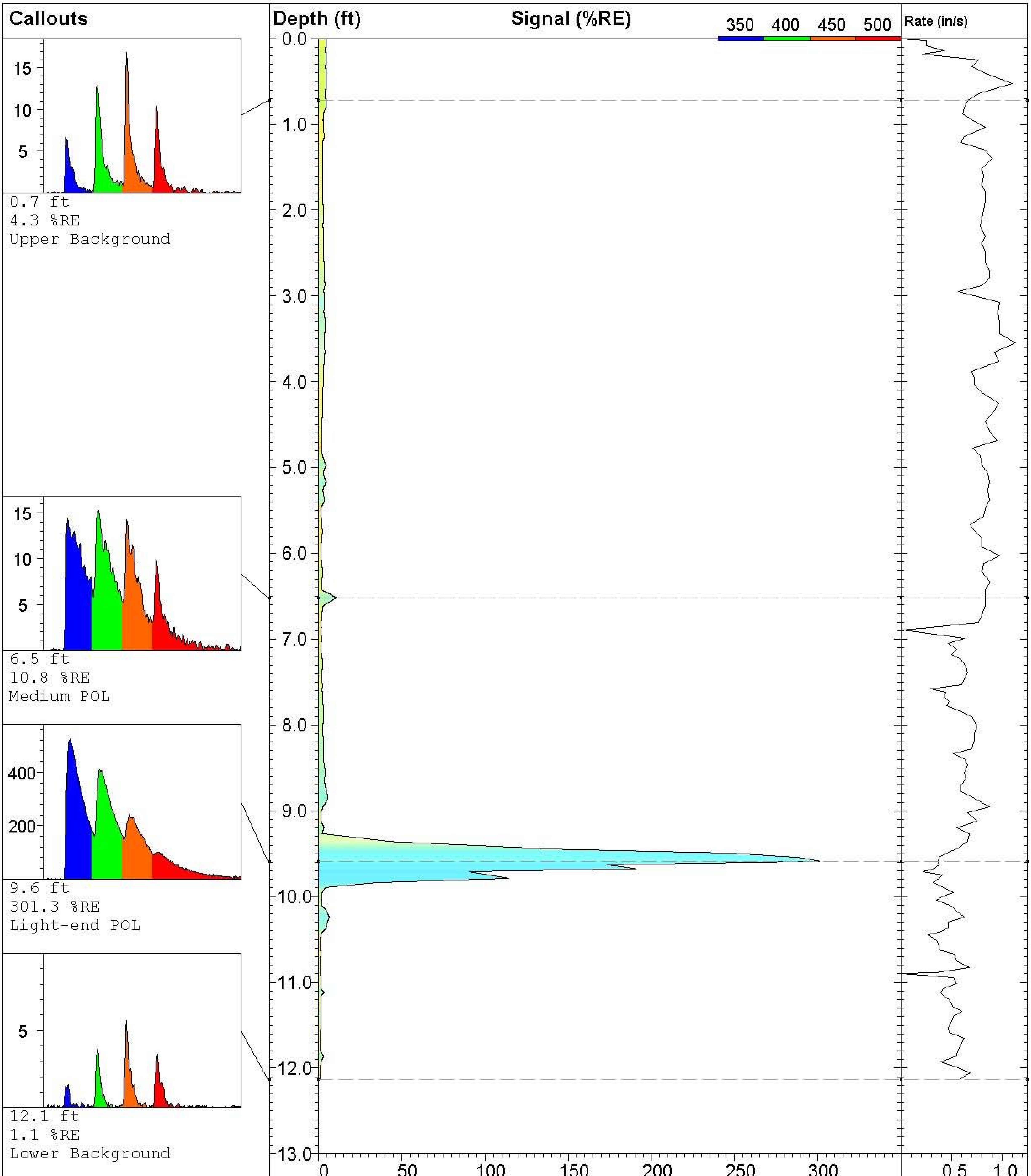
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.99 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **32.2 % @ 8.33 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-28 11:43 ADT**



10NC27 UV-077		**UVOST By Dakota** www.DakotaTechnologies.com
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **12.13 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **301.3 % @ 9.59 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-28 13:45 ADT**

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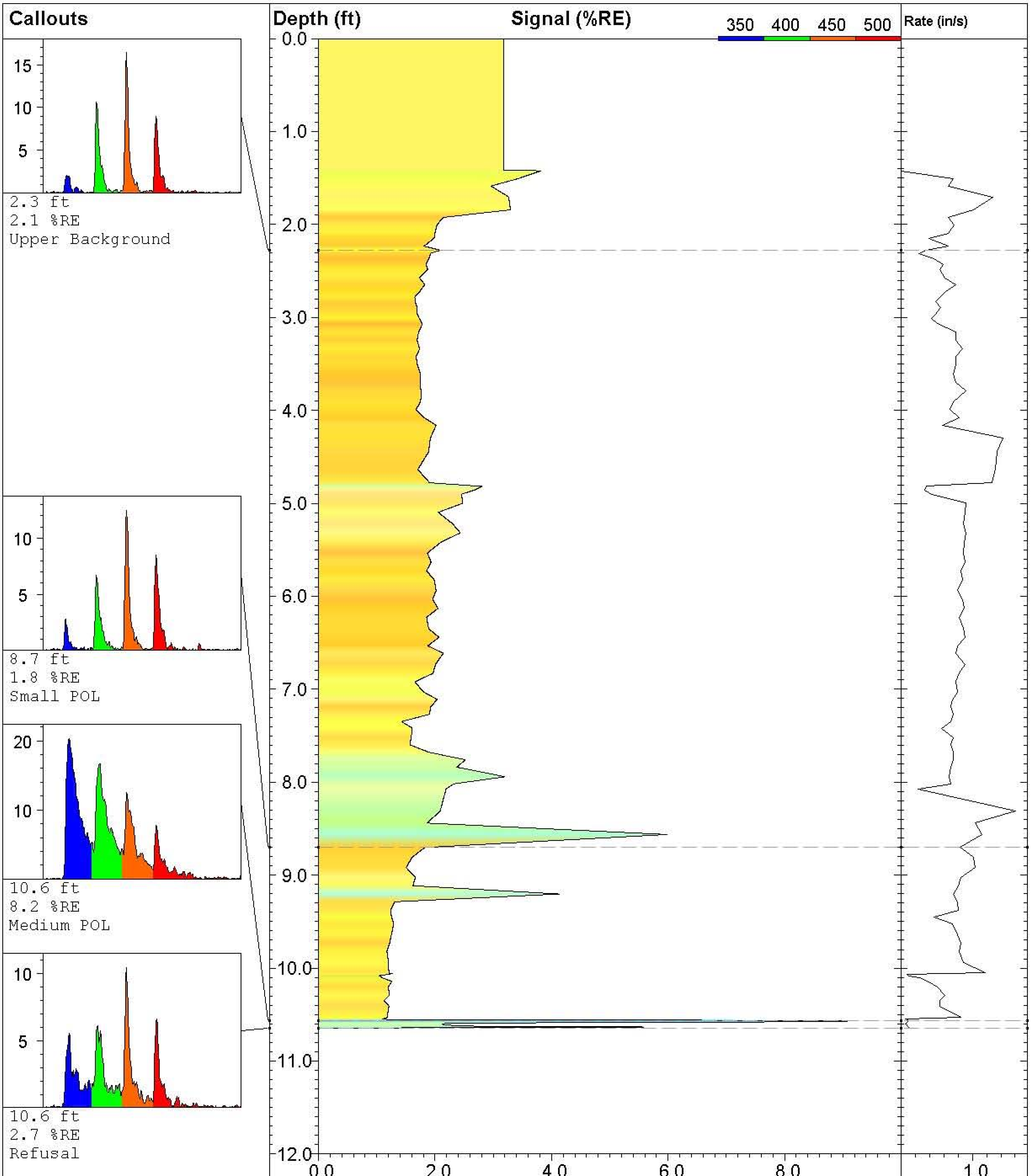

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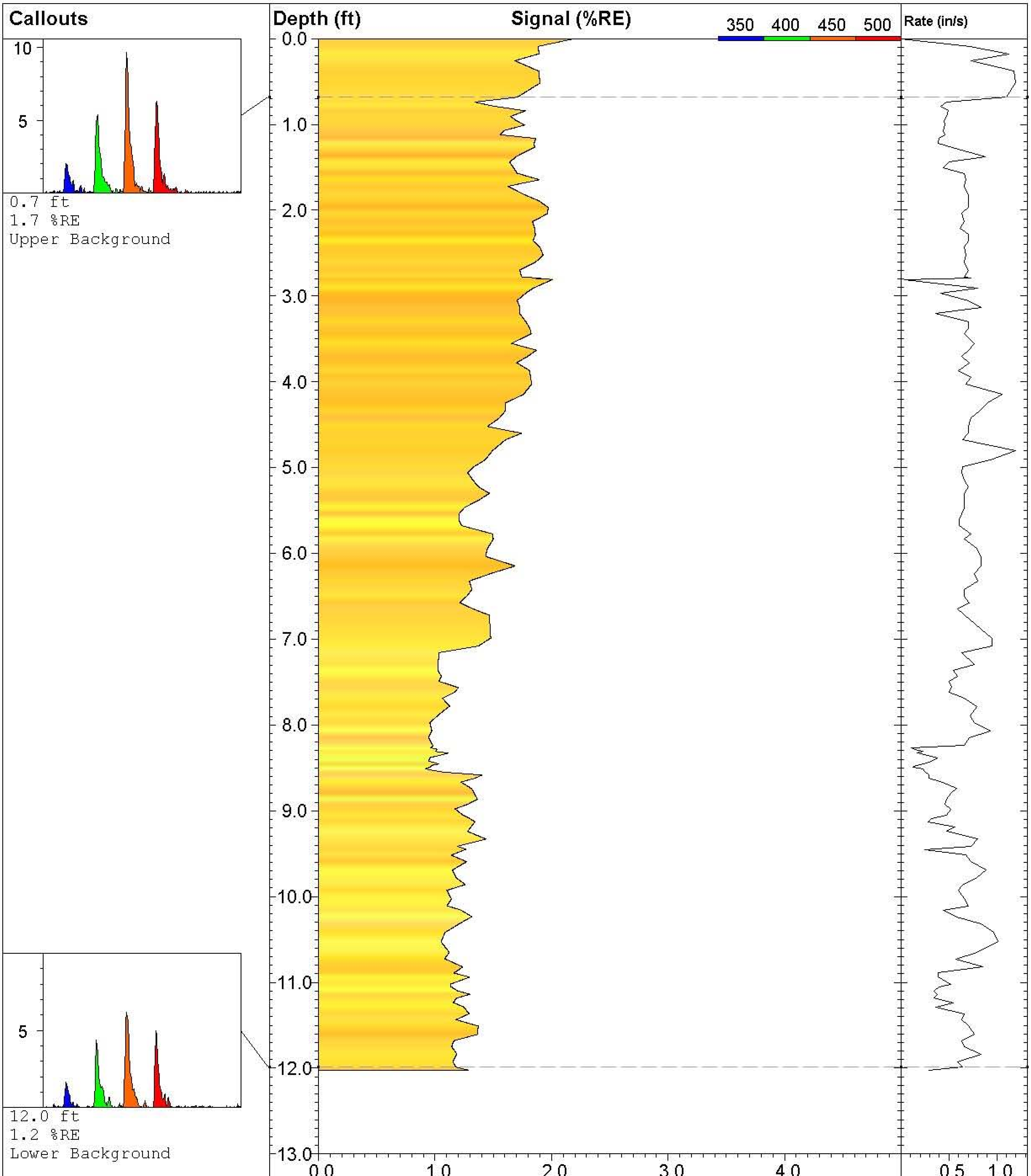
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **10.64 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **9.1 % @ 10.57 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-28 14:02 ADT**



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10NC27 UV-079

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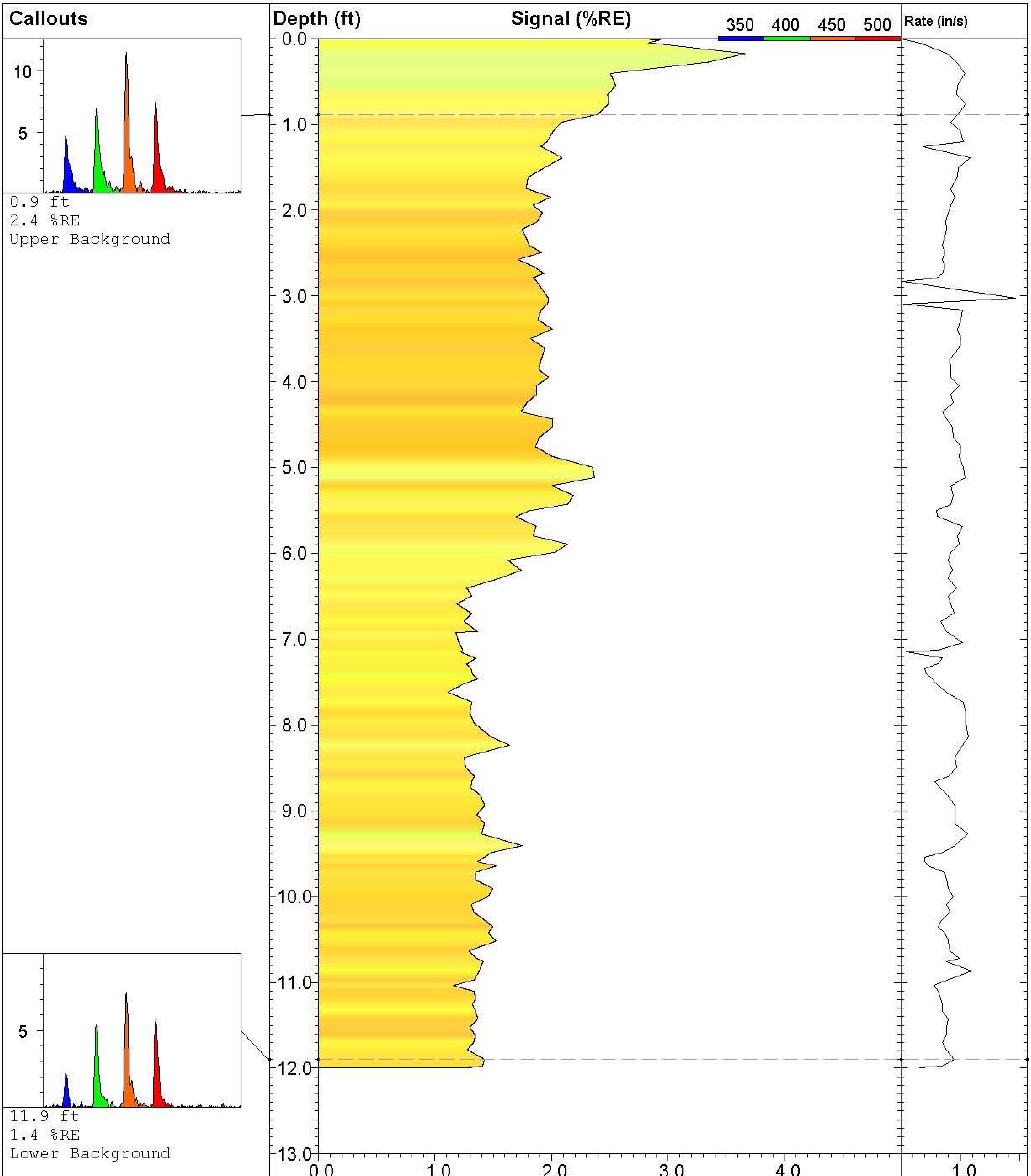
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **12.03 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.2 % @ 0.00 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-28 14:15 ADT**



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10NC27 UV-080

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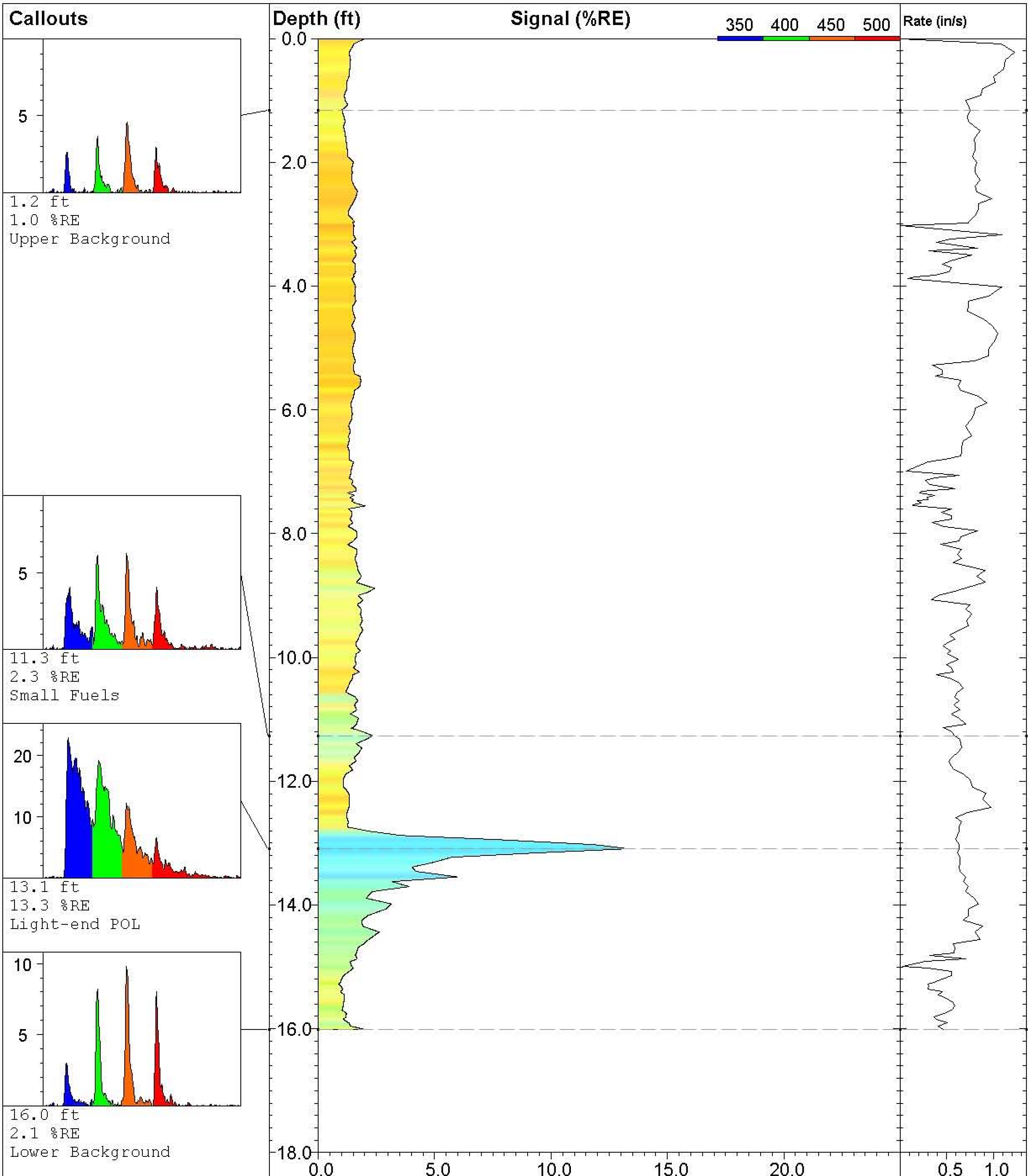
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **12.00 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **3.7 % @ 0.18 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-28 14:44 ADT**



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10NC27 UV-081

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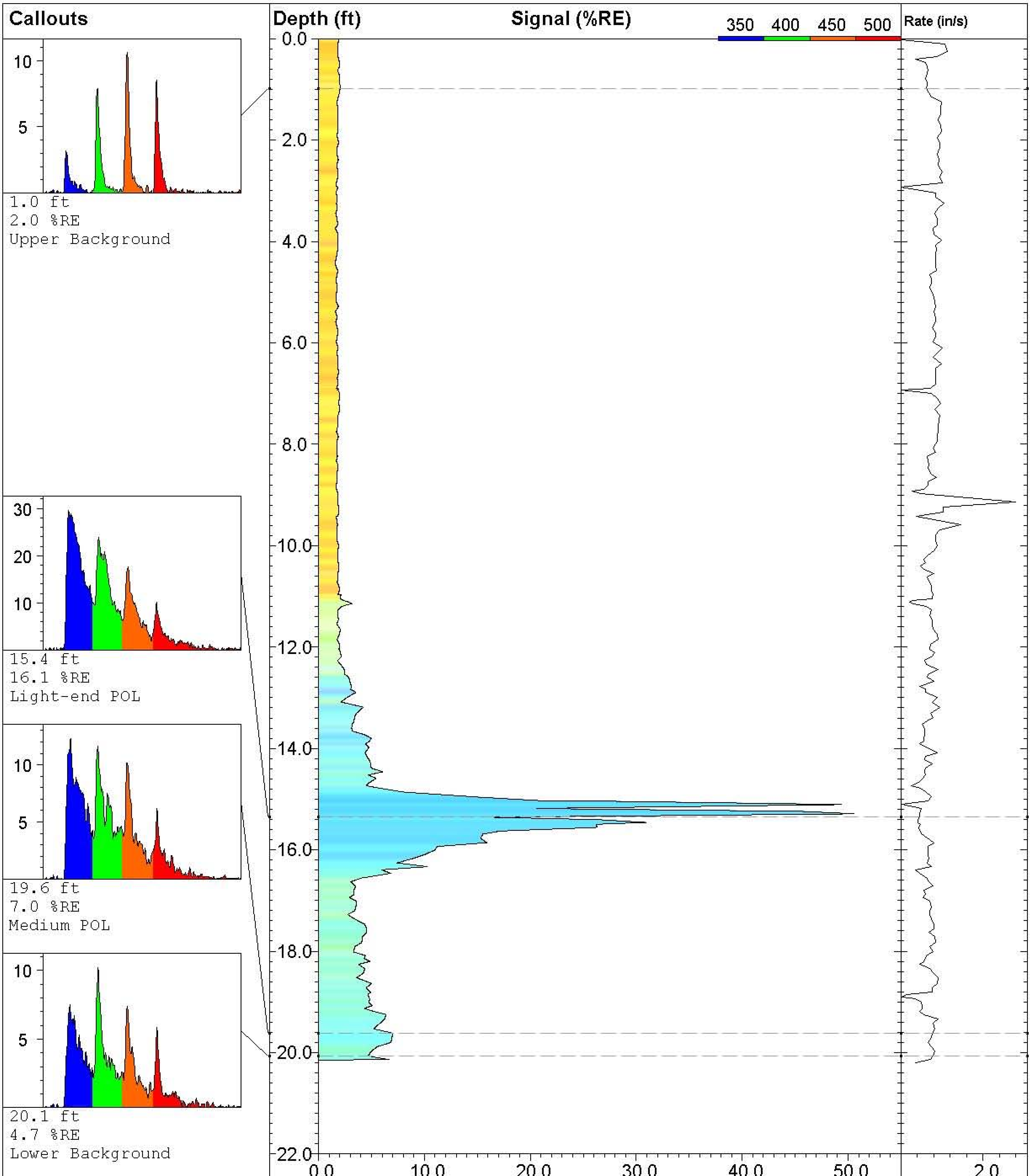
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.02 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **13.3 % @ 13.09 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-28 15:39 ADT**



10NC27 UV-082

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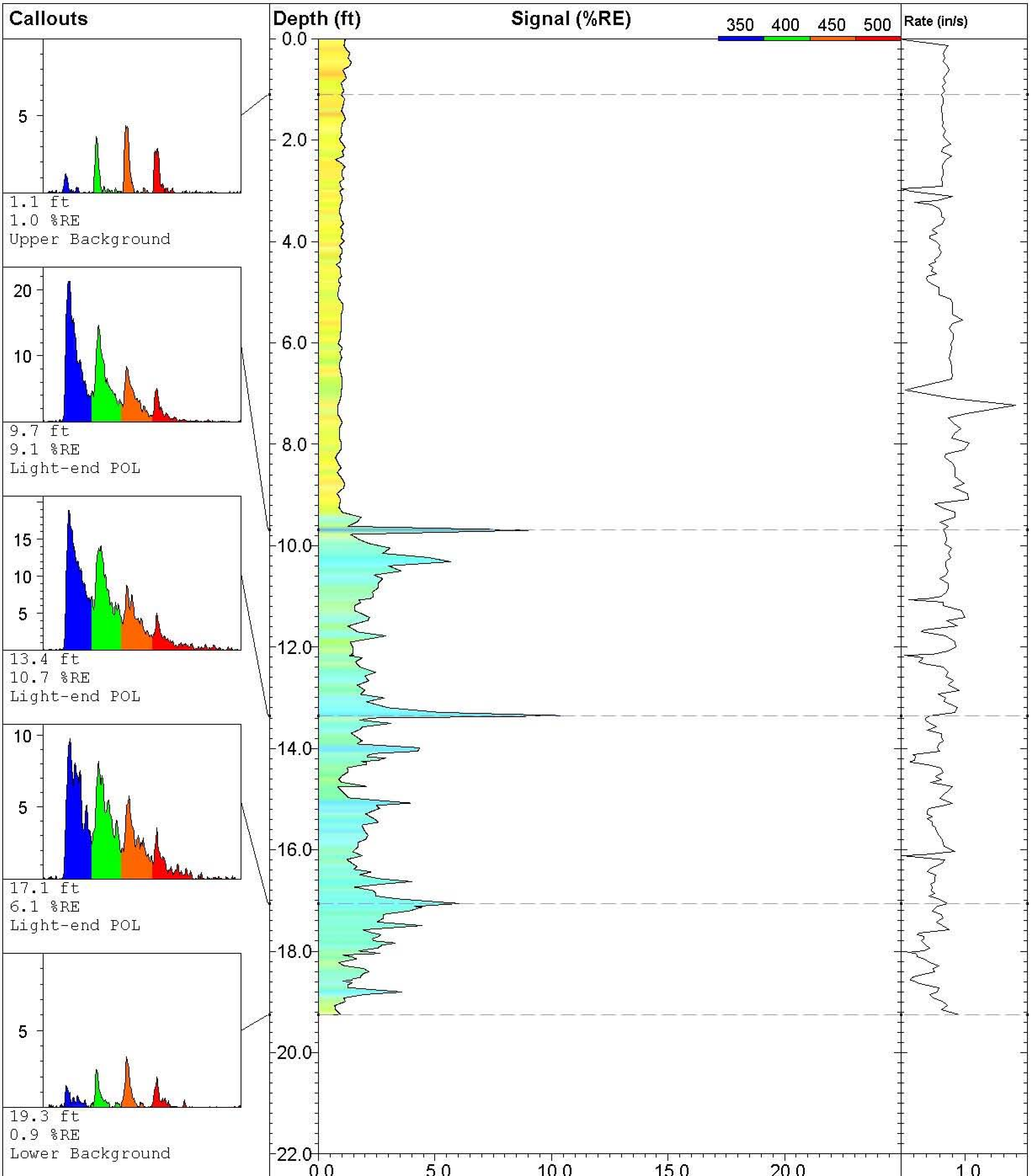
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.20 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **50.8 % @ 15.29 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-28 16:04 ADT**



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10NC27 UV-083

UVOST By Dakota
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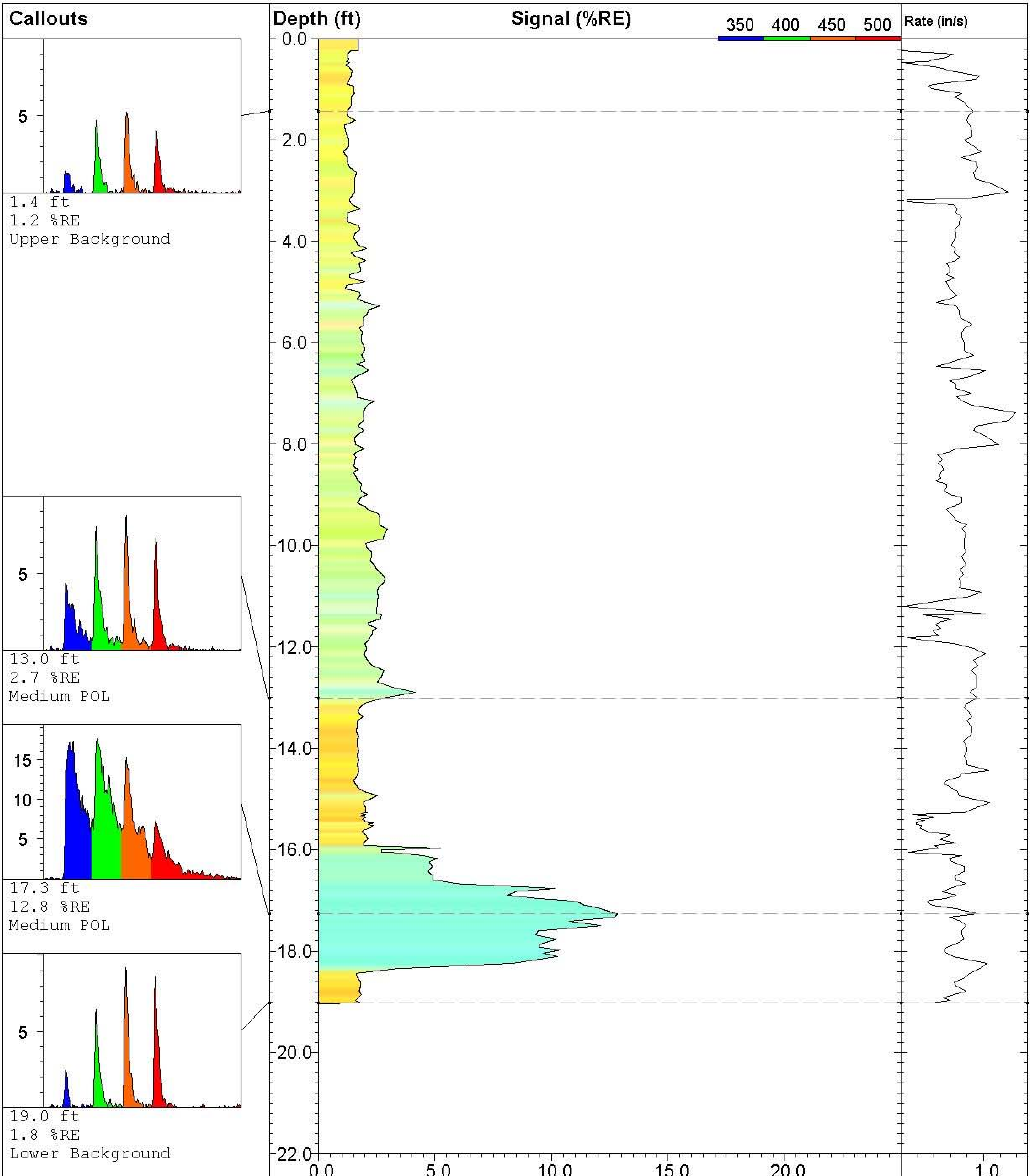
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **19.25 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **10.7 % @ 13.36 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-28 17:02 ADT**



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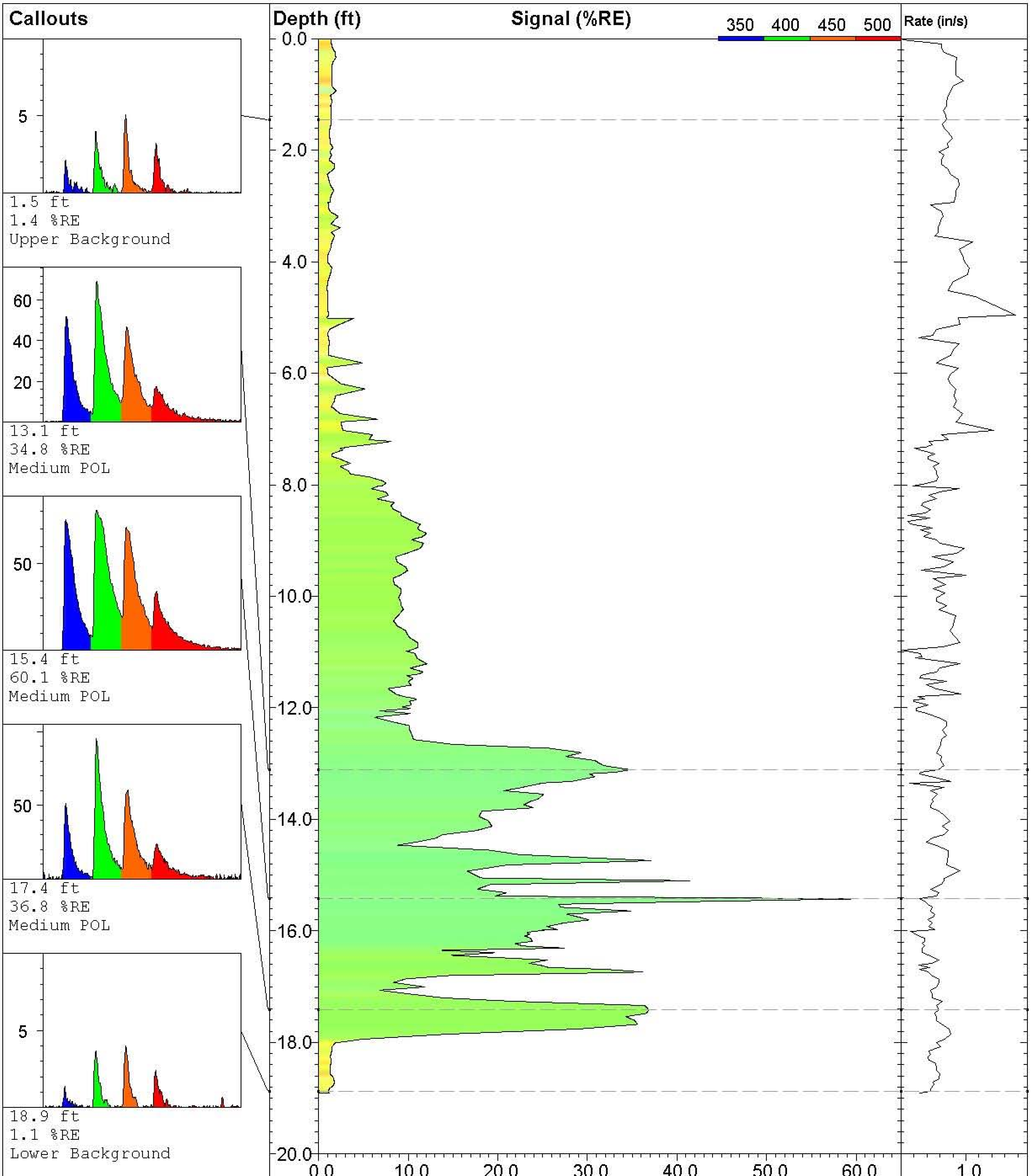
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**
	Final depth: **19.03 ft**	
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**
	Max signal: **12.8 % @ 17.27 ft**	
	Job:	*Operator/Unit:* **PCaron/UVOST1016**
	Date & Time: **2010-07-30 08:46 ADT**	



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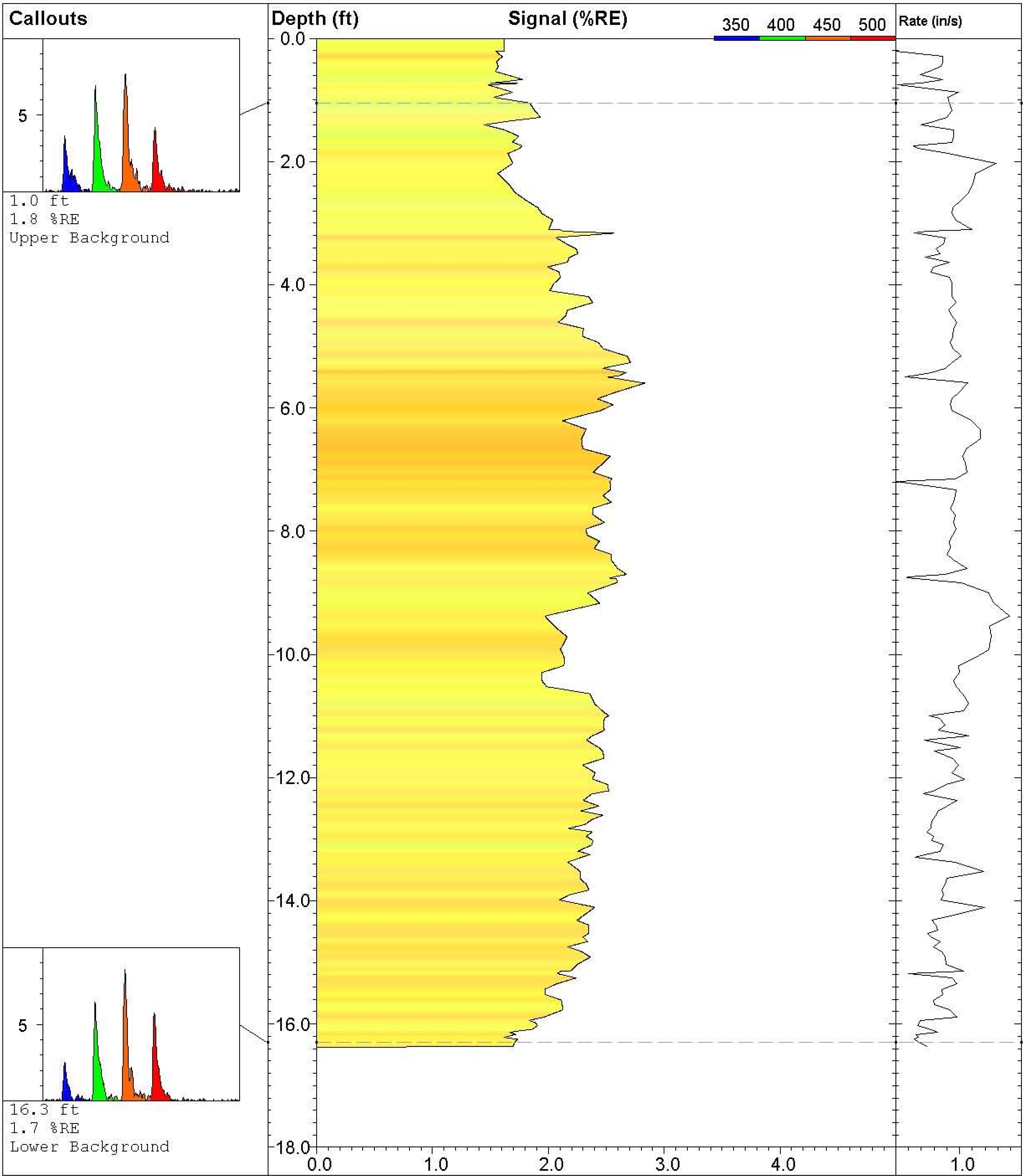
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **18.91 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **60.1 % @ 15.43 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-30 09:12 ADT**



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10NC27 UV-086

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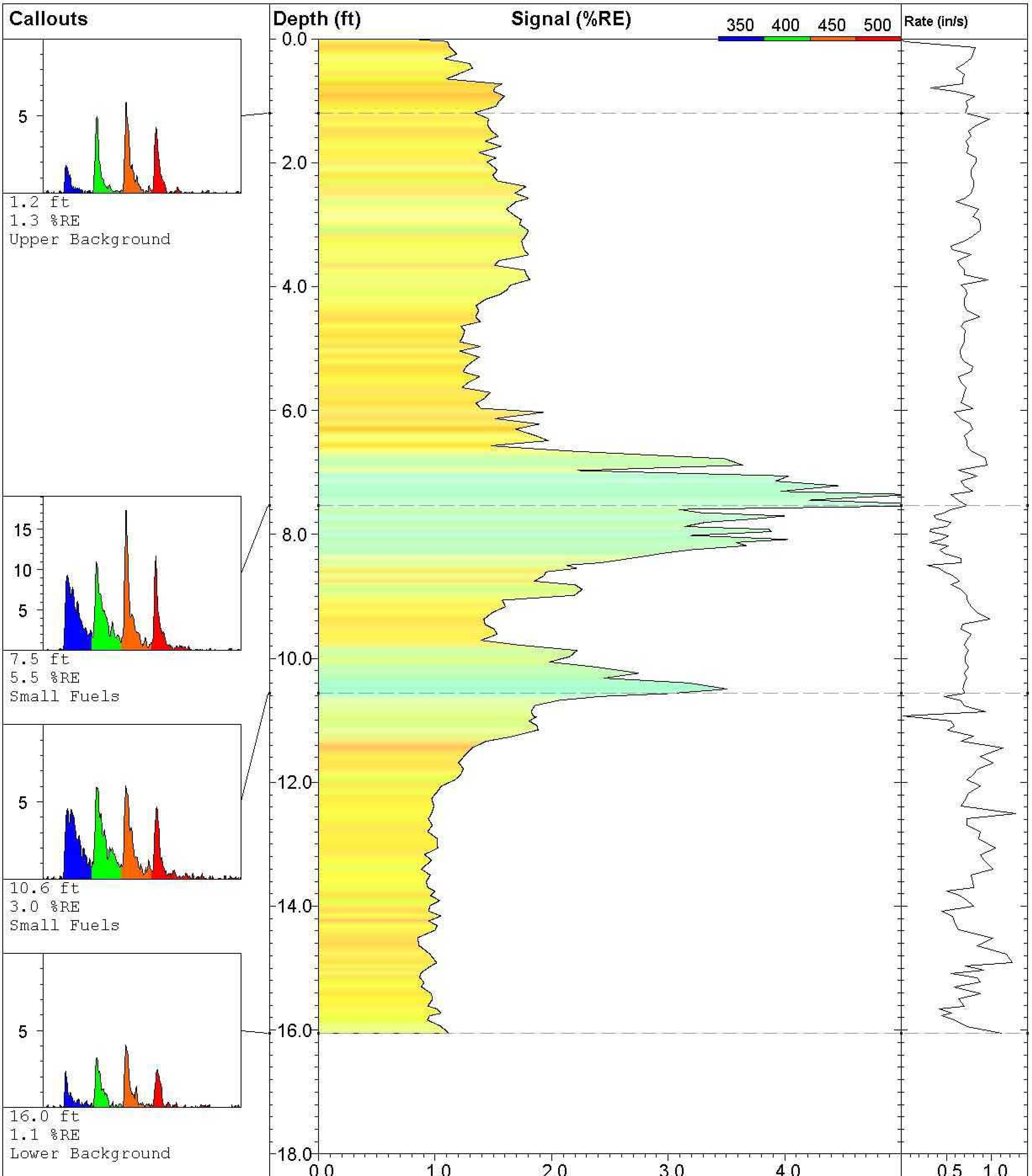
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.37 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.8 % @ 5.60 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-30 09:58 ADT**



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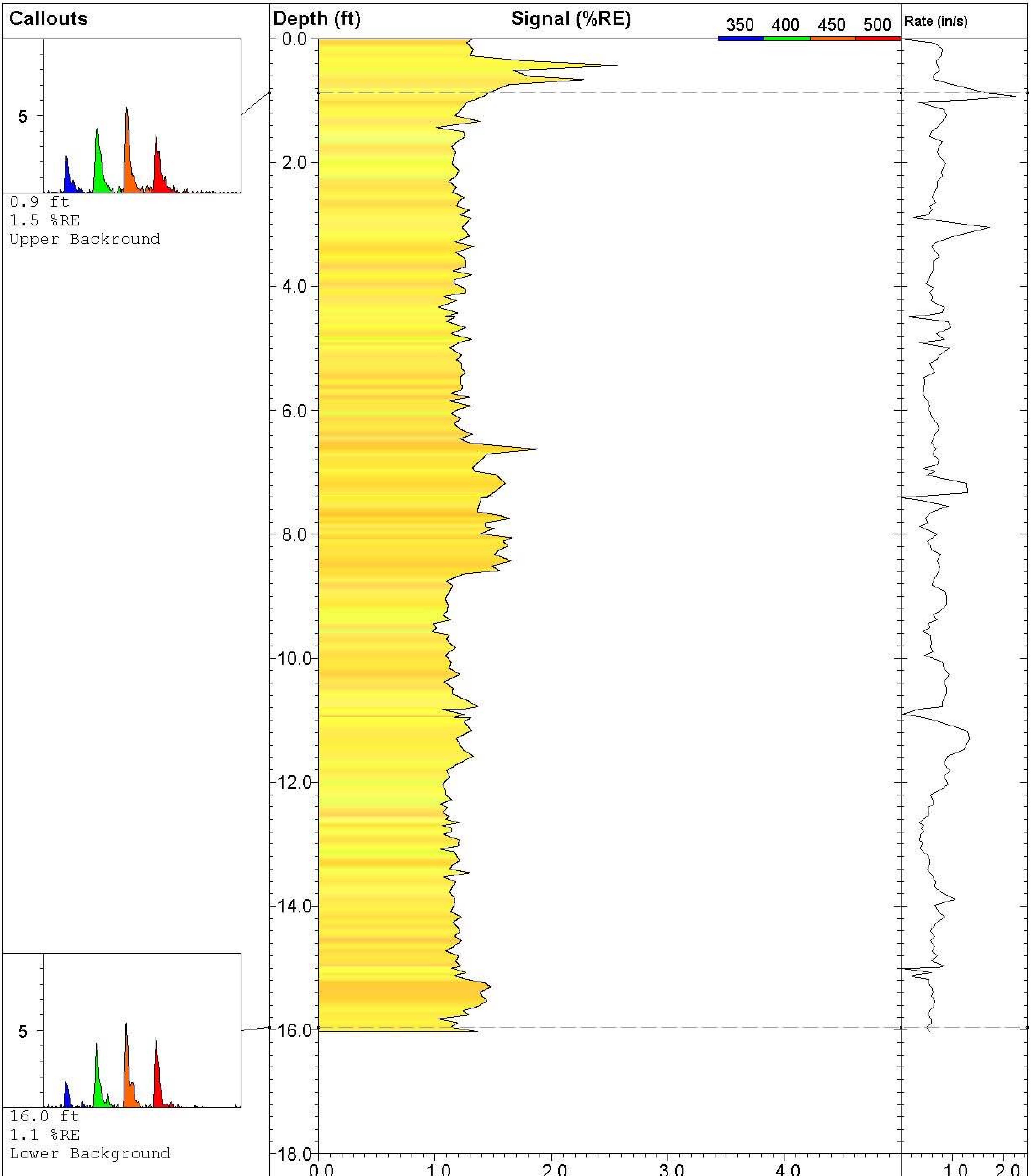
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.06 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **5.5 % @ 7.53 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-30 10:23 ADT**



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10NC27 UV-088

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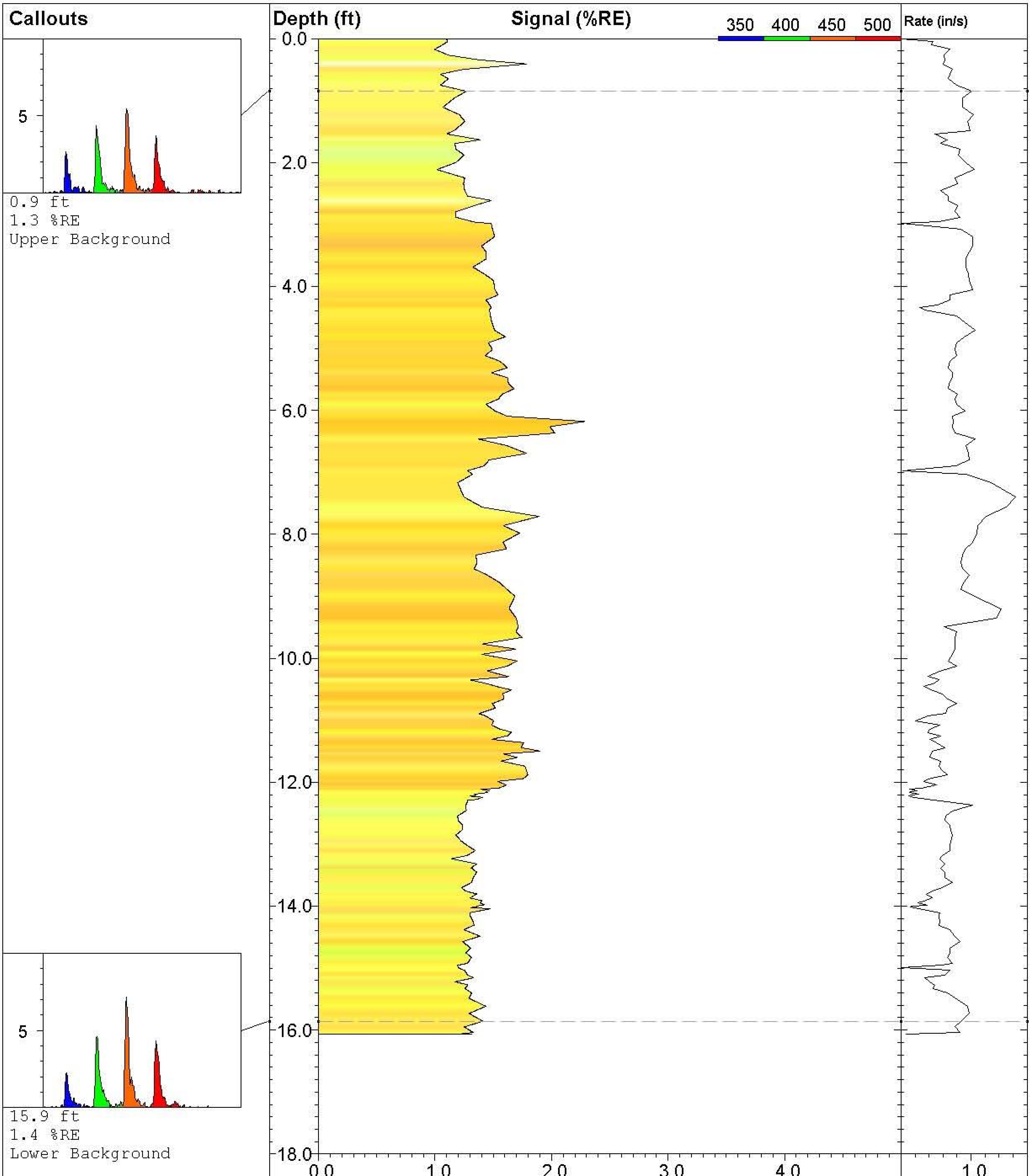
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.03 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.6 % @ 0.43 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-30 10:50 ADT**



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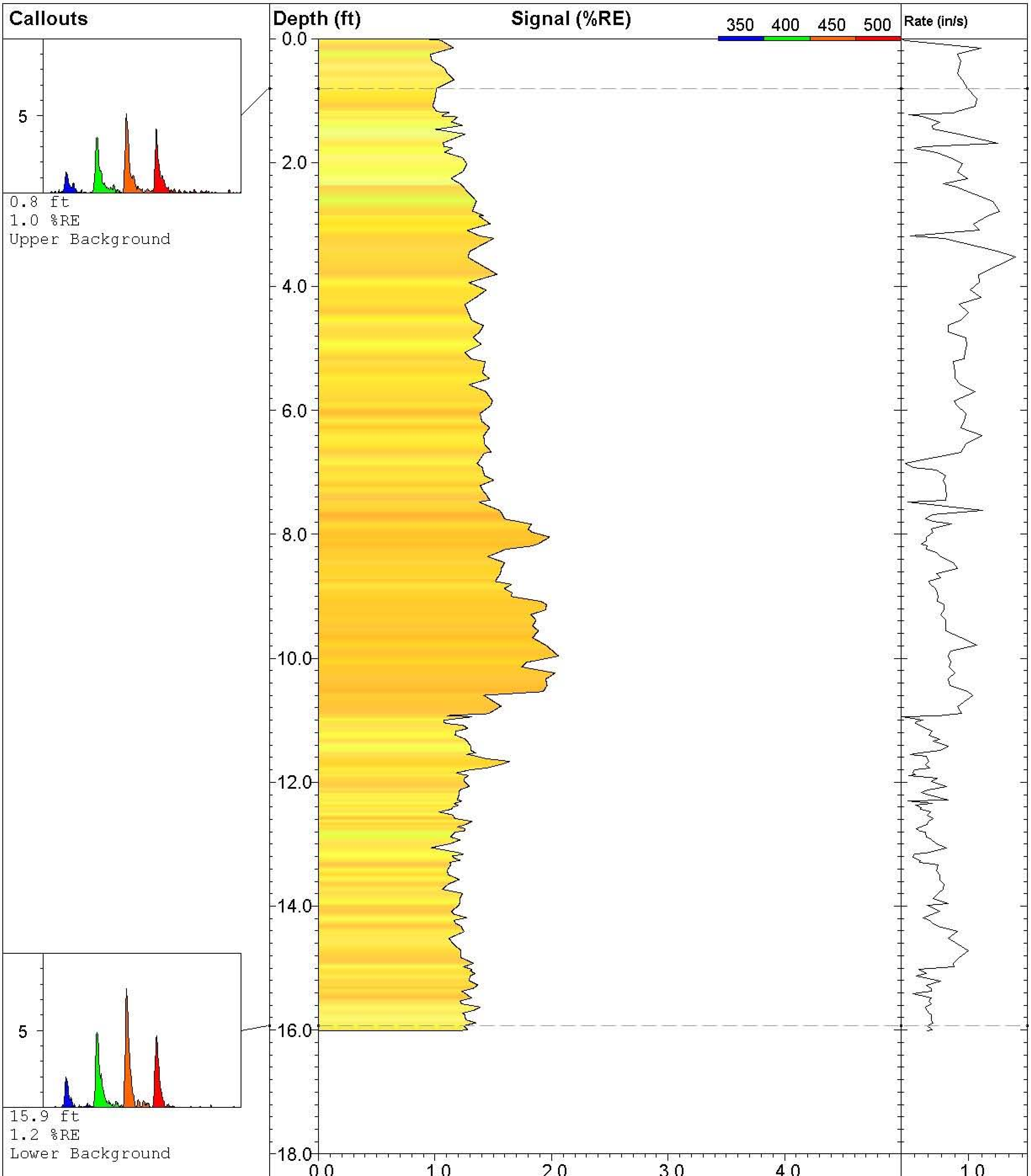
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.07 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.3 % @ 6.18 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-30 12:11 ADT**



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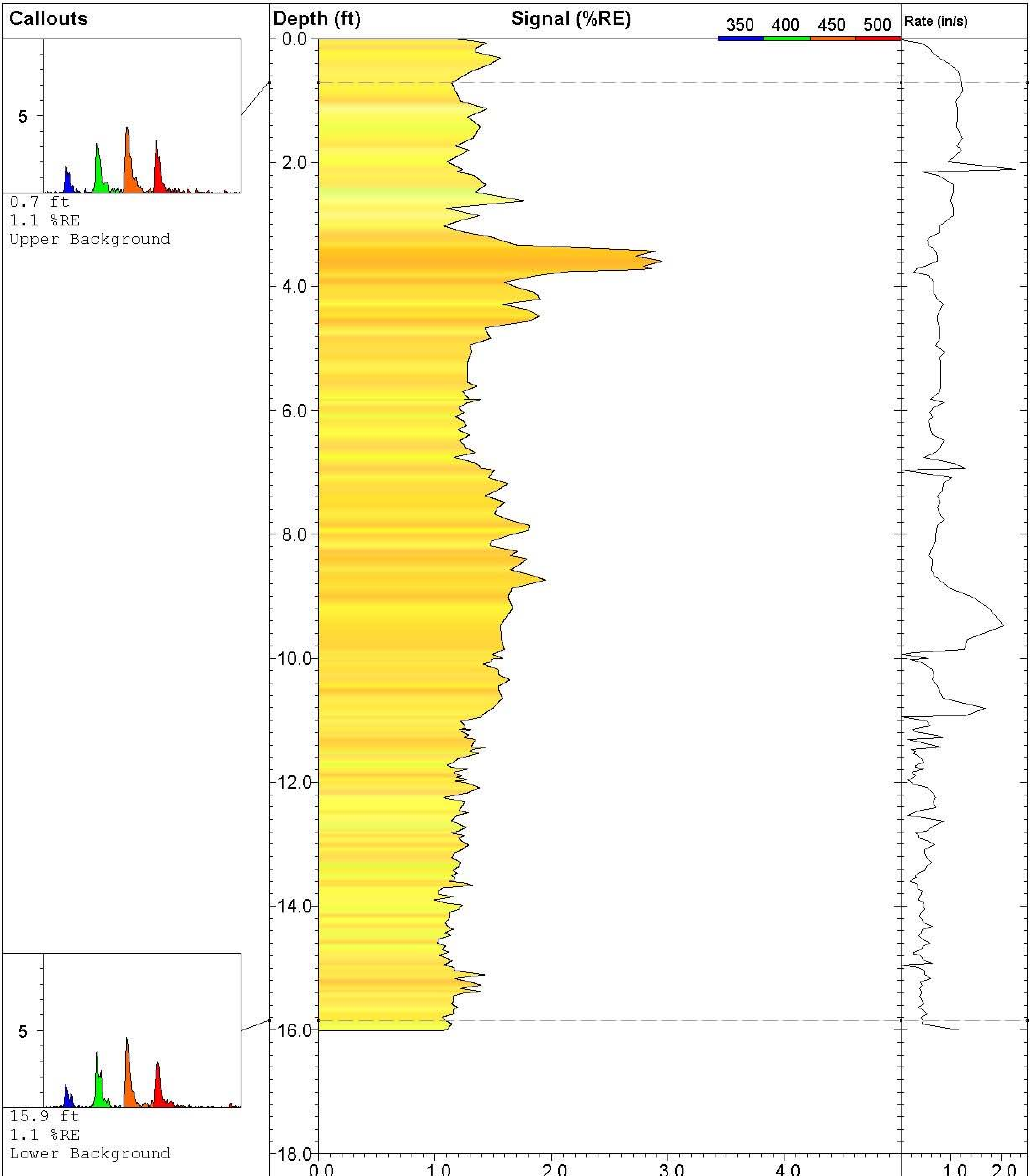
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.01 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.1 % @ 9.96 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-30 12:33 ADT**



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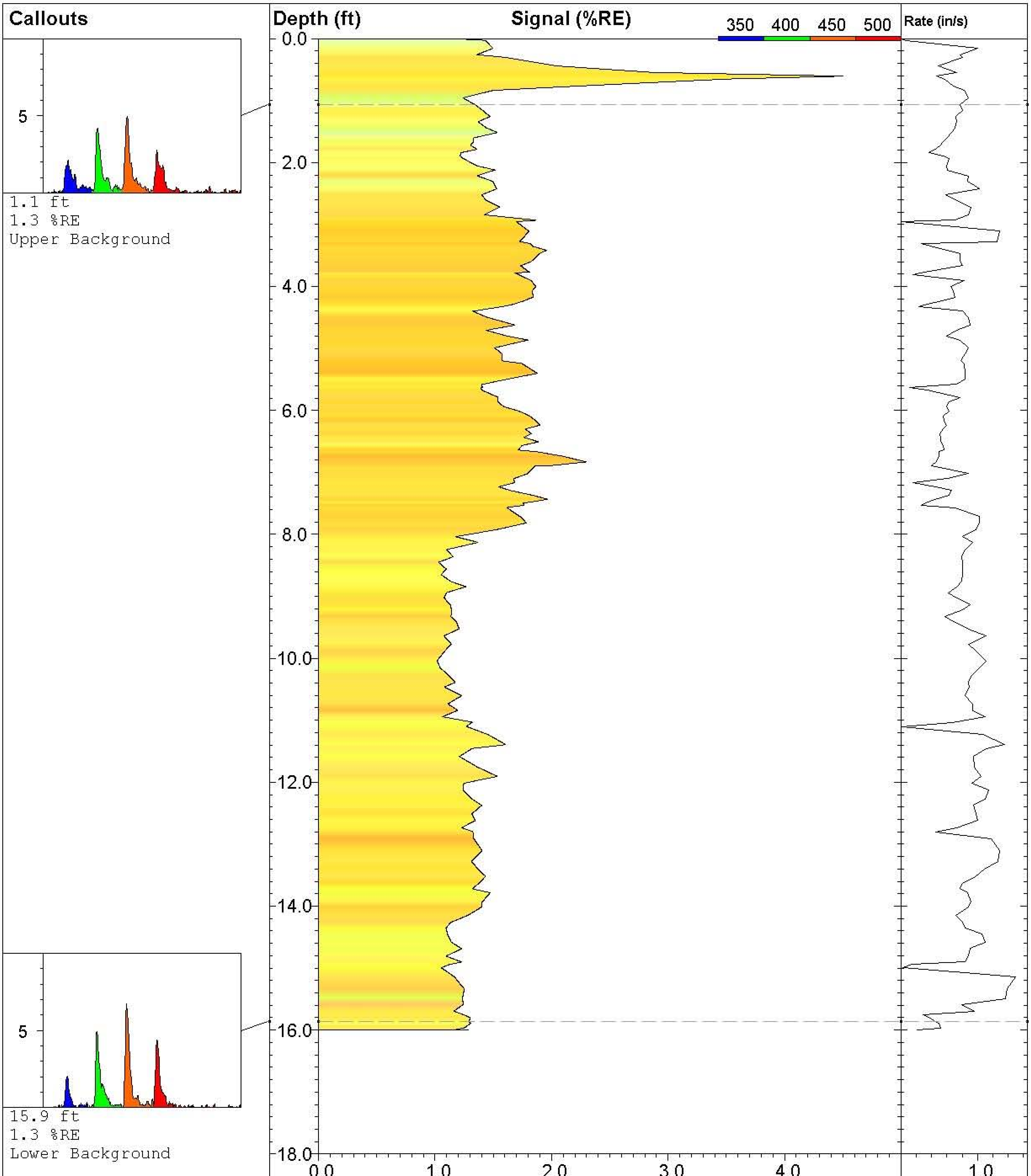
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.01 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **3.0 % @ 3.59 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-30 13:00 ADT**



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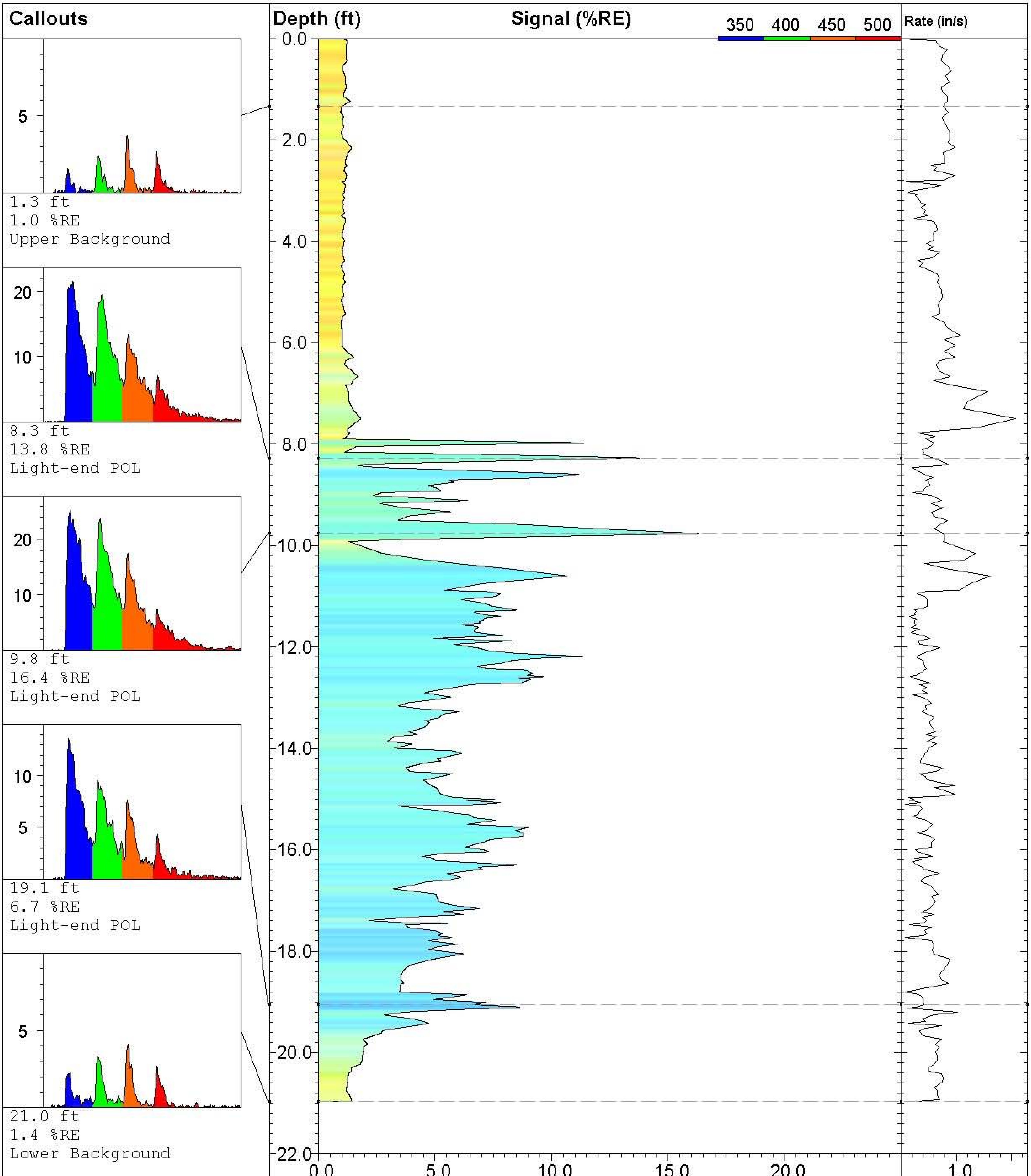
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.00 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **4.5 % @ 0.61 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-30 13:33 ADT**



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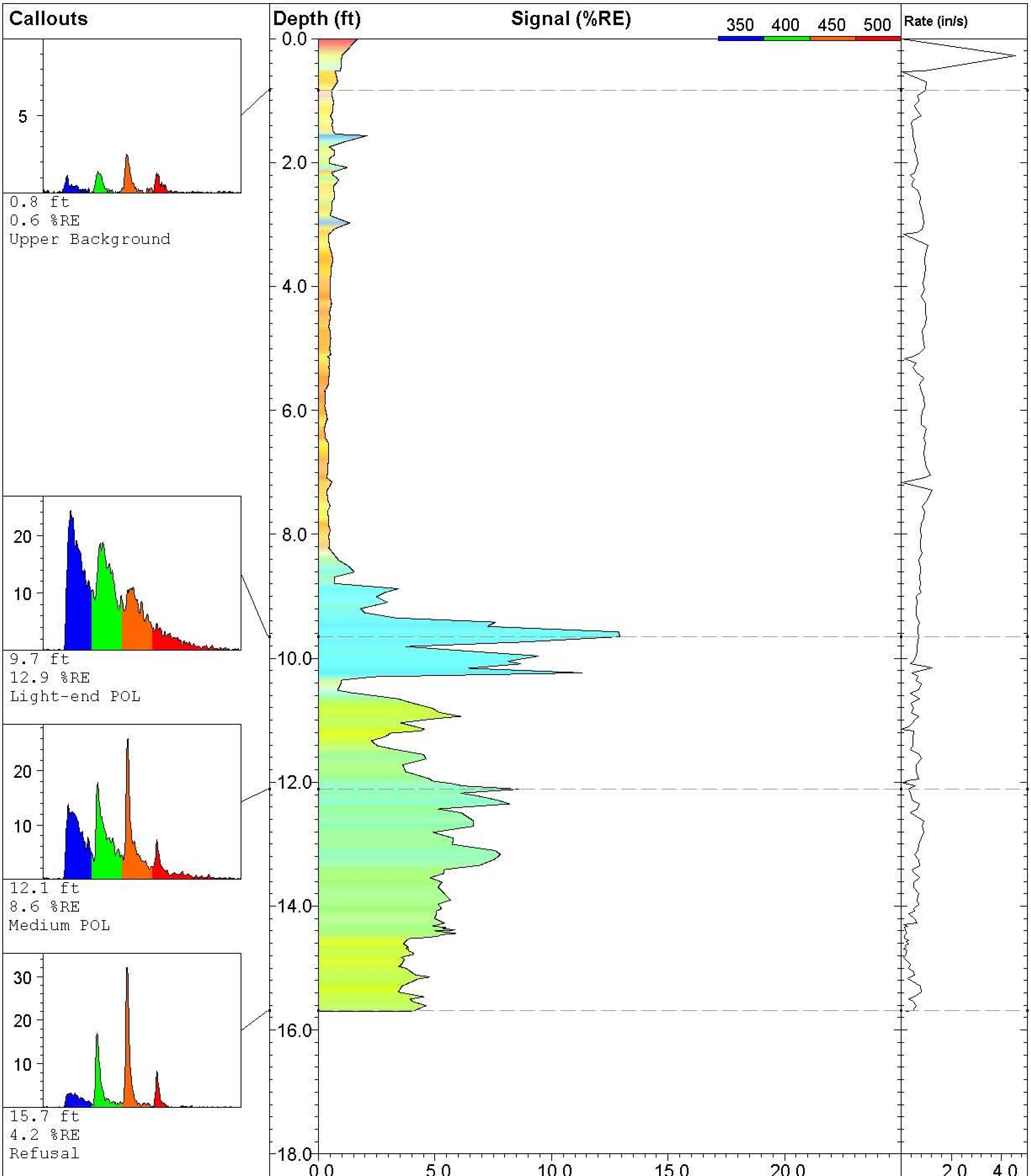
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.96 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **16.4 % @ 9.76 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-30 14:08 ADT**



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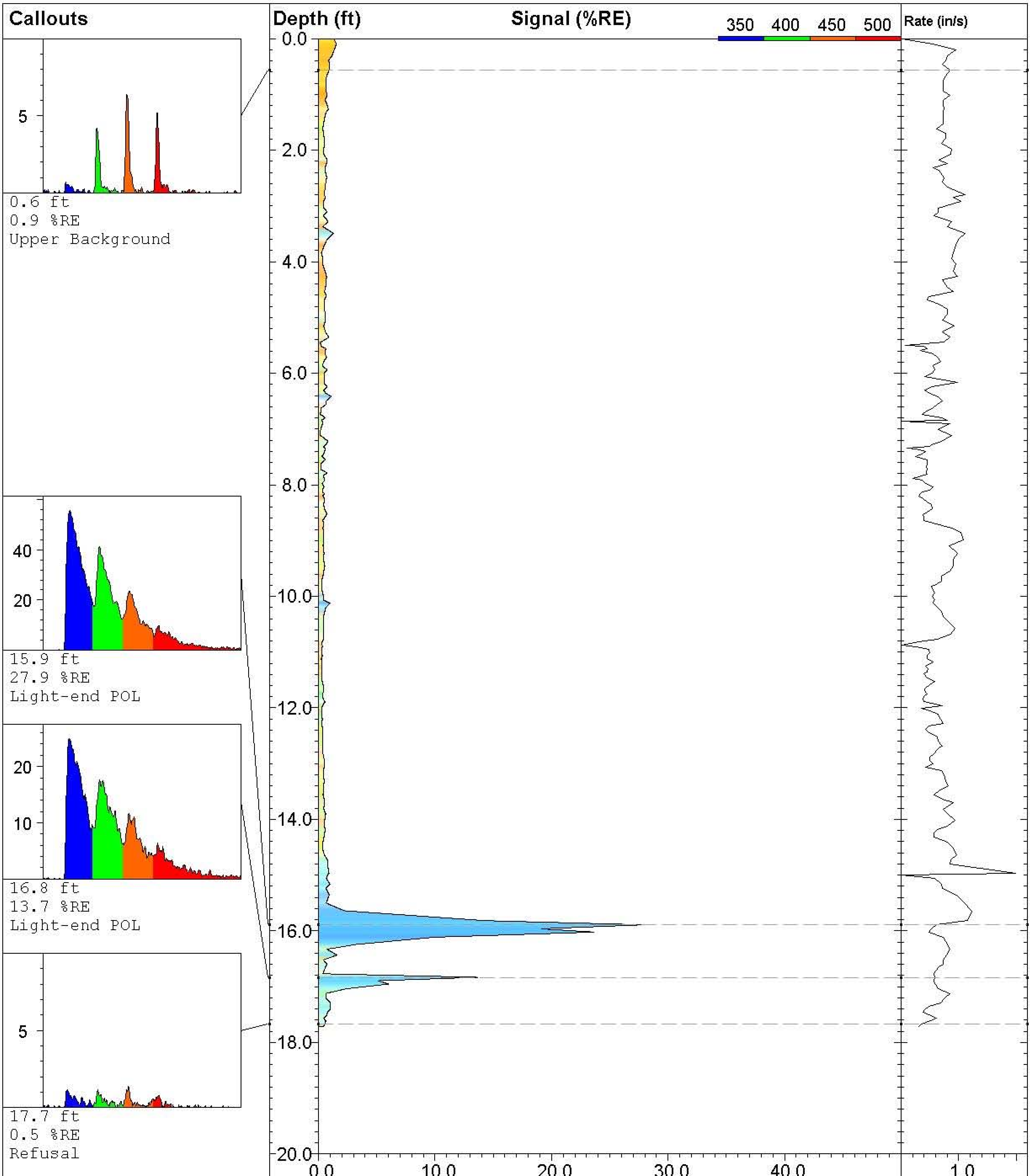
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.70 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **12.9 % @ 9.65 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-30 15:54 ADT**



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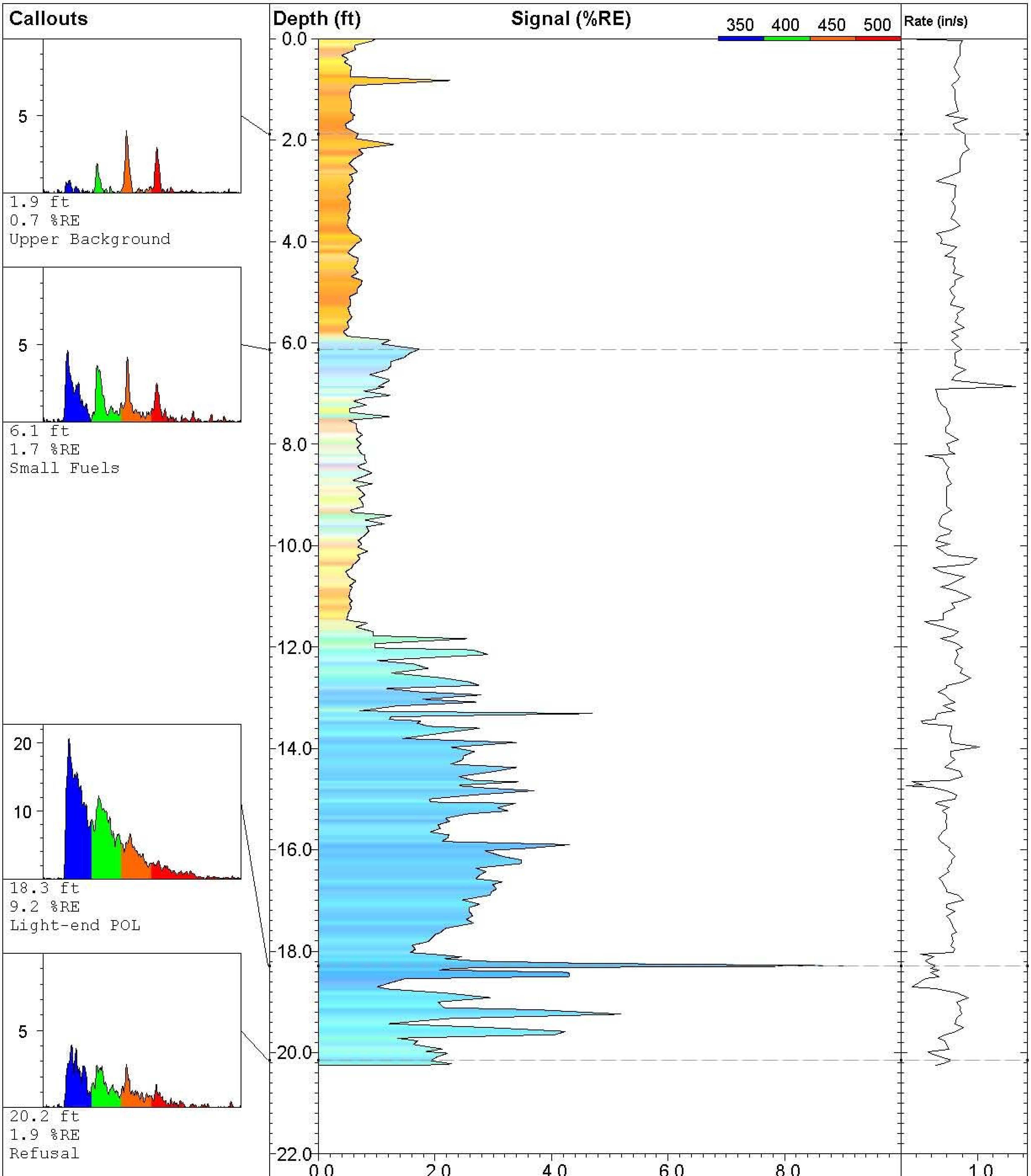
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.71 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **27.9 % @ 15.89 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-30 17:20 ADT**



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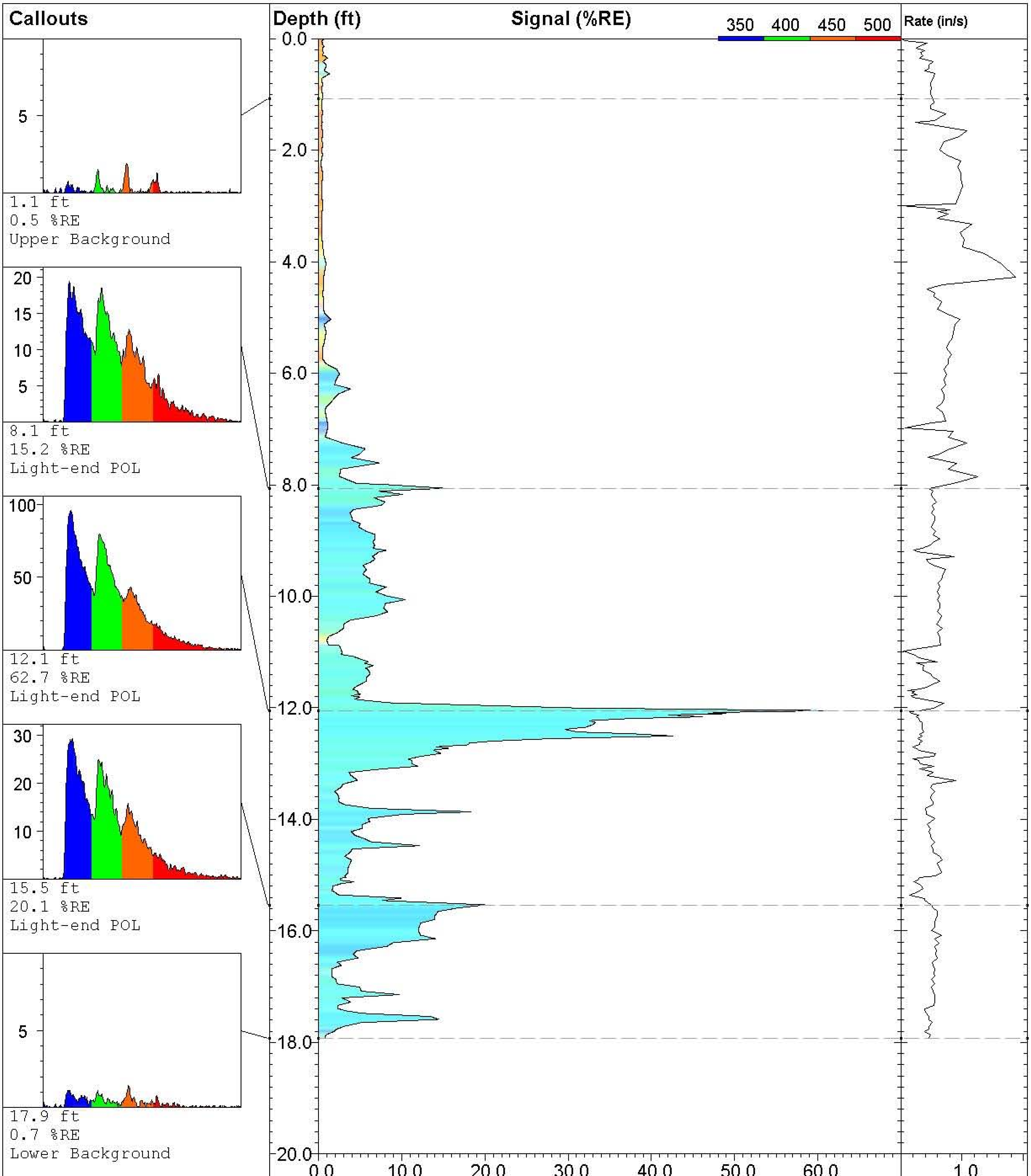
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.25 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **9.2 % @ 18.29 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-30 17:41 ADT**



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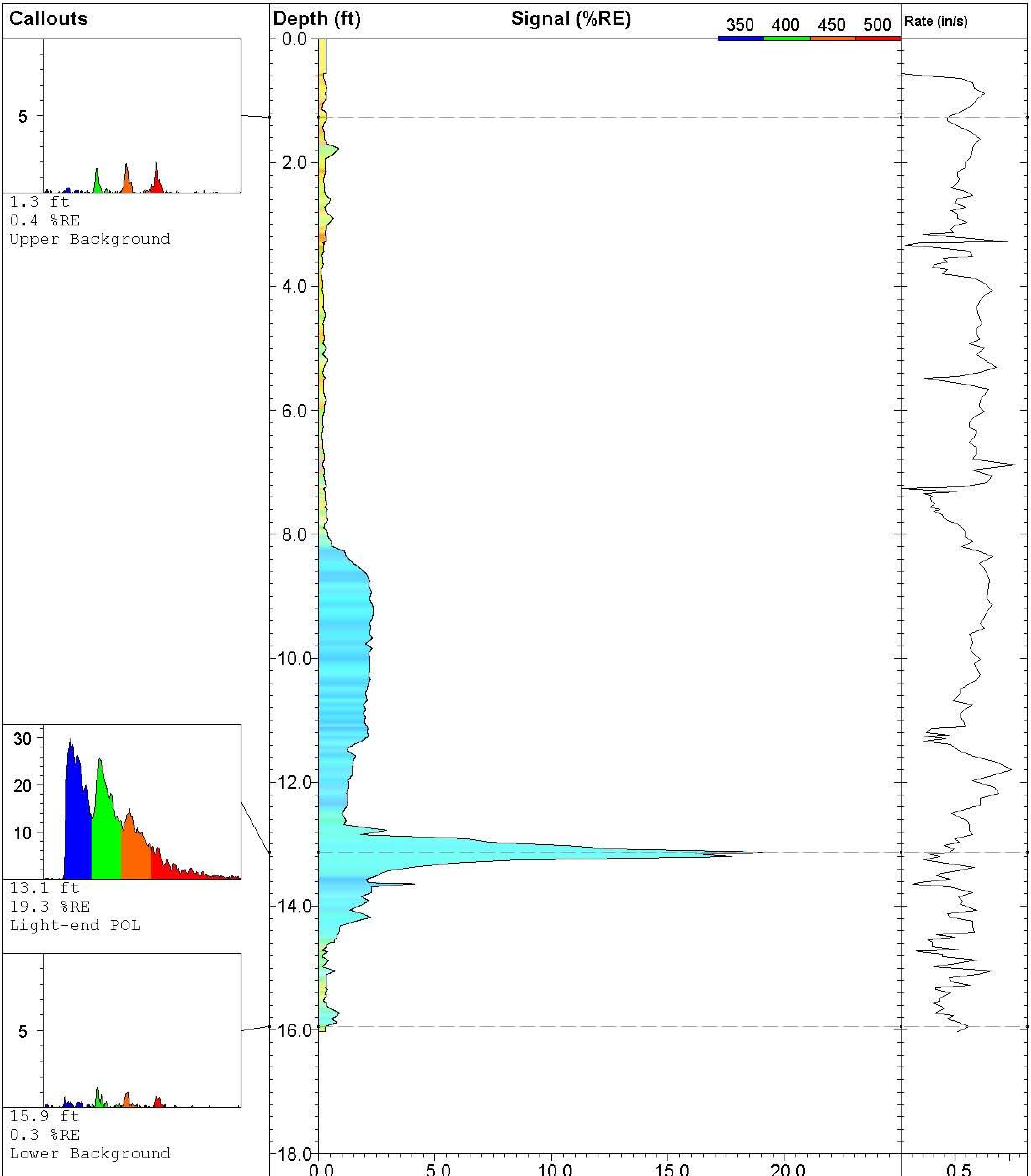
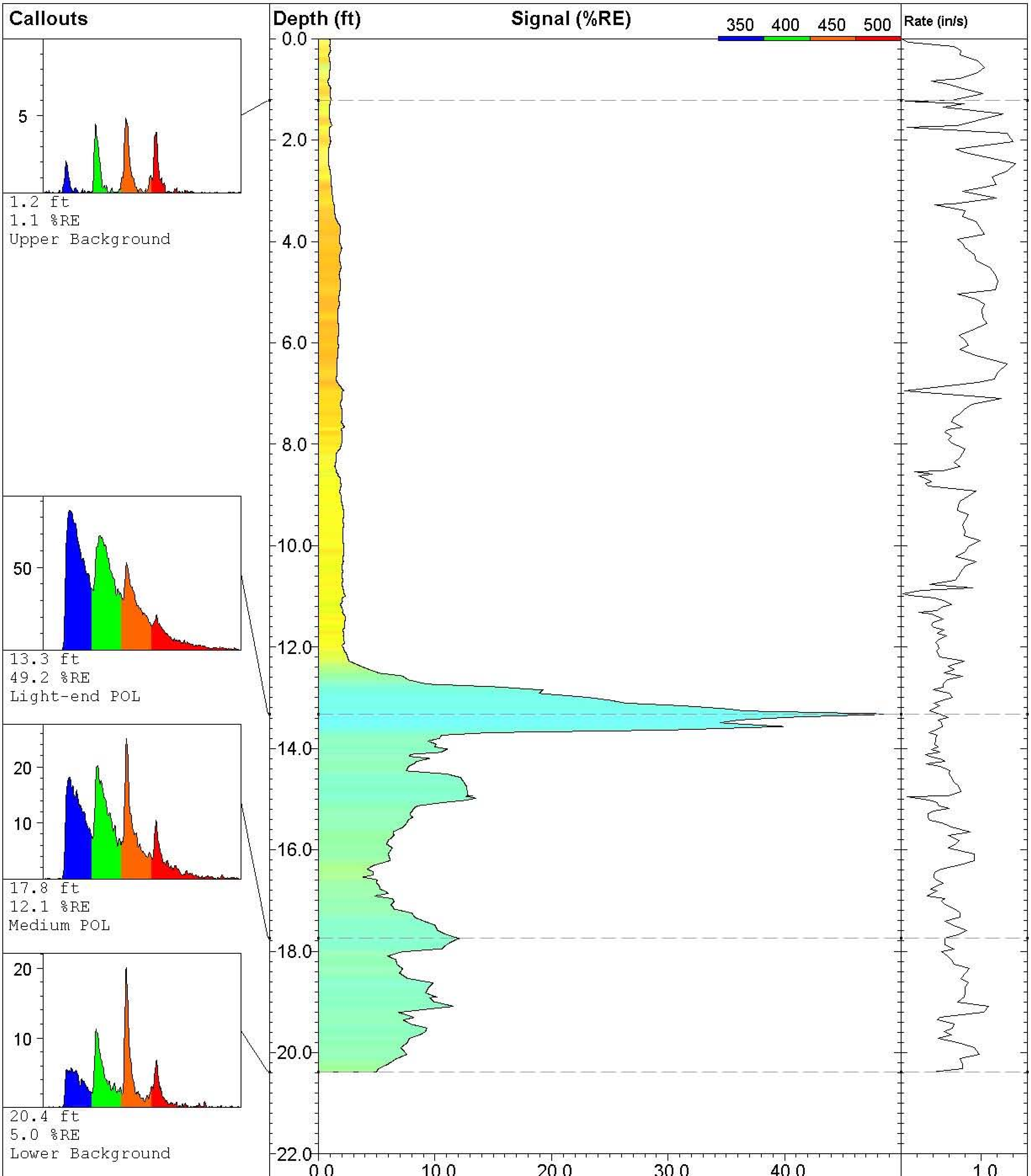
10NC27 UV-097

UVOST By Dakota
www.DakotaTechnologies.com

Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.92 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **62.7 % @ 12.05 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-31 08:48 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-098**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.02 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **19.3 % @ 13.13 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-31 09:35 ADT**



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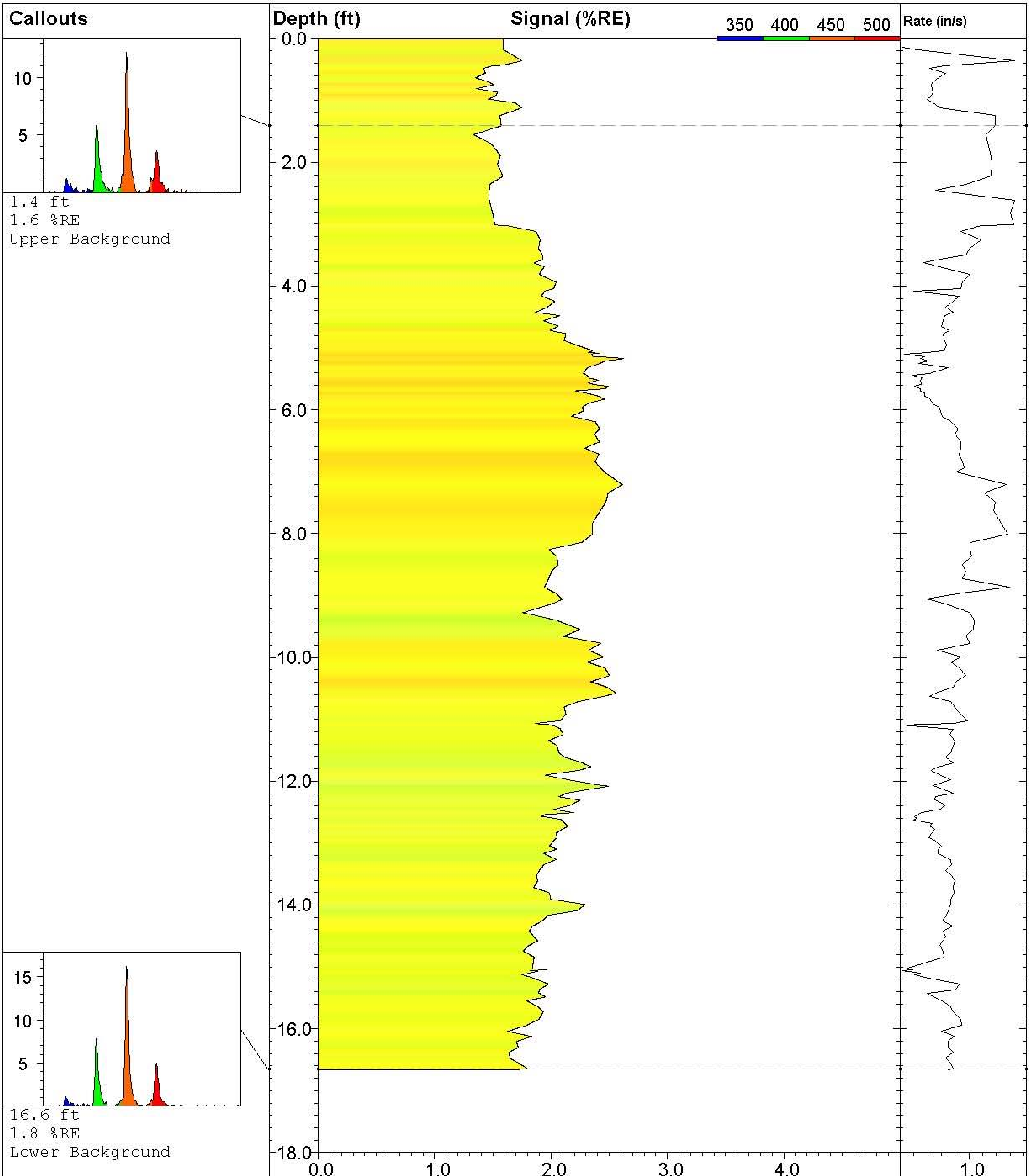
10NC27 UV-099

UVOST By Dakota
www.DakotaTechnologies.com

Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.39 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **49.2 % @ 13.32 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-31 14:24 ADT**



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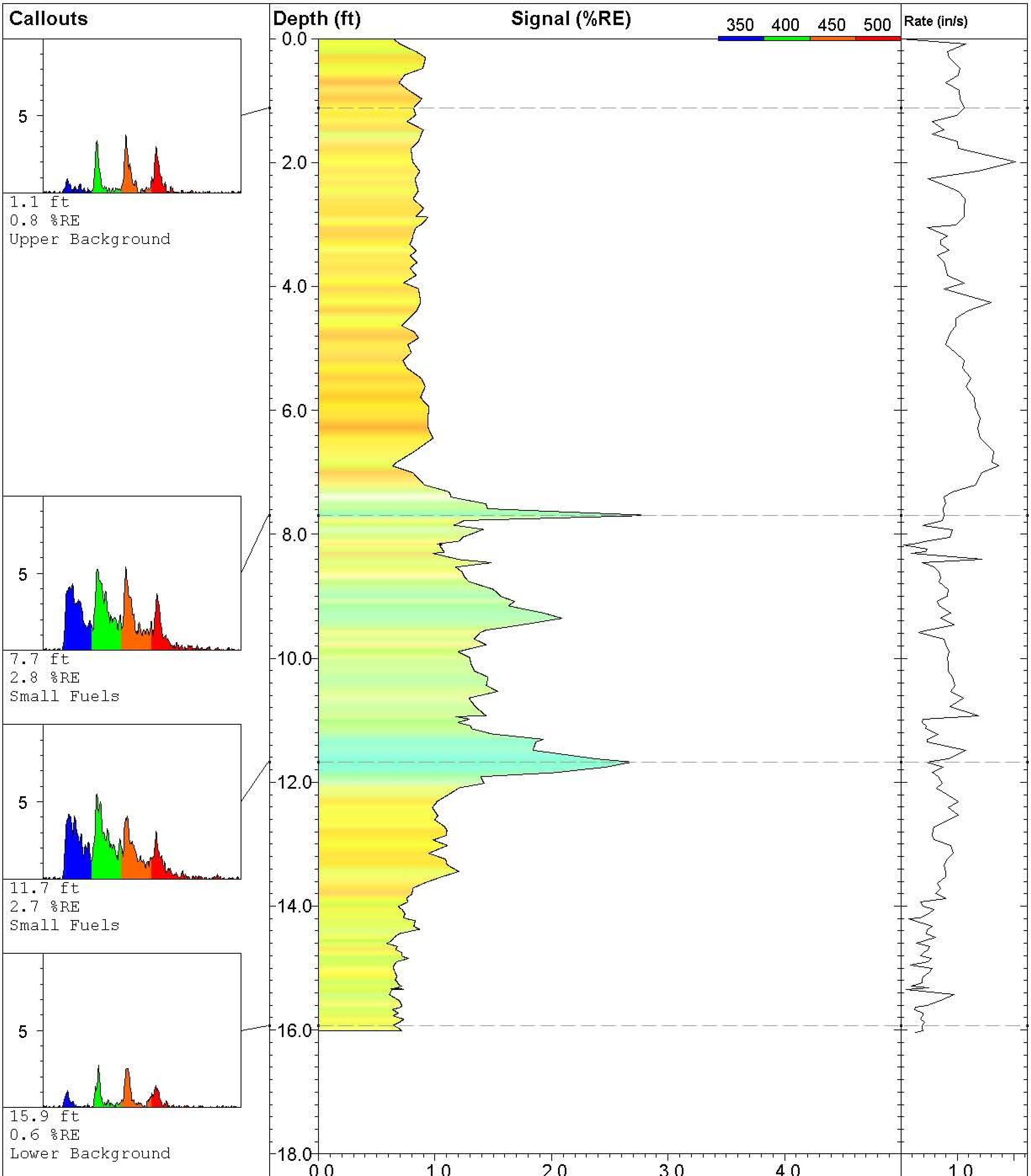
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.66 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.6 % @ 5.17 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-31 14:50 ADT**



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10NC27 UV-101

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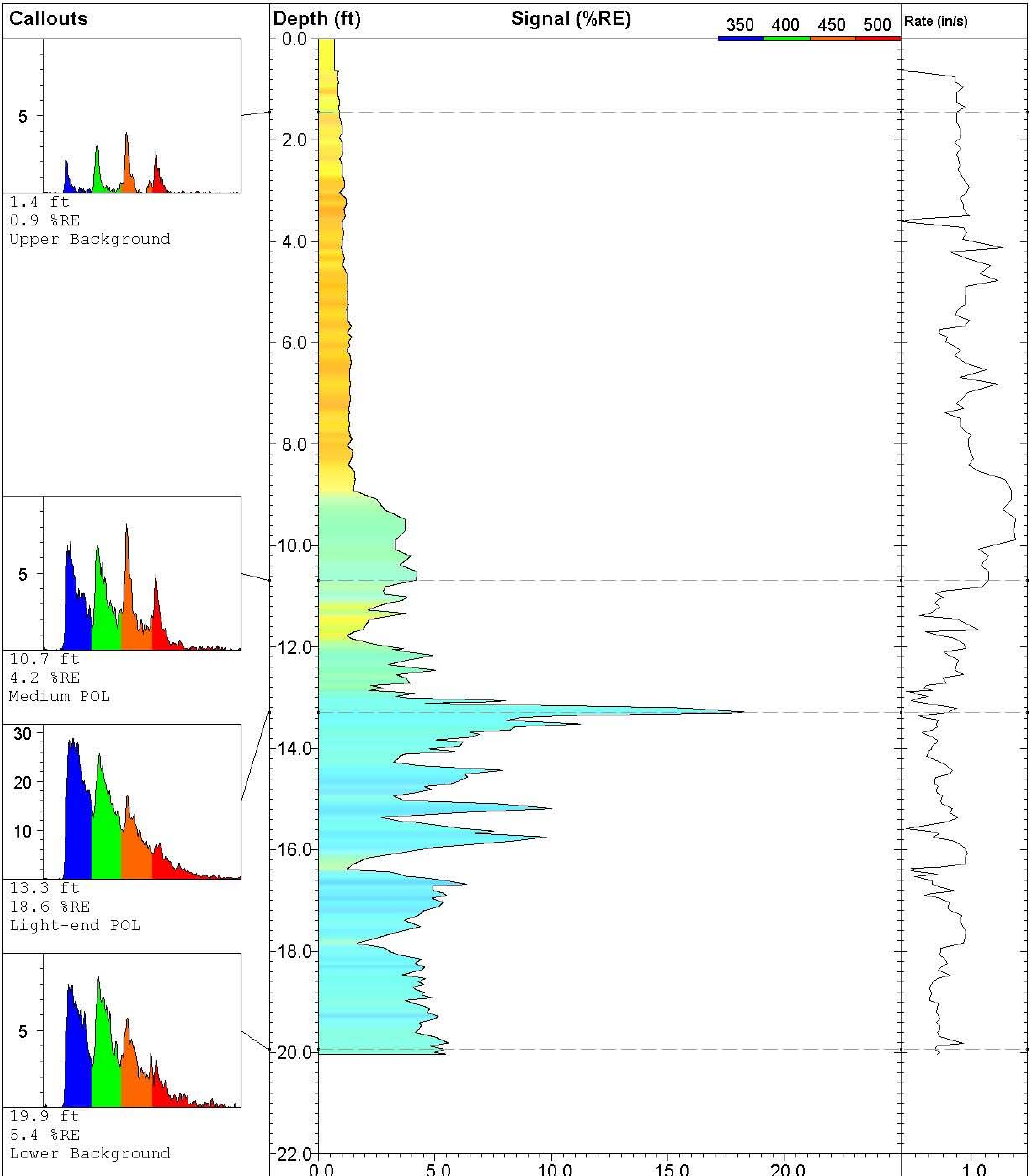
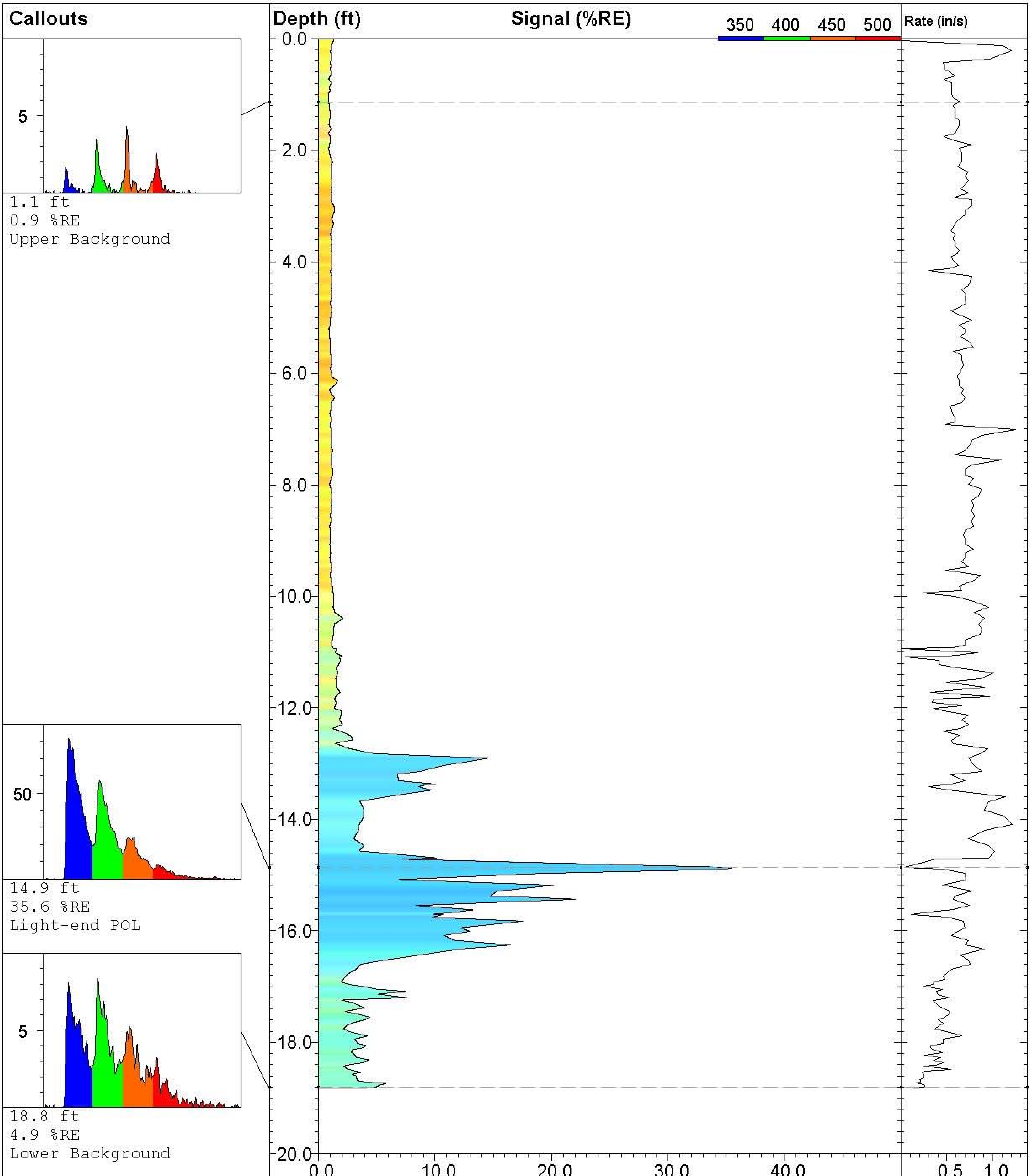
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.03 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.8 % @ 7.69 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-31 15:23 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-102**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.03 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **18.6 % @ 13.30 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-31 15:50 ADT**



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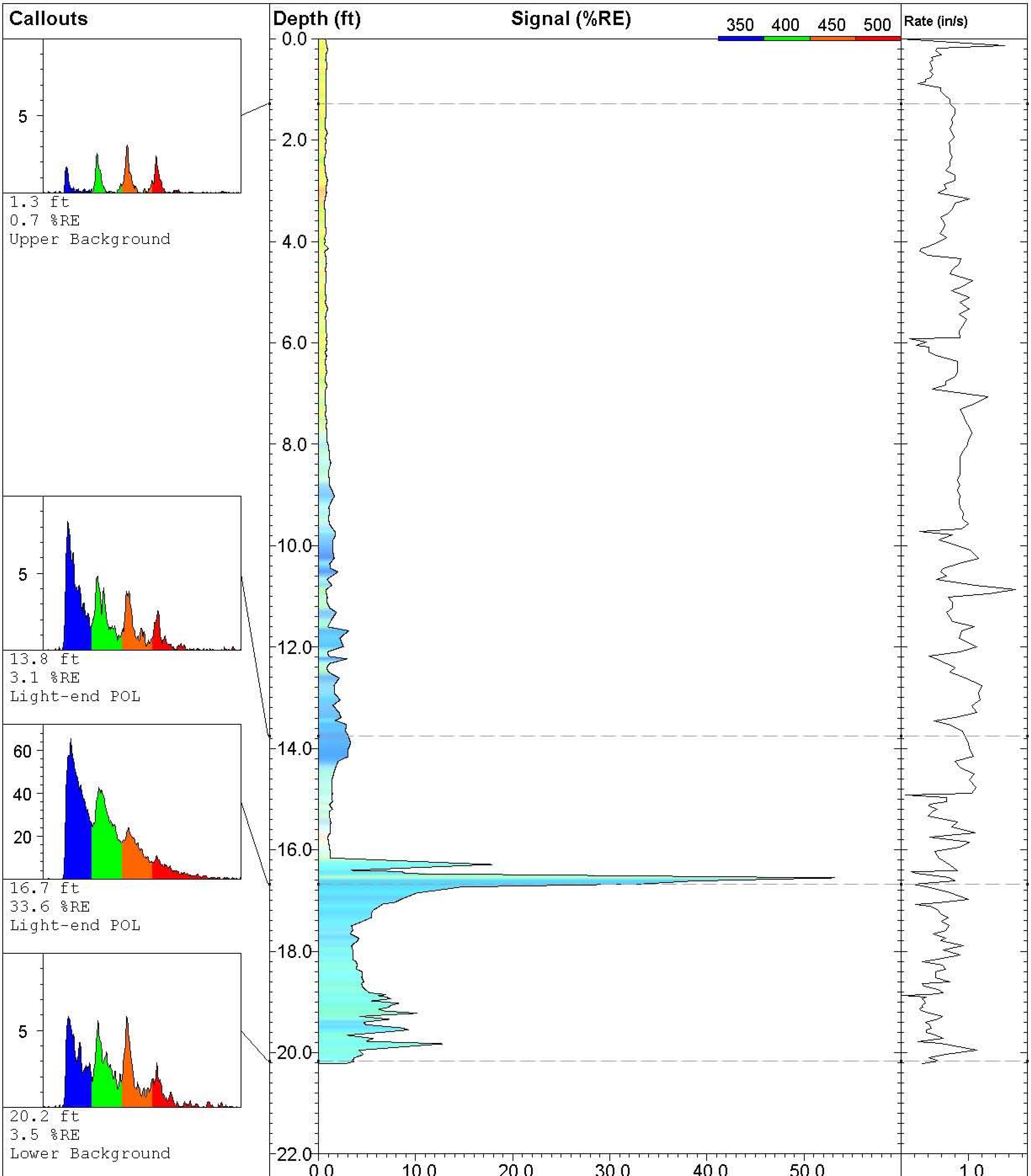
10NC27 UV-103

UVOST By Dakota
www.DakotaTechnologies.com

Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **18.82 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **35.6 % @ 14.87 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-07-31 18:59 ADT**



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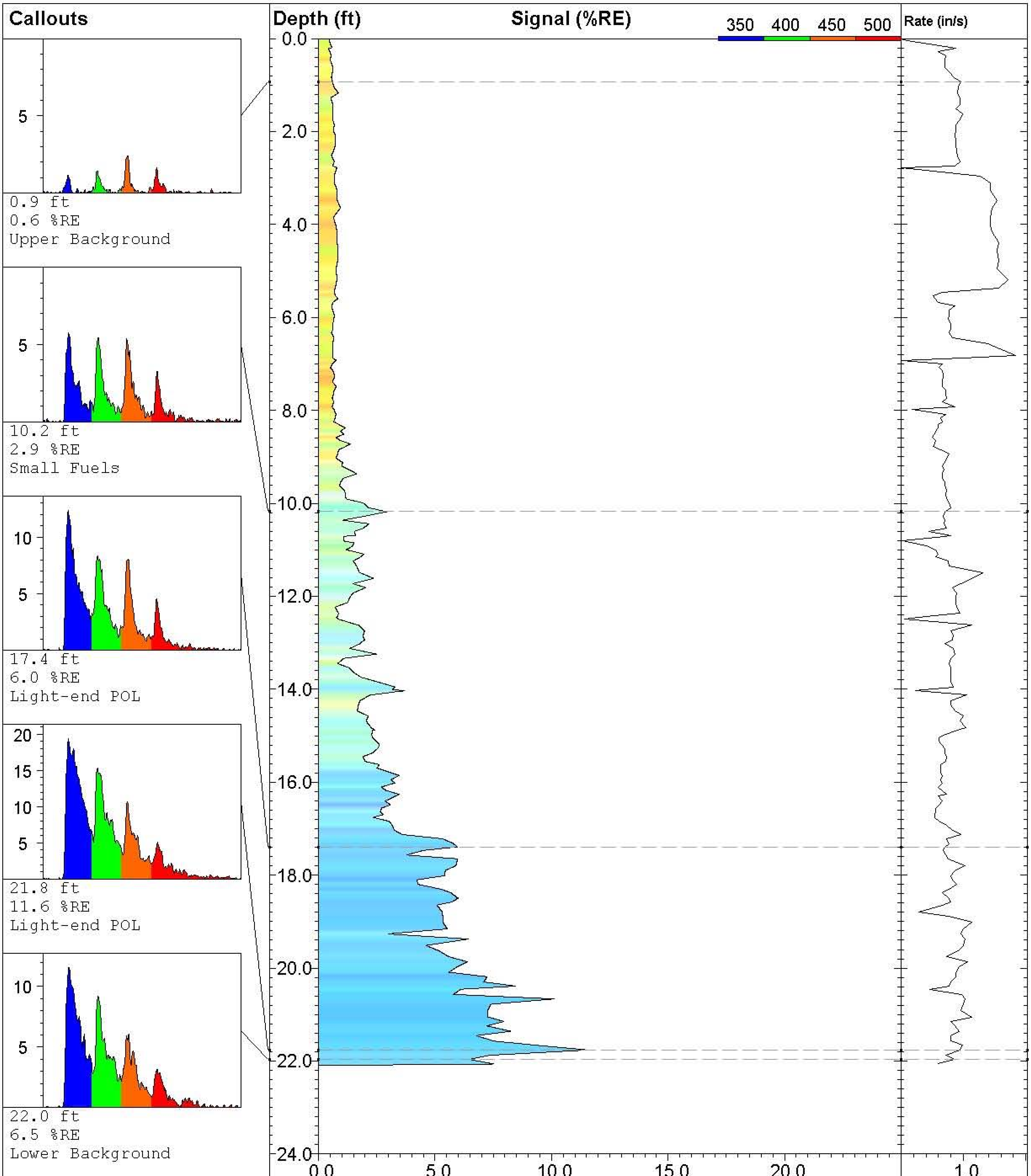
10NC27 UV-104

UVOST By Dakota
www.DakotaTechnologies.com

Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.21 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **53.1 % @ 16.55 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-01 10:19 ADT**



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10NC27 UV-105

UVOST By Dakota
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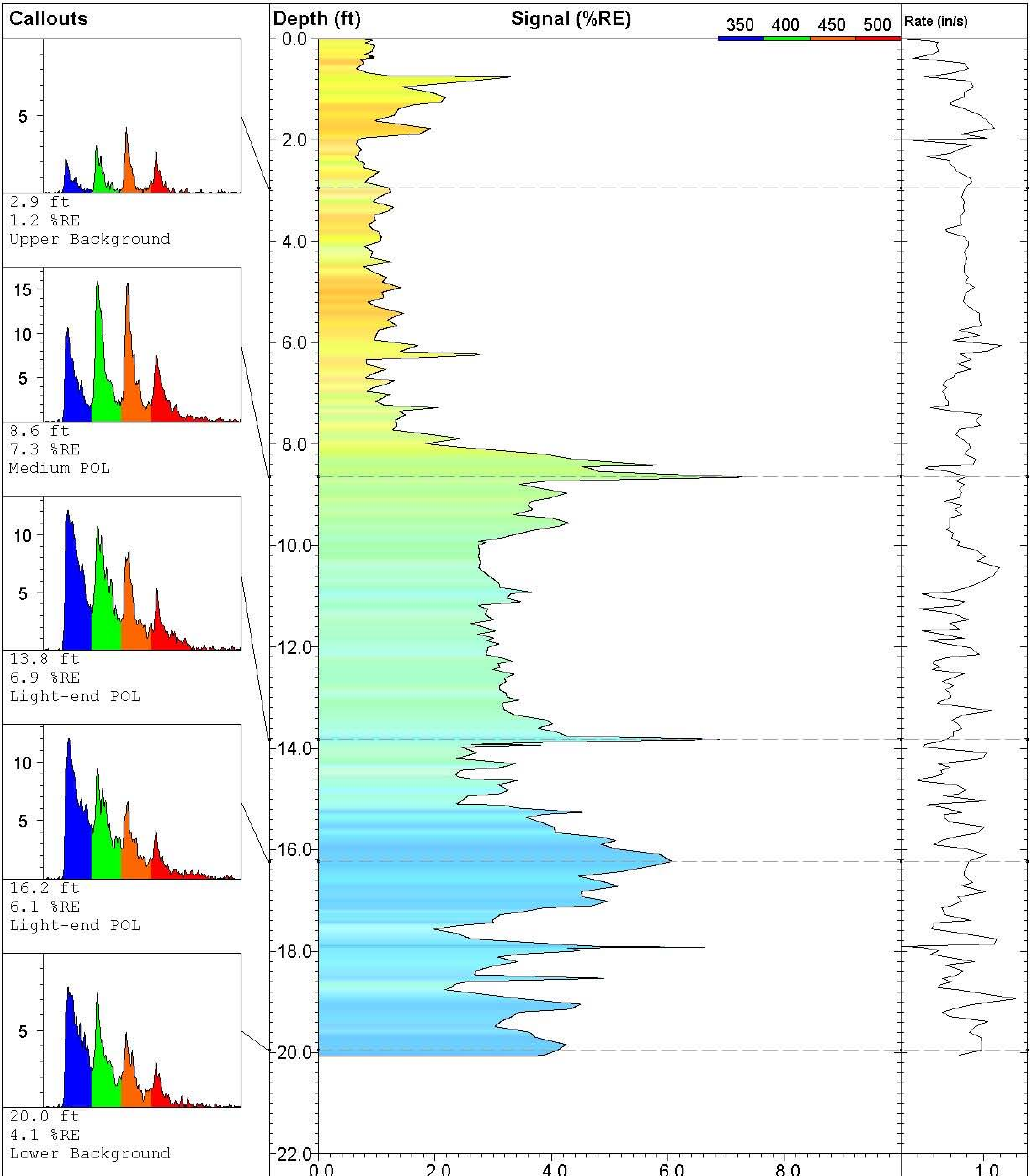
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **22.08 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **11.6 % @ 21.76 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-01 11:33 ADT**



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10NC27 UV-106

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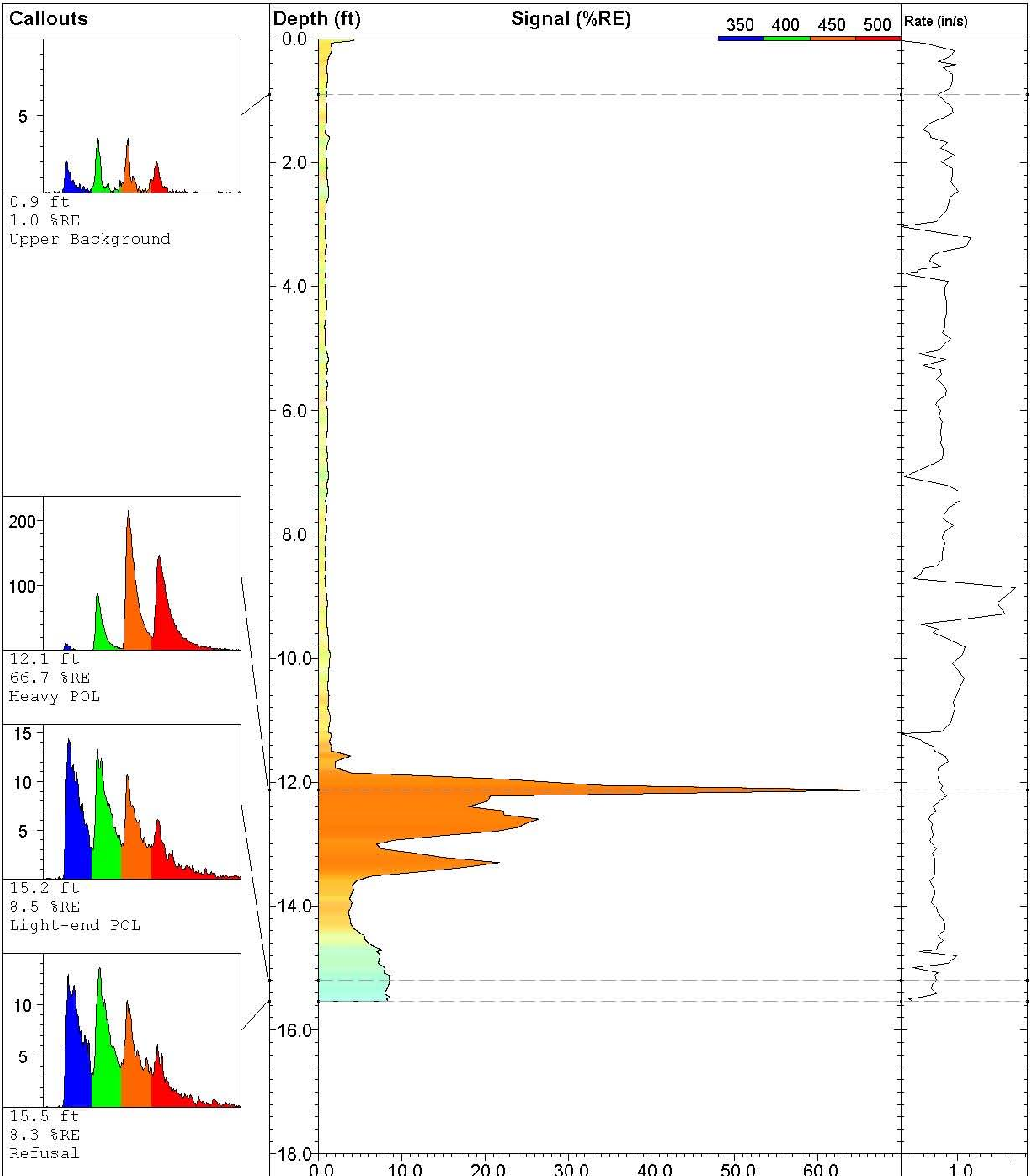
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.06 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **7.3 % @ 8.65 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-01 15:13 ADT**



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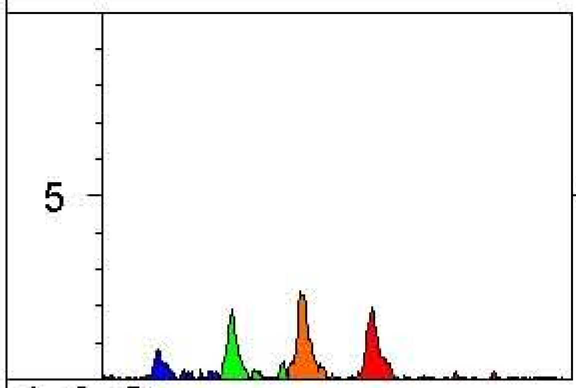
10NC27 UV-107

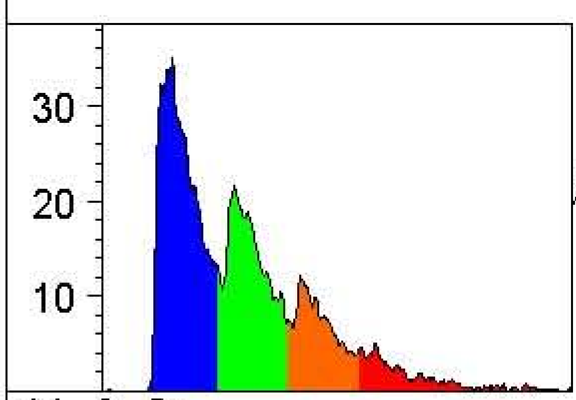
UVOST By Dakota
www.DakotaTechnologies.com

Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.53 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **66.7 % @ 12.13 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-01 15:42 ADT**

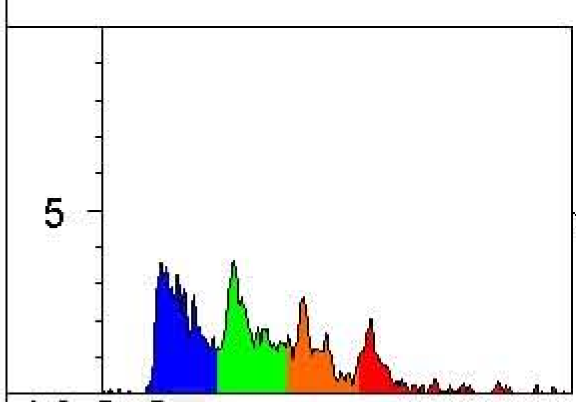
Callouts



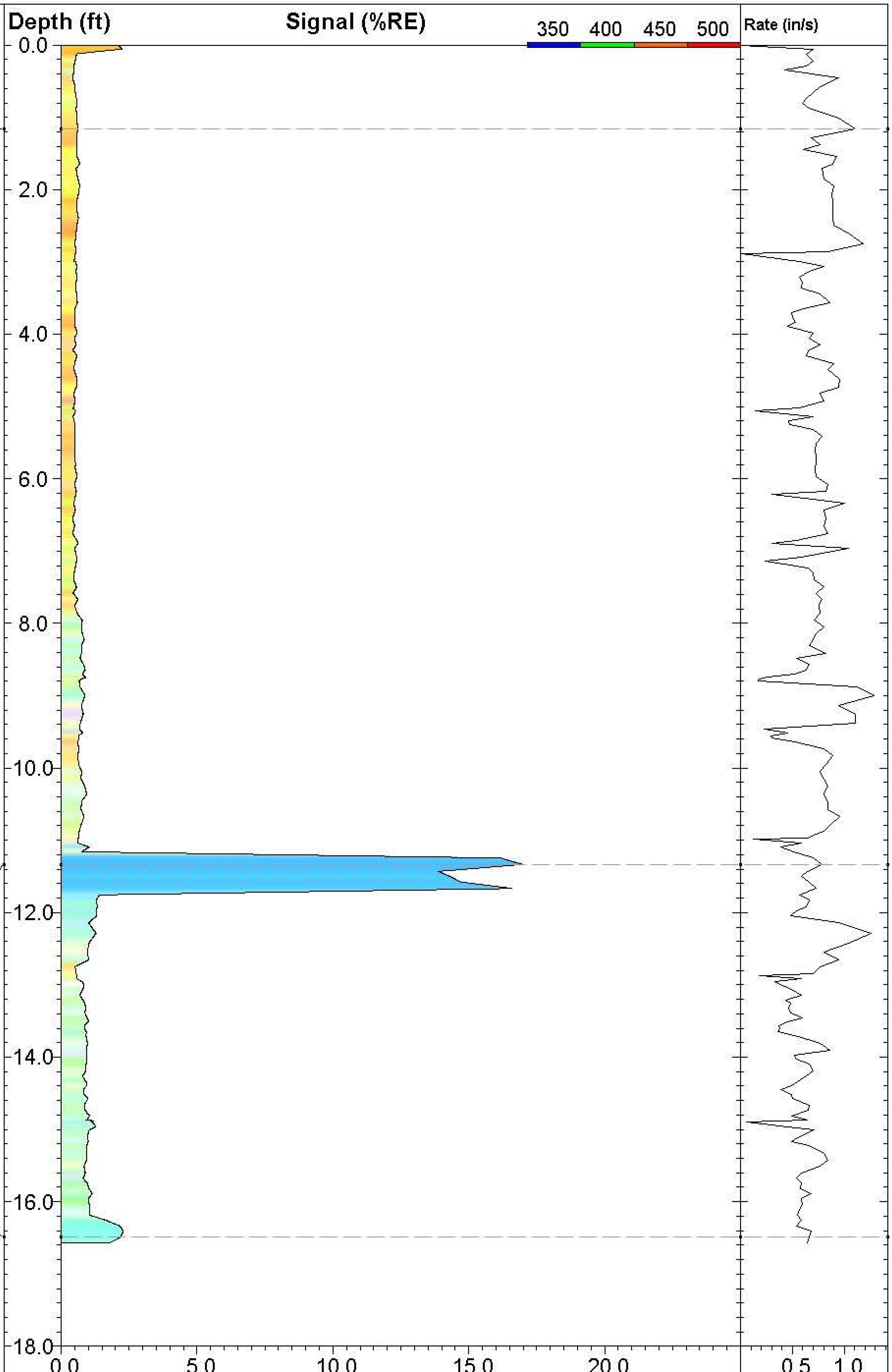
1.2 ft
0.6 %RE
Upper Background



11.3 ft
17.0 %RE
Light-end POL



16.5 ft
2.2 %RE
Refusal



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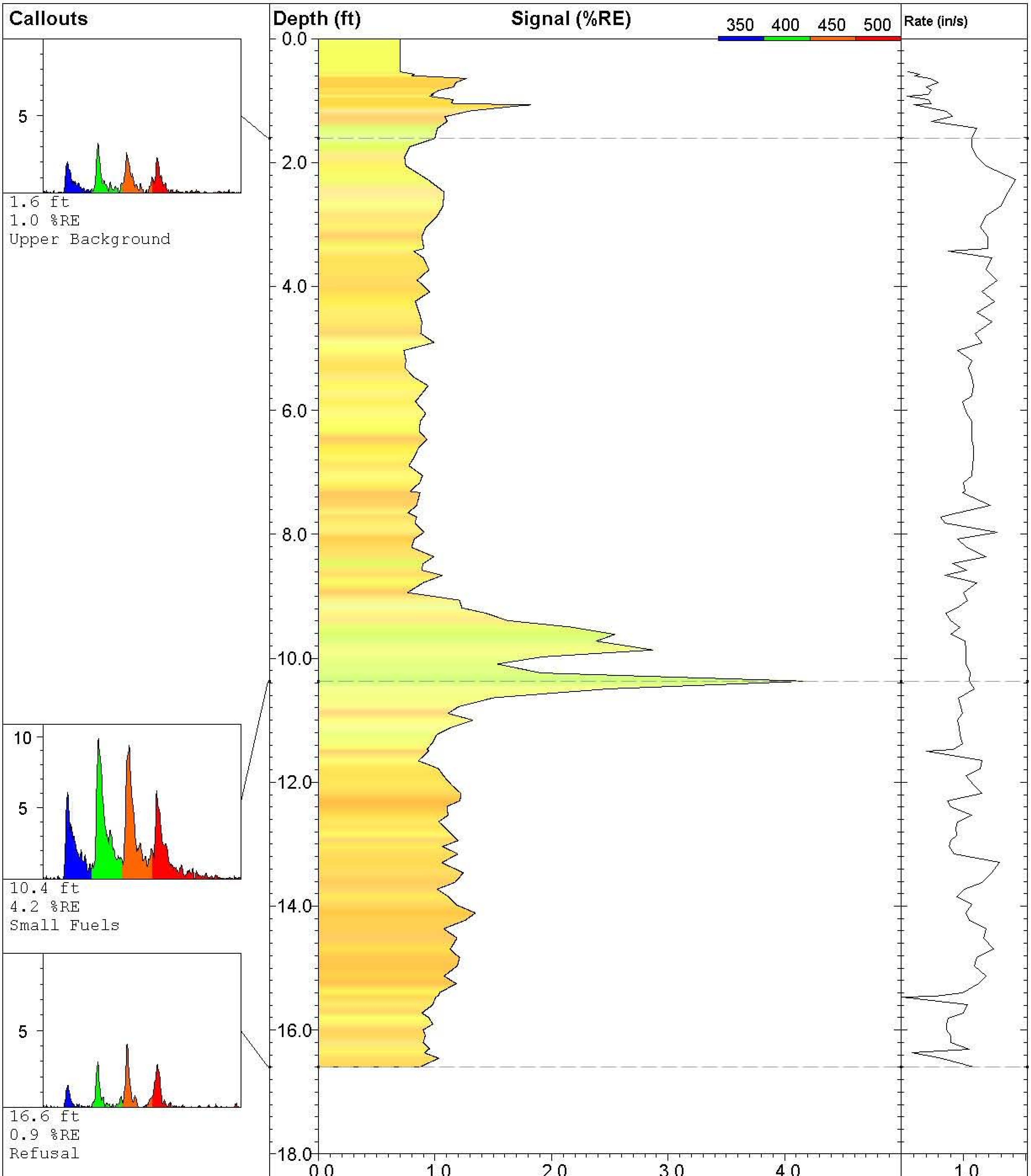
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.57 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **17.0 % @ 11.34 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-01 16:08 ADT**



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10NC27 UV-109

UVOST By Dakota
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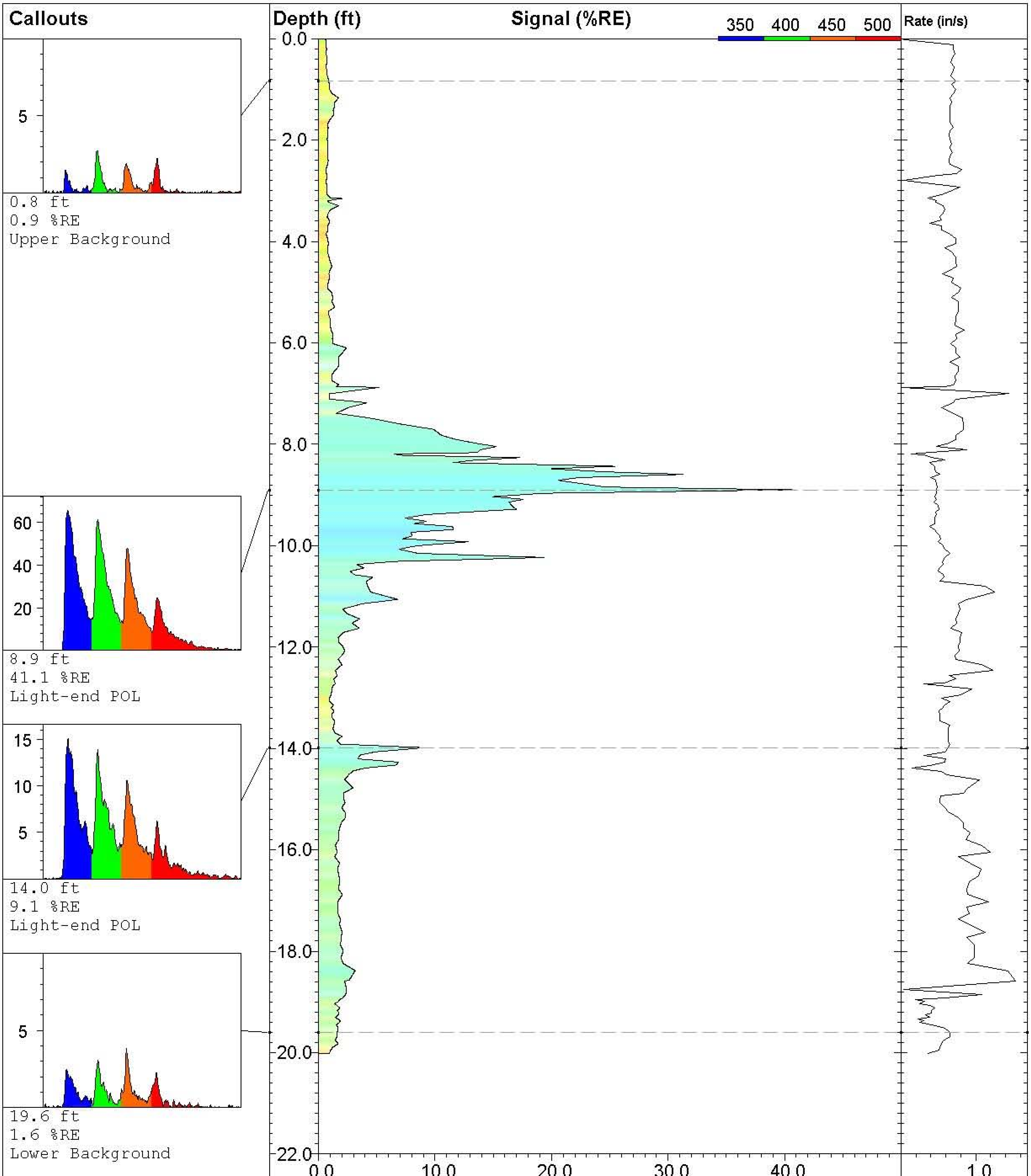
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.60 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **4.2 % @ 10.37 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-01 16:42 ADT**



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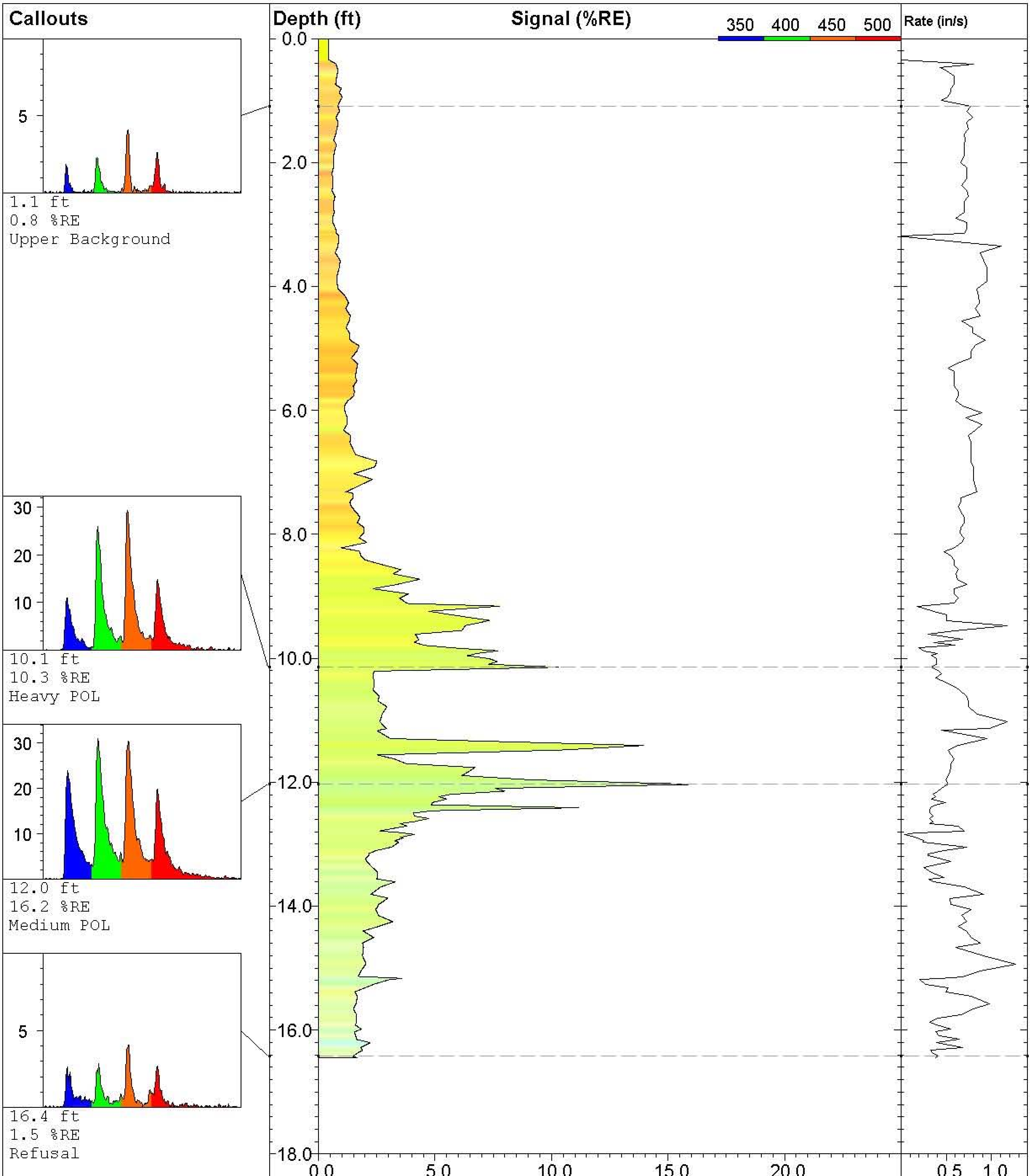
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.02 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **41.1 % @ 8.90 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-01 18:11 ADT**



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10NC27 UV-111

UVOST By Dakota
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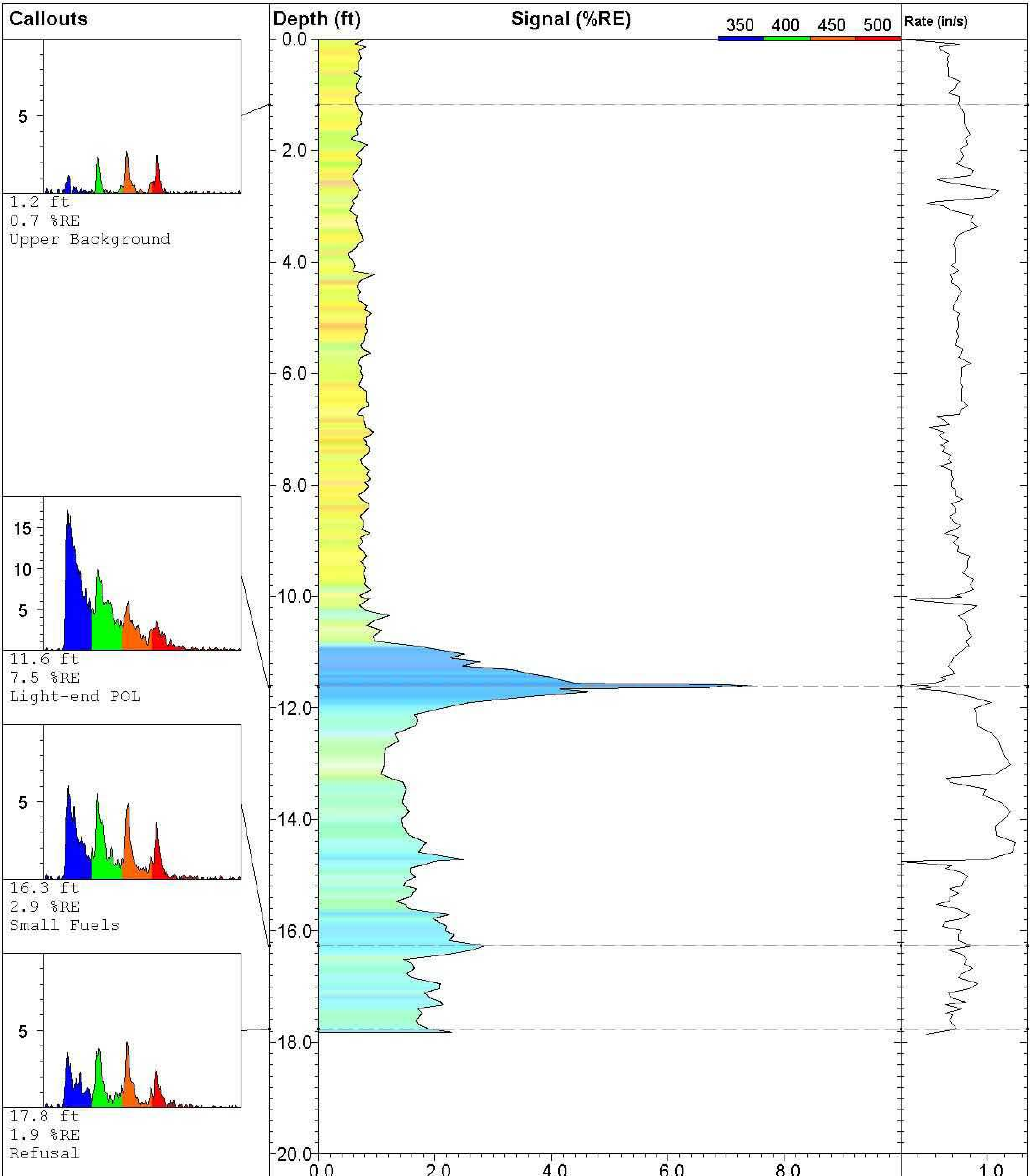
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.45 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **16.2 % @ 12.04 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-01 18:30 ADT**



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10NC27 UV-112

UVOST By Dakota
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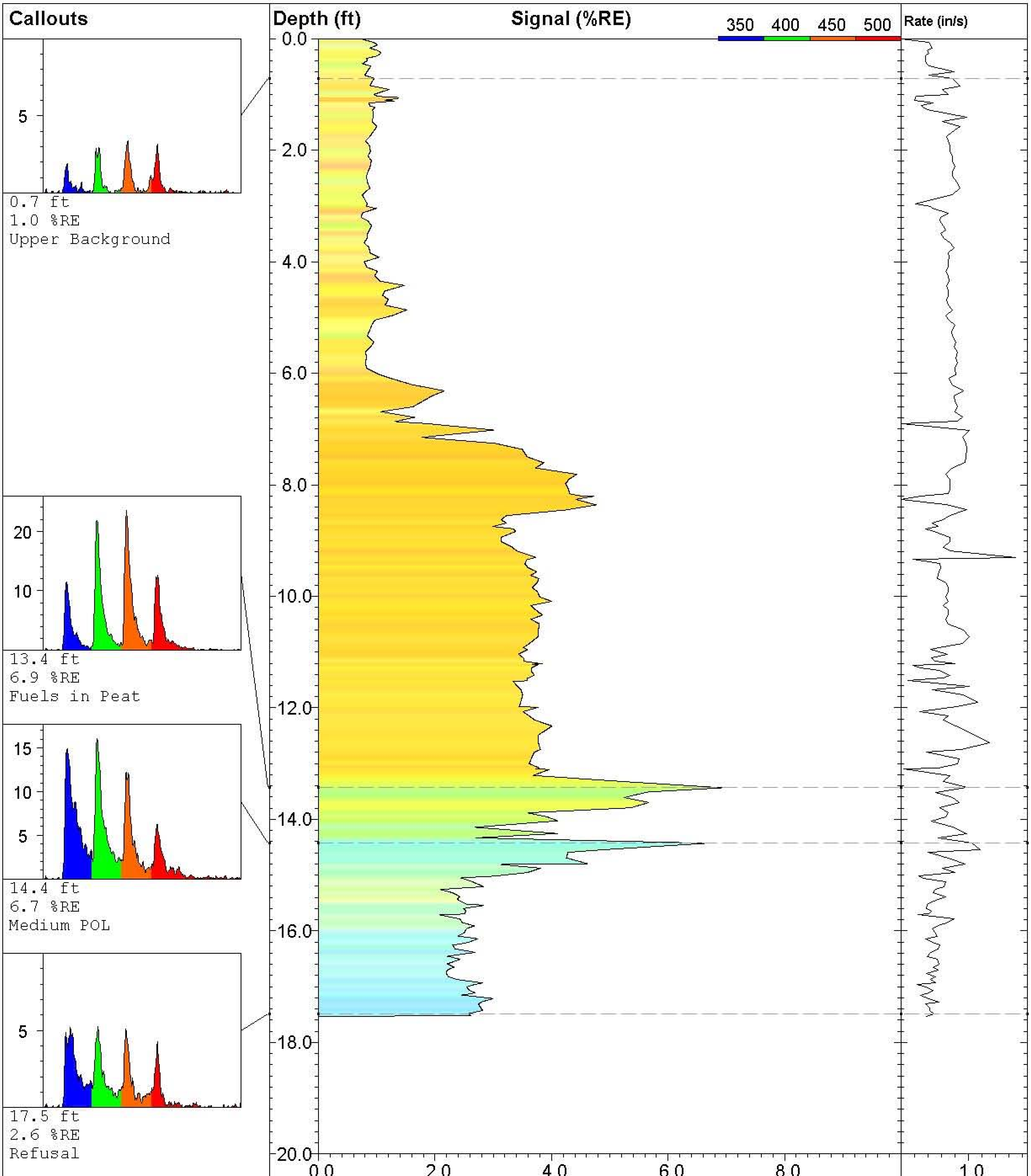
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.86 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **7.5 % @ 11.61 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-02 10:21 ADT**



10NC27 UV-113

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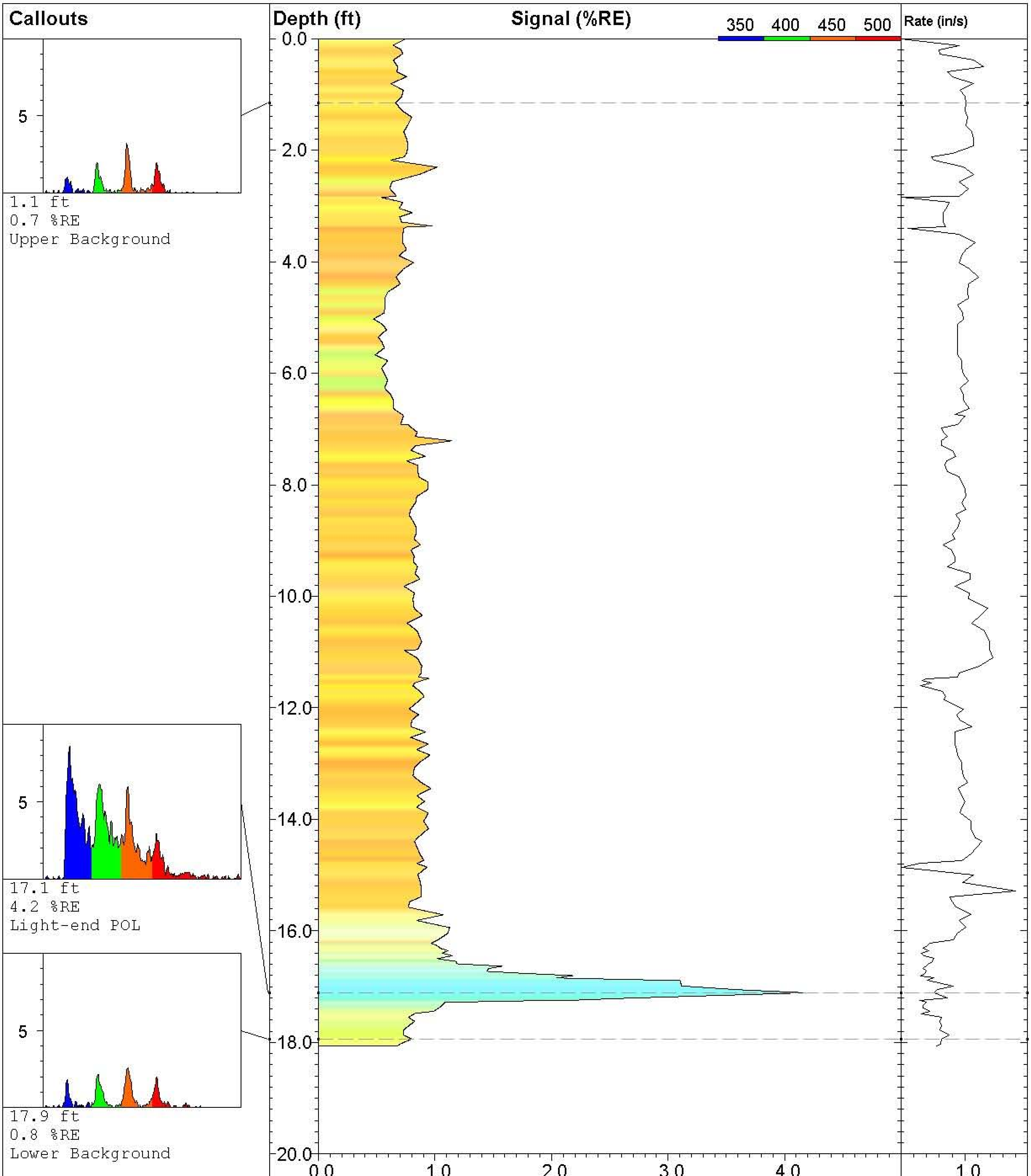
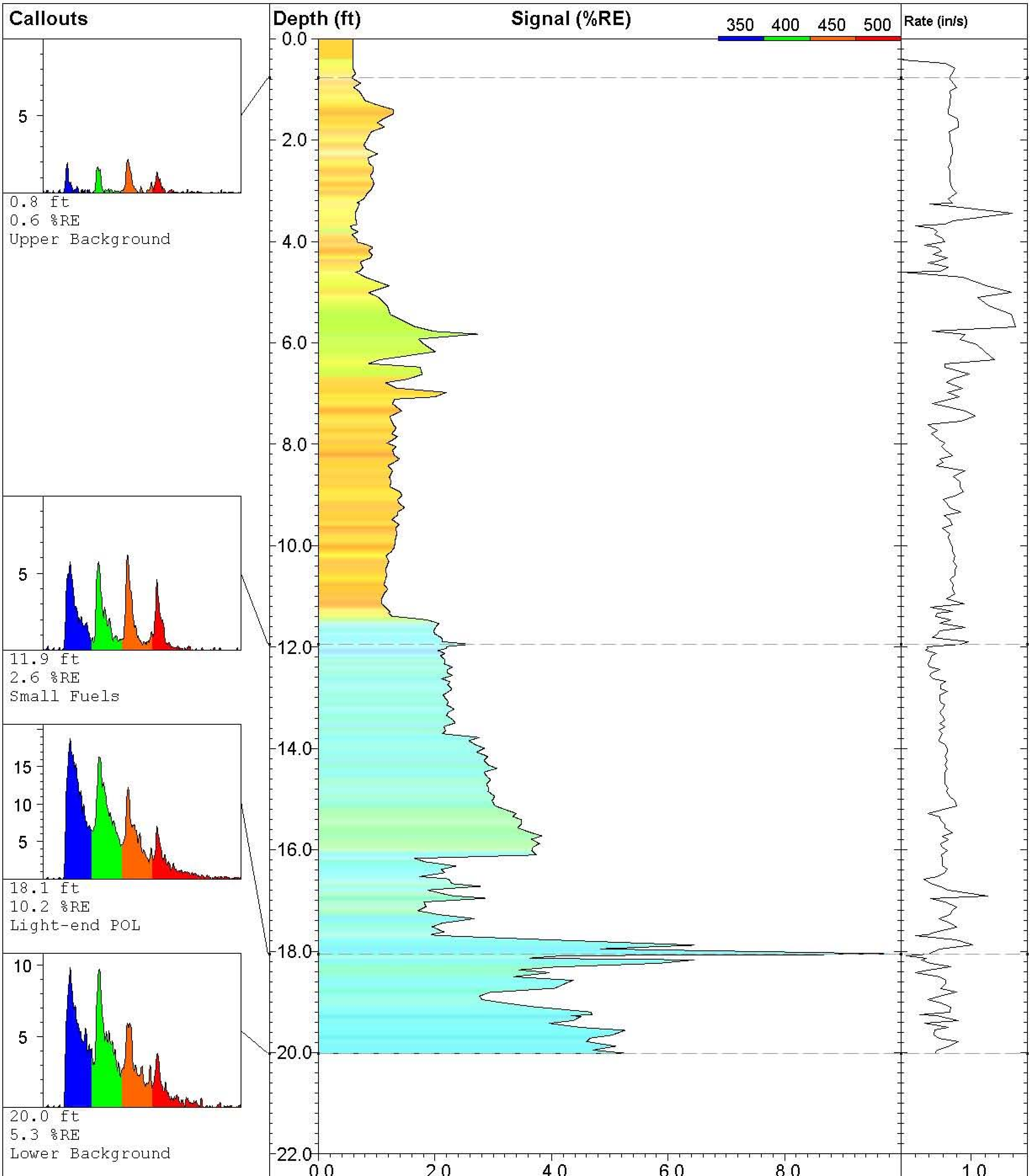
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.53 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **6.9 % @ 13.43 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-02 11:07 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-114**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **18.06 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **4.2 % @ 17.11 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-02 14:32 ADT**



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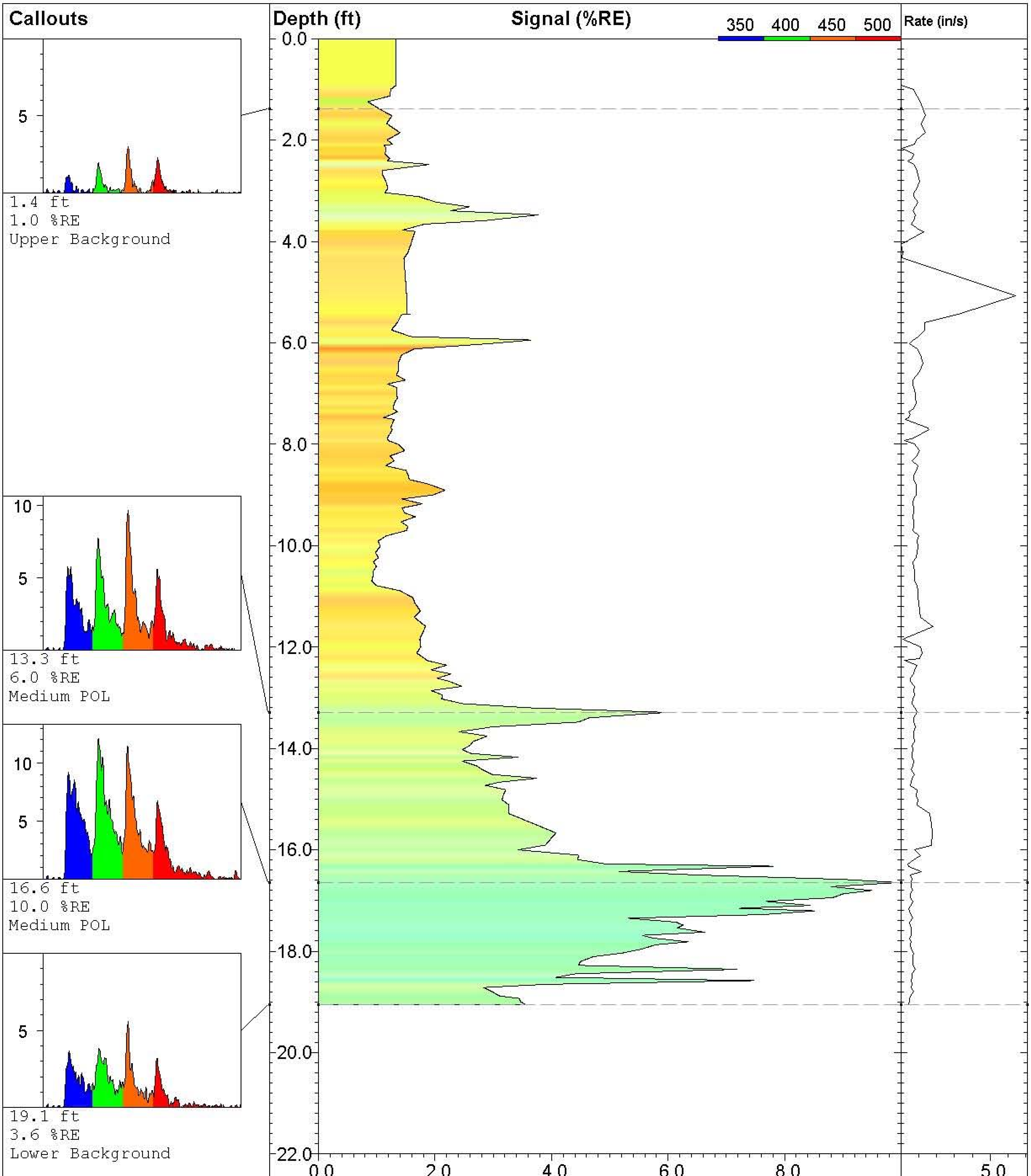
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.02 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **10.2 % @ 18.06 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-02 14:48 ADT**



10NC27 UV-116		**UVOST By Dakota** www.DakotaTechnologies.com
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **19.06 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **10.0 % @ 16.65 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-02 15:10 ADT**

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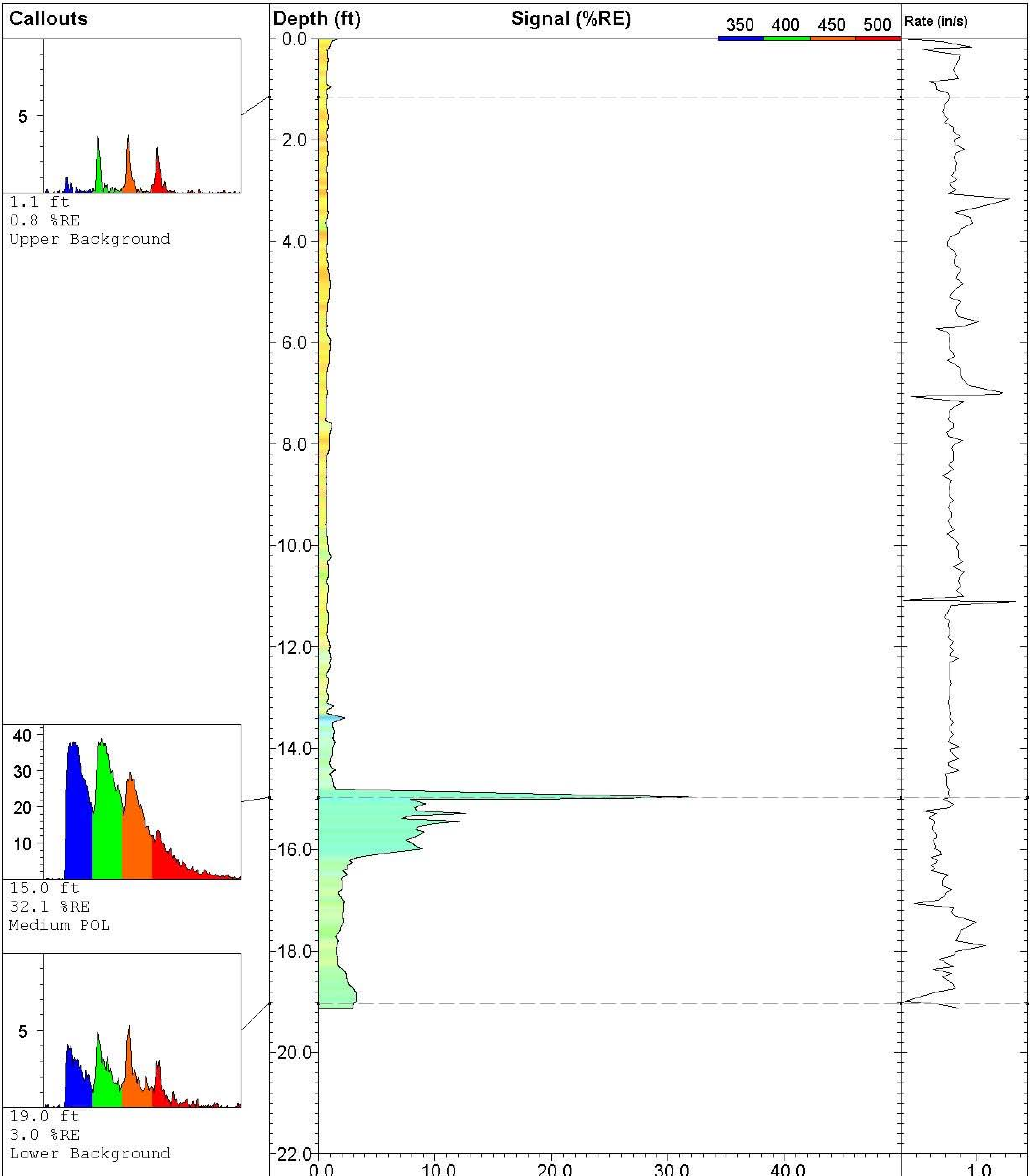

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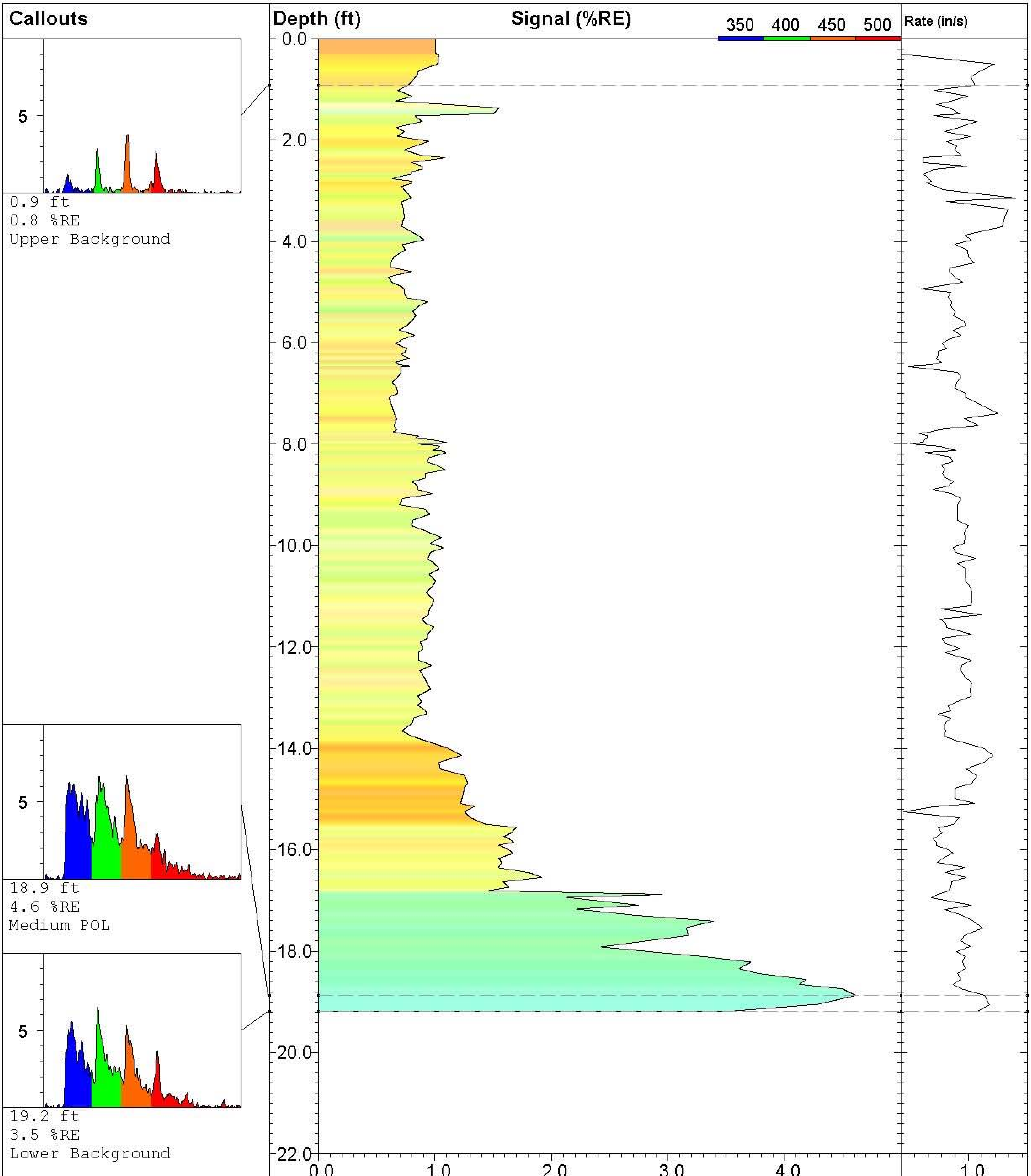
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **19.14 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **32.1 % @ 14.96 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-02 15:34 ADT**



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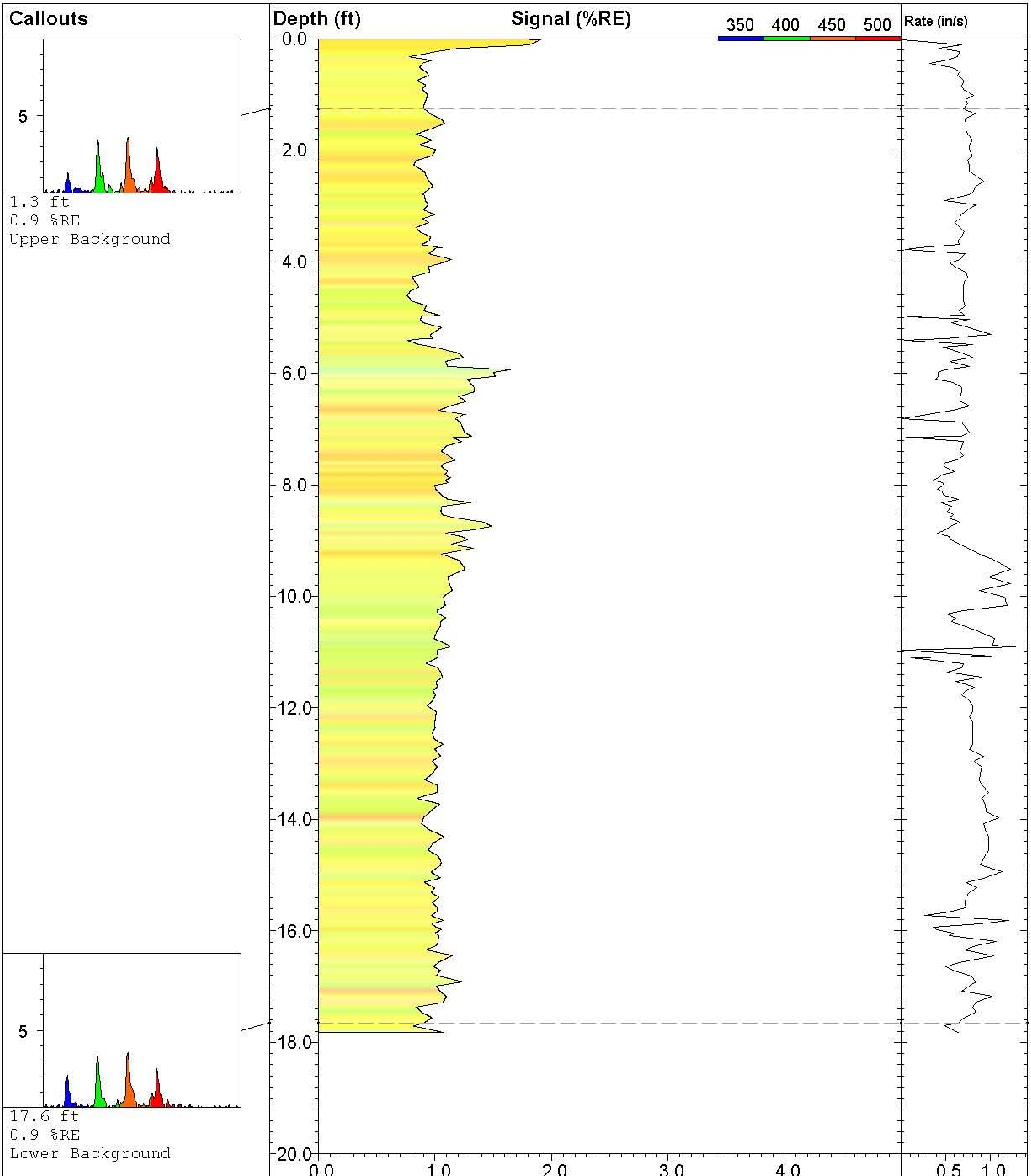
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **19.19 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **4.6 % @ 18.87 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-02 15:53 ADT**



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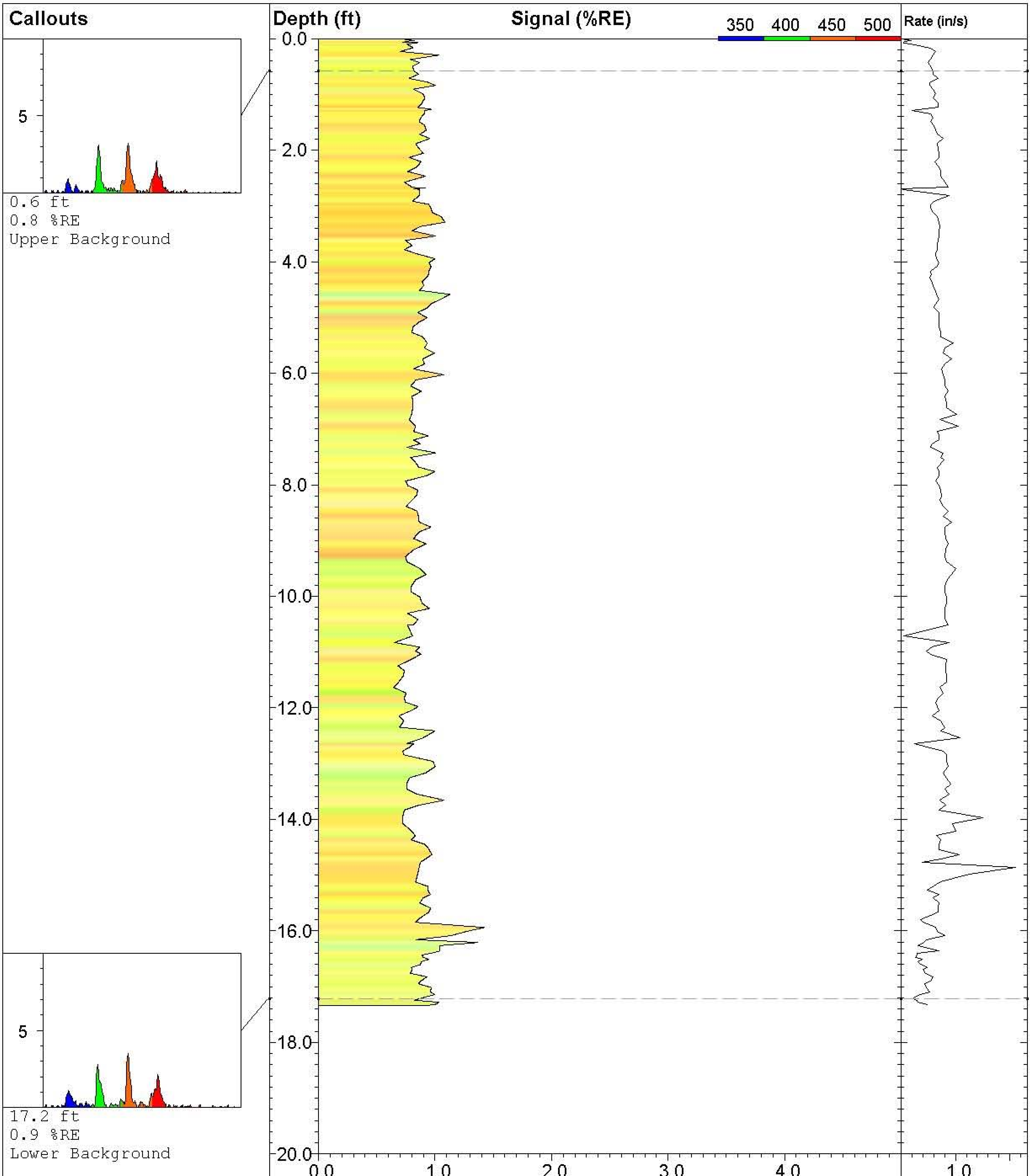
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.82 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.9 % @ 0.02 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-02 16:15 ADT**



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10NC27 UV-120

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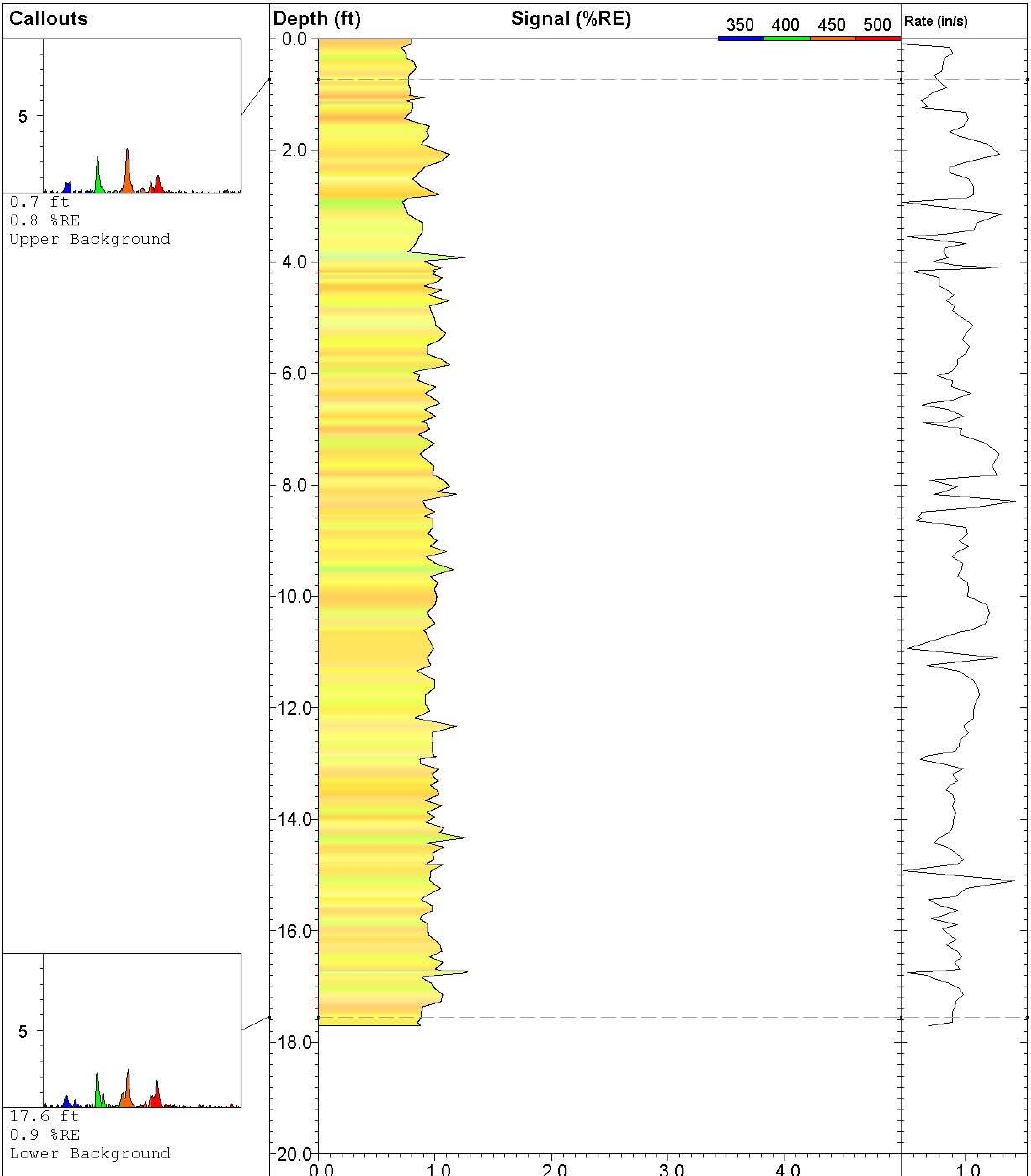
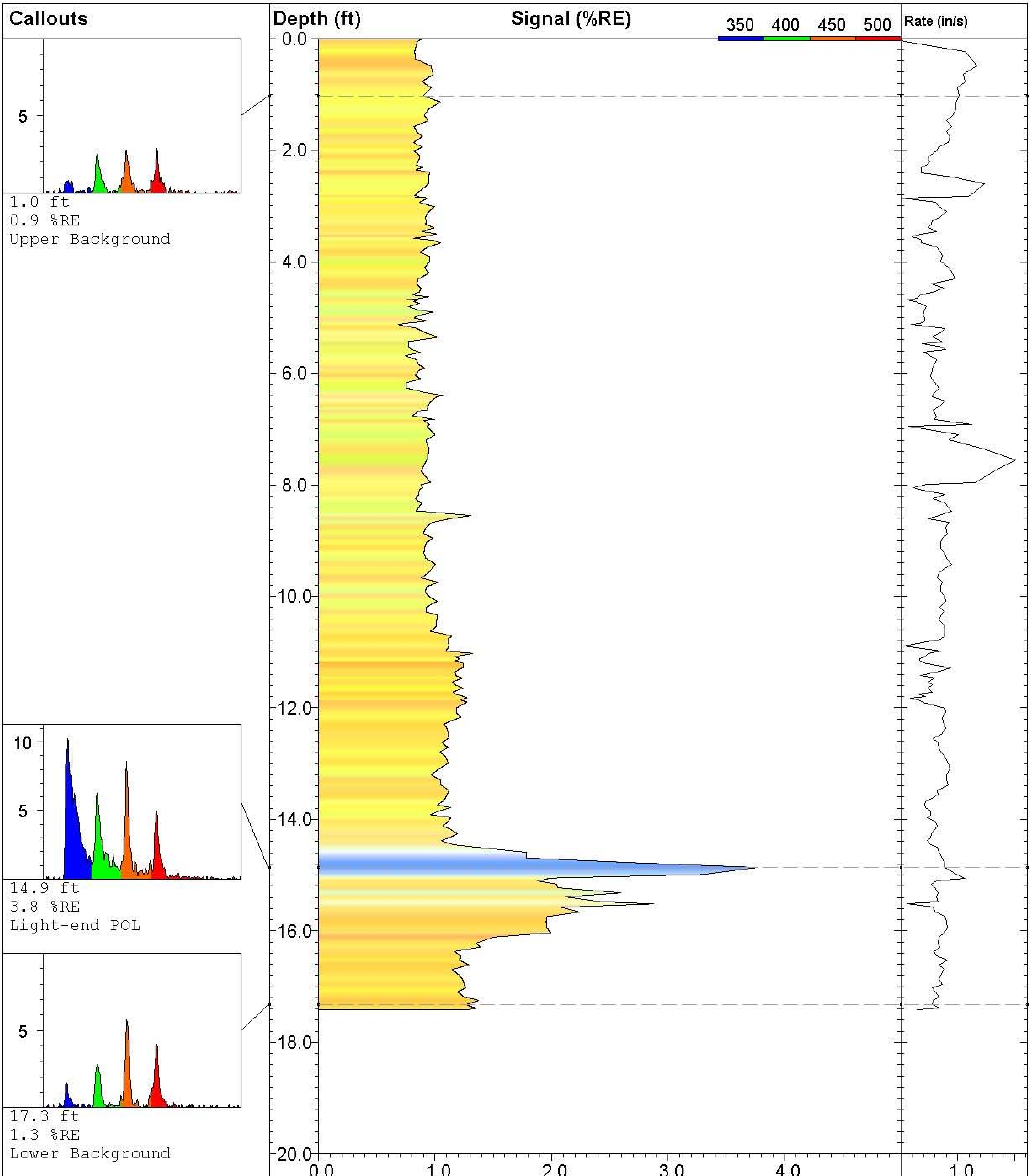
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.34 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.4 % @ 15.94 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-02 16:35 ADT**



Hammer Environmental Services	10NC27 UV-121		UVOST By Dakota www.DakotaTechnologies.com
PO Box 872804	*Site:* **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.70 ft**
Wasilla, Alaska 99687 (907) 841-2216	*Client:* **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.3 % @ 16.73 ft**
www.hammerenvironmental.com	*Job:*	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-02 16:55 ADT**



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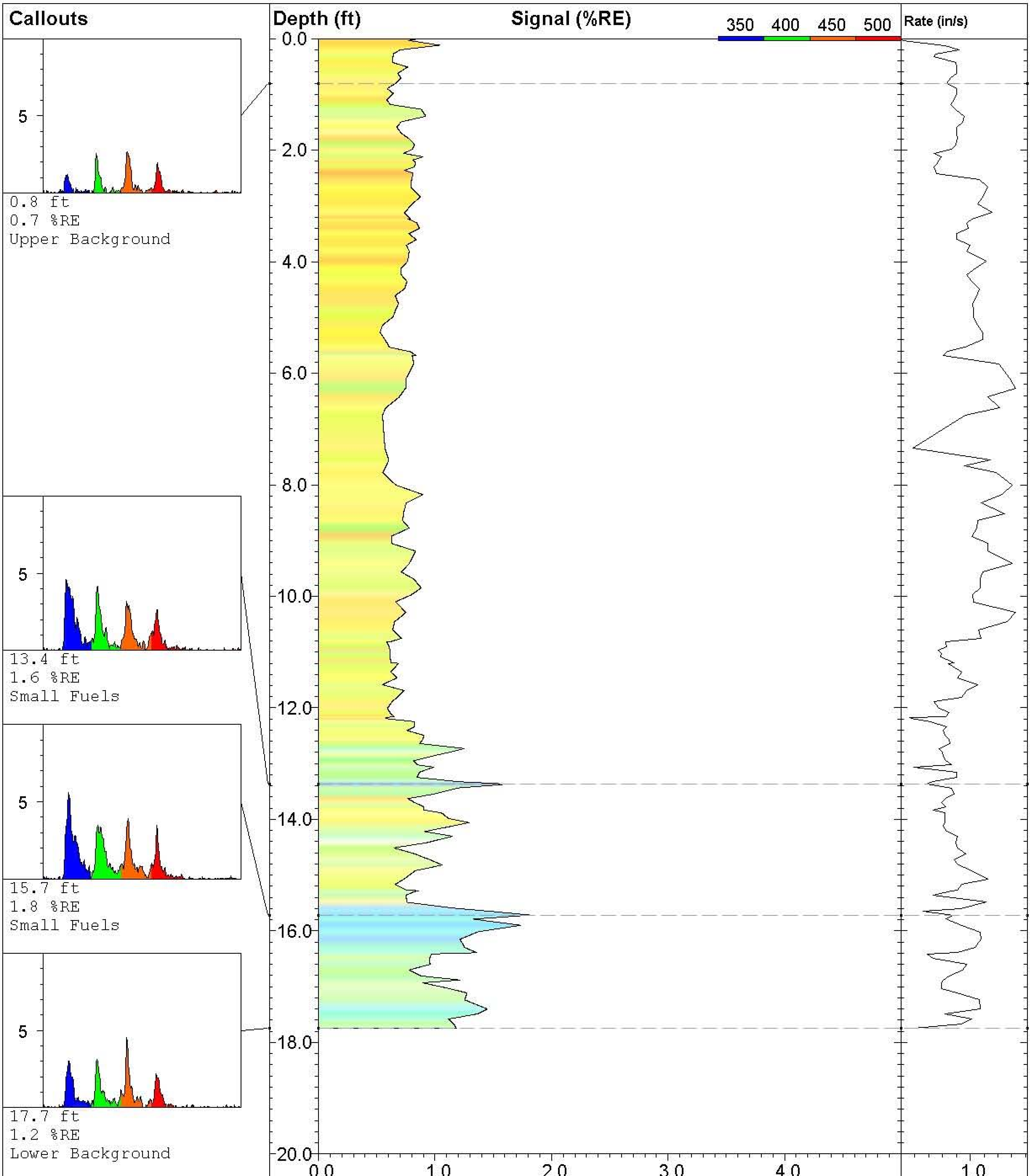
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.42 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **3.8 % @ 14.86 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-02 17:44 ADT**



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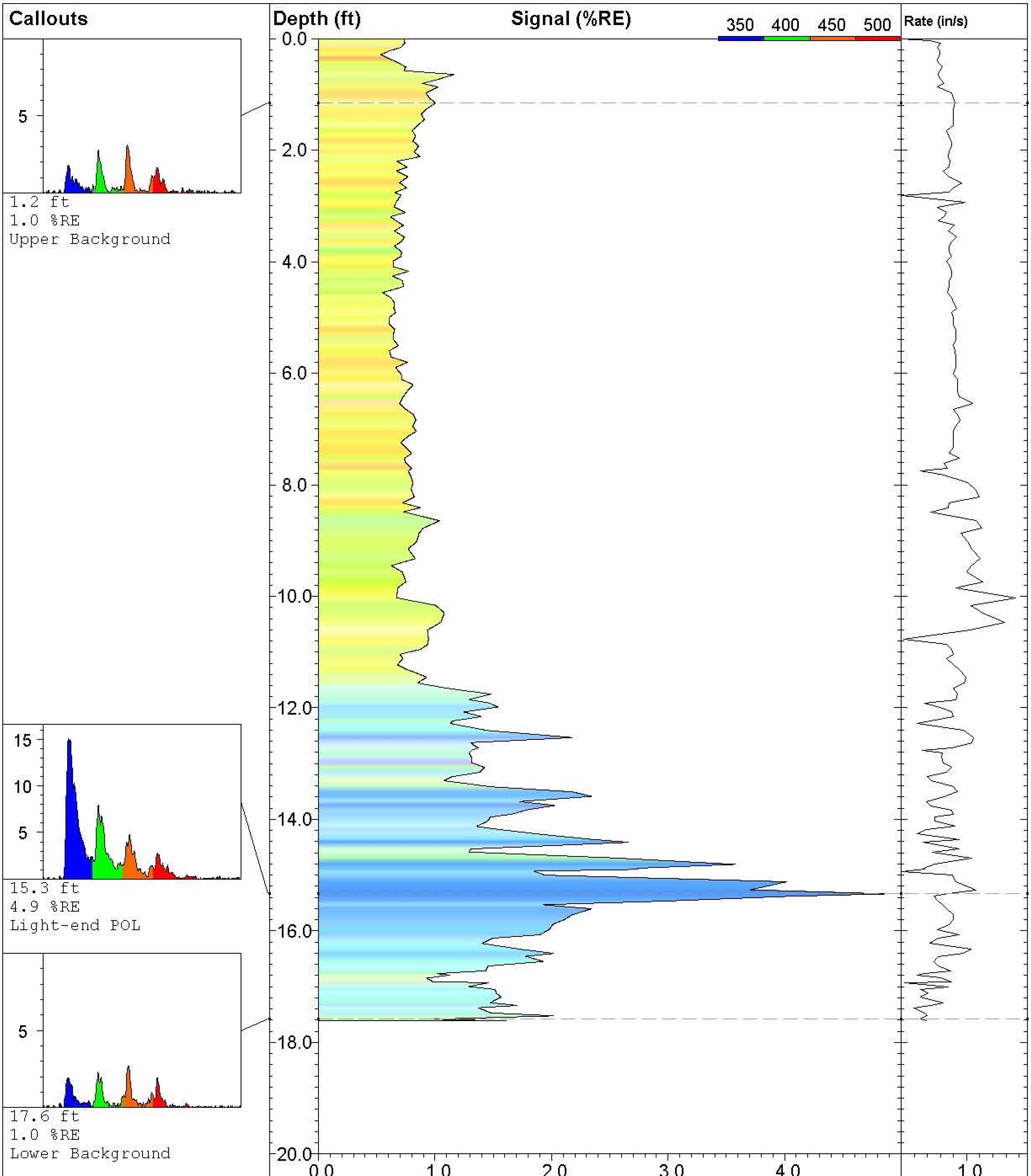
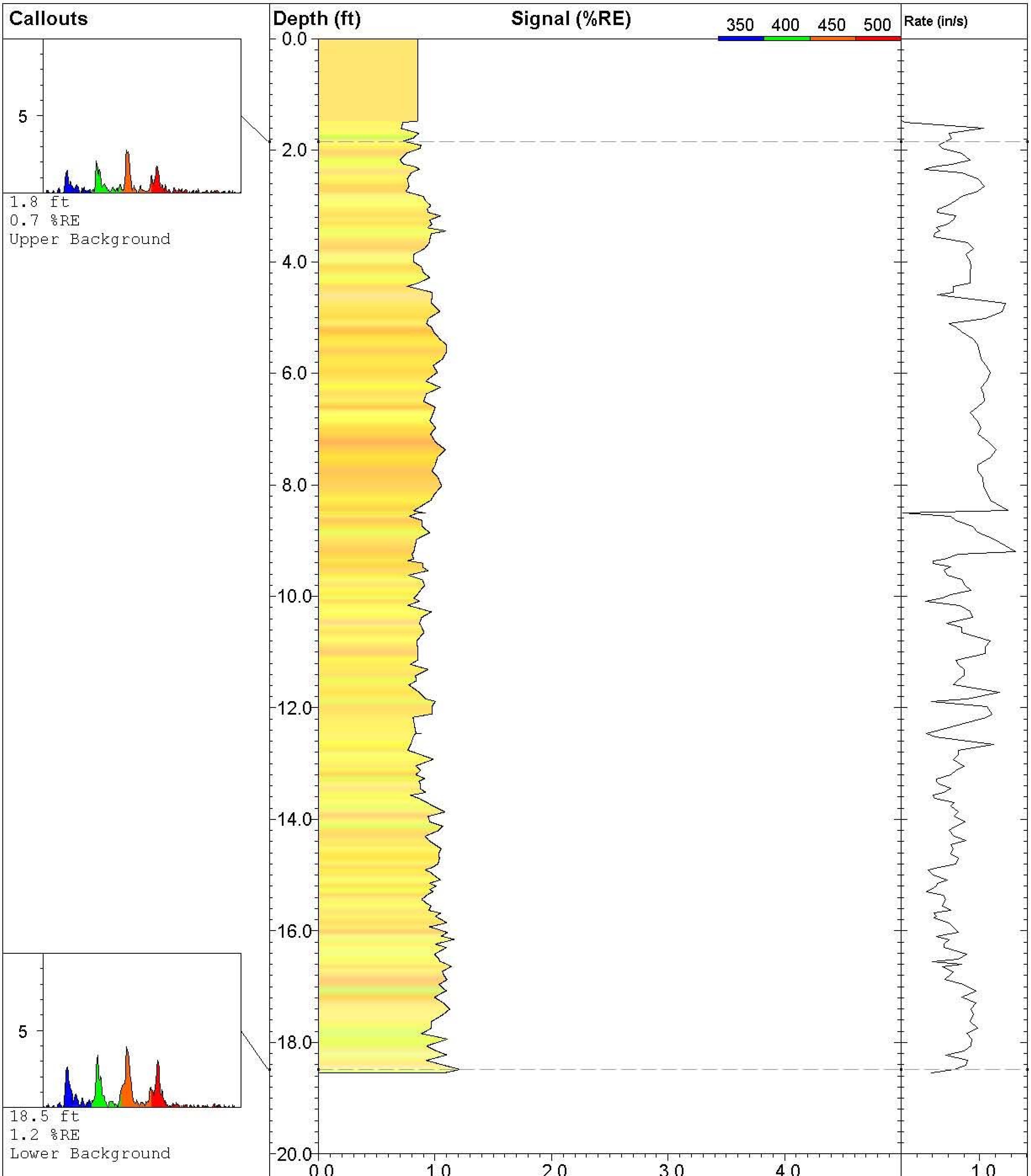
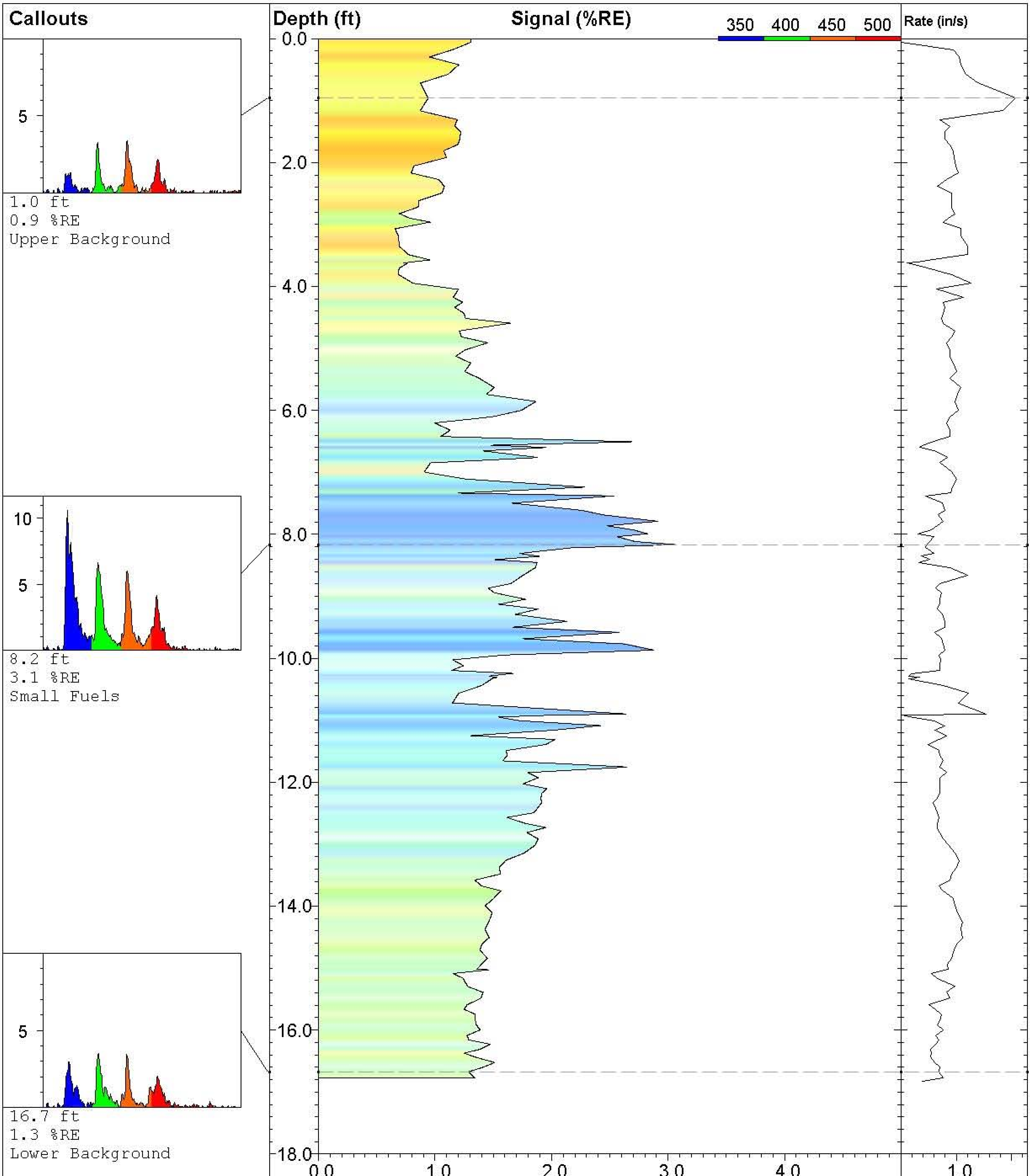
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.75 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.8 % @ 15.72 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-02 18:17 ADT**



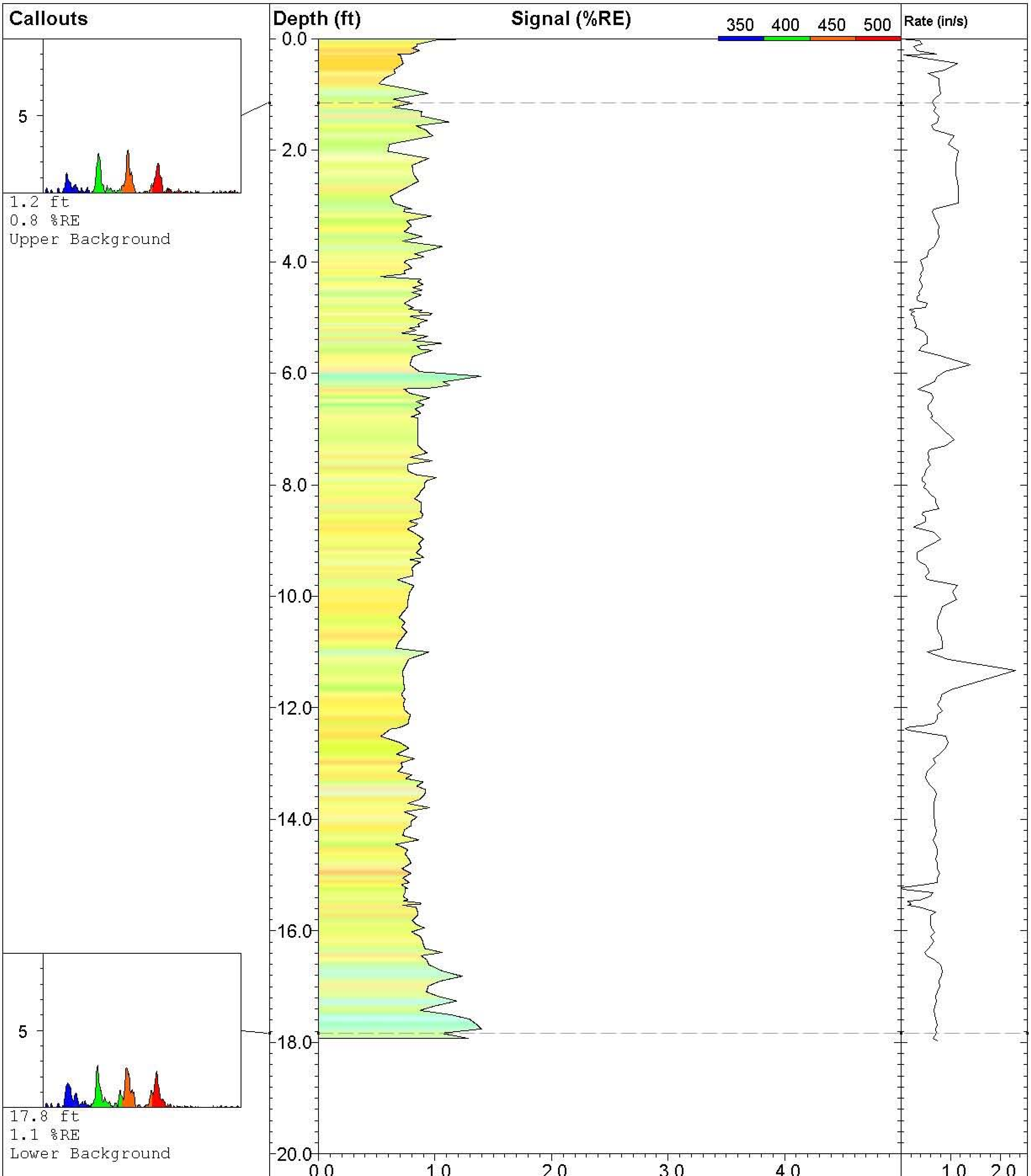
Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-124**	**UVOST By Dakota** www.DakotaTechnologies.com
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.61 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **4.9 % @ 15.34 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-02 19:38 ADT**



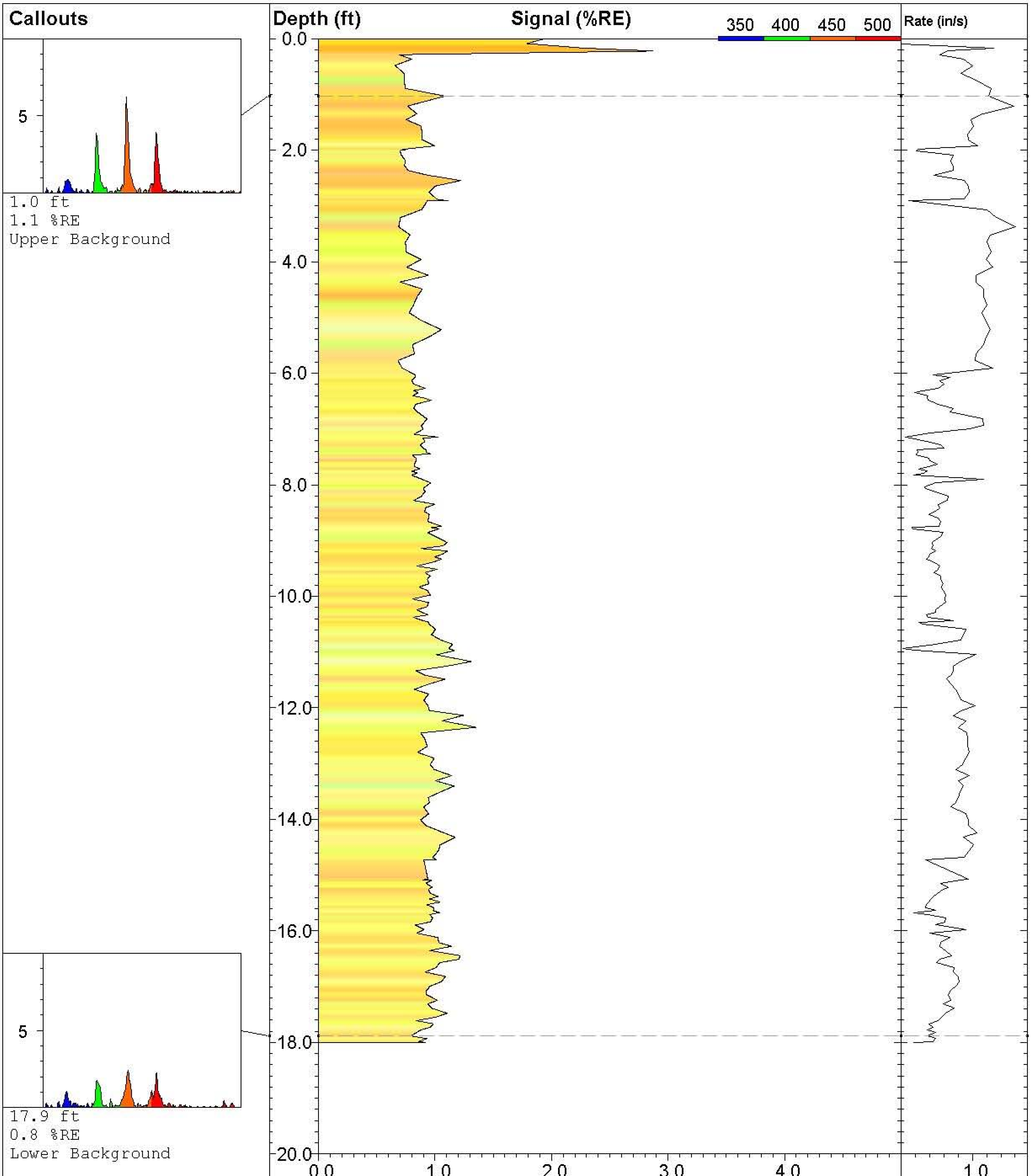
Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-125**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **18.55 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.2 % @ 18.48 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-02 20:09 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-126**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **16.83 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **3.1 % @ 8.17 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-02 20:27 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-127**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.97 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.4 % @ 17.76 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-03 10:05 ADT**



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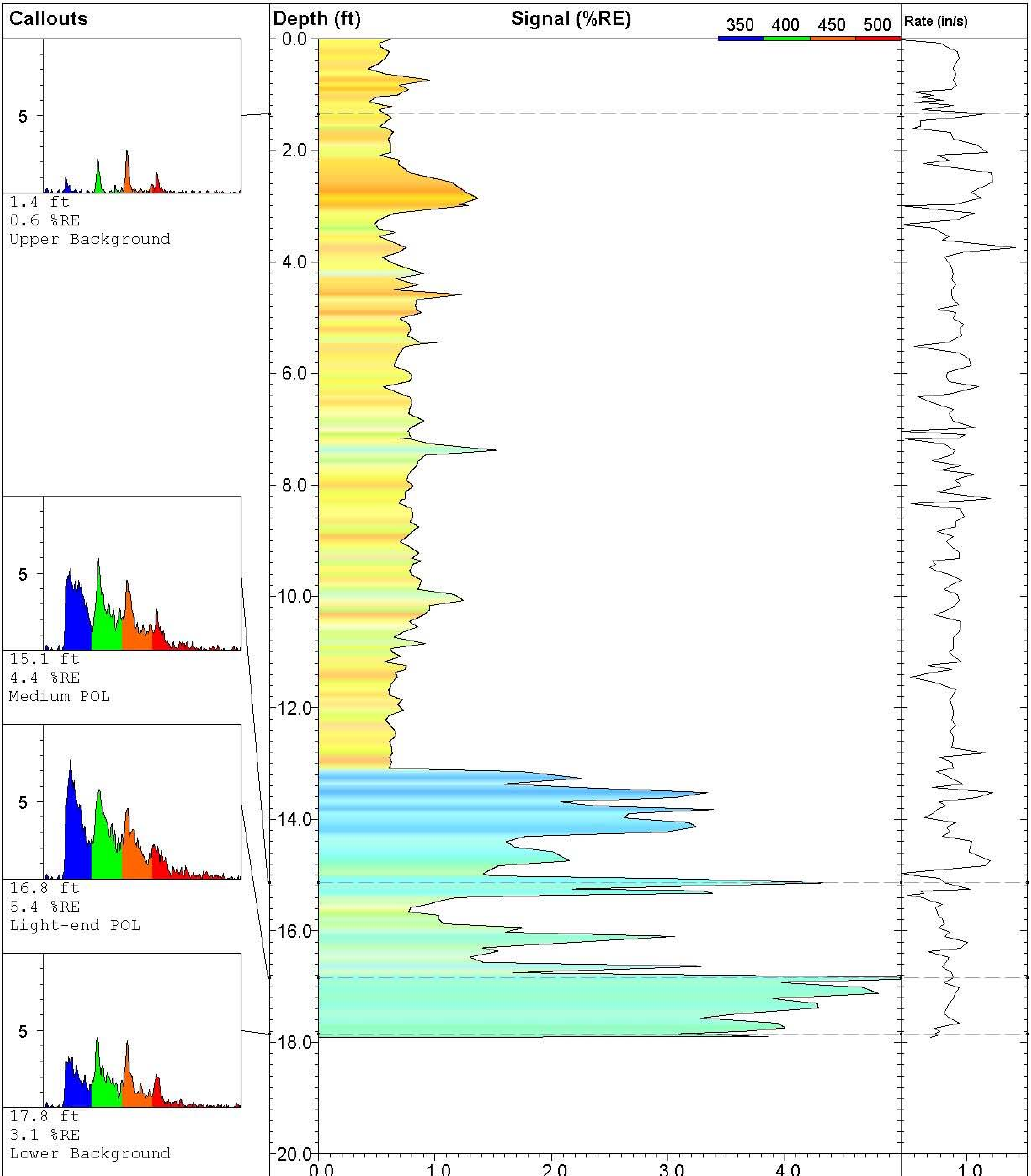
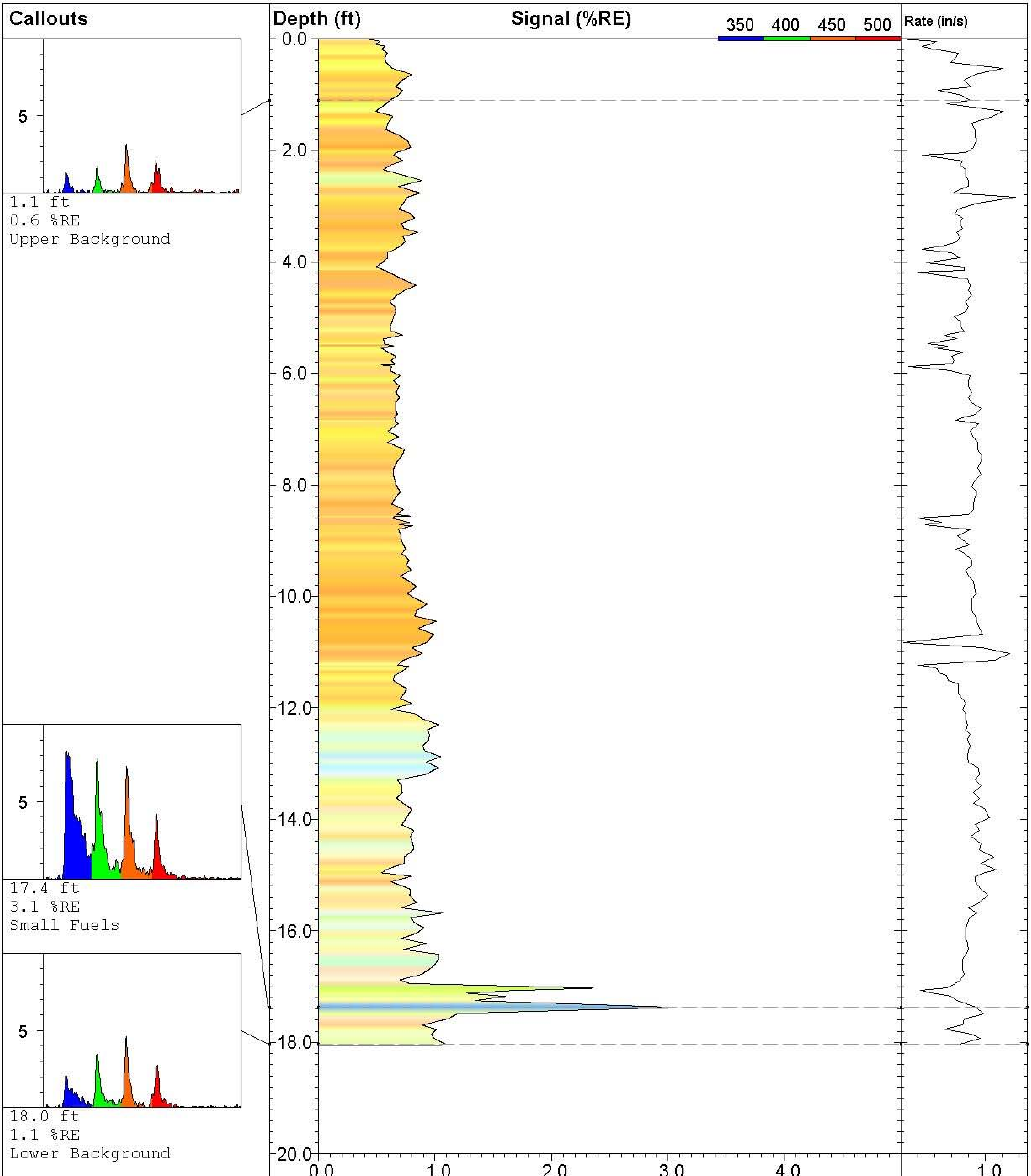
10NC27 UV-128

UVOST By Dakota
www.DakotaTechnologies.com

Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **18.00 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.9 % @ 0.22 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-03 10:29 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	10NC27 UV-129		UVOST By Dakota www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.90 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **5.4 % @ 16.84 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-03 11:27 ADT**



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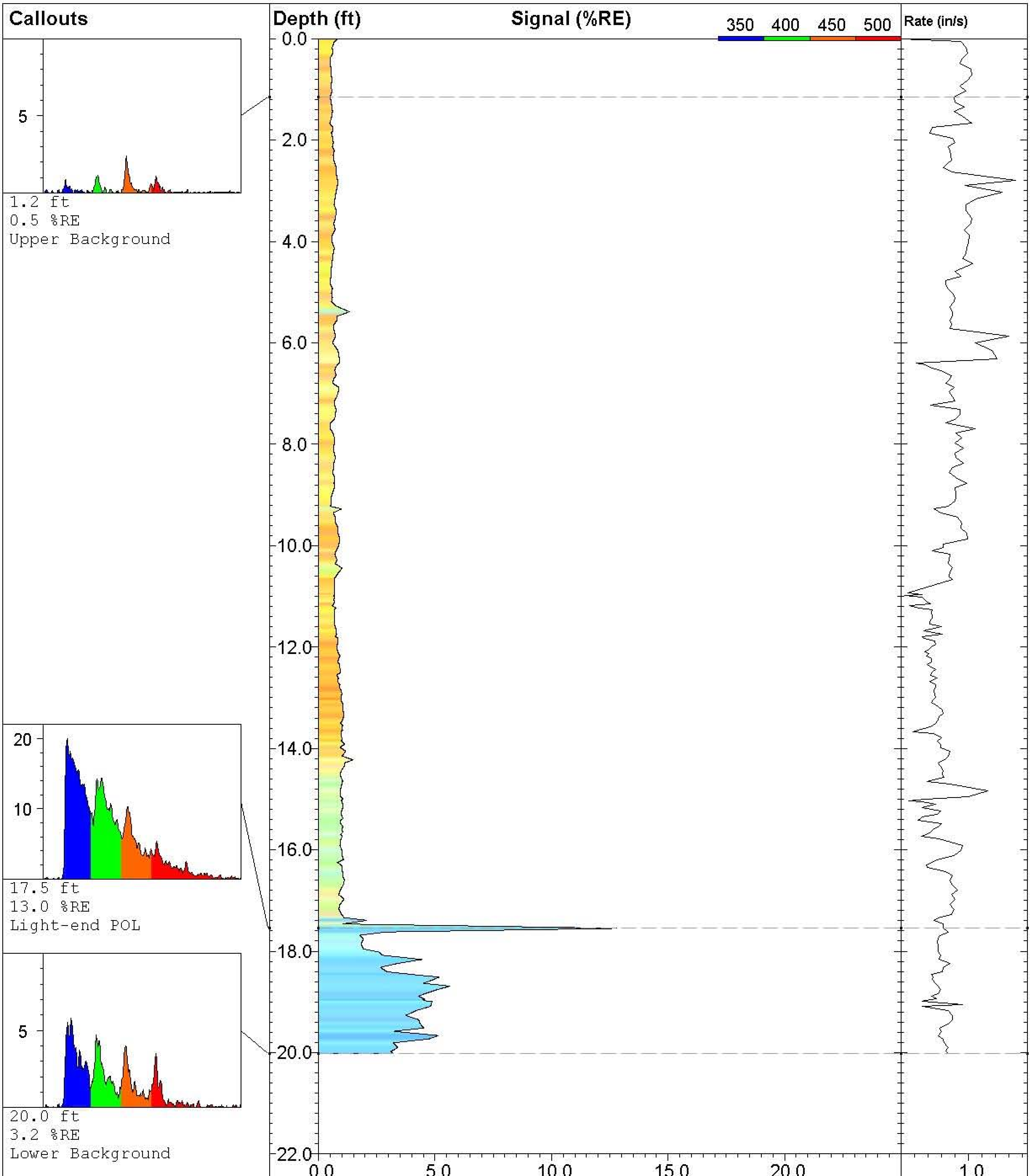
10NC27 UV-130

UVOST By Dakota
www.DakotaTechnologies.com

Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **18.04 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **3.1 % @ 17.37 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-03 13:32 ADT**



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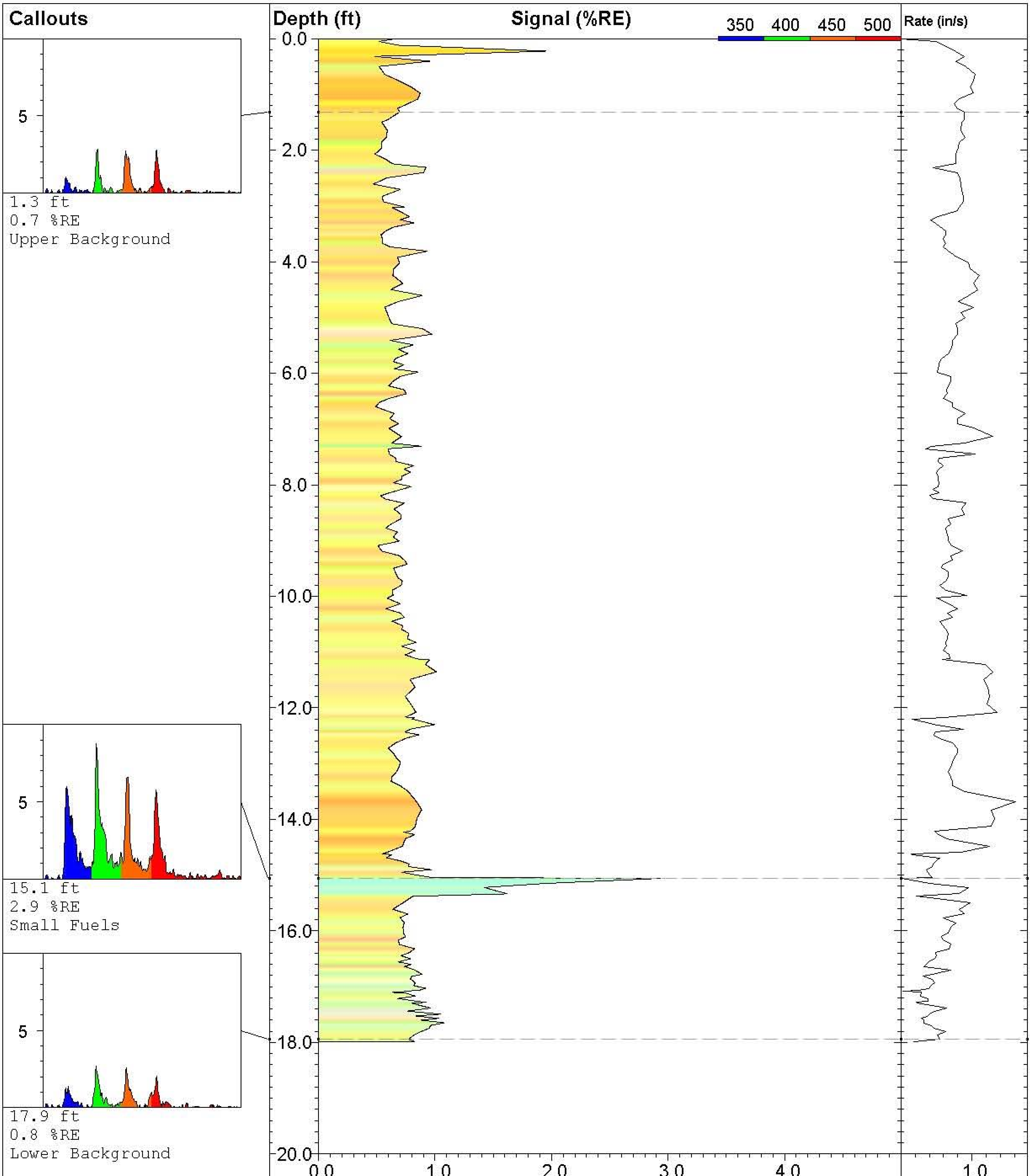
10NC27 UV-131

UVOST By Dakota
www.DakotaTechnologies.com

Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.01 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **13.0 % @ 17.55 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-03 13:12 ADT**



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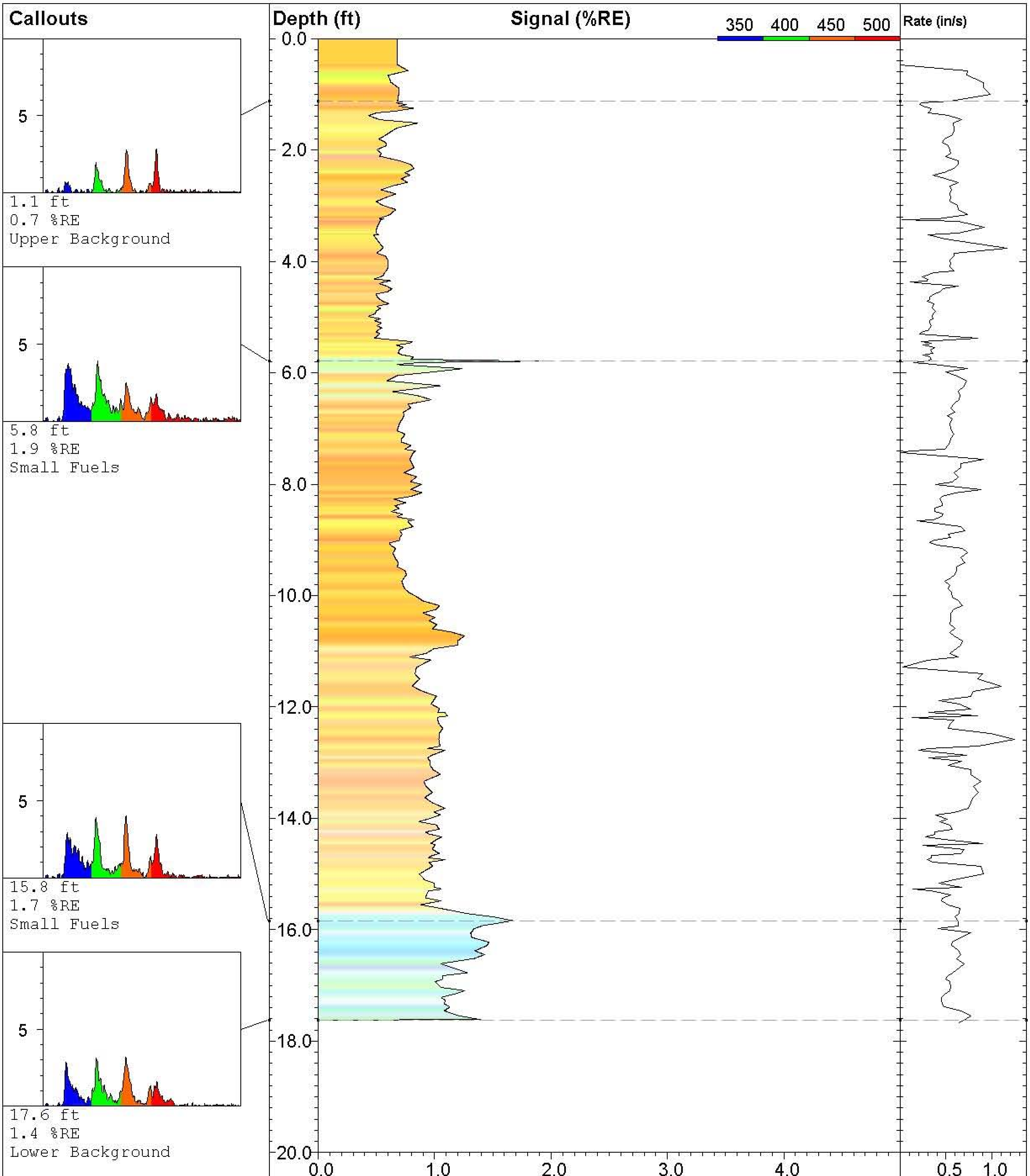
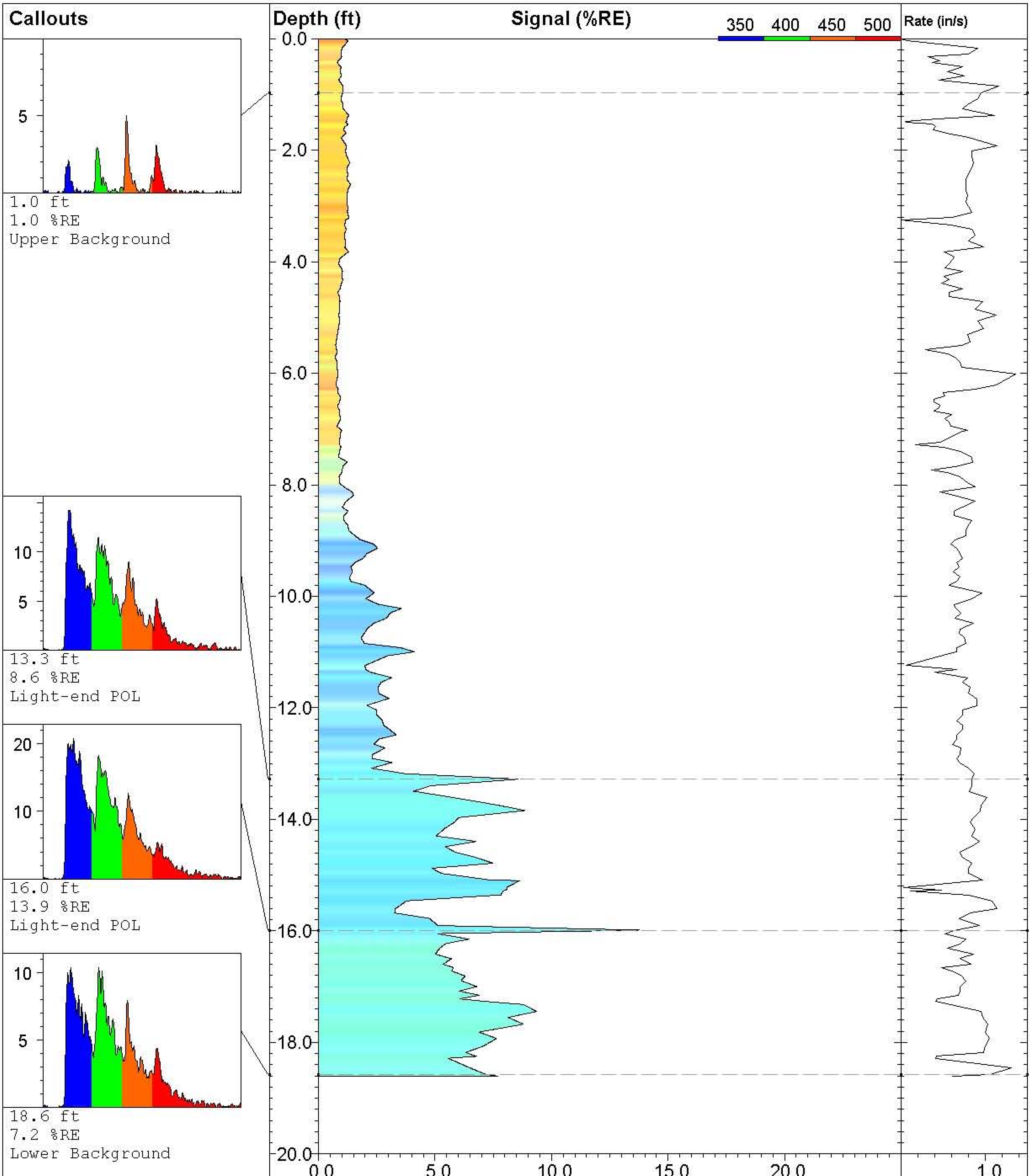
10NC27 UV-132

UVOST By Dakota
www.DakotaTechnologies.com

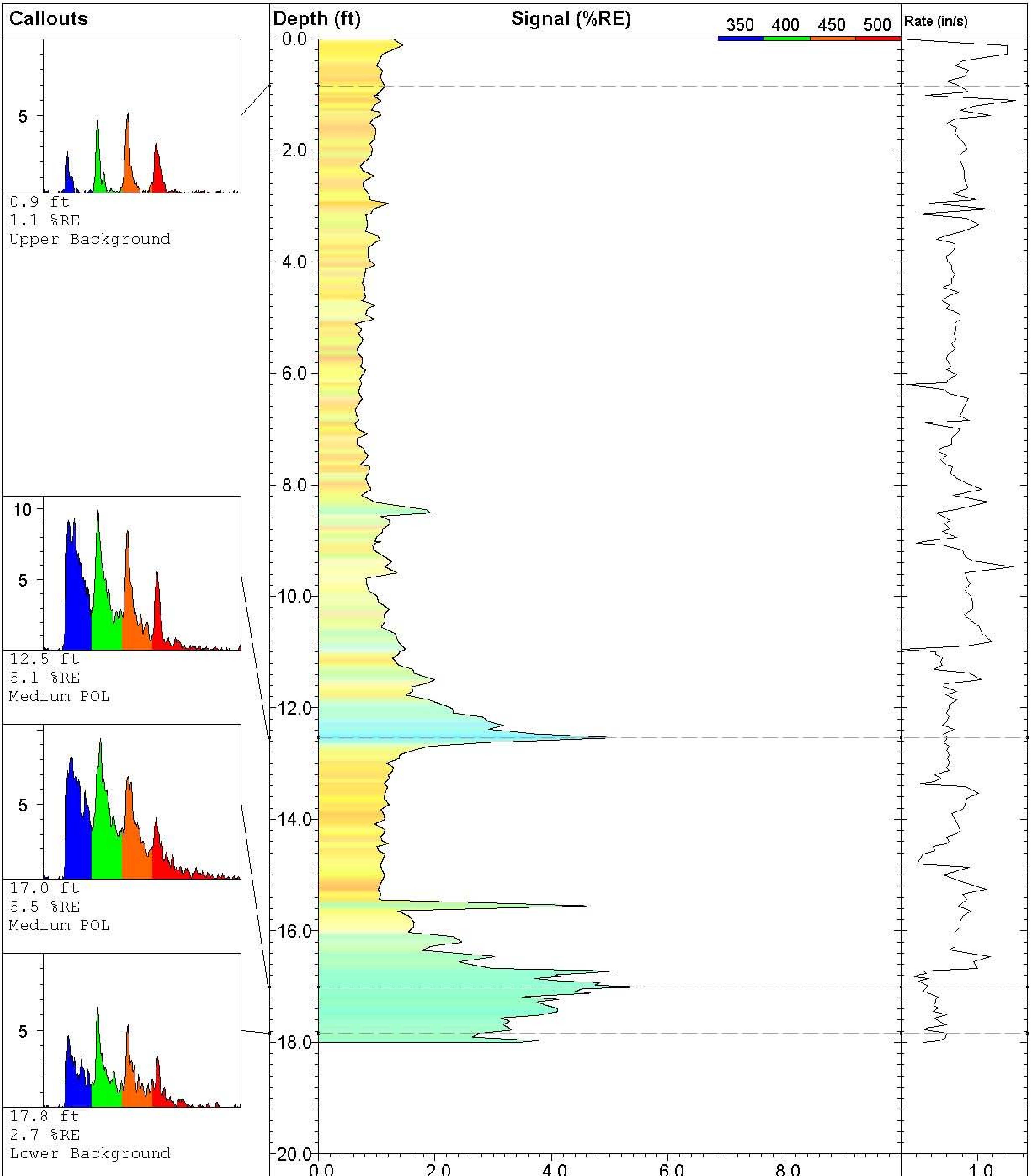
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.99 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.9 % @ 15.06 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-03 12:49 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-133**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.67 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.9 % @ 5.79 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-03 14:29 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-134**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **18.60 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **13.9 % @ 15.99 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-07 11:45 ADT**



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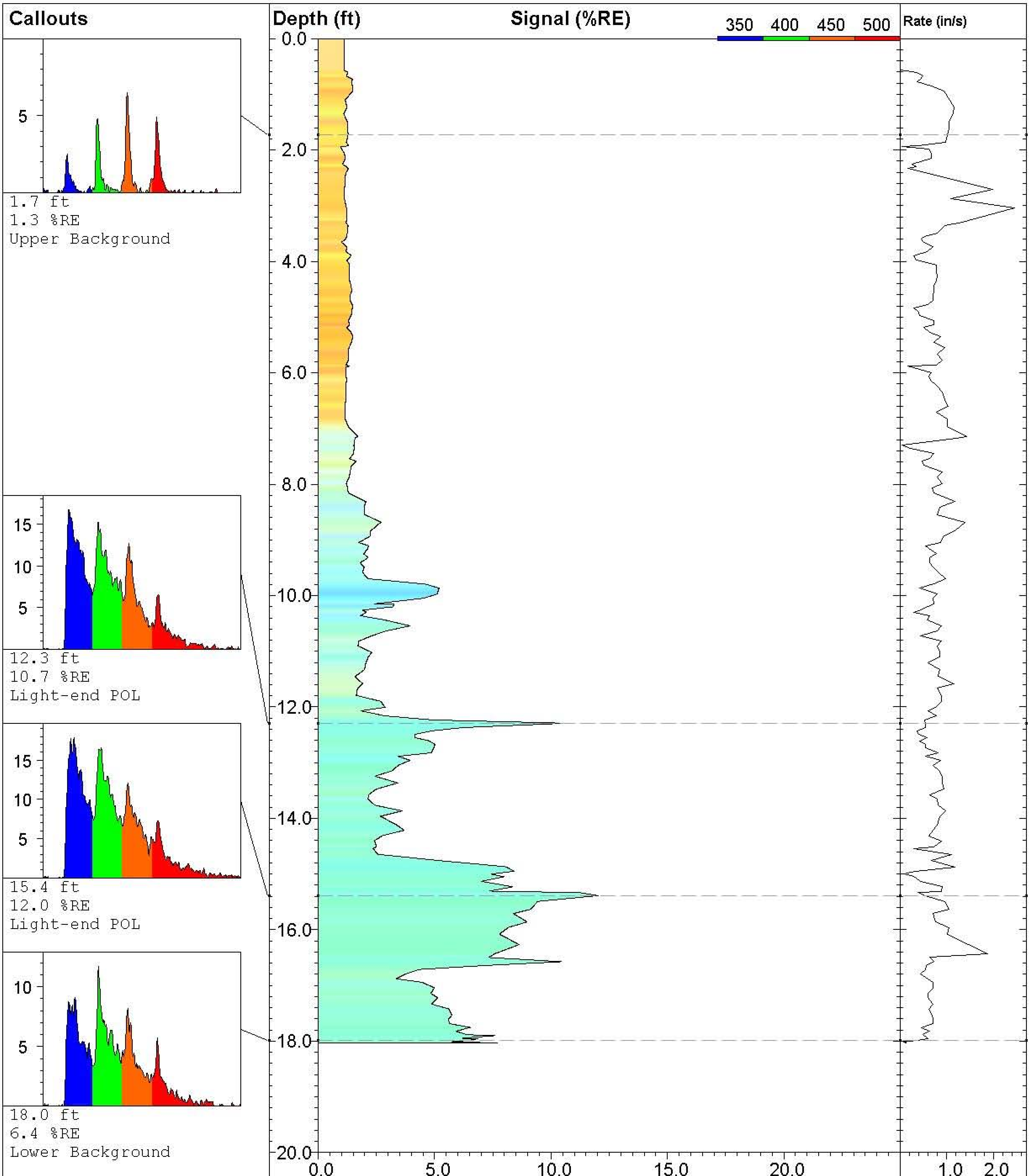
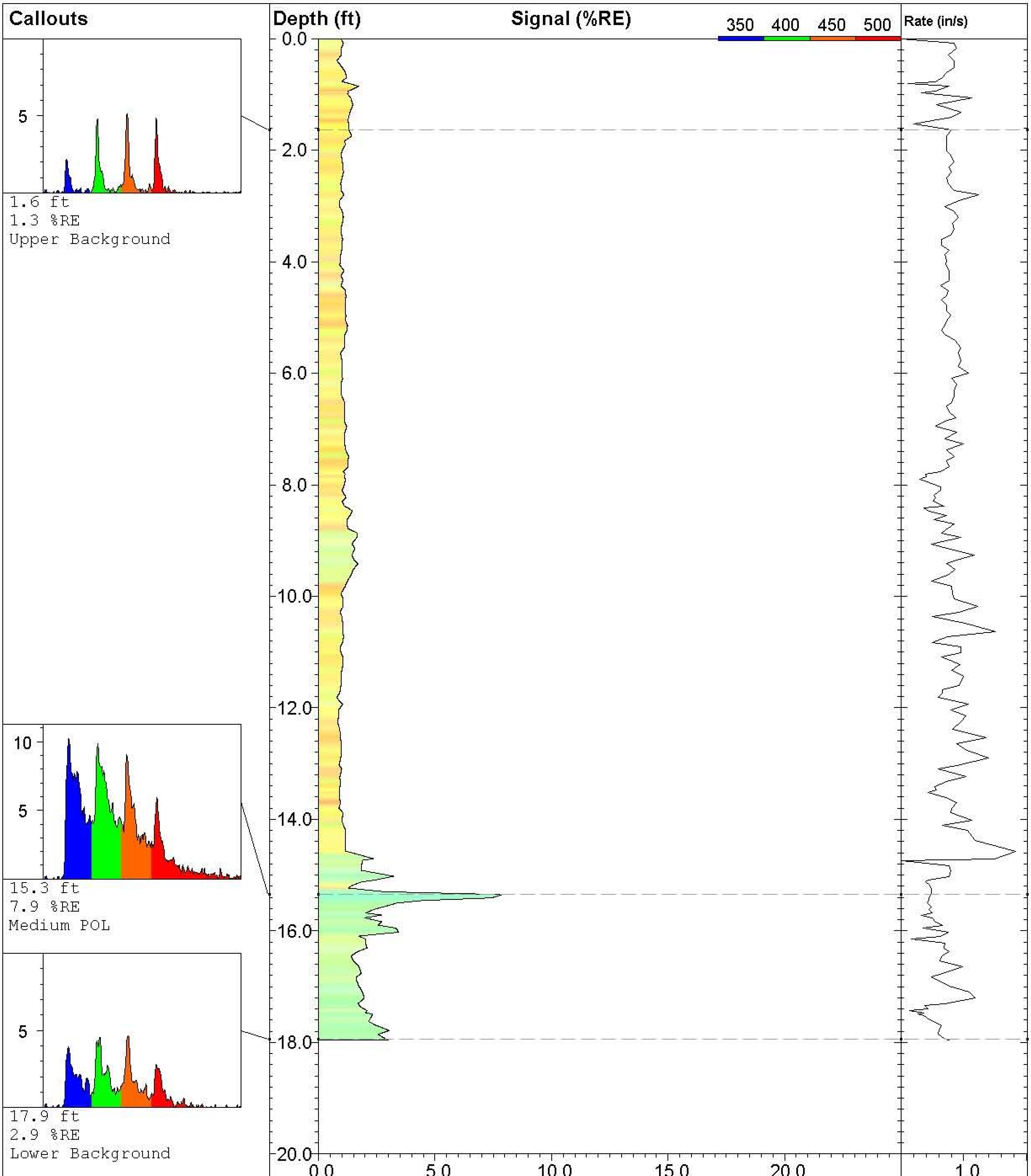
10NC27 UV-135

UVOST By Dakota
www.DakotaTechnologies.com

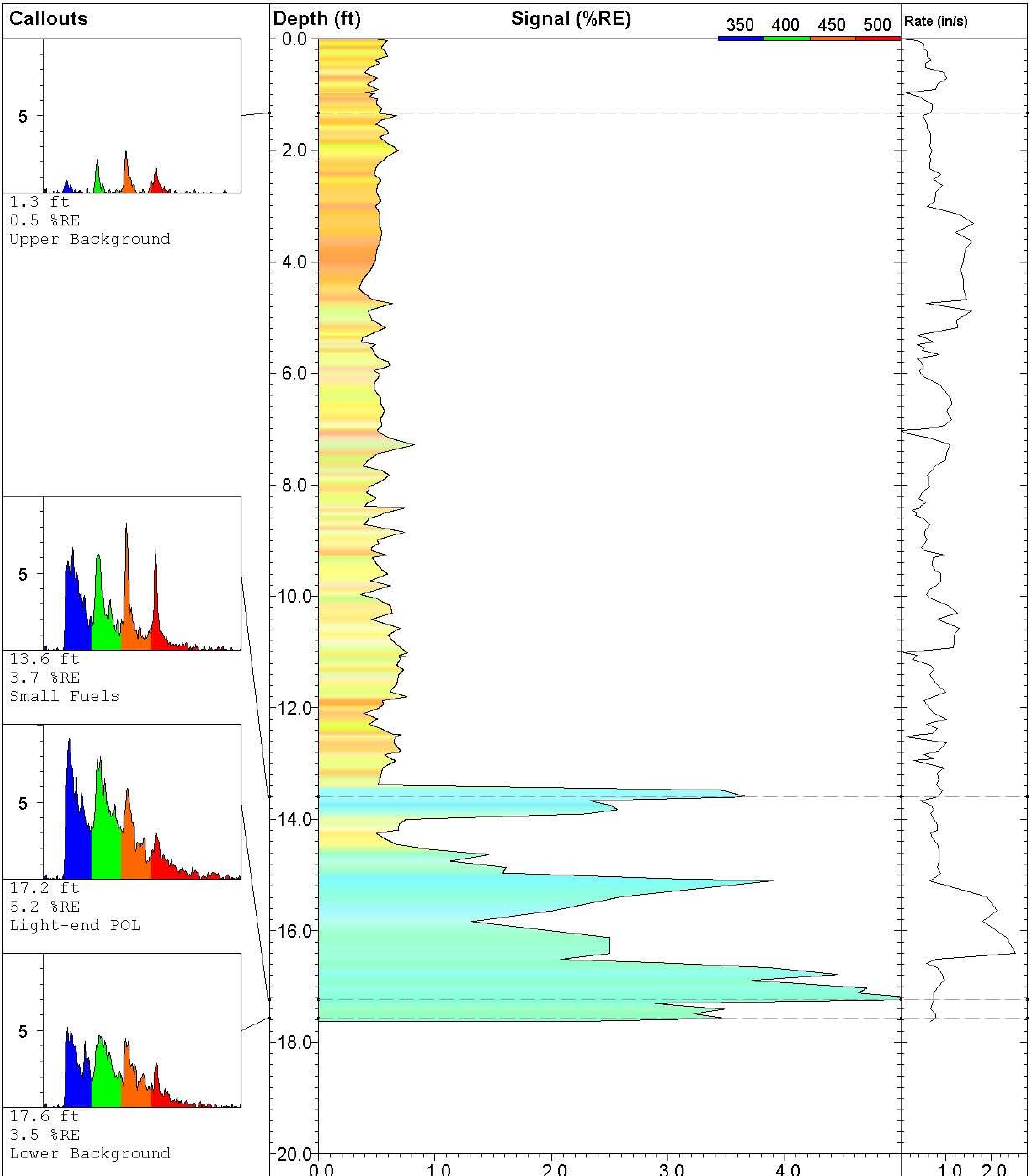
Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **18.00 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **5.5 % @ 17.01 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-07 12:04 ADT**



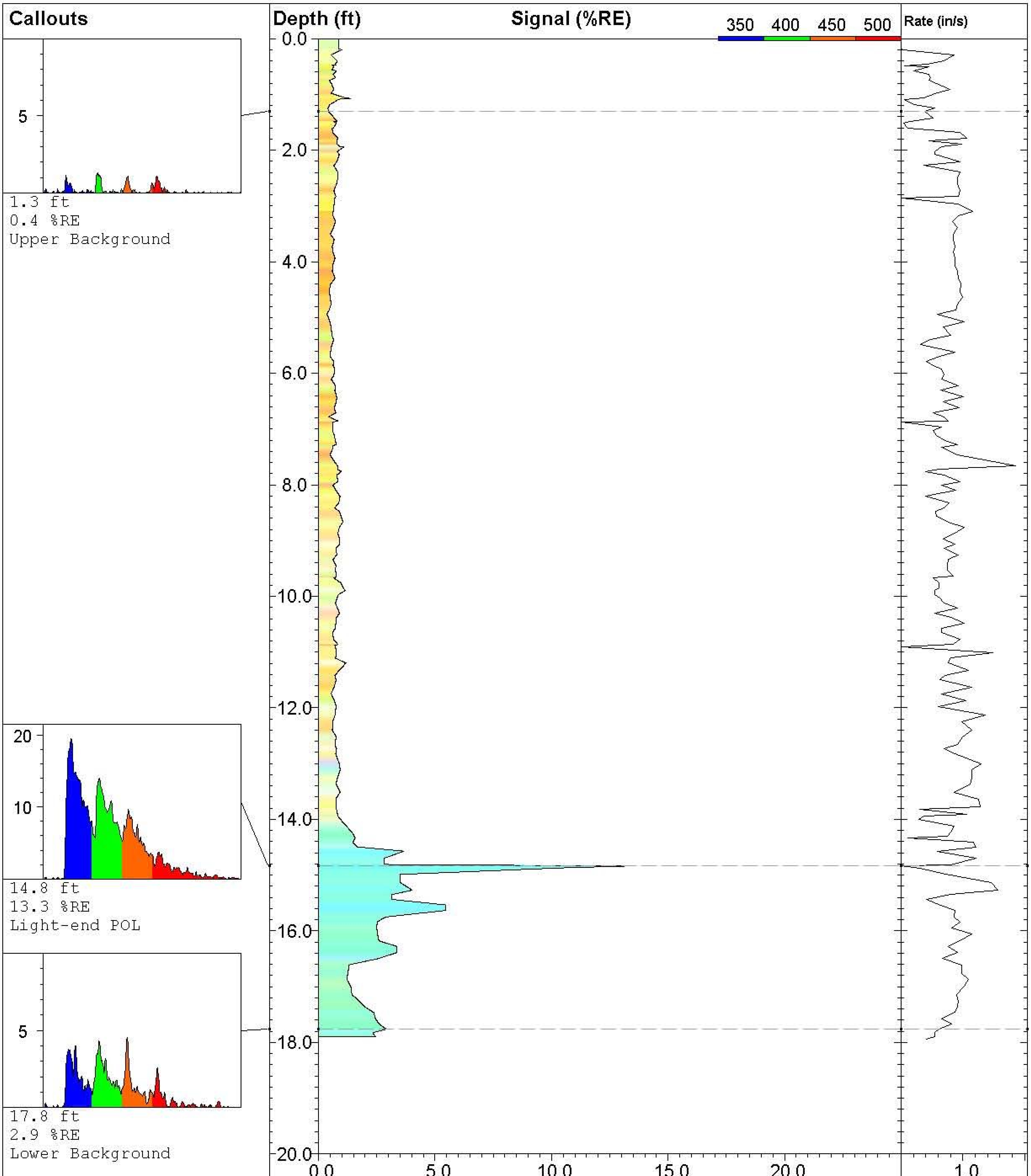
Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-136**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **18.04 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **12.0 % @ 15.39 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-07 13:38 ADT**



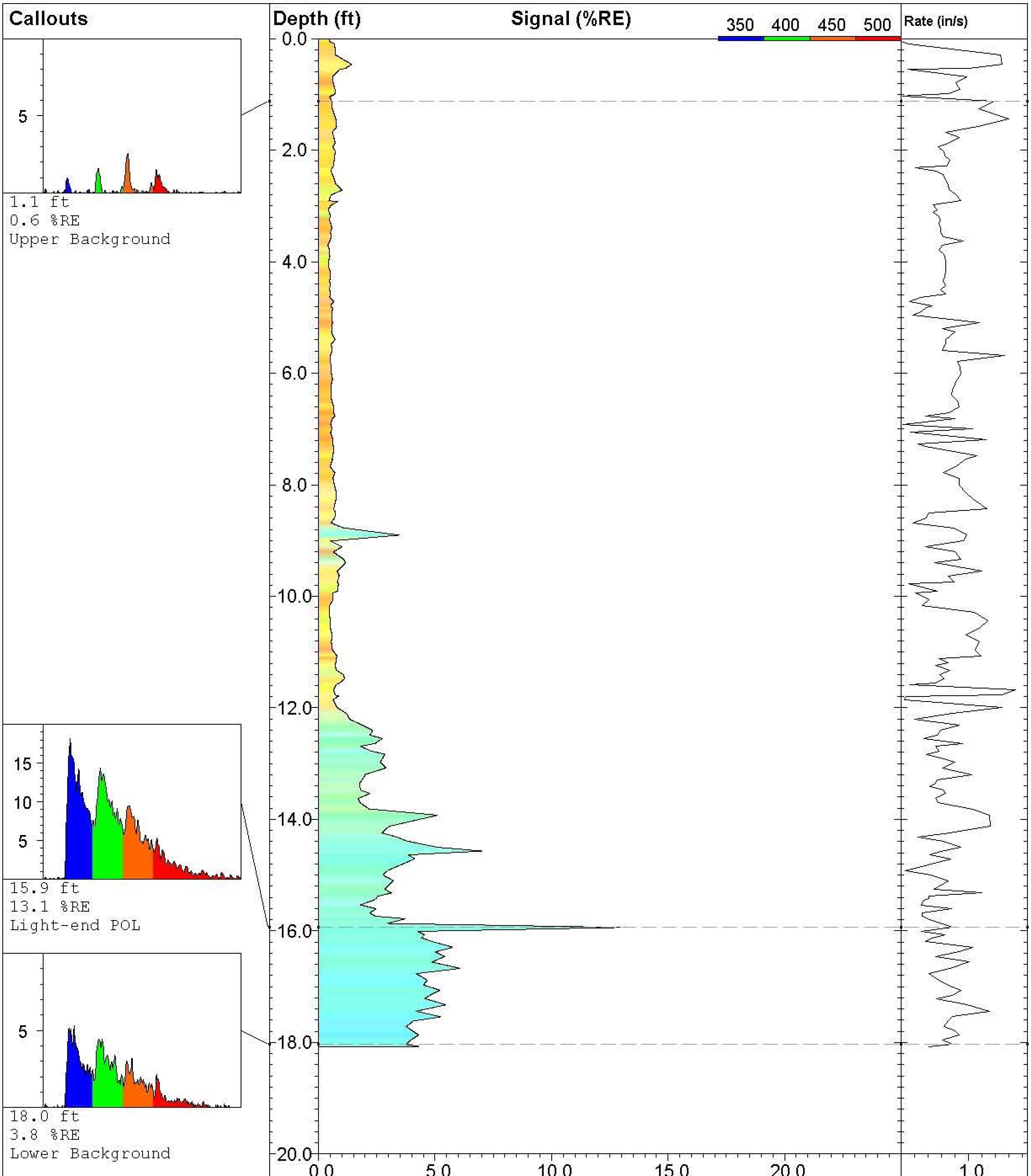
Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-137**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.96 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **7.9 % @ 15.35 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-07 14:03 ADT**



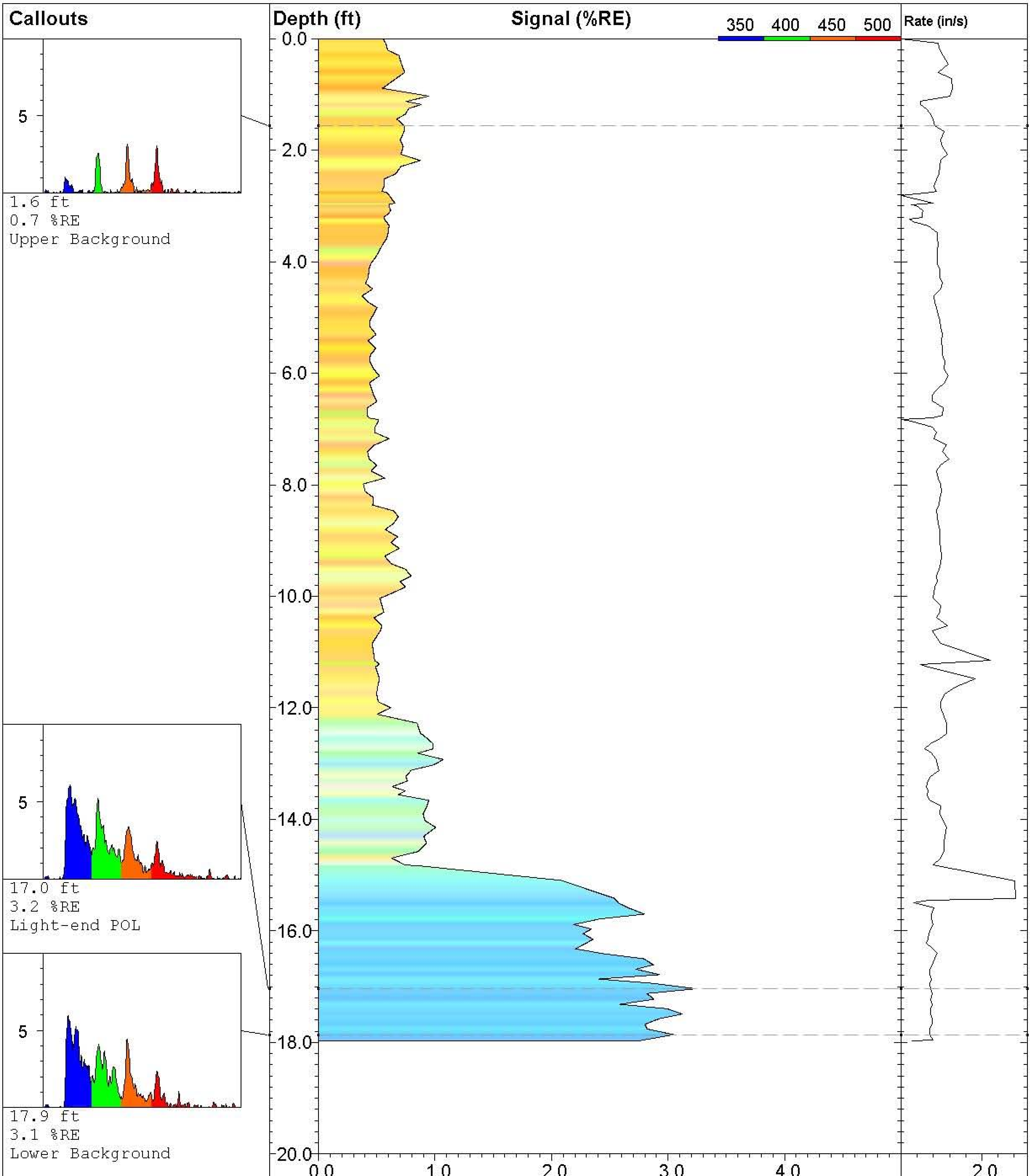
Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-138**	**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**
	Final depth: **17.63 ft**	
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**
	Max signal: **5.2 % @ 17.23 ft**	
	Job:	*Operator/Unit:* **PCaron/UVOST1016**
	Date & Time: **2010-08-07 14:47 ADT**	



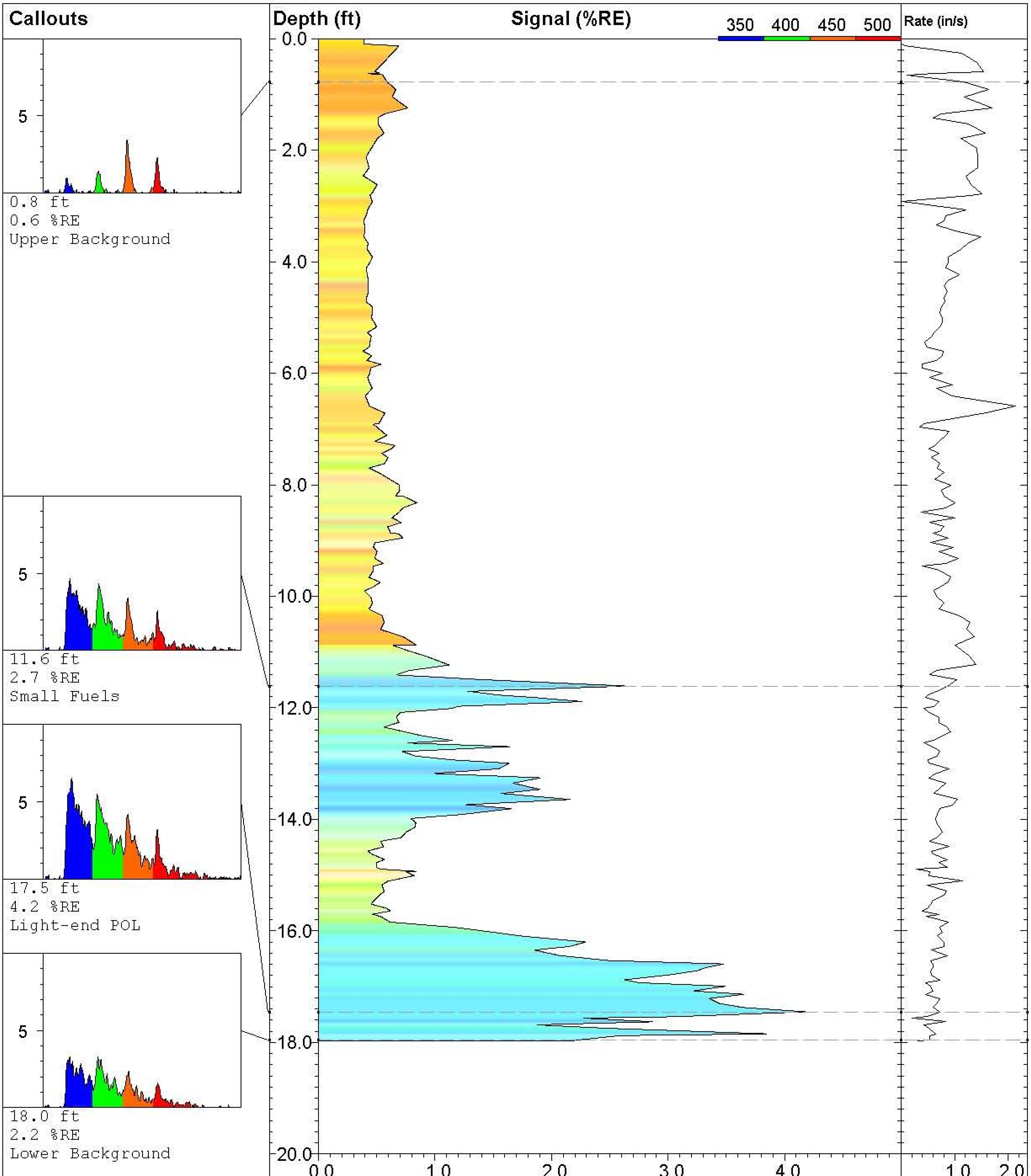
Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-139**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.94 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **13.3 % @ 14.84 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-07 15:14 ADT**



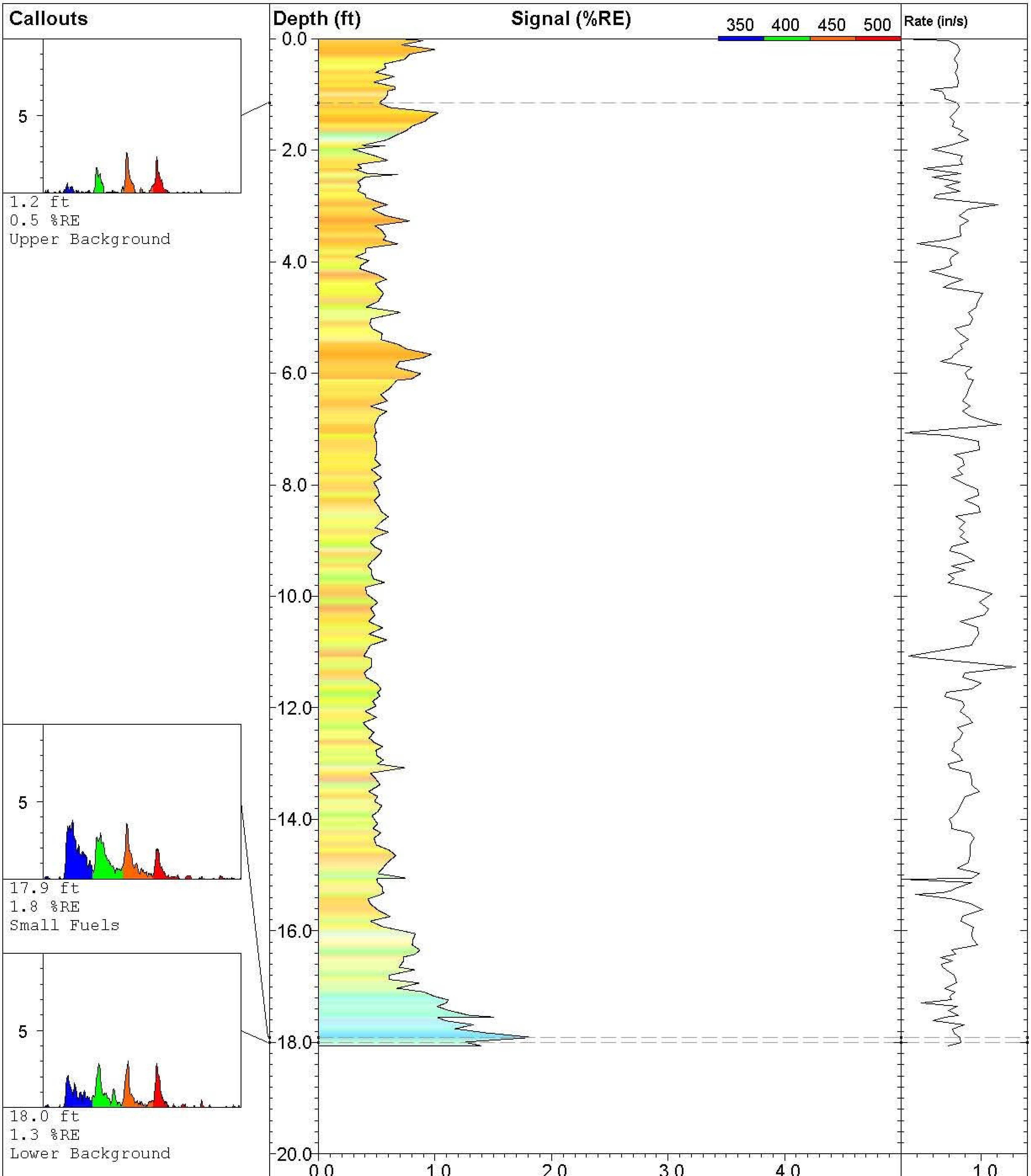
Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-140**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **18.07 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **13.1 % @ 15.94 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-07 15:51 ADT**



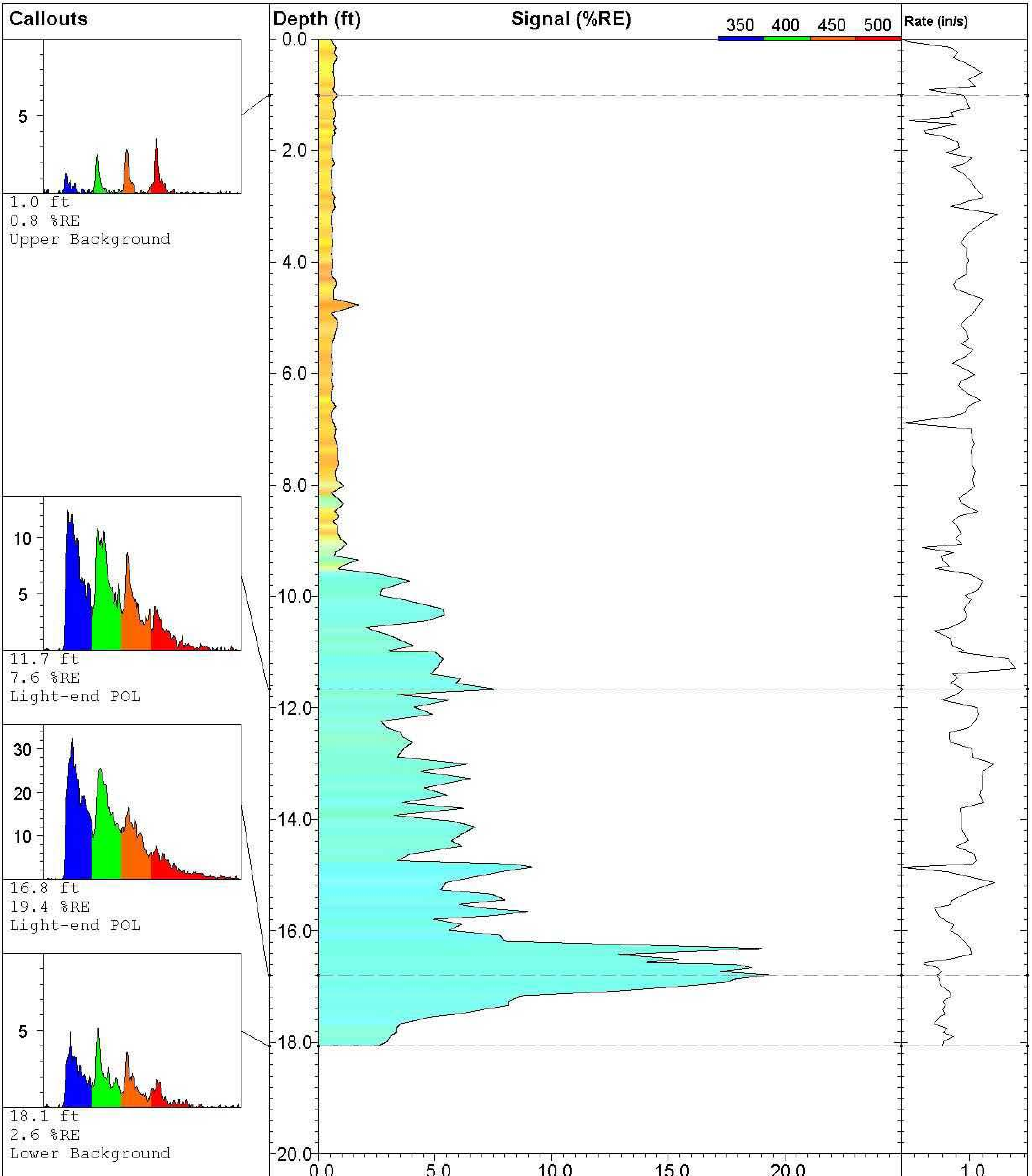
Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-141**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.98 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **3.2 % @ 17.04 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-07 16:40 ADT**



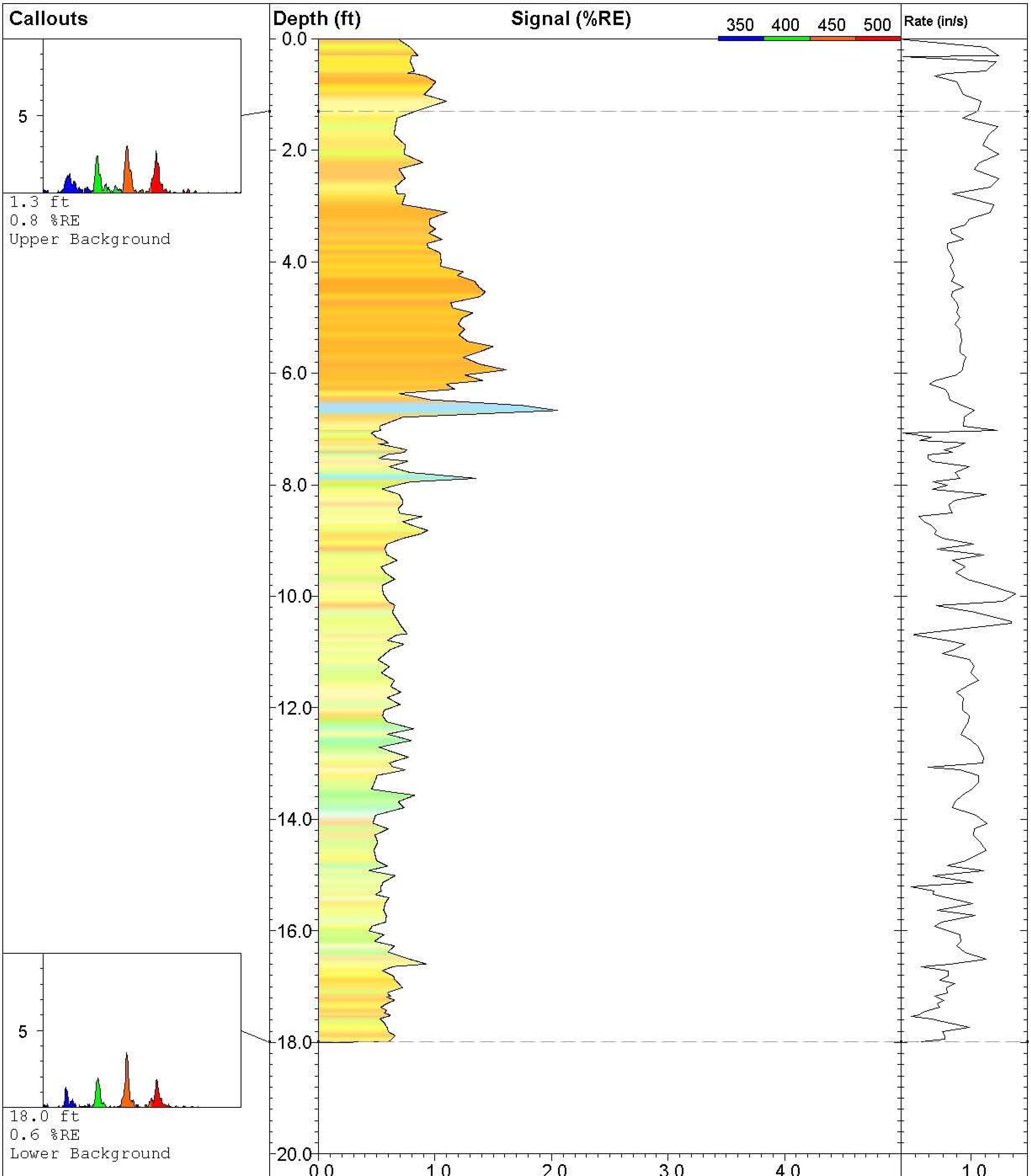
Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-142**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.98 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **4.2 % @ 17.45 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-07 16:59 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-143**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **18.06 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.8 % @ 17.91 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-07 17:24 ADT**



Hammer Environmental Services PO Box 872804 Wasilla, Alaska 99687 (907) 841-2216 www.hammerenvironmental.com	**10NC27 UV-144**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **18.06 ft**
	Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **19.4 % @ 16.79 ft**
	Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-07 18:59 ADT**



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10NC27 UV-145

UVOST By Dakota
www.DakotaTechnologies.com

Site: **NE Cape 2010**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **17.99 ft**
Client: **Bristol Env/ USACE**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **2.1 % @ 6.67 ft**
Job:	*Operator/Unit:* **PCaron/UVOST1016**	*Date & Time:* **2010-08-07 19:23 ADT**

ATTACHMENT 2

Soil Boring Logs

Bristol ENVIRONMENTAL REMEDIATION SERVICES, LLC	10NC11UV10	Logged By: Lyndsey Kleppin
USACE NE Cape HTRW	Site ID: MOC Site Location: St. Lawrence Island Boring Location: N 3404022.272 E 1811069.49	Drilled By: Justin Rucker Drilling Company: Hammer Environmental Drill Rig: GeoProbe Drilling Method: Direct-Push Probe Borehole Diameter: 2 inches
Job No. 410026	Elevation: 65.43 feet above MSL Total Depth: 8 feet	Date Started: 8/8/2010 Date Completed 8/8/2010

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0			10NC11UV10 2'-4'	70			GW	SILTY GRAVEL (GW) with clay, brown (10YR 4/4), moist, with two 1" seams of moist brown peat
							GM	SILTY GRAVEL (GM), brown (10YR 3/3), moist, strong fuel odor
			10NC11UV10 6'-8'	50			GC	CLAYEY GRAVEL (GC), dark yellowish brown (10YR 3/6), moist, strong fuel odor
10								
20								

Notes:

° = degrees
% = percent
" = inch or inches
bgs = below ground surface
ft = foot or feet

ID = identification
MSL = mean sea level
No. = number
USCS = Unified Soil Classification System

Bristol ENVIRONMENTAL REMEDIATION SERVICES, LLC

USACE
NE Cape HTRW

Job No. 410026

10NC11UV12

Site ID:	MOC
Site Location:	St. Lawrence Island
Boring Location:	N 3403966.994 E 1811151.158
Elevation:	68.18 feet above MSL
Total Depth:	8 feet

Logged By:	Lyndsey Kleppin
Drilled By:	Justin Rucker
Drilling Company:	Hammer Environmental
Drill Rig:	GeoProbe
Drilling Method:	Direct-Push Probe
Borehole Diameter:	2 inches
Date Started:	8/8/2010
Date Completed	8/8/2010

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0							PT	PEAT (PT), dark brown (10YR 3/3), dry, with woody debris
				50			GC	CLAYEY GRAVEL (GC), brown (10YR 4/4), dry
				60			GC	CLAYEY GRAVEL (GC), grey (GLEY1 4/10Y), moist, strong fuel odor, wet at 7 feet bgs
10								
20								

Notes:

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bgs = below ground surface
ft = foot or feet
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USCS = Unified Soil Classification System

Bristol
ENVIRONMENTAL
REMEDIATION SERVICES, LLC

USACE
NE Cape HTRW

Job No. 410026

10NC11UV13

Site ID:	MOC
Site Location:	St. Lawrence Island
Boring Location:	N 3403972.399 E 1811195.293
Elevation:	65.27 feet above MSL
Total Depth:	8 feet

Logged By:	Lyndsey Kleppin
Drilled By:	Justin Rucker
Drilling Company:	Hammer Environmental
Drill Rig:	GeoProbe
Drilling Method:	Direct-Push Probe
Borehole Diameter:	2 inches
Date Started:	8/8/2010
Date Completed	8/8/2010

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0							PT	PEAT (PT), brown (10YR 3/3), dry with woody debris and gravel
			10NC11UV13 4'-6'	60 80			GW	SANDY GRAVEL (GW) with clay, grey (GLEY1 5/10Y), moist
10								
20								

Notes:
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bgs = below ground surface
ft = foot or feet
ID = identification
MSL = mean sea level
No. = number
USCS = Unified Soil Classification System

Bristol ENVIRONMENTAL REMEDIATION SERVICES, LLC

10NC11UV16

USACE NE Cape HTRW	Site ID: MOC	Logged By:	Lyndsey Kleppin
Job No. 410026	Site Location: St. Lawrence Island	Drilled By:	Justin Rucker
	Boring Location: N 3403890.817, E 1811322.313	Drilling Company:	Hammer Environmental
	Elevation: 69.84 feet above MSL	Drill Rig:	GeoProbe
	Total Depth: 8 feet	Drilling Method:	Direct-Push Probe
		Borehole Diameter:	2 inches
		Date Started:	8/8/2010
		Date Completed	8/8/2010

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0–2			10NC11UV16 4'-8'	60			PT	PEAT (PT) with gravel, dark brown (10YR 3/3), dry
2–4							GW	GRAVEL (GW) with peat, brown (10YR 4/4), dry, slight fuel odor
4–5							OL	ORGANIC SILT (OL), dark brown (10YR 4/2), dry, strong fuel odor
5–8				80			GW	SANDY GRAVEL (GW), brown (10YR 5/4), moist, slight fuel odor, with grey clay

Depth scale: 0, 10, 20

Notes:

° = degrees
% = percent
" = inch or inches
bgs = below ground surface
ft = foot or feet
ID = identification
MSL = mean sea level
No. = number
USCS = Unified Soil Classification System

Bristol ENVIRONMENTAL REMEDIATION SERVICES, LLC

USACE
NE Cape HTRW

Job No. 410026

10NC11UV26

Site ID:	MOC
Site Location:	St. Lawrence Island
Boring Location:	N 3404014.845 E 1811171.195
Elevation:	66.92 feet above MSL
Total Depth:	12 feet

Logged By:	Lyndsey Kleppin
Drilled By:	Justin Rucker
Drilling Company:	Hammer Environmental
Drill Rig:	GeoProbe
Drilling Method:	Direct-Push Probe
Borehole Diameter:	2 inches
Date Started:	8/8/2010
Date Completed	8/8/2010

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0–4				10			PT	GRAVELLY PEAT (PT) with organic silt, brown (10YR 3/4), dry, no fuel odor
4–5							CL	SANDY CLAY (CL) with gravel, grey (GLEY1 5/N), dry
5–12				80			SW	GRAVELLY SAND (SW) with clay, brown (10YR 5/4), moist, slight fuel odor. 1" organic silt seam at 10 feet bgs, dark brown, slight fuel odor; 1" Peat seam at 11 feet bgs, dark brown, slight fuel odor
8–12			10NC11UV26 9'-11'	60				

Depth scale: 0, 10, 20

Notes:
° = degrees
% = percent
" = inch or inches
bgs = below ground surface
ft = foot or feet
ID = identification
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Bristol ENVIRONMENTAL REMEDIATION SERVICES, LLC

USACE
NE Cape HTRW

Job No. 410026

10NC11UV52

Site ID:	MOC
Site Location:	St. Lawrence Island
Boring Location:	N 3403846.688 E 1811285.467
Elevation:	73.76 feet above MSL
Total Depth:	16 feet

Logged By:	Lyndsey Kleppin
Drilled By:	Justin Rucker
Drilling Company:	Hammer Environmental
Drill Rig:	GeoProbe
Drilling Method:	Direct-Push Probe
Borehole Diameter:	2 inches
Date Started:	8/8/2010
Date Completed	8/8/2010

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0							PT	PEAT (PT) with gravel and organic silt, brown (10YR 4/6), dry
				80			GW	SANDY GRAVEL (GW), grey clasts with brown (10YR 4/6) organic silty matrix, dry
							PT	PEAT (PT), dark brown (10YR 3/1), dry, slight fuel odor
				100			GW	SANDY GRAVEL (GW) with clay, brown (10YR 4/4), moist, moderate fuel odor
10			10NC11UV52 10'-12'	100			ML	SANDY SILT (ML), greyish brown (10YR 5/2), moist, strong fuel odor
			10NC11UV52 15'-16'	100			GW	SILTY GRAVEL (GW) with clay, grey (GLEY1 4/N) with brown (10YR 4/4) mottling, moist, moderate fuel odor
20								

Notes:

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Bristol ENVIRONMENTAL REMEDIATION SERVICES, LLC	**10NC27UV08**	Logged By: Lyndsey Kleppin Drilled By: Justin Rucker Drilling Company: Hammer Environmental Drill Rig: GeoProbe Drilling Method: Direct-Push Probe Borehole Diameter: 2 inches Date Started: 7/29/2010 Date Completed 7/29/2010
USACE NE Cape HTRW	Site ID: MOC Site Location: St. Lawrence Island Boring Location: N 3403978.298 E 1810879.411 Elevation: 68.77 feet above MSL Total Depth: 4.5 feet	
Job No. 410026		

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0							PT	PEAT (PT), brown (7.5YR 4/2), dry, moderate fuel odor, woody debris
			10NC27UV08 2.5'-4.5'				OL	CLAYEY SILT (OL), brown, moist, organic, moderate fuel odor
							PT	PEAT (PT), dark brown (7.5YR 3/4), moist, strong fuel odor
10								
20								

Notes:

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Bristol ENVIRONMENTAL REMEDIATION SERVICES, LLC

USACE
NE Cape HTRW

Job No. 410026

10NC27UV09

Site ID:	MOC
Site Location:	St. Lawrence Island
Boring Location:	N 3404017.228 E 1810872.203
Elevation:	69.17 feet above MSL
Total Depth:	11 feet

Logged By:	Lyndsey Kleppin
Drilled By:	Justin Rucker
Drilling Company:	Hammer Environmental
Drill Rig:	GeoProbe
Drilling Method:	Direct-Push Probe
Borehole Diameter:	2 inches
Date Started:	7/29/2010
Date Completed	7/29/2010

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0							PT	SANDY PEAT (PT), brown ,dry
							CL	SILTY CLAY (CL), brown (7.5YR 4/3), moist
			10NC27UV09 8'-11'	50			PT	PEAT (PT) brown, moist, slight fuel odor with grey (7.5YR 4/1) clay, frozen from 4' to 9'
10							SC	CLAYEY SAND (SC), grey (7.5YR 4/1), moist, strong fuel odor
20								

Notes:

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bgs = below ground surface
ft = foot or feet

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Bristol ENVIRONMENTAL REMEDIATION SERVICES, LLC

USACE
NE Cape HTRW

Job No. 410026

10NC27UV103

Site ID:	MOC
Site Location:	St. Lawrence Island
Boring Location:	N 3403779.203 E 1810553.066
Elevation:	76.93 feet above MSL
Total Depth:	16 feet

Logged By:	Lyndsey Kleppin
Drilled By:	Justin Rucker
Drilling Company:	Hammer Environmental
Drill Rig:	GeoProbe
Drilling Method:	Direct-Push Probe
Borehole Diameter:	2 inches
Date Started:	8/8/2010
Date Completed	8/8/2010

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0							PT	GRAVELLY PEAT (PT), brown, dry
				60			PT	PEAT(PT), dark brown, dry, grading to organic silt (OL)
				90			GW	SANDY GRAVEL (GW) with clay, grey (GLEY1 5/N), dry, strong fuel odor, wet at 15 feet bgs
10				100				
			10NC27UV103 14'-16'	100				
20								

Notes:

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ENVIRONMENTAL
REMEDIATION SERVICES, LLC

USACE
NE Cape HTRW

Job No. 410026

10NC27UV110

Site ID:	MOC
Site Location:	St. Lawrence Island
Boring Location:	N 3403795.522 E 1810894.427
Elevation:	76.07 feet above MSL
Total Depth:	12 feet

Logged By:	Lyndsey Kleppin
Drilled By:	Justin Rucker
Drilling Company:	Hammer Environmental
Drill Rig:	GeoProbe
Drilling Method:	Direct-Push Probe
Borehole Diameter:	2 inches
Date Started:	8/8/2010
Date Completed	8/8/2010

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0								No core sample taken.
			10NC27UV110 8'-10'	100			CH	FAT CLAY (CH), grey (GLEY1 5/N), wet, slight petroleum odor
10							CL	SANDY CLAY (CL) with gravel, grey (GLEY1 5/N), wet, slight petroleum odor
20								

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Bristol ENVIRONMENTAL REMEDIATION SERVICES, LLC

USACE
NE Cape HTRW

Job No. 410026

10NC27UV136

Site ID:	MOC
Site Location:	St. Lawrence Island
Boring Location:	N 3403748.308 E 1810506.114
Elevation:	77.04 feet above MSL
Total Depth:	17 feet

Logged By:	Lyndsey Kleppin
Drilled By:	Justin Rucker
Drilling Company:	Hammer Environmental
Drill Rig:	GeoProbe
Drilling Method:	Direct-Push Probe
Borehole Diameter:	2 inches
Date Started:	8/8/2010
Date Completed	8/8/2010

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0				10			GM	SILTY GRAVEL (GM), brown (10YR 3/4), dry organic silt with woody debris
				90				
							SM	SILTY SAND (SM), brownish black (10YR 2/1), moist, moderate fuel odor
10				80			GW	SANDY GRAVEL (GW), grey (10YR 4/1), moist, moderate fuel odor, wet @ 15 feet with strong fuel odor
			10NC27UV136 15'-17'	70				
20								

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10NC27UV17

USACE
NE Cape HTRW

Job No. 410026

Site ID:	MOC
Site Location:	St. Lawrence Island
Boring Location:	N 3404013.877 E 1811023.45
Elevation:	67.9 feet above MSL
Total Depth:	17 feet

Logged By:	Lyndsey Kleppin
Drilled By:	Justin Rucker
Drilling Company:	Hammer Environmental
Drill Rig:	GeoProbe
Drilling Method:	Direct-Push Probe
Borehole Diameter:	2 inches
Date Started:	7/29/2010
Date Completed	7/29/2010

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0							PT	PEAT (PT) with gravel, brown (7.5YR 4/4), dry, slight fuel odor
							OL	SANDY SILT (OL), organic silt with peat, brown (7.5YR 4/4), frozen from 4'-5.5', strong fuel odor
10			10NC27UV17 14'-17'				GW	SANDY GRAVEL (GW) with silt and clay, brown, moist, strong fuel odor, wet at 12' with free product
20								

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ft = foot or feet

ID = identification
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Bristol ENVIRONMENTAL REMEDIATION SERVICES, LLC

USACE
NE Cape HTRW

Job No. 410026

10NC27UV23

Site ID:	MOC
Site Location:	St. Lawrence Island
Boring Location:	N 3403912.669 E 1810897.907
Elevation:	72 feet above MSL
Total Depth:	9 feet

Logged By:	Lyndsey Kleppin
Drilled By:	Justin Rucker
Drilling Company:	Hammer Environmental
Drill Rig:	GeoProbe
Drilling Method:	Direct-Push Probe
Borehole Diameter:	2 inches
Date Started:	7/29/2010
Date Completed	7/29/2010

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0				100			GM	SILTY GRAVEL (GM), brown (10YR 3/4), dry with grey clasts
							CL	LEAN CLAY (CL), grey (10YR 4/1), dry with minor lenses of brown organic silt and peat
			10NC27UV23 6'-9'				CL	LEAN CLAY (CL), grey (10YR 4/1), moist, strong fuel odor, two 6" dry, brown PEAT (PT) lenses with strong fuel odor
10								
20								

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Bristol ENVIRONMENTAL REMEDIATION SERVICES, LLC

USACE
NE Cape HTRW

Job No. 410026

10NC27UV58

Site ID:	MOC
Site Location:	St. Lawrence Island
Boring Location:	N 3404055.878 E 1810819.154
Elevation:	68.01 feet above MSL
Total Depth:	17 feet

Logged By:	Lyndsey Kleppin
Drilled By:	Justin Rucker
Drilling Company:	Hammer Environmental
Drill Rig:	GeoProbe
Drilling Method:	Direct-Push Probe
Borehole Diameter:	2 inches
Date Started:	7/29/2010
Date Completed	7/29/2010

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0							PT	PEAT (PT), dark brown, frozen, with 6" seam of grey clay at 2.5 feet
							PT	PEAT (PT), dark brown, frozen to 5 feet and dry at depth, strong fuel odor
10								
			10NC27UV58 14'-17'				OL	Organic SILT (OL) with gravel, dark brown, dry, moderate fuel odor
							GW	SANDY GRAVEL (GW), brown, wet, strong fuel odor with free product
20								

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Job No. 410026

10NC27UV61

Site ID:	MOC
Site Location:	St. Lawrence Island
Boring Location:	N 3404050.733 E 1810982.558
Elevation:	61.9 feet above MSL
Total Depth:	8 feet

Logged By:	Lyndsey Kleppin
Drilled By:	Justin Rucker
Drilling Company:	Hammer Environmental
Drill Rig:	GeoProbe
Drilling Method:	Direct-Push Probe
Borehole Diameter:	2 inches
Date Started:	7/29/2010
Date Completed	7/29/2010

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0			10NC27UV61 0'-5'	30			PT	PEAT(PT) with minor gravel, dark brown (7.5YR 3/3), moist, strong fuel odor
			10NC27UV61 5-8'	100			SM	SILTY SAND with clay (SM), dark grey-brown (10YR 3/1), wet, strong fuel odor
10								
20								

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USACE
NE Cape HTRW

Job No. 410026

10NC27UV74

Site ID:	MOC
Site Location:	St. Lawrence Island
Boring Location:	N 3404096.409 E 1811013.478
Elevation:	60.52 feet above MSL
Total Depth:	16 feet

Logged By:	Lyndsey Kleppin
Drilled By:	Justin Rucker
Drilling Company:	Hammer Environmental
Drill Rig:	GeoProbe
Drilling Method:	Direct-Push Probe
Borehole Diameter:	2 inches
Date Started:	7/29/2010
Date Completed	7/29/2010

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0				30			PT	PEAT(PT), dark brown (10YR 3/4), frozen, slight petroleum odor
				100			OL	Organic SILT (OL), dark brown (7.5YR 3/1), moist, moderate fuel odor. 4" seam of SAND, wet, dark grey, strong fuel odor @ 6 feet
10			10NC27UC74 8'-10'	100			GW	SILTY GRAVEL (GW) with clay, dark greyish brown (10YR 5/2), moist, strong fuel odor @ 8 feet
				50				
20								

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Bristol ENVIRONMENTAL REMEDIATION SERVICES, LLC

USACE
NE Cape HTRW

Job No. 410026

10NC27UV77

Site ID:	MOC
Site Location:	St. Lawrence Island
Boring Location:	N 3404120.805 E 1811007.195
Elevation:	59.52 feet above MSL
Total Depth:	11 feet

Logged By:	Lyndsey Kleppin
Drilled By:	Justin Rucker
Drilling Company:	Hammer Environmental
Drill Rig:	GeoProbe
Drilling Method:	Direct-Push Probe
Borehole Diameter:	2 inches
Date Started:	7/29/2010
Date Completed	7/29/2010

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0				60			PT	PEAT (PT), dark brown, dry, frozen from 2" to 17" depth, moderate fuel odor
							OL	Organic SILT (OL) with minor SAND, dark brown, moist, strong fuel odor
				100			CL	LEAN CLAY (CL), grey (10YR 4/1), moist, low plasticity clay with minor gravel
10			10NC27UV77 9'-11'	100				
20								

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Bristol ENVIRONMENTAL REMEDIATION SERVICES, LLC

USACE
NE Cape HTRW

Job No. 410026

10NC27UV85

Site ID:	MOC
Site Location:	St. Lawrence Island
Boring Location:	N 3403888.948 E 1810795.673
Elevation:	73.99 feet above MSL
Total Depth:	16 feet

Logged By:	Lyndsey Kleppin
Drilled By:	Justin Rucker
Drilling Company:	Hammer Environmental
Drill Rig:	GeoProbe
Drilling Method:	Direct-Push Probe
Borehole Diameter:	2 inches
Date Started:	8/8/2010
Date Completed	8/8/2010

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0				20			GW	SANDY GRAVEL (GW), brown (10YR 3/4), dry, wet with slight fuel odor @ 7 feet
				20				
10				70			GC	CLAYEY GRAVEL (GC), grey (GLEY1 5/N), wet, moderate fuel odor
			10NC27UV85 12'-16'	50				
20								

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USACE
NE Cape HTRW

Job No. 410026

10NC27UV95

Site ID:	MOC
Site Location:	St. Lawrence Island
Boring Location:	N 3403833.572 E 1810793.27
Elevation:	75.01 feet above MSL
Total Depth:	17 feet

Logged By:	Lyndsey Kleppin
Drilled By:	Justin Rucker
Drilling Company:	Hammer Environmental
Drill Rig:	GeoProbe
Drilling Method:	Direct-Push Probe
Borehole Diameter:	2 inches
Date Started:	8/8/2010
Date Completed	8/8/2010

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0							SW	SAND (SW), brown, dry
							GW	SANDY GRAVEL (GW), brown (10YR 3/4), dry
10							CL	GRAVELLY CLAY (CL), grey (GLEY1 5/N) with brown mottling, moist, slight petroleum odor, wet @12 feet
			10NC27UV95 15'-17'				GC	CLAYEY GRAVEL (GC), grey (GLEY1 5/N), moist, moderate fuel odor
20								

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Bristol ENVIRONMENTAL REMEDIATION SERVICES, LLC

USACE
NE Cape HTRW

Job No. 410026

10NC27UV99

Site ID:	MOC
Site Location:	St. Lawrence Island
Boring Location:	N 3403807.039 E 1810553.369
Elevation:	76.43 feet above MSL
Total Depth:	16 feet

Logged By:	Lyndsey Kleppin
Drilled By:	Justin Rucker
Drilling Company:	Hammer Environmental
Drill Rig:	GeoProbe
Drilling Method:	Direct-Push Probe
Borehole Diameter:	2 inches
Date Started:	8/8/2010
Date Completed	8/8/2010

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0				40			GW	SILTY GRAVEL (GW), brown (10YR 3/4), dry, organic silt with 1" thick PEAT (PT) seam @ 4 feet
				100			ML	SANDY SILT, grey (GLEY1 5/N), dry
10			10NC27UV99 12'-16'	100 100			GW	SANDY GRAVEL (GW) with clay, grey (GLEY1 5/N), moist, wet with strong fuel odor @ 12 feet
20								

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ft = foot or feet

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Bristol ENVIRONMENTAL REMEDIATION SERVICES, LLC

USACE
NE Cape HTRW

Job No. 410026

10NC27TP01

Site ID:	MOC
Site Location:	St. Lawrence Island
Boring Location:	N 3403972.734 E 1811307.577
Elevation:	69 feet above MSL
Total Depth:	12 feet

Logged By:	Lyndsey Kleppin
Drilled By:	Jack Willis
Drilling Company:	
Drill Rig:	Excavator
Drilling Method:	Test Pit
Borehole Diameter:	Not Applicable
Date Started:	8/6/2010
Date Completed	8/6/2010

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0							PT	PEAT (PT), brown, moist, no fuel odor with roots and woody debris
							SC	CLAYEY SAND (SC) with gravel, grey (GLEY1 5/10Y), moist with few <1" seams of yellow-brown organic silt, wet at 6 feet bgs
10								
20								

Notes:

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10NC27TP02

USACE
NE Cape HTRW

Job No. 410026

Site ID:	MOC
Site Location:	St. Lawrence Island
Boring Location:	N 3403922.327 E 1811277.168
Elevation:	66.97 feet above MSL
Total Depth:	12 feet

Logged By:	Lyndsey Kleppin
Drilled By:	Jack Willis
Drilling Company:	
Drill Rig:	Excavator
Drilling Method:	Test Pit
Borehole Diameter:	Not Applicable
Date Started:	8/6/2010
Date Completed	8/6/2010

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0							PT	PEAT (PT), gravelly, brown, dry with roots
							GC	CLAYEY GRAVEL (GC) with sand, grey, dry, 2" dark brown PEAT (PEAT) seam at 6' bgs, strong fuel odor at water table
10								
20								

Notes:
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Bristol ENVIRONMENTAL REMEDIATION SERVICES, LLC

10NC27TP03

USACE
NE Cape HTRW

Job No. 410026

Site ID:	MOC
Site Location:	St. Lawrence Island
Boring Location:	N 3403847.096 E 1811234.437
Elevation:	74.6 feet above MSL
Total Depth:	12 feet

Logged By:	Lyndsey Kleppin
Drilled By:	Jack Willis
Drilling Company:	
Drill Rig:	Excavator
Drilling Method:	Test Pit
Borehole Diameter:	Not Applicable
Date Started:	8/6/2010
Date Completed	8/6/2010

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0							GW	SILTY GRAVEL (GW), brown, dry, compacted fill
							GW	GRAVEL (GW) with PEAT (PT), brown, dry with roots
10							GW	SANDY GRAVEL (GW), brown, moist, with large angular clasts up to 2' in length, wet at 9 feet bgs, water at 10 feet bgs
20								

Notes:

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10NC27TP04

USACE
NE Cape HTRW

Job No. 410026

Site ID:	MOC
Site Location:	St. Lawrence Island
Boring Location:	N 3403826.933 E 1810779.894
Elevation:	75.35 feet above MSL
Total Depth:	15 feet

Logged By:	Lyndsey Kleppin
Drilled By:	Jack Willis
Drilling Company:	
Drill Rig:	Excavator
Drilling Method:	Test Pit
Borehole Diameter:	Not Applicable
Date Started:	8/7/2010
Date Completed	8/7/2010

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0							PT	PEAT (PT), brown, dry
							GW	SANDY GRAVEL (GM), light brown, dry, slight fuel odor
							GM	SILTY GRAVEL (GM), red, dry, discontinuous lens on NE side of test pit wall
10							GC	CLAYEY GRAVEL (GC), grey, moist, moderate fuel odor, water at 14 feet bgs
20								

Notes:

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ft = foot or feet

ID = identification
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USCS = Unified Soil Classification System

Bristol ENVIRONMENTAL REMEDIATION SERVICES, LLC

USACE
NE Cape HTRW

Job No. 410026

10NC27TP05

Site ID:	MOC
Site Location:	St. Lawrence Island
Boring Location:	N 3403990.4 E 1810557.782
Elevation:	72.5 feet above MSL
Total Depth:	17 feet

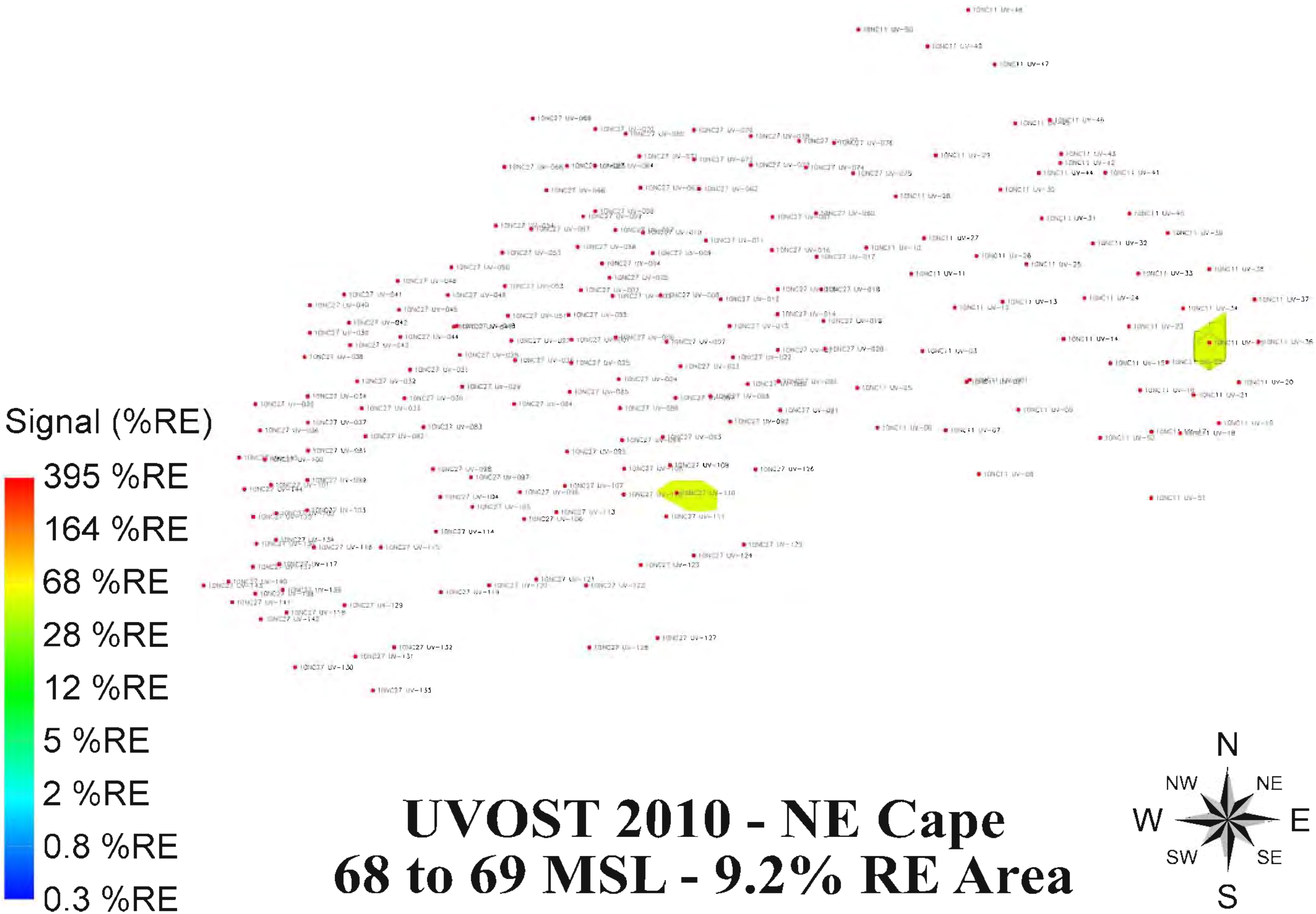
Logged By:	Lyndsey Kleppin
Drilled By:	Jack Willis
Drilling Company:	
Drill Rig:	Excavator
Drilling Method:	Test Pit
Borehole Diameter:	Not Applicable
Date Started:	8/7/2010
Date Completed	8/7/2010

Depth (ft)	Sample Interval	Blow Count	Lab No.	Recovery (%)	PID (ppm)	Graphic Log	USCS	Lithology Description
0							GW	SANDY GRAVEL (GW), light brown, dry
							GC	CLAYEY GRAVEL (GC) with sand, grey, large clasts up to 2' in length
10								
							GC	CLAYEY GRAVEL (GC) with sand, grey
20								

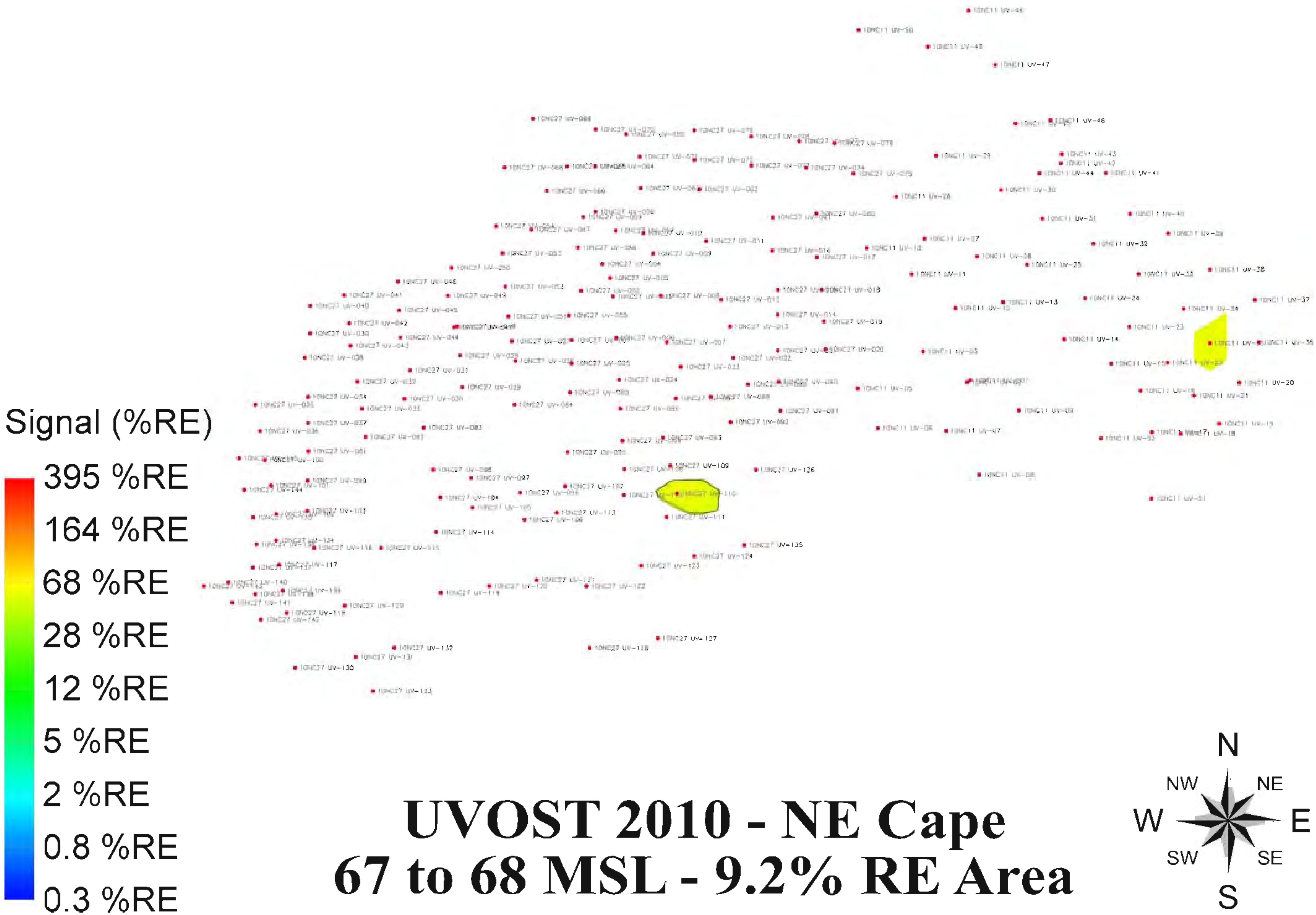
Notes:
° = degrees
% = percent
" = inch or inches
bgs = below ground surface
ft = foot or feet
ID = identification
MSL = mean sea level
No. = number
USCS = Unified Soil Classification System

ATTACHMENT 3

9.2% RE Section Figures



UVOST 2010 - NE Cape
68 to 69 MSL - 9.2% RE Area



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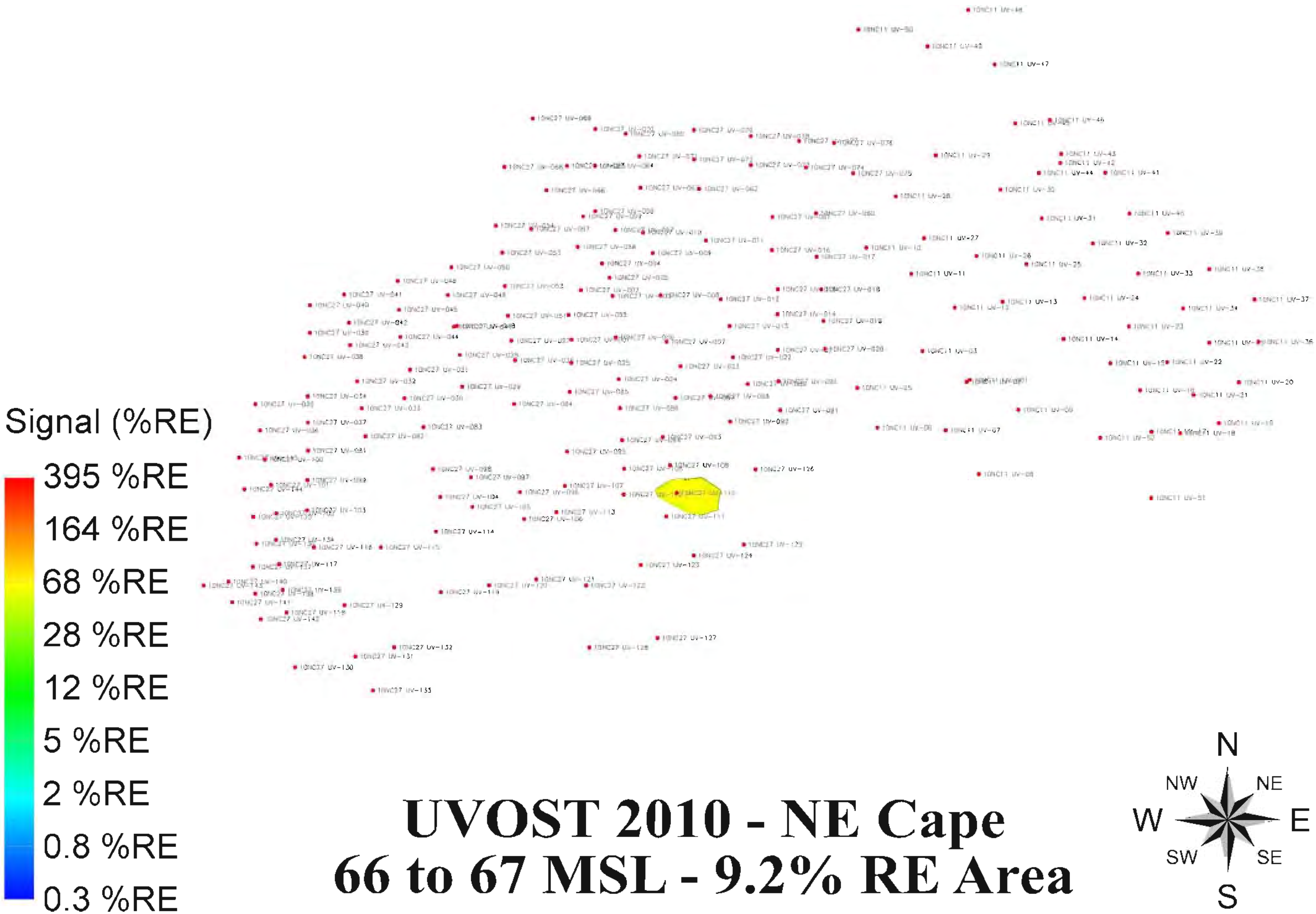
67 to 68 MSL - 9.2% RE Area



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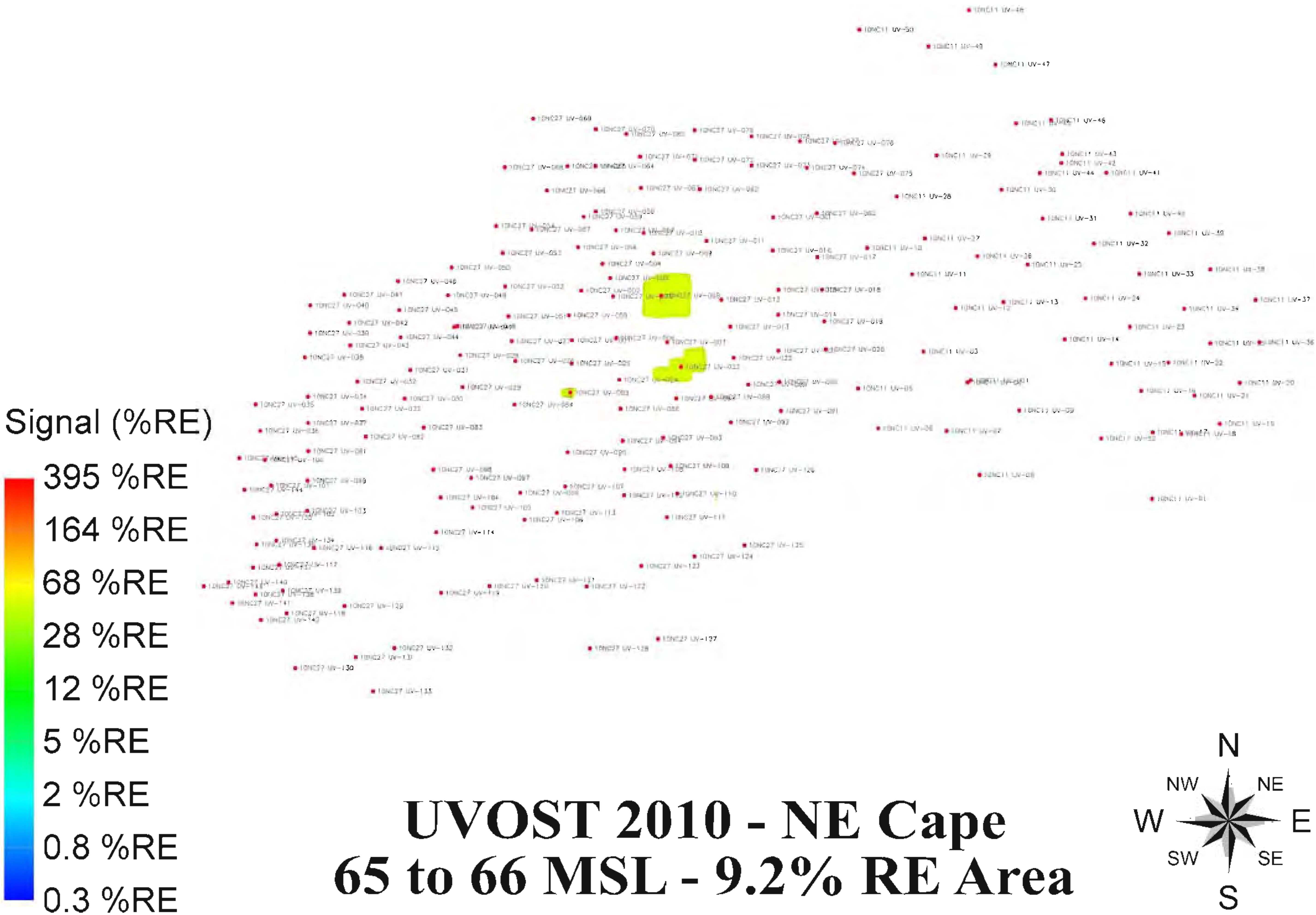

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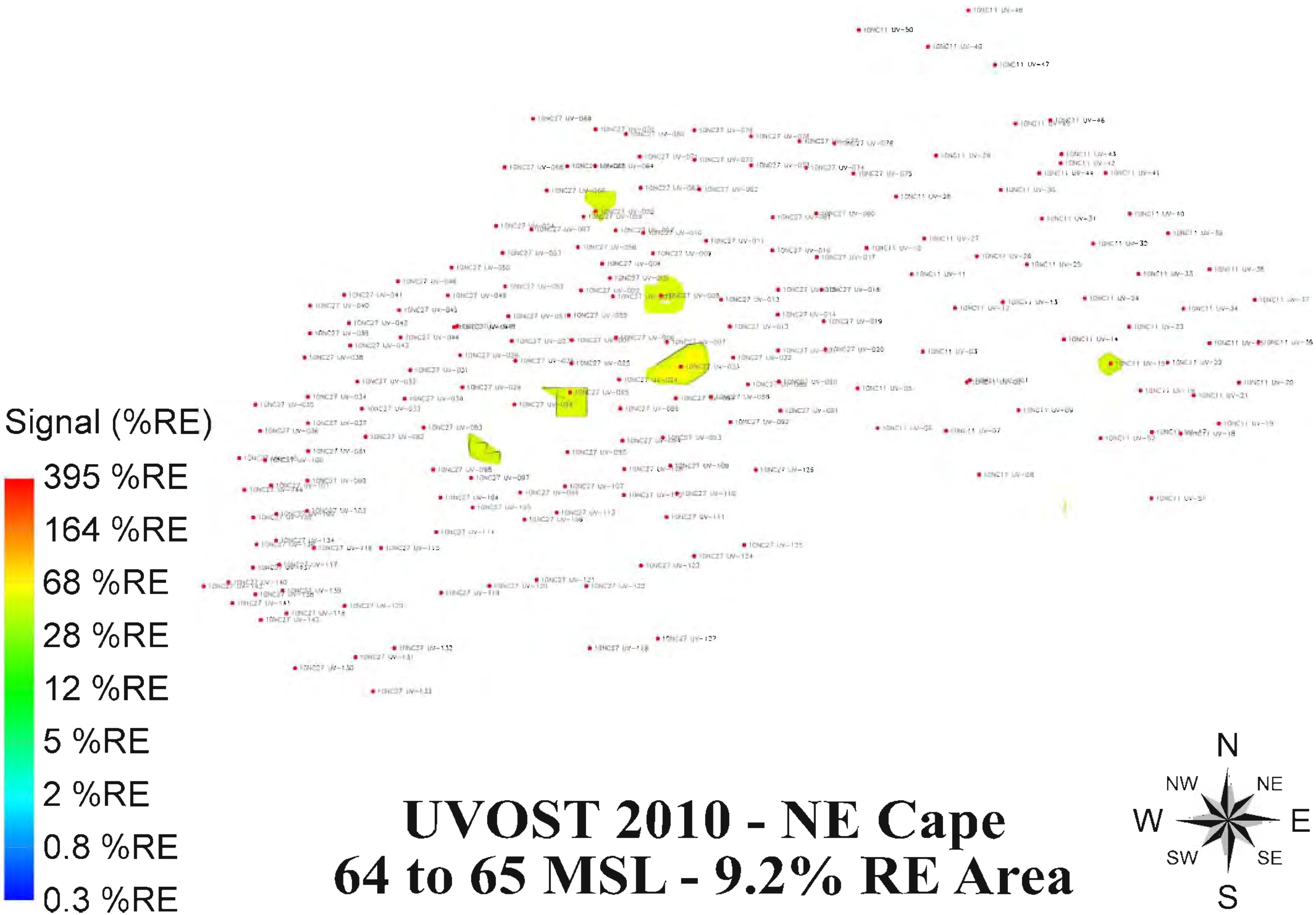

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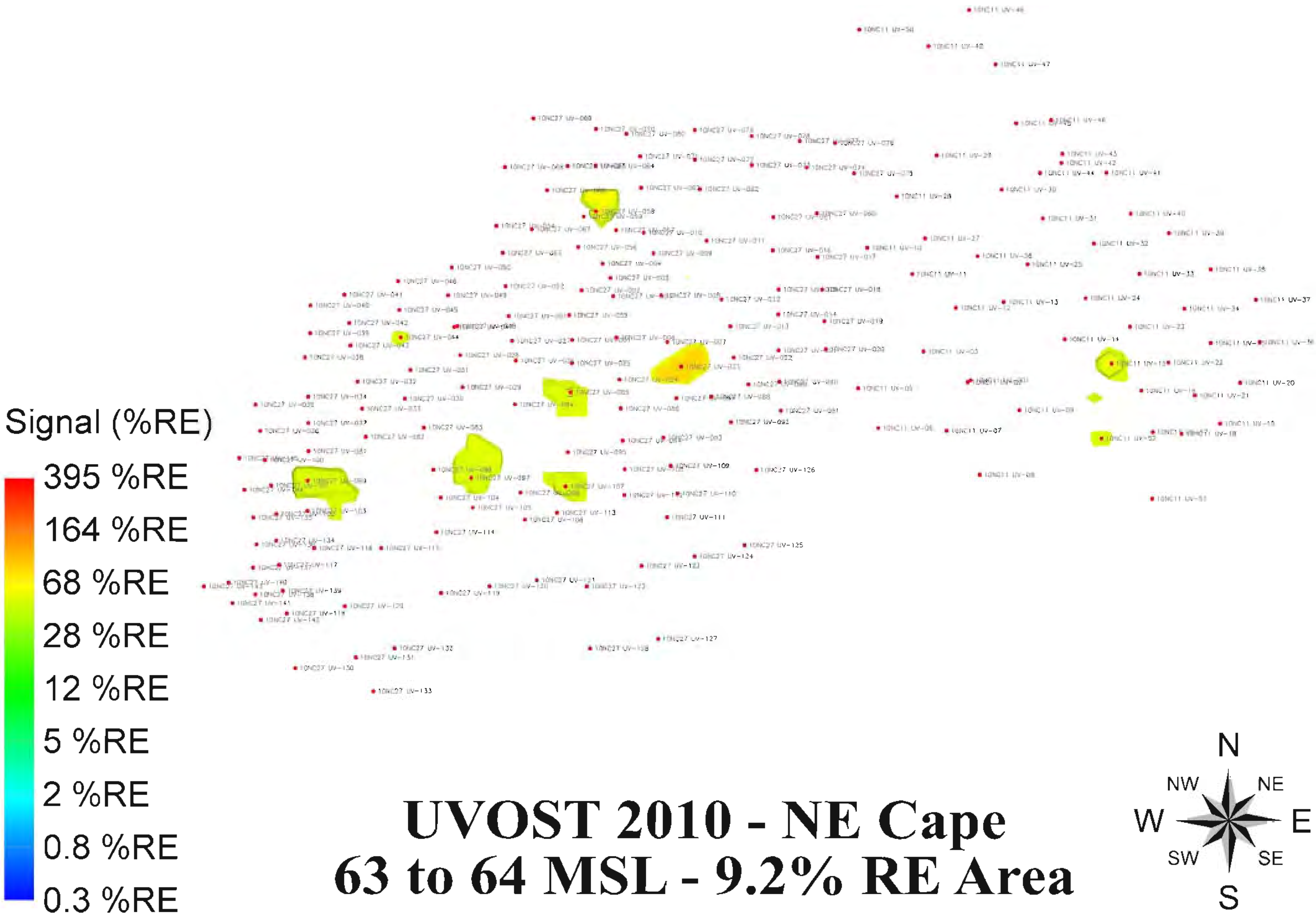

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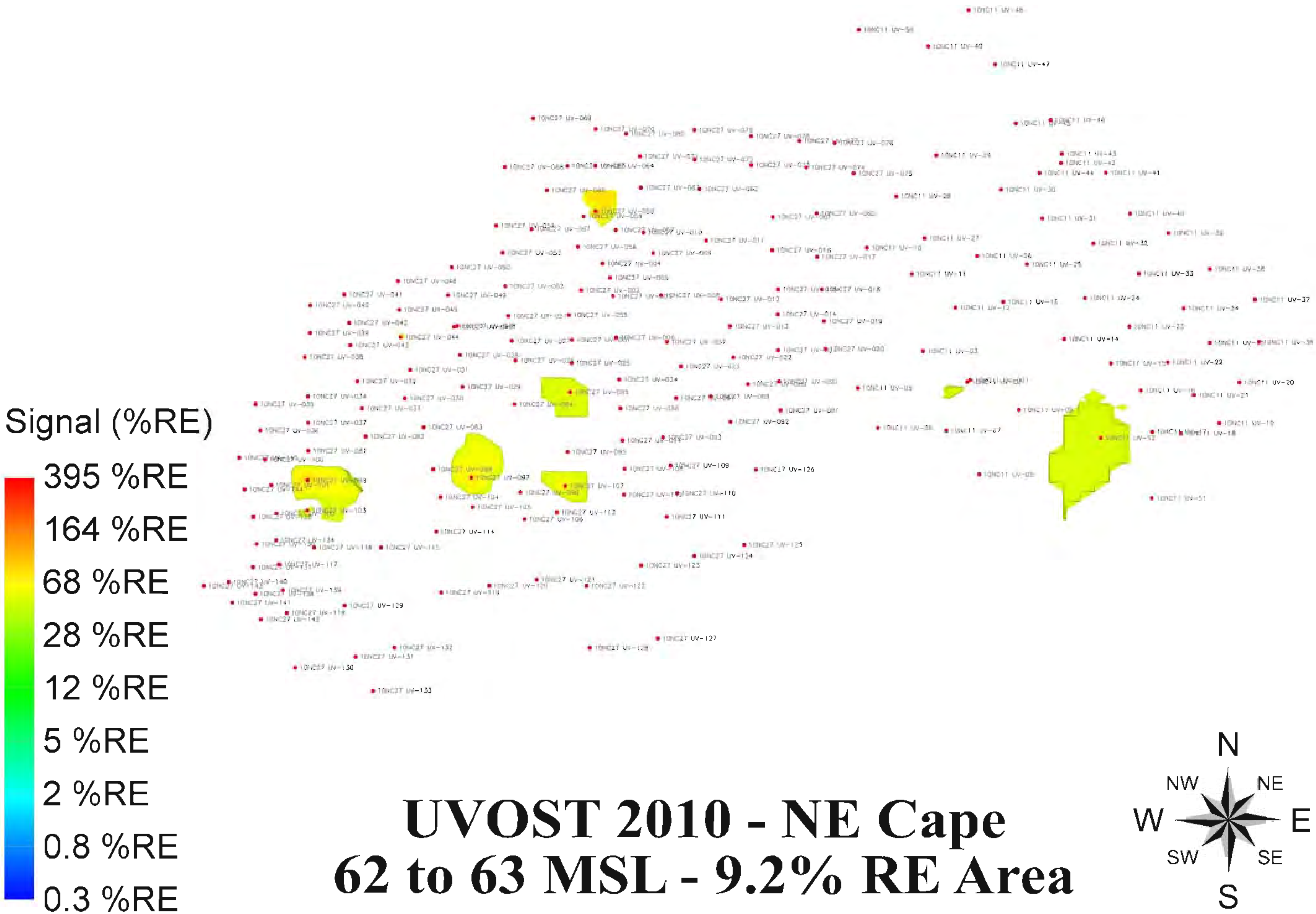

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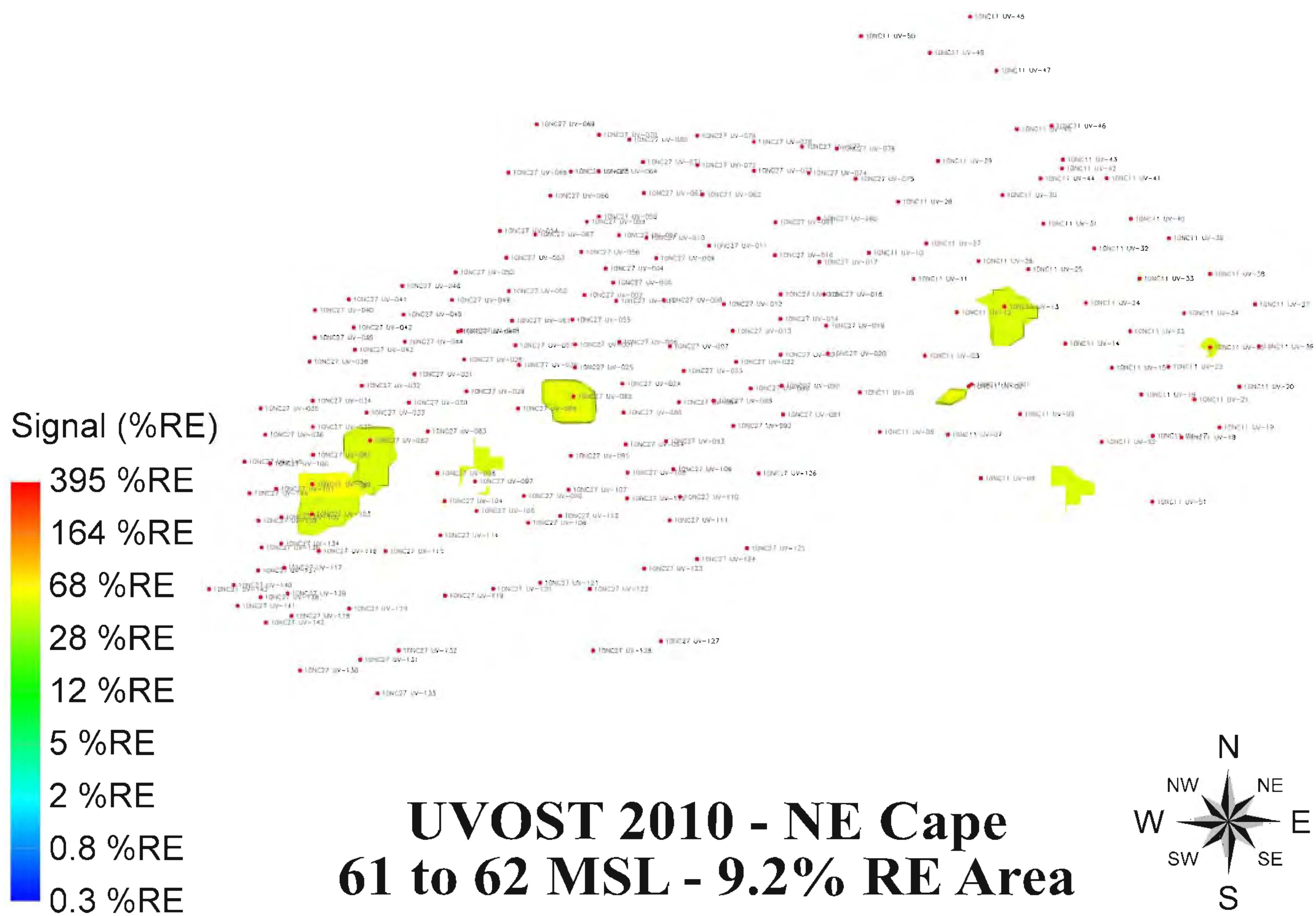
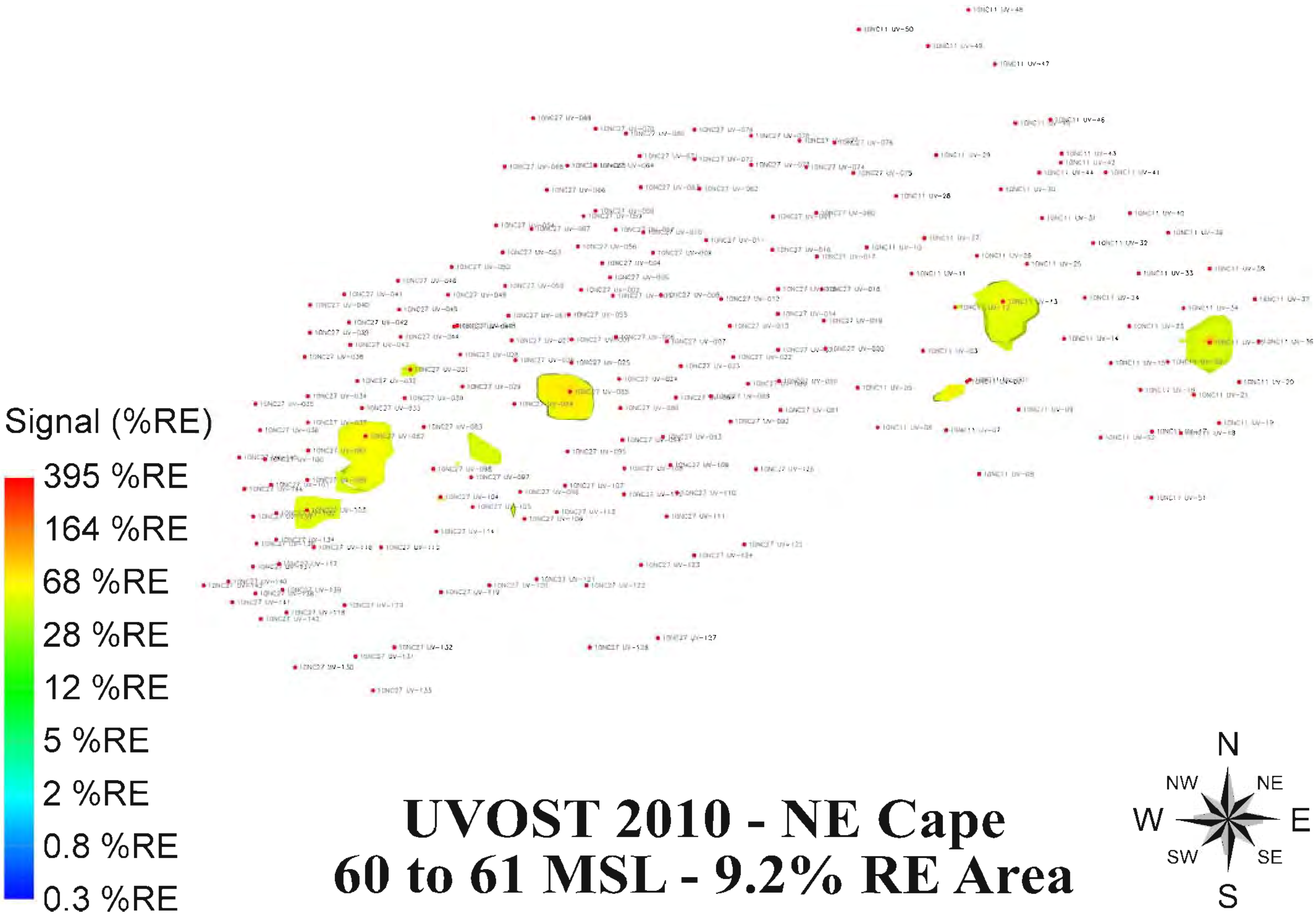
62 to 63 MSL - 9.2% RE Area



UVOST 2010 - NE Cape
61 to 62 MSL - 9.2% RE Area



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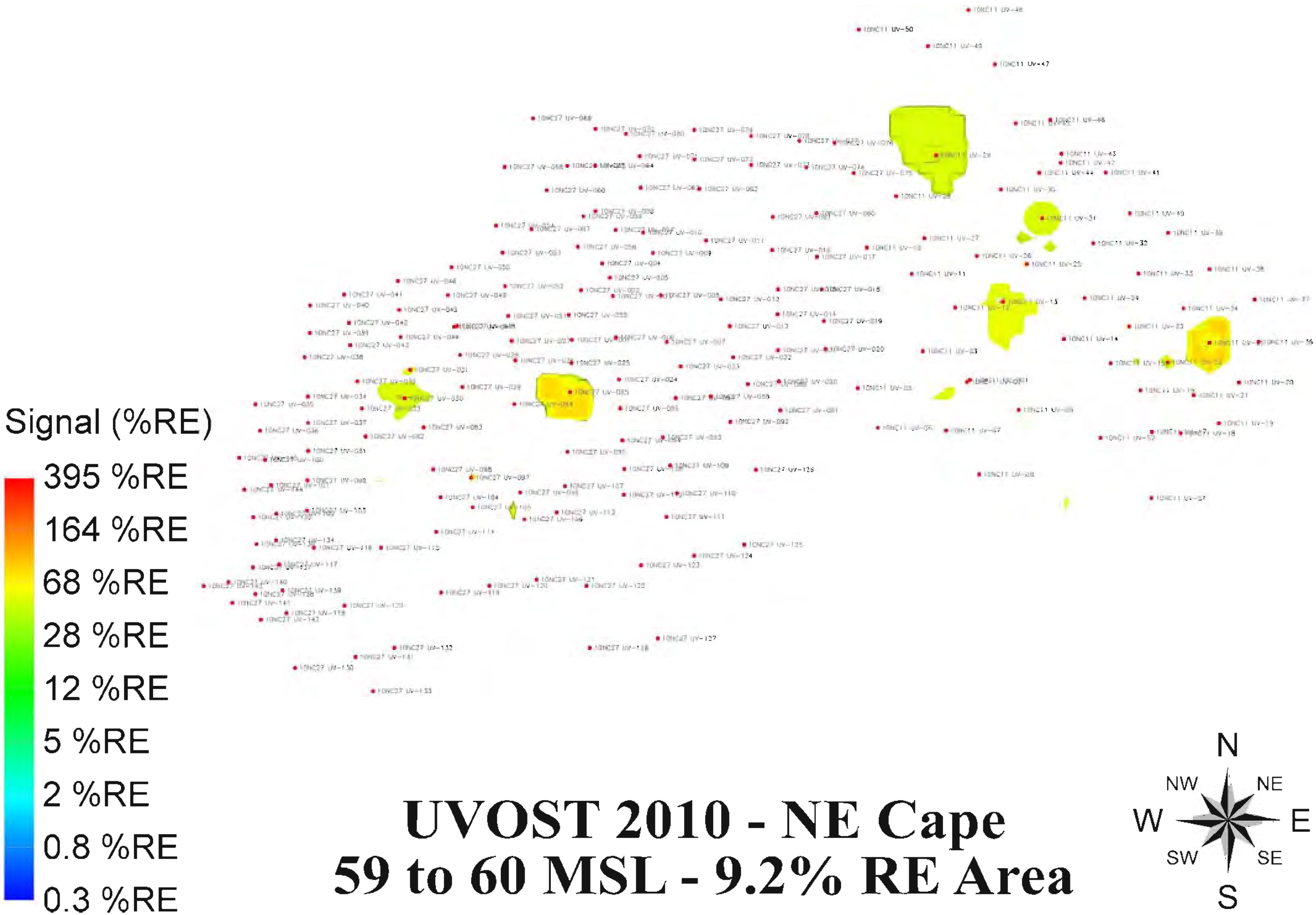
60 to 61 MSL - 9.2% RE Area



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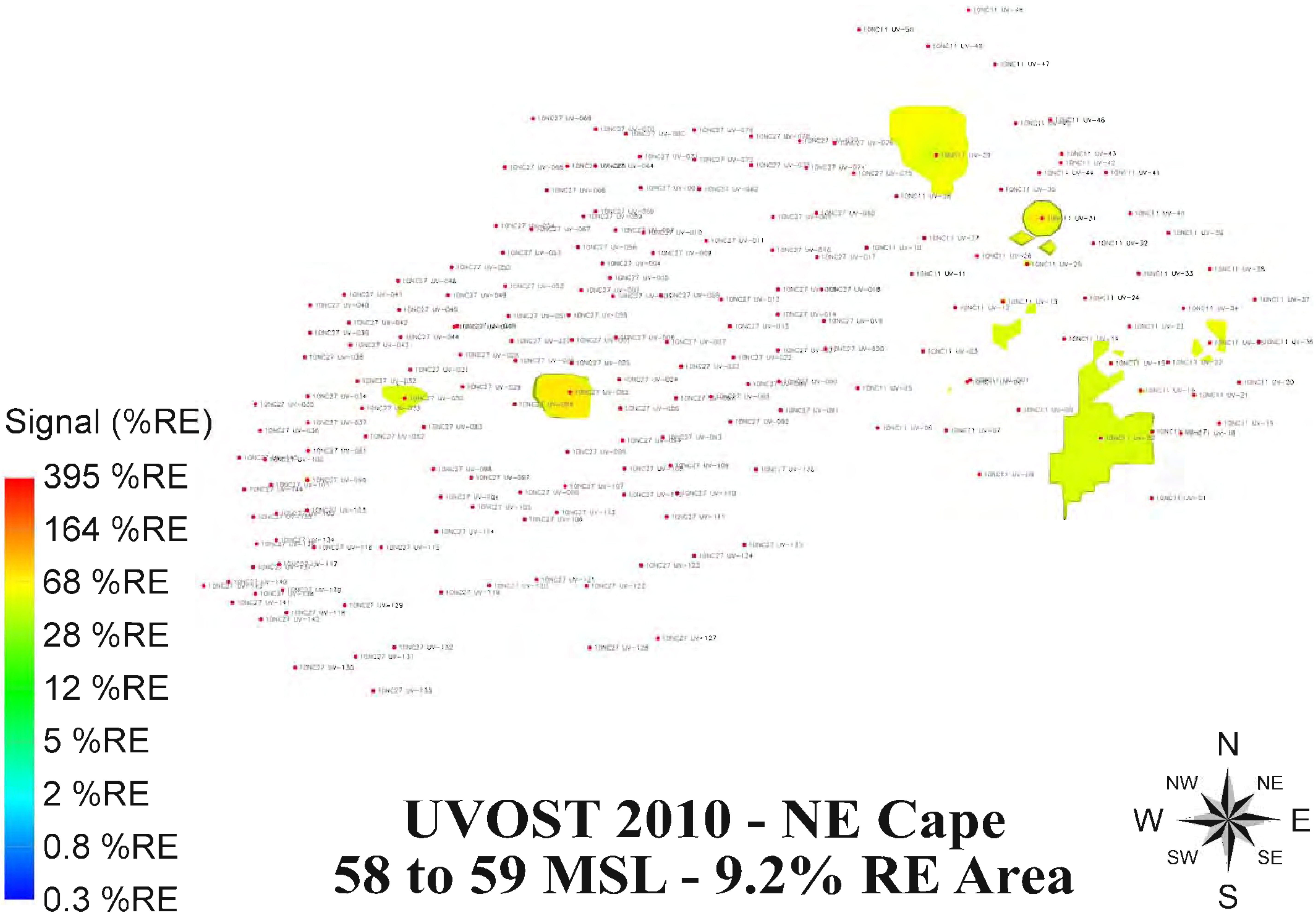

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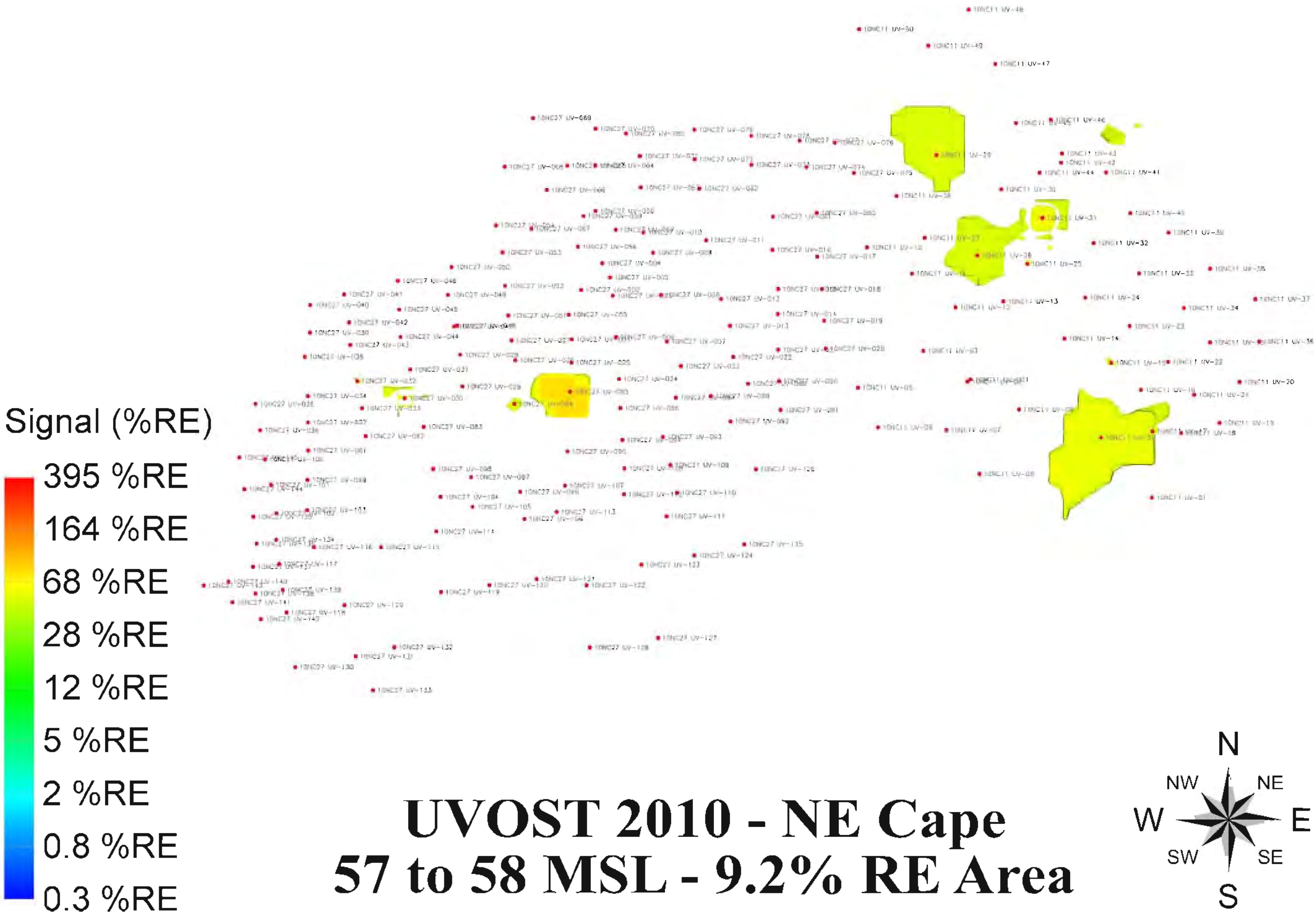

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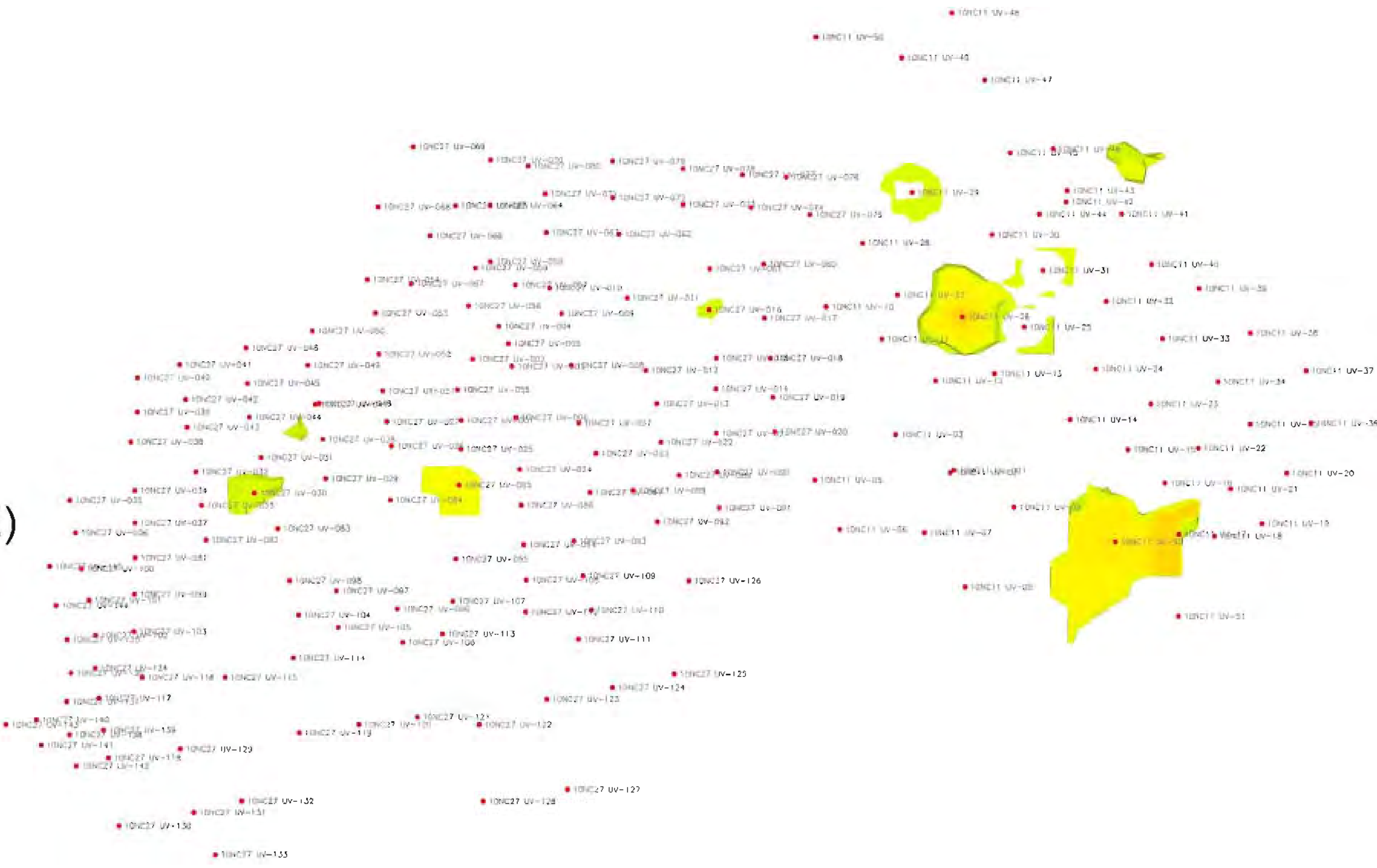

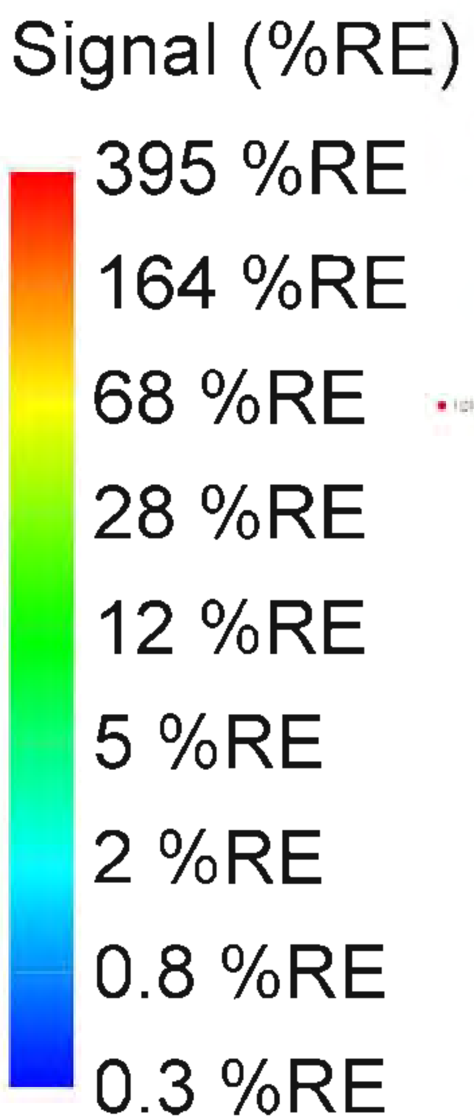

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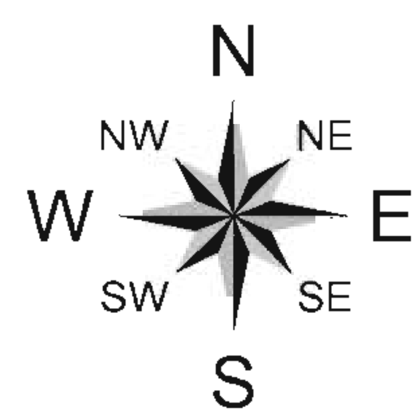
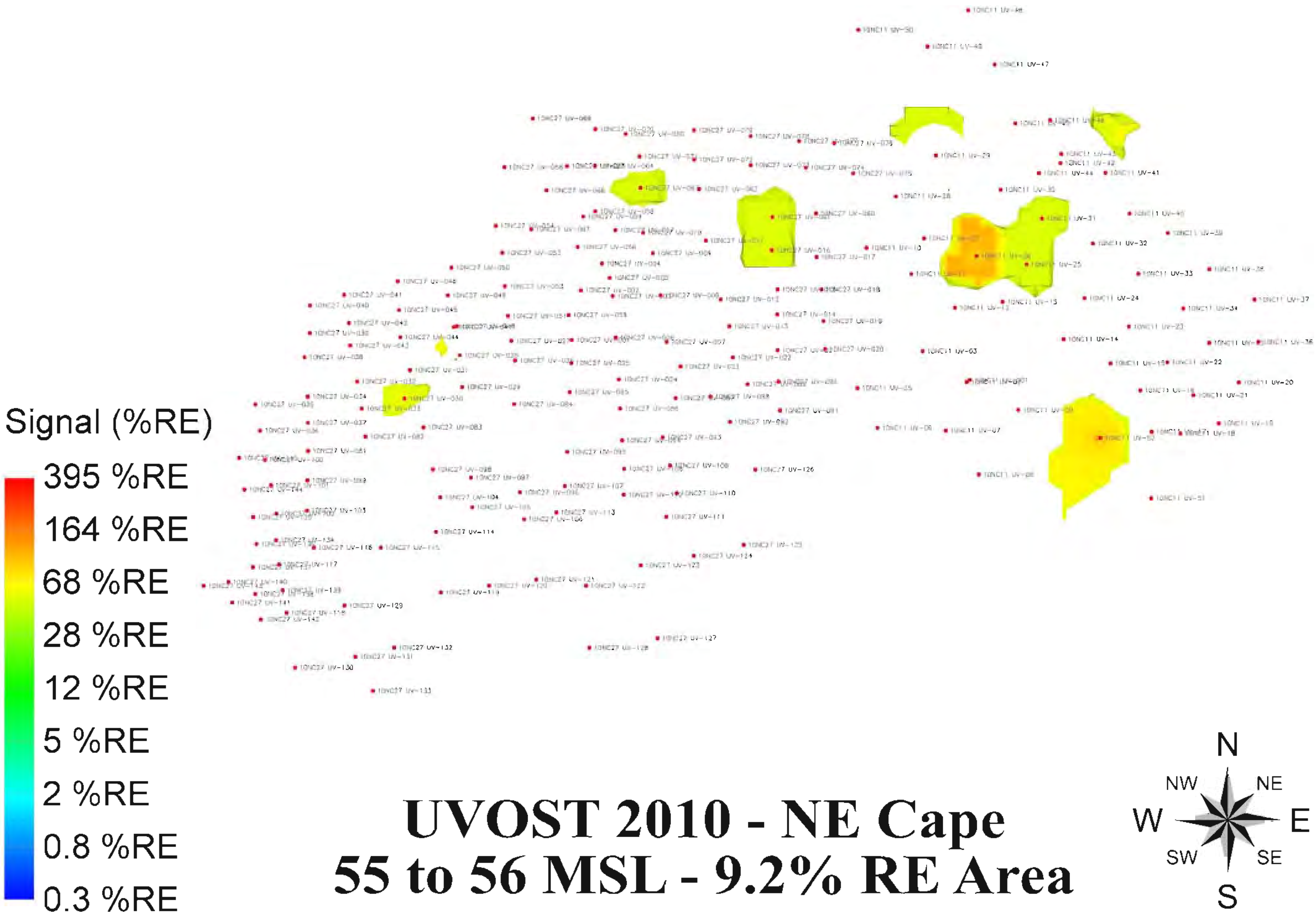
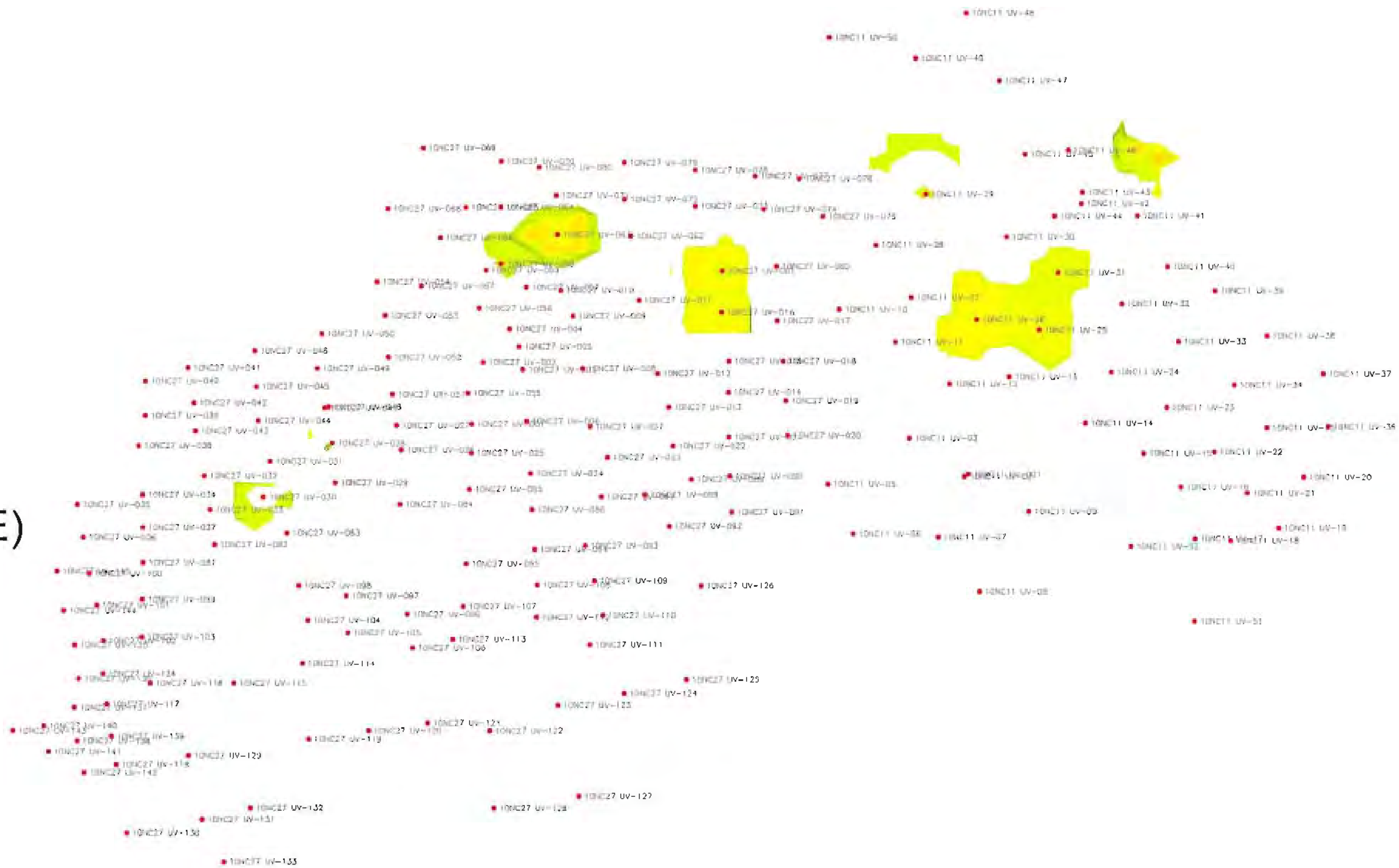




UVOST 2010 - NE Cape
55 to 56 MSL - 9.2% RE Area

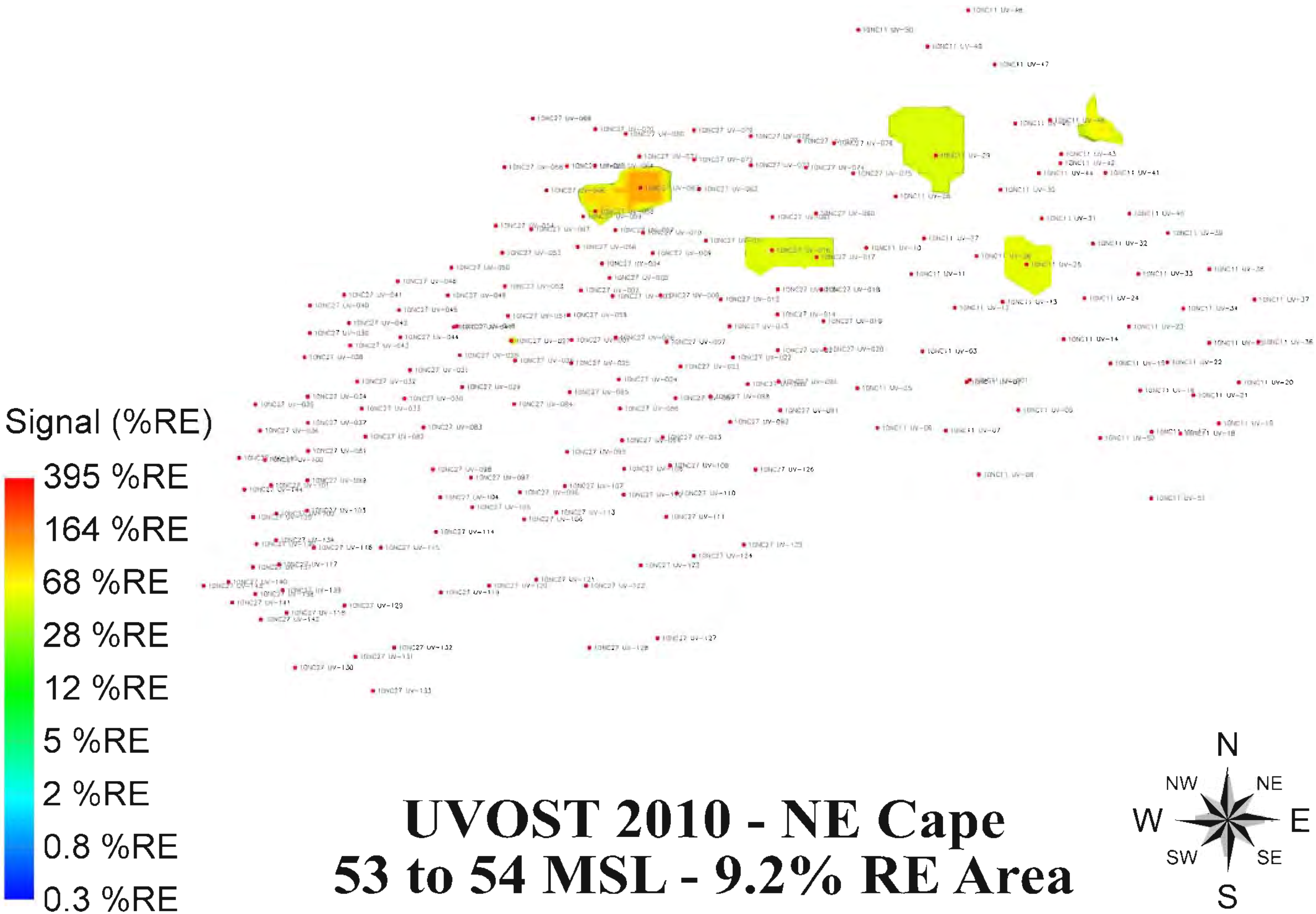


Signal (%RE)

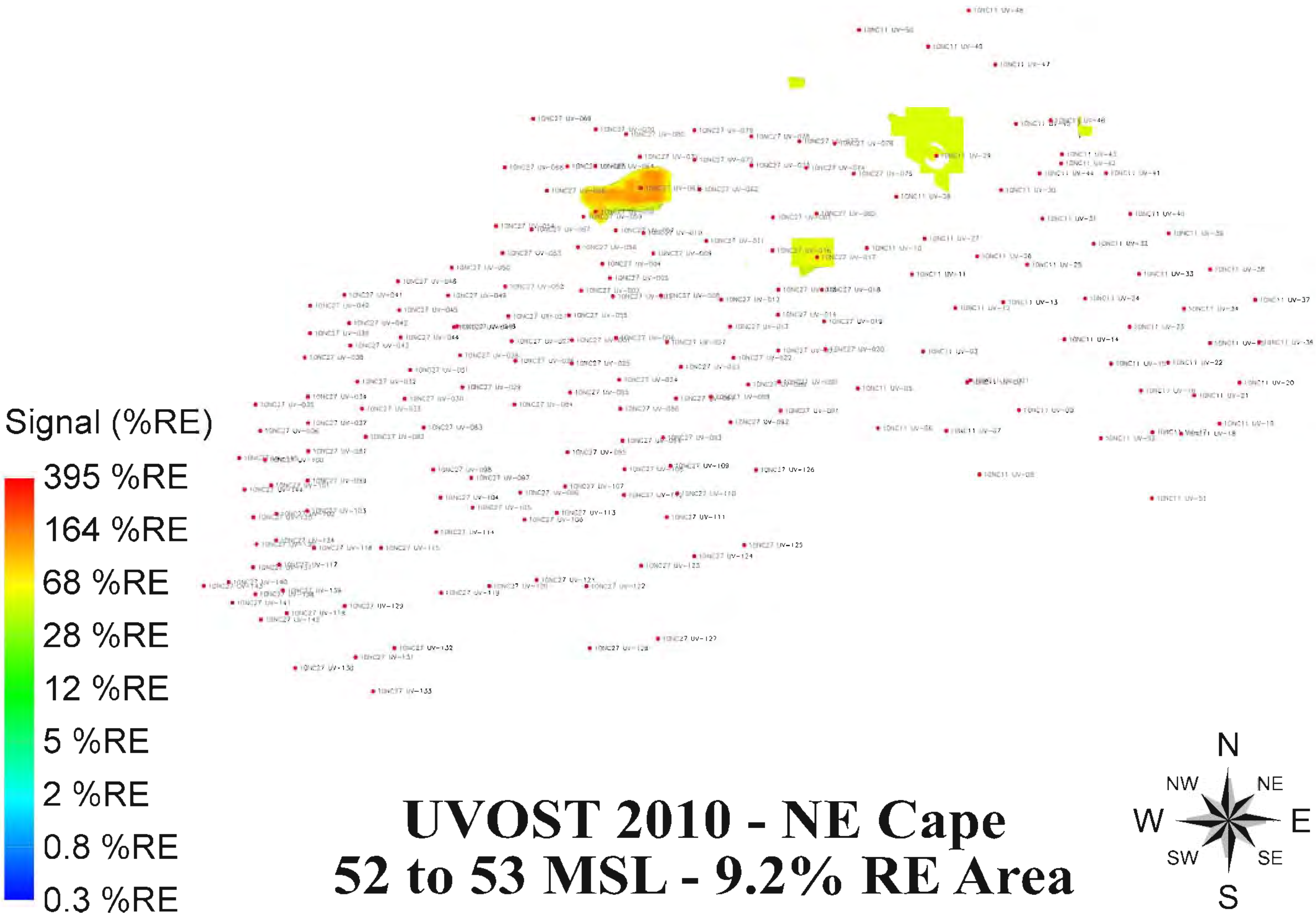
395 %RE
164 %RE
68 %RE
28 %RE
12 %RE
5 %RE
2 %RE
0.8 %RE
0.3 %RE

UVOST 2010 - NE Cape
54 to 55 MSL - 9.2% RE Area

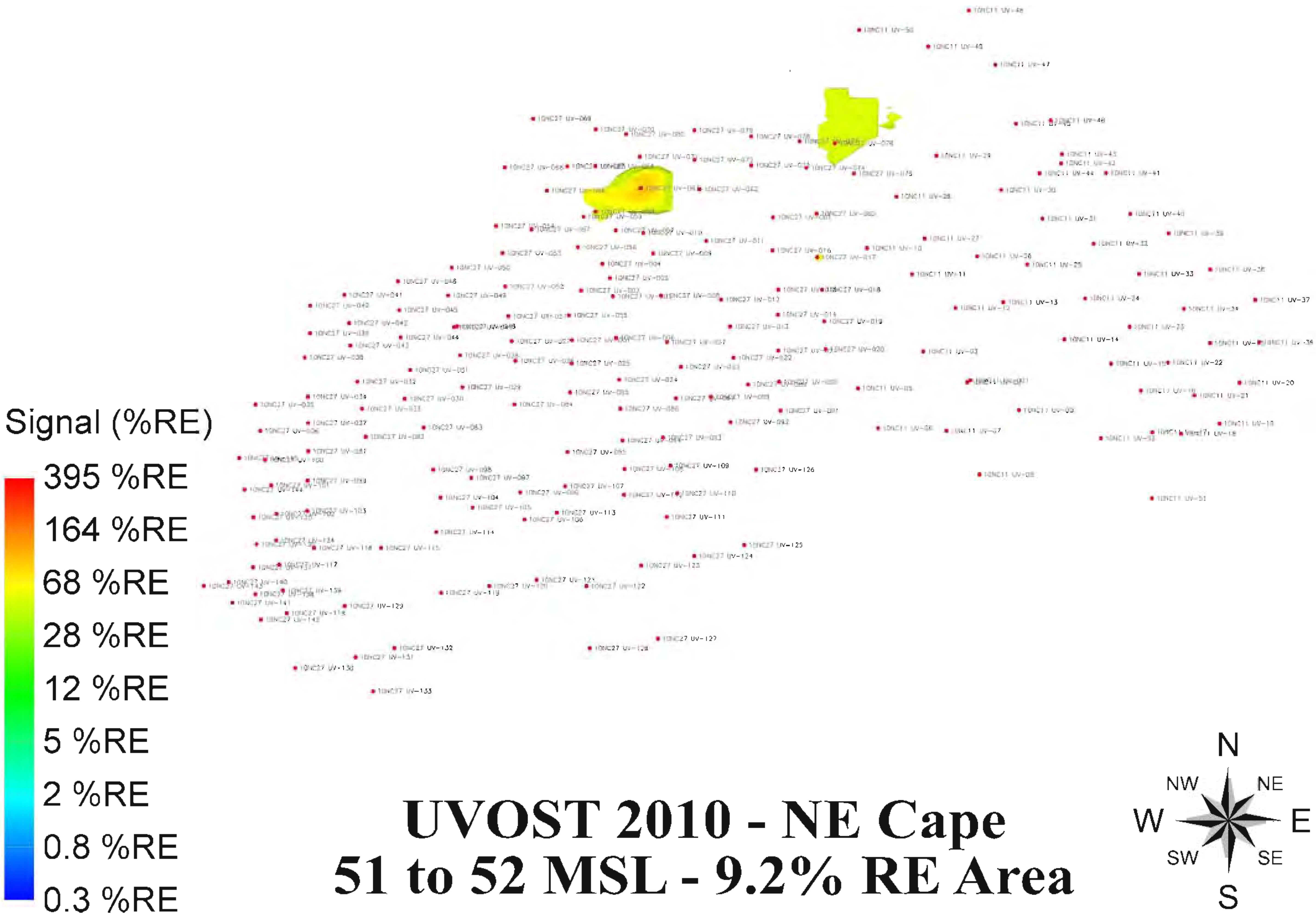
N NE E SE S SW W NW



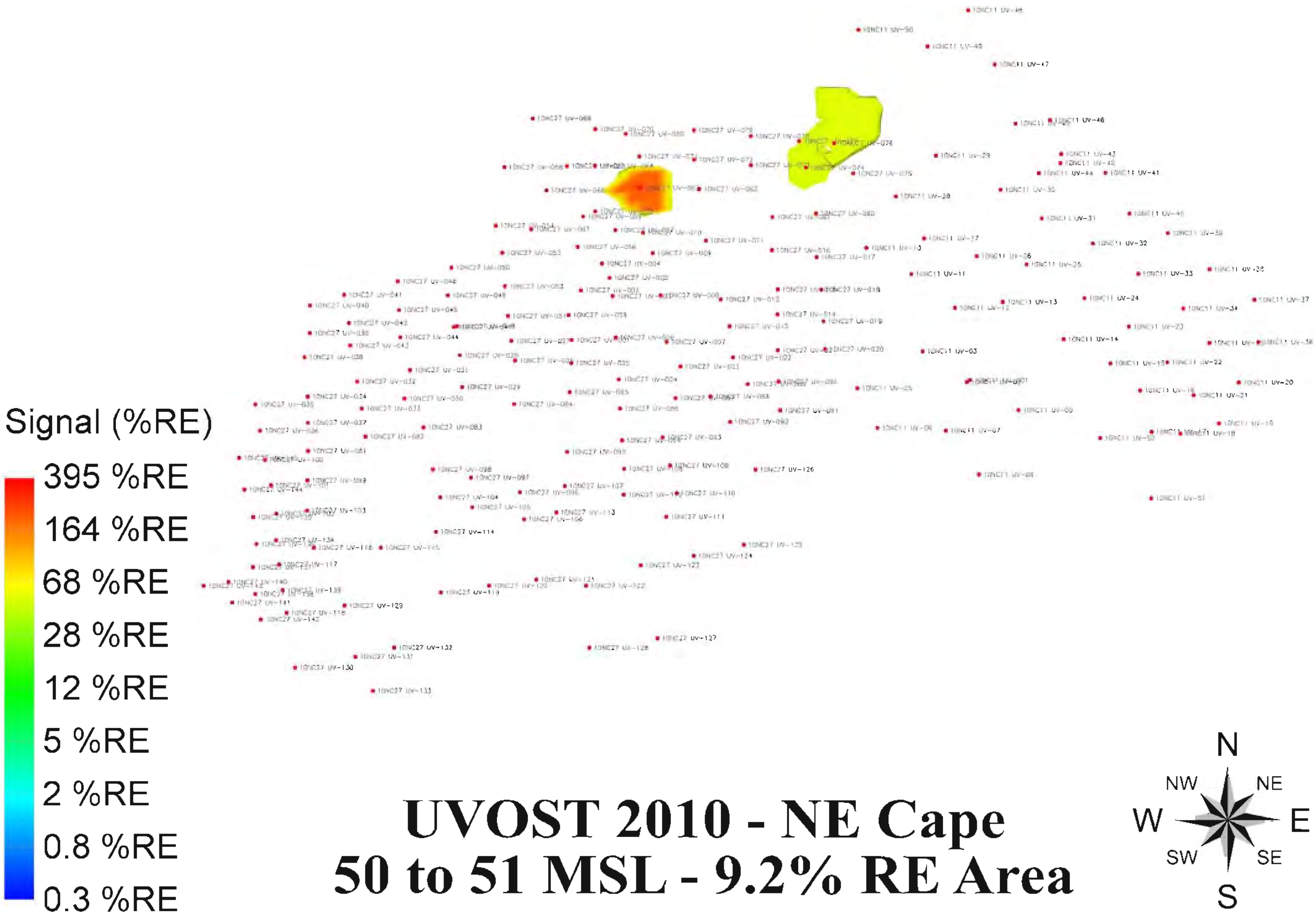
UVOST 2010 - NE Cape
53 to 54 MSL - 9.2% RE Area



UVOST 2010 - NE Cape
52 to 53 MSL - 9.2% RE Area



UVOST 2010 - NE Cape
51 to 52 MSL - 9.2% RE Area



UVOST 2010 - NE Cape
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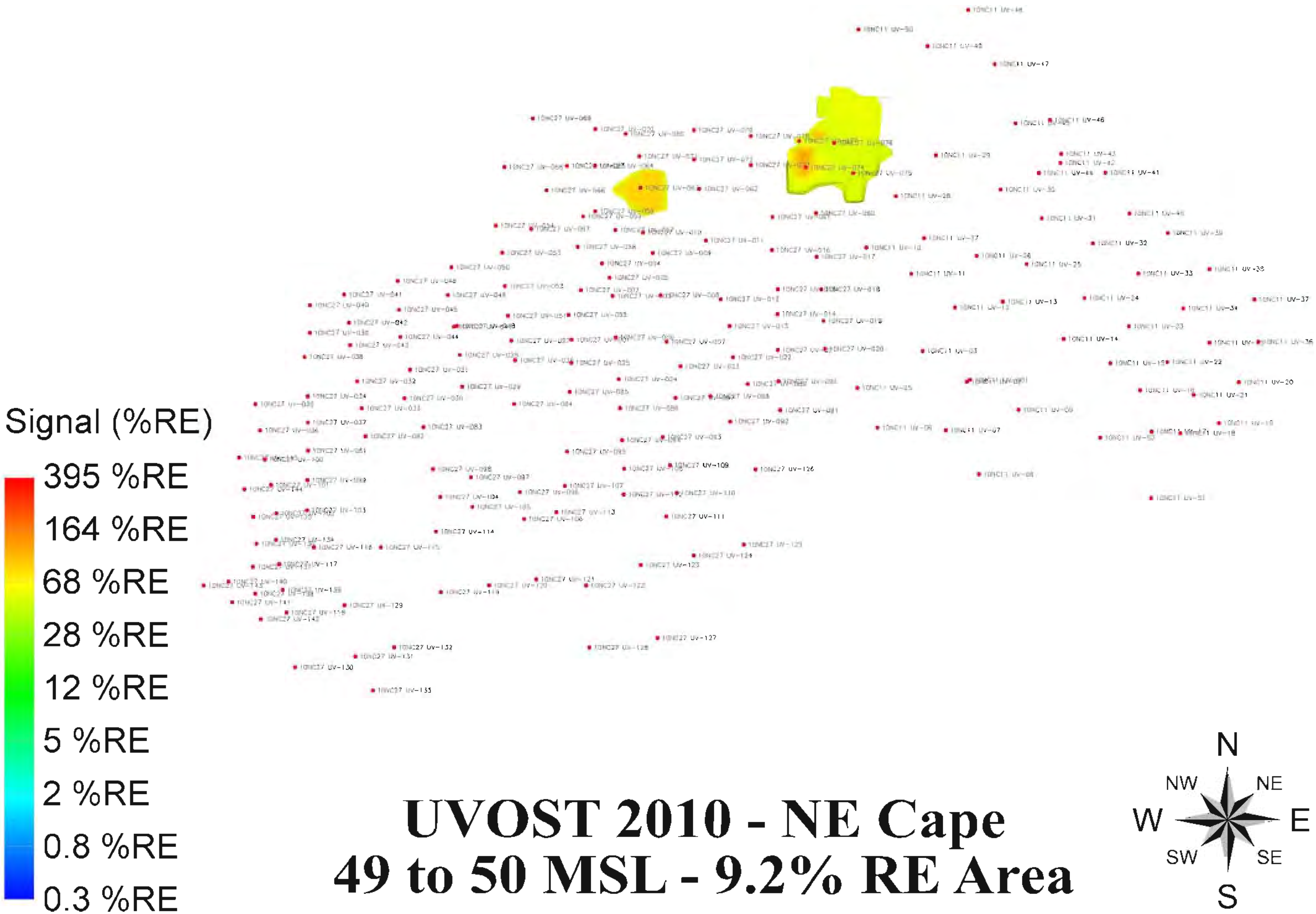
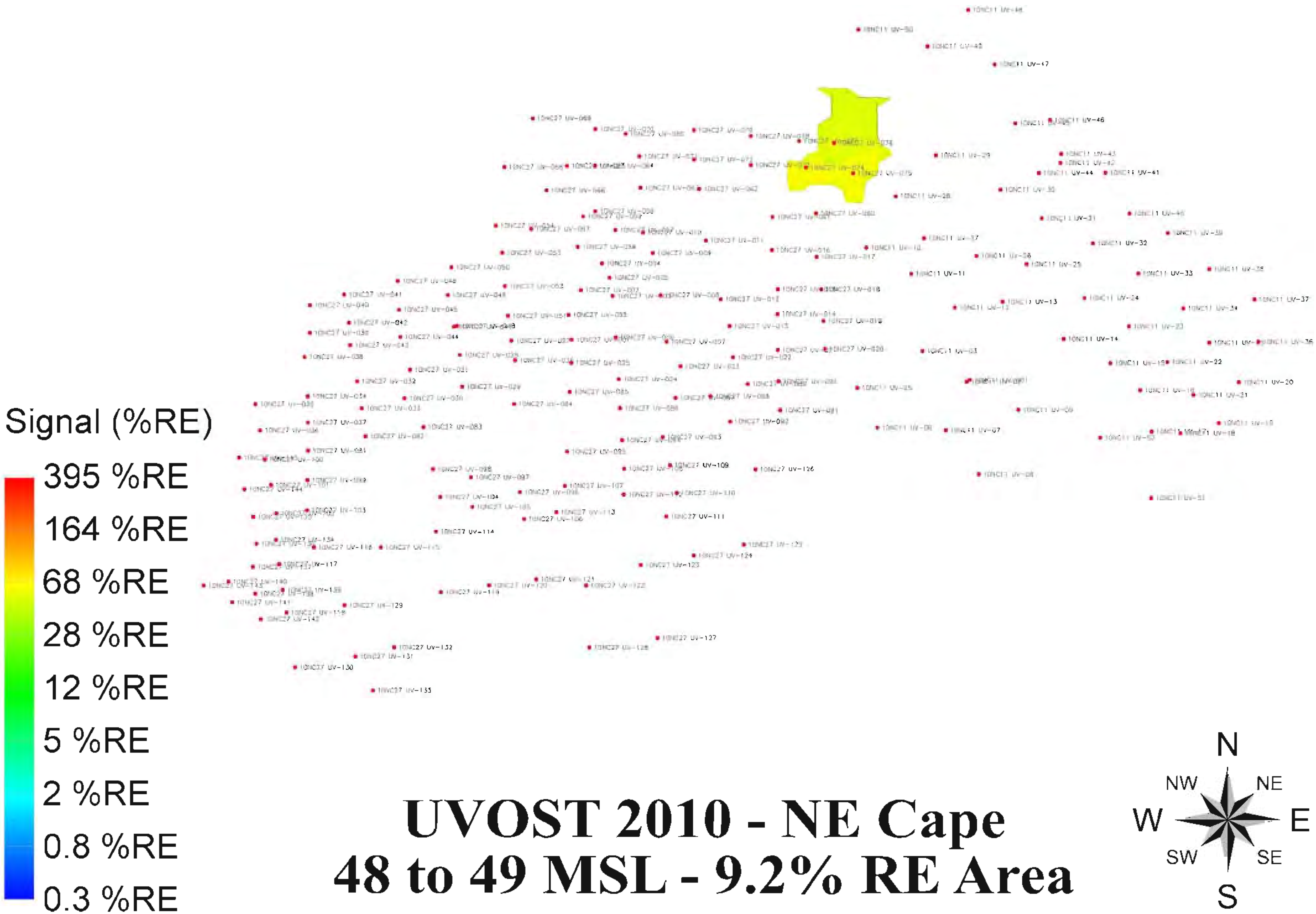


UVOST 2010 - NE Cape
49 to 50 MSL - 9.2% RE Area



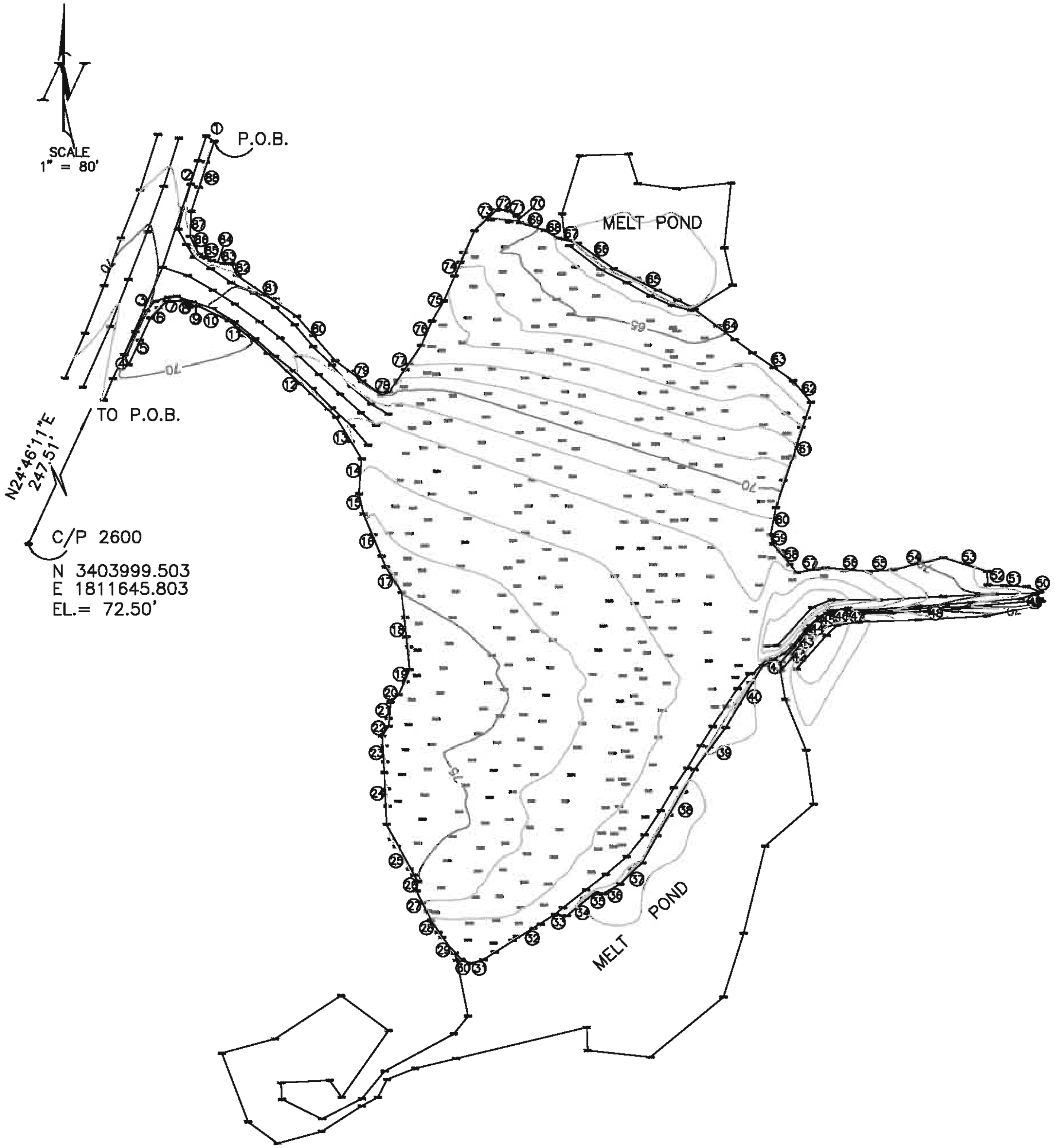
UVOST 2010 - NE Cape
48 to 49 MSL - 9.2% RE Area

APPENDIX E

Site 9 As-Built Survey

NORTHEAST CAPE ST. LAWRENCE ISLAND
AREA 9 DUMPSITE
TOPOGRAPHIC SURVEY

"AS–BUILT" POST CONSTRUCTION
SURVEY CONDUCTED AUGUST 2010



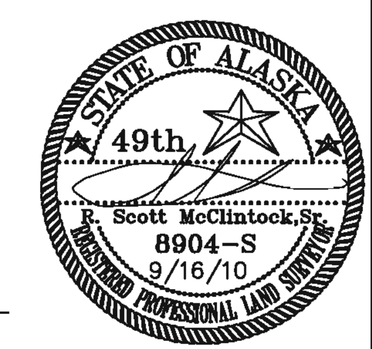
LINE	BEARING	DISTANCE	LINE	BEARING	DISTANCE
L1	N55°05'46"W	5.34ft			
L2	S18°24'26"W	77.28ft	L45	N61°00'59"E	6.78ft
L3	S23°50'46"W	53.25ft	L46	N81°51'50"E	10.17ft
L4	S23°56'50"E	6.29ft	L47	S84°39'39"E	11.54ft
L5	N25°01'36"E	28.86ft	L48	N85°44'04"E	85.10ft
L6	N44°13'54"E	13.02ft	L49	N70°02'54"E	11.40ft
L7	N87°18'51"E	9.20ft	L50	N68°29'52"W	7.99ft
L8	S60°59'27"E	5.99ft	L51	N87°40'51"W	21.72ft
L9	S85°49'04"E	3.55ft	L52	N02°47'16"W	7.58ft
L10	S63°48'20"E	18.50ft	L53	N72°24'51"W	25.47ft
L11	S52°07'37"E	17.95ft	L54	S76°20'48"W	28.79ft
L12	S46°57'22"E	62.66ft	L55	S86°29'05"W	13.60ft
L13	S31°29'47"E	27.26ft	L56	N85°23'51"W	24.21ft
L14	S04°26'49"W	19.57ft	L57	S81°07'20"W	16.57ft
L15	S12°59'52"E	11.61ft	L58	N39°48'24"W	20.72ft
L16	S22°31'48"E	32.02ft	L59	N13°53'30"W	5.30ft
L17	S32°17'09"E	16.97ft	L60	N11°08'32"E	15.50ft
L18	S05°47'38"E	43.15ft	L61	N18°25'57"E	61.92ft
L19	S23°06'51"W	15.21ft	L62	N40°01'33"W	15.68ft
L20	S48°33'33"W	6.17ft	L63	N55°28'37"W	27.51ft
L21	S04°22'36"W	13.53ft	L64	N53°06'24"W	42.88ft
L22	S34°39'47"W	6.54ft	L65	N63°53'06"W	48.09ft
L23	S03°26'36"E	20.56ft	L66	N54°28'49"W	24.58ft
L24	S02°35'32"E	29.01ft	L67	N75°50'31"W	11.41ft
L25	S28°37'25"E	36.24ft	L68	N59°10'14"W	8.55ft
L26	S07°14'20"W	5.35ft	L69	N72°53'12"W	14.42ft
L27	S25°53'51"E	18.29ft	L70	N28°01'27"W	4.13ft
L28	S35°10'54"E	17.06ft	L71	N56°48'36"W	5.56ft
L29	S42°11'57"E	10.65ft	L72	N86°02'02"W	6.60ft
L30	S68°22'03"E	5.87ft	L73	S46°27'04"W	16.92ft
L31	N73°35'16"E	7.18ft	L74	S23°35'53"W	42.65ft
L32	N57°35'59"E	47.36ft	L75	S30°49'29"W	13.12ft
L33	S83°20'24"E	6.77ft	L76	S23°47'15"W	14.91ft
L34	N50°32'33"E	20.40ft	L77	S34°25'36"W	31.55ft
L35	S81°35'31"E	4.56ft	L78	S67°41'02"W	4.60ft
L36	N60°15'23"E	10.79ft	L79	N53°22'50"W	32.29ft
L37	N45°47'31"E	17.05ft	L80	N40°53'30"W	32.70ft
L38	N29°21'51"E	59.73ft	L81	N55°36'15"W	40.42ft
L39	N36°44'18"E	29.15ft	L82	N25°48'56"W	7.10ft
L40	N30°42'03"E	40.46ft	L83	N86°52'28"W	4.50ft
L41	N60°37'26"E	13.64ft	L84	N76°09'07"W	6.67ft
L42	N46°34'24"E	6.78ft	L85	N62°45'36"W	8.15ft
L43	N38°31'15"E	11.44ft	L86	N26°29'36"W	11.19ft
L44	N48°38'27"E	10.40ft	L87	N03°09'41"E	13.87ft
			L88	N18°03'53"E	41.06ft

* *SURVEYOR'S CERTIFICATE* *

I HEREBY CERTIFY THAT I AM PROPERLY REGISTERED AND LICENSED TO PRACTICE LAND SURVEYING IN THE STATE OF ALASKA, THAT THIS PLAT REPRESENTS A SURVEY MADE BY ME OR UNDER MY DIRECT SUPERVISION, THAT THE MONUMENTS SHOWN HEREON ACTUALLY EXIST AS DESCRIBED, AND THAT ALL DIMENSIONS, RELATIVE BEARINGS, RELATIVE ELEVATIONS AND OTHER DETAILS ARE CORRECT.

DATE: 09/16/10

R. SCOTT McCLINTOCK, SR.



° ** LEGEND **

(22)–INDICATES EXTERIOR CAP BOUNDARY LINE COURSE

▲–INDICATES 5/8"X 30" REBAR CONTROL MONUMENT

55.52–INDICATES SURVEYED SPOT ELEVATION

° ** SURVEY NOTES **

1. THIS SURVEY WAS CONDUCTED USING RTK/GPS SURVEYING TECHNIQUES.
2. COORDINATES ARE ALASKA STATE PLANE ZONE 9 REDUCED TO HORIZONTAL GROUND IN US SURVEY FEET.
3. ELEVATIONS AND COORDINATES ARE BASED UPON A SINGLE POINT STATIC OBSERVATION USING NGS OPUS SOLUTION.
4. CONTOUR INTERVAL IS ONE FOOT.

ECO–LAND, LLC
SURVEYING & MAPPING
P.O. BOX 1444 NOME, ALASKA 99762
(907) 443–6068

User: NPEACOCK Jun 08, 2011 - 3:02pm
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Xrefs: BR22X34LEG.DWG - Images: None

REVISIONS			
NO.	DATE	BY	DESCRIPTION

LEGEND

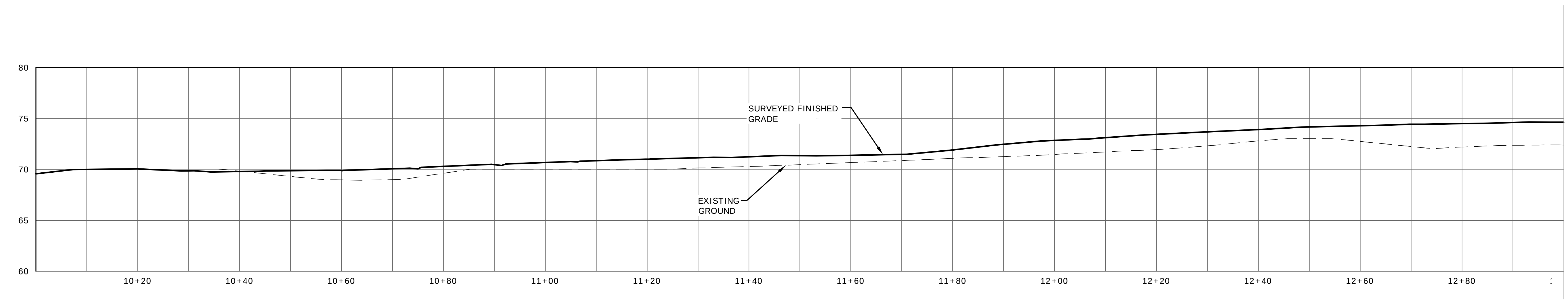
Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC
Phone (907) 563-0013 Fax (907) 563-6713
Project No. 410026

NE CAPE HTRW REMEDIAL ACTIONS
NE CAPE, ST. LAWRENCE ISLAND, ALASKA

SITE 9 AS-BUILT SURVEY
PLAN VIEW

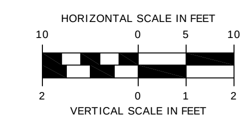
SCALE: SHOWN | DESIGNED: DST | CHECKED: MW | DRAWN: DST | DATE: 3/23/2011

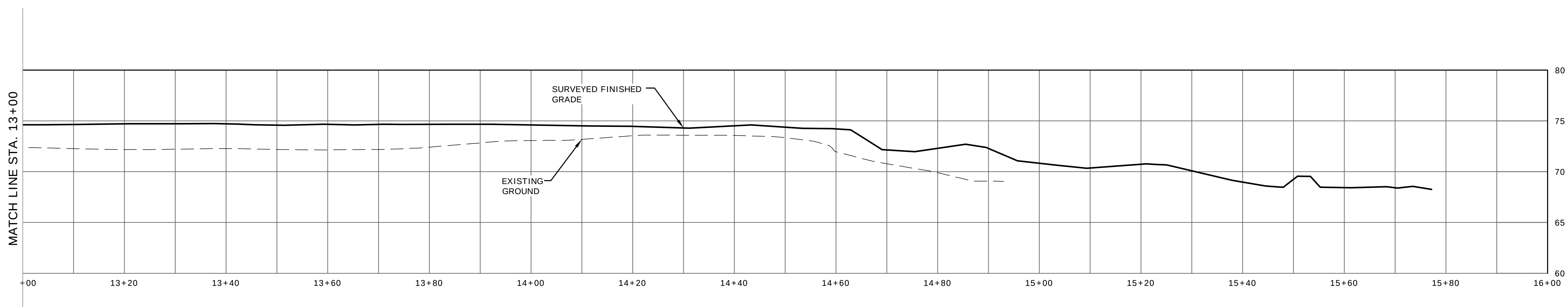
SHEET NO.
AB-1
SHEET 1 OF 3



A - SITE 9 LANDFILL CAP WEST TO EAST AS-BUILT CROSS SECTION

SCALE: SHOWN





A - SITE 9 LANDFILL CAP WEST TO EAST AS-BUILT CROSS SECTION

SCALE: SHOWN

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Xrefs: BR22X34LEG.DWG - Images: None

REVISIONS			
NO.	DATE	BY	DESCRIPTION

LEGEND

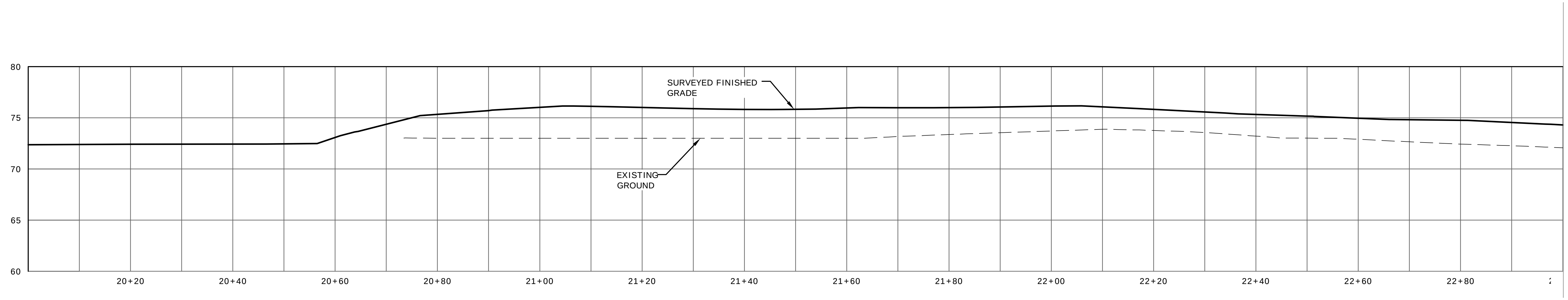
Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC
Phone (907) 563-0013 Fax (907) 563-6713
Project No. 410026

NE CAPE HTRW REMEDIAL ACTIONS
NE CAPE, ST. LAWRENCE ISLAND, ALASKA

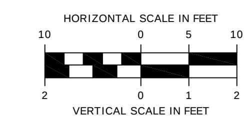
SITE 9 AS-BUILT SURVEY
WEST TO EAST CROSS SECTION

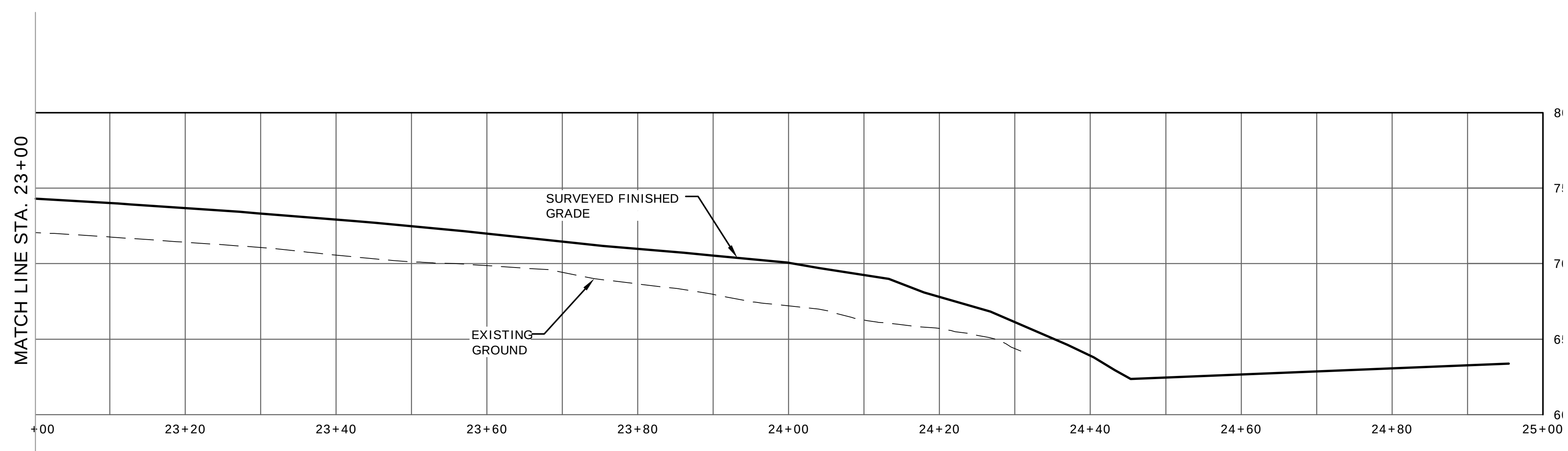
SHEET NO.
AB-2

SCALE: SHOWN	DESIGNED: DST	CHECKED: MW	DRAWN: DST	DATE: 3/23/2011	SHEET 2 OF 3



B
-
SITE 9 LANDFILL CAP SOUTH TO NORTH AS-BUILT CROSS SECTION
SCALE: SHOWN





B
-
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SCALE: SHOWN

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Xrefs: BR22X34LEG.DWG - Images: None

REVISIONS

NO.	DATE	BY	DESCRIPTION

LEGEND

Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC
Phone (907) 563-0013 Fax (907) 563-6713
Project No. 410026

NE CAPE HTRW REMEDIAL ACTIONS
NE CAPE, ST. LAWRENCE ISLAND, ALASKA

SITE 9 AS-BUILT SURVEY
NORTH TO SOUTH CROSS SECTION

SHEET NO.
AB-3

SCALE: SHOWN	DESIGNED: DST	CHECKED: MW	DRAWN: DST	DATE: 3/23/2011	SHEET 3 OF 3

APPENDIX F

Analytical Results Tables

Appendix F Tables

Table 1 Site 9 Pre-Construction Surface Water Sample Results

Analysis Method	Analyte	Cleanup Level	Unit	Sample ID	10NC09WA01	10NC09WA02	10NC09WA03	10NC09WA04	10NC09WA05[D]
				Location ID	09-01	09-02	09-03	09-04	09-04
				Lab ID	20582-1	20582-4	20582-5	20582-6	20582-7
				Date Collected	7/16/2010	7/16/2010	7/16/2010	7/16/2010	7/16/2010
6020	Arsenic-dissolved	0.01	mg/L		0.0042 J	0.0049 J	0.006 J	0.0057 J	0.0053 J
6020	Barium-dissolved	2	mg/L		0.0035 J	0.0059 J	0.0052 J	0.009	0.0093
6020	Cadmium-dissolved	0.005	mg/L		0.0004 U	0.0004 U	0.0004 U	0.00019 J	0.0004 U
6020	Chromium-dissolved	0.1	mg/L		0.002 J	0.0025 J	0.0029 J	0.003 J	0.0032 J
6020	Lead-dissolved	0.015	mg/L		0.0004 U	0.0004 U	0.0004 U	0.00045 J	0.00049 J
6020	Selenium-dissolved	0.05	mg/L		0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U
6020	Silver-dissolved	0.1	mg/L		0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U
7470A	Mercury-dissolved	0.002	mg/L		0.000052 J	0.0001 U	0.0001 U	0.0001 U	0.0001 U
6020	Arsenic-total	0.01	mg/L		0.0047 J	0.0066 J	0.0062 J	0.0053 J	0.0059 J
6020	Barium-total	2	mg/L		0.0045 J	0.0056 J	0.0051 J	0.013	0.013
6020	Cadmium-total	0.005	mg/L		0.0004 U	0.0004 U	0.0004 U	0.00026 J	0.00022 J
6020	Chromium-total	0.1	mg/L		0.0026 J	0.0037 J	0.003 J	0.003 J	0.0031 J
6020	Lead-total	0.015	mg/L		0.0004 U	0.0004 U	0.0004 U	0.0012 J	0.0012 J
6020	Selenium-total	0.05	mg/L		0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U
6020	Silver-total	0.1	mg/L		0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U
7470A	Mercury-total	0.002	mg/L		0.000049 J	0.000057 J	0.0001 U	0.0001 U	0.000069 J
8082	PCB-1016	1,000	µg/L		0.077 U	0.078 U	0.078 U	0.076 U	0.076 U
8082	PCB-1221	1,000	µg/L		0.06 U	0.06 U	0.06 U	0.059 U	0.059 U
8082	PCB-1232	1,000	µg/L		0.048 U	0.049 U	0.049 U	0.048 U	0.048 U
8082	PCB-1242	1,000	µg/L		0.058 U	0.058 U	0.058 U	0.057 U	0.057 U
8082	PCB-1248	1,000	µg/L		0.058 U	0.058 U	0.058 U	0.057 U	0.057 U
8082	PCB-1254	1,000	µg/L		0.058 U	0.058 U	0.058 U	0.057 U	0.057 U
8082	PCB-1260	1,000	µg/L		0.077 U	0.078 U	0.078 U	0.076 U	0.076 U
8260B	Benzene	5	µg/L		0.15 U	0.15 U	0.15 U	0.15 U	0.15 U
8260B	Toluene	1,000	µg/L		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
8260B	Ethylbenzene	700	µg/L		0.15 U	0.15 U	0.15 U	0.15 U	0.15 U
8260B	Total Xylenes	10,000	µg/L		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8270C SIM	1-Methylnaphthalene	150	µg/L		0.019 U	0.02 U	0.02 U	0.019 U	0.019 U
8270C SIM	2-Methylnaphthalene	150	µg/L		0.047 U	0.05 U	0.049 U	0.047 U	0.047 U
8270C SIM	Acenaphthene	2,200	µg/L		0.047 U	0.05 U	0.049 U	0.047 U	0.047 U
8270C SIM	Acenaphthylene	2,200	µg/L		0.019 U	0.02 U	0.02 U	0.019 U	0.019 U
8270C SIM	Anthracene	11,000	µg/L		0.019 U	0.02 U	0.02 U	0.019 U	0.019 U

Table 1 Site 9 Pre-Construction Surface Water Sample Results (continued)

Analysis Method	Analyte	Cleanup Level	Unit	Sample ID	10NC09WA01	10NC09WA02	10NC09WA03	10NC09WA04	10NC09WA05[D]
				Location ID	09-01	09-02	09-03	09-04	09-04
				Lab ID	20582-1	20582-4	20582-5	20582-6	20582-7
				Date Collected	7/16/2010	7/16/2010	7/16/2010	7/16/2010	7/16/2010
8270C SIM	Benzo[a]anthracene	1.2	µg/L		0.029 J	0.05 U	0.049 U	0.047 U	0.047 U
8270C SIM	Benzo[a]pyrene	0.2	µg/L		0.047 U	0.031 J	0.049 U	0.047 U	0.047 U
8270C SIM	Benzo[b]fluoranthene	1.2	µg/L		0.035 J	0.05 U	0.049 U	0.047 U	0.047 U
8270C SIM	Benzo[g,h,i]perylene	1,100	µg/L		0.047 U	0.05 U	0.049 U	0.047 U	0.047 U
8270C SIM	Benzo[k]fluoranthene	12	µg/L		0.055 J	0.05 U	0.049 U	0.047 U	0.047 U
8270C SIM	Chrysene	120	µg/L		0.049 J	0.034 J	0.023 J	0.047 U	0.047 U
8270C SIM	Dibenz(a,h)anthracene	0.12	µg/L		0.047 U	0.05 U	0.049 U	0.047 U	0.047 U
8270C SIM	Fluoranthene	1,500	µg/L		0.047 U	0.05 U	0.049 U	0.047 U	0.047 U
8270C SIM	Fluorene	1,500	µg/L		0.047 U	0.05 U	0.049 U	0.047 U	0.047 U
8270C SIM	Indeno[1,2,3-cd]pyrene	1.2	µg/L		0.021 J	0.05 U	0.049 U	0.047 U	0.047 U
8270C SIM	Naphthalene	730	µg/L		0.047 U	0.05 U	0.049 U	0.047 U	0.047 U
8270C SIM	Phenanthrene	11,000	µg/L		0.019 U	0.02 U	0.02 U	0.019 U	0.019 U
8270C SIM	Pyrene	1,100	µg/L		0.047 U	0.05 U	0.049 U	0.047 U	0.047 U
AK101	GRO (C6-C10)	1.3	mg/L		0.044 U	0.044 U	0.044 U	0.044 U	0.044 U
AK102	DRO (nC10-<nC25)	1.5	mg/L		0.026 J	0.044 J	0.032 J	0.052 J	0.049 J
AK103	RRO (nC25-nC36)	1.1	mg/L		0.032 J	0.06 J	0.042 J	0.059 J	0.059 J
Field Tested	Turbidity	NA	NTU		2.46	4.64	4.64	5.14	5.14

Table Notes:

[D] Indicates duplicate of previous sample

µg/L = micrograms per liter

DRO = Diesel Range Organics

GRO = Gasoline Range Organics

ID = identification

J-The analyte was identified; the quantitation is an estimate.

mg/L = milligrams per liter

NA = Not Applicable

NTU = Nephelometric Turbidity Units

PCB = Polychlorinated biphenyl

RRO = Residual Range Organics

SIM = Selective Ionization Monitoring

U-The analyte was not detected in the sample. The limit of detection (LOD) precedes the U.

Table 2 Site 9 Mid-Construction Surface Water Sample Results

Analysis Method	Analyte	Cleanup Level	Unit	Sample ID	10NC09WA06	10NC09WA07	10NC09WA08	10NC09WA09	10NC09WA010[D]
				Location ID	09-01	09-02	09-03	09-04	09-04
				Lab ID	20690-1	20690-2	20690-3	20690-4	20690-5
				Date Collected	7/24/2010	7/24/2010	7/24/2010	7/24/2010	7/24/2010
6020	Arsenic-dissolved	0.01	mg/L		0.002 UB	0.0004 U	0.002 UB	0.002 UB	0.002 UB
6020	Barium-dissolved	2	mg/L		0.005 J	0.0056 J	0.0052 J	0.014	0.014
6020	Cadmium-dissolved	0.005	mg/L		0.0004 QL	0.0004 QL	0.0004 U QL	0.0004 U QL	0.0004 U QL
6020	Chromium-dissolved	0.1	mg/L		0.0048 J	0.003 J	0.0037 J	0.0041 J	0.0042 J
6020	Lead-dissolved	0.015	mg/L		0.00022 J	0.0003 J	0.00024 J	0.00056 J	0.0006 J
6020	Selenium-dissolved	0.05	mg/L		0.0013 J	0.0012 J	0.0021 J	0.0004 U QL	0.00083 J
6020	Silver-dissolved	0.1	mg/L		0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U
7470A	Mercury-dissolved	0.002	mg/L		0.0001 U	0.0001 U	0.000062 J	0.0001 U	0.000065 J
6020	Arsenic-total	0.01	mg/L		0.0004 U	0.0004 U	0.0004 U	0.002 UB	0.002 UB
6020	Barium-total	2	mg/L		0.0058 J	0.007	0.0061	0.018	0.018
6020	Cadmium-total	0.005	mg/L		0.0004 U QL	0.0004 U QL	0.0004 U QL	0.00018 J QL	0.0004 U QL
6020	Chromium-total	0.1	mg/L		0.0031 J	0.0022 J	0.0032 J	0.0043 J	0.0044 J
6020	Lead-total	0.015	mg/L		0.00026 J	0.00042 J	0.0005 J	0.0024	0.0023
6020	Selenium-total	0.05	mg/L		0.0011 J	0.00048 J	0.002 J	0.0019 J	0.00098 J
6020	Silver-total	0.1	mg/L		0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U
7470A	Mercury-total	0.002	mg/L		0.0001 U	0.000065 J	0.0001 U	0.0001 U	0.0001 U
8082	PCB-1016	1,000	µg/L		0.078 U	0.078 U	0.078 U	0.078 U	0.078 U
8082	PCB-1221	1,000	µg/L		0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
8082	PCB-1232	1,000	µg/L		0.049 U	0.049 U	0.049 U	0.049 U	0.049 U
8082	PCB-1242	1,000	µg/L		0.058 U	0.058 U	0.058 U	0.058 U	0.058 U
8082	PCB-1248	1,000	µg/L		0.058 U	0.058 U	0.058 U	0.058 U	0.058 U
8082	PCB-1254	1,000	µg/L		0.058 U	0.058 U	0.058 U	0.058 U	0.058 U
8082	PCB-1260	1,000	µg/L		0.078 U	0.078 U	0.078 U	0.078 U	0.078 U
8260B	Benzene	5	µg/L		0.15 U	0.15 U	0.15 U	0.15 U	0.15 U
8260B	Ethylbenzene	700	µg/L		0.15 U	0.15 U	0.15 U	0.15 U	0.15 U
8260B	Total Xylenes	10,000	µg/L		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	Toluene	1,000	µg/L		0.9 J	0.2 U	1.4	0.2 U	0.2 U
8270C SIM	1-Methylnaphthalene	150	µg/L		0.019 U	0.02 U	0.02 U	0.019 U	0.019 U
8270C SIM	2-Methylnaphthalene	150	µg/L		0.049 U	0.049 U	0.049 U	0.049 U	0.048 U
8270C SIM	Acenaphthene	2,200	µg/L		0.049 U	0.049 U	0.049 U	0.049 U	0.048 U
8270C SIM	Acenaphthylene	2,200	µg/L		0.019 U	0.02 U	0.02 U	0.019 U	0.019 U
8270C SIM	Anthracene	11,000	µg/L		0.019 U	0.02 U	0.02 U	0.019 U	0.019 U

Table 2 Site 9 Mid-Construction Surface Water Sample Results (continued)

Analysis Method	Analyte	Cleanup Level	Unit	Sample ID	10NC09WA06	10NC09WA07	10NC09WA08	10NC09WA09	10NC09WA010[D]
				Location ID	09-01	09-02	09-03	09-04	09-04
				Lab ID	20690-1	20690-2	20690-3	20690-4	20690-5
				Date Collected	7/24/2010	7/24/2010	7/24/2010	7/24/2010	7/24/2010
8270C SIM	Benzo[a]anthracene	1.2	µg/L		0.033 J	0.032 J	0.049 U	0.049 U	0.048 U
8270C SIM	Benzo[a]pyrene	0.2	µg/L		0.049 U	0.049 U	0.049 U	0.049 U	0.048 U
8270C SIM	Benzo[b]fluoranthene	1.2	µg/L		0.049 U	0.049 U	0.049 U	0.049 U	0.048 U
8270C SIM	Benzo[g,h,i]perylene	1,100	µg/L		0.049 U	0.049 U	0.049 U	0.049 U	0.048 U
8270C SIM	Benzo[k]fluoranthene	12	µg/L		0.049 U	0.049 U	0.049 U	0.049 U	0.048 U
8270C SIM	Chrysene	120	µg/L		0.097 UB	0.098 UB	0.098 UB	0.097 UB	0.96 UB
8270C SIM	Dibenz(a,h)anthracene	0.12	µg/L		0.049 U	0.049 U	0.049 U	0.049 U	0.048 U
8270C SIM	Fluoranthene	1,500	µg/L		0.049 U	0.049 U	0.049 U	0.049 U	0.048 U
8270C SIM	Fluorene	1,500	µg/L		0.049 U	0.049 U	0.049 U	0.049 U	0.048 U
8270C SIM	Indeno[1,2,3-cd]pyrene	1.2	µg/L		0.097 UB	0.098 UB	0.098 UB	0.097 UB	0.96 UB
8270C SIM	Naphthalene	730	µg/L		0.049 U	0.049 U	0.049 U	0.049 U	0.048 U
8270C SIM	Phenanthrene	11,000	µg/L		0.019 U	0.02 U	0.02 U	0.019 U	0.019 U
8270C SIM	Pyrene	1,100	µg/L		0.049 U	0.049 U	0.049 U	0.049 U	0.048 U
AK101	GRO (C6-C10)	1.3	mg/L		0.044 U	0.023 J	0.044 U	0.044 U	0.044 U
AK102	DRO (nC10-<nC25)	1.5	mg/L		0.041 J	0.071 J	0.085 J	0.11	0.12
AK103	RRO (nC25-nC36)	1.1	mg/L		0.065 J	0.058 J	0.048 J	0.17	0.2
Tested	Turbidity	NA	NTU		1.1	3.15	2.84	5.05	5.05

Notes:

[D] Indicates duplicate of previous sample

B-The analyte was detected in the method blank at a concentration less than 10 times the reported value. Sample results less than the LOQ are reported as non-detect and are "B: flagged. Sample results above the LOQ are reported and also "B" flagged.

J-The analyte was identified; the quantitation is an estimate.

QL = One or more quality control criteria failed; the result may be biased low.

U-The analyte was not detected in the sample. The limit of detection (LOD) precedes the U.

µg/L = micrograms per liter

DRO = Diesel Range Organics

GRO = Gasoline Range Organics

ID = identification

mg/L = milligrams per liter

NA = Not Applicable

NTU = Nephelometric Turbidity Units

PCB = Polychlorinated biphenyl

RRO = Residual Range Organics

SIM = Selective Ionization Monitoring

Table 3 Site 9 Post-Construction Surface Water Sample Results

Analysis Method	Analyte	Cleanup Level	Unit	Sample ID	10NC09WA11	10NC09WA12	10NC09WA13	10NC09WA14	10NC09WA15[D]
				Location ID	09-01	09-02	09-03	09-04	09-04
				Lab ID	21220-1	21220-2	21220-3	21220-4	21220-5
				Date Collected	8/23/2010	8/24/2010	8/24/2010	8/24/2010	8/24/2010
6020	Arsenic-dissolved	0.01	mg/L		0.0004 U QL	0.0004 U QL	0.0004 U QL	0.0004 U QL	0.0004 J
6020	Barium-dissolved	2	mg/L		0.0062	0.0069	0.0061	0.016	0.018
6020	Cadmium-dissolved	0.005	mg/L		0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U
6020	Chromium-dissolved	0.1	mg/L		0.0004 U QL	0.0004 U QL	0.0004 J	0.00041 J	0.0004 U QL
6020	Lead-dissolved	0.015	mg/L		0.00019 J	0.0004 U	0.0004 U	0.0004 J	0.0004 U
6020	Selenium-dissolved	0.05	mg/L		0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U
6020	Silver-dissolved	0.1	mg/L		0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U
7470A	Mercury-dissolved	0.002	mg/L		0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U
6020	Arsenic-total	0.01	mg/L		0.0004 U QL	0.00035 J	0.00056 J	0.00086 J	0.00026 J
6020	Barium-total	2	mg/L		0.006	0.0076	0.0082	0.018	0.017
6020	Cadmium-total	0.005	mg/L		0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.00031 J
6020	Chromium-total	0.1	mg/L		0.0004 U QL	0.00047 J	0.00056 J	0.00046 J	0.00049 J
6020	Lead-total	0.015	mg/L		0.0004 U	0.0004 U	0.00043 J	0.00074 J	0.00076 J
6020	Selenium-total	0.05	mg/L		0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U
6020	Silver-total	0.1	mg/L		0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U
7470A	Mercury-total	0.002	mg/L		0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U
8082	PCB-1016	1,000	µg/L		0.077 U	0.077 U	0.077 U	0.077 U	0.077 U
8082	PCB-1221	1,000	µg/L		0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
8082	PCB-1232	1,000	µg/L		0.048 U	0.048 U	0.048 U	0.048 U	0.048 U
8082	PCB-1242	1,000	µg/L		0.058 U	0.058 U	0.058 U	0.058 U	0.058 U
8082	PCB-1248	1,000	µg/L		0.058 U	0.058 U	0.058 U	0.058 U	0.058 U
8082	PCB-1254	1,000	µg/L		0.058 U	0.058 U	0.058 U	0.058 U	0.058 U
8082	PCB-1260	1,000	µg/L		0.077 U	0.077 U	0.077 U	0.077 U	0.077 U
8260B	Benzene	5	µg/L		0.15 U	0.15 U	0.15 U	0.15 U	0.15 U

Table 3 Site 9 Post-Construction Surface Water Sample Results (continued)

Analysis Method	Analyte	Cleanup Level	Unit	Sample ID	10NC09WA11	10NC09WA12	10NC09WA13	10NC09WA14	10NC09WA15[D]
				Location ID	09-01	09-02	09-03	09-04	09-04
				Lab ID	21220-1	21220-2	21220-3	21220-4	21220-5
				Date Collected	8/23/2010	8/24/2010	8/24/2010	8/24/2010	8/24/2010
8260B	Ethylbenzene	700	µg/L		0.15 U	0.15 U	0.15 U	0.15 U	0.15 U
8260B	Total Xylenes	10,000	µg/L		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	Toluene	1,000	µg/L		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
8270C SIM	1-Methylnaphthalene	150	µg/L		0.019 U	0.019 U	0.019 U	0.02 U	0.019 U
8270C SIM	2-Methylnaphthalene	150	µg/L		0.049 U	0.048 U	0.048 U	0.049 U	0.048 U
8270C SIM	Acenaphthene	2,200	µg/L		0.049 U	0.048 U	0.048 U	0.049 U	0.048 U
8270C SIM	Acenaphthylene	2,200	µg/L		0.019 U	0.019 U	0.019 U	0.02 U	0.019 U
8270C SIM	Anthracene	11,000	µg/L		0.019 U	0.019 U	0.019 U	0.02 U	0.019 U
8270C SIM	Benzo[a]anthracene	1.2	µg/L		0.049 U	0.048 U	0.048 U	0.049 U	0.048 U
8270C SIM	Benzo[a]pyrene	0.2	µg/L		0.049 U	0.048 U	0.048 U	0.049 U	0.048 U
8270C SIM	Benzo[b]fluoranthene	1.2	µg/L		0.049 U	0.048 U	0.048 U	0.049 U	0.048 U
8270C SIM	Benzo[g,h,i]perylene	1,100	µg/L		0.049 U	0.048 U	0.048 U	0.049 U	0.048 U
8270C SIM	Benzo[k]fluoranthene	12	µg/L		0.049 U	0.048 U	0.048 U	0.049 U	0.048 U
8270C SIM	Chrysene	120	µg/L		0.049 U	0095 UB	0.095 UB	0.049 U	0.048 U
8270C SIM	Dibenz(a,h)anthracene	0.12	µg/L		0.049 U	0.048 U	0.048 U	0.049 U	0.048 U
8270C SIM	Fluoranthene	1,500	µg/L		0.049 U	0.048 U	0.048 U	0.049 U	0.048 U
8270C SIM	Fluorene	1,500	µg/L		0.049 U	0.048 U	0.048 U	0.049 U	0.048 U
8270C SIM	Indeno[1,2,3-cd]pyrene	1.2	µg/L		0.049 U	0.029 J	0.028 J	0.027 J	0.024 J
8270C SIM	Naphthalene	730	µg/L		0.049 U	0.048 U	0.048 U	0.049 U	0.048 U
8270C SIM	Phenanthrene	11,000	µg/L		0.019 U	0.019 U	0.019 U	0.02 U	0.019 U
8270C SIM	Pyrene	1,100	µg/L		0.049 U	0.048 U	0.048 U	0.049 U	0.048 U

Table 3 Site 9 Post-Construction Surface Water Sample Results (continued)

Analysis Method	Analyte	Cleanup Level	Unit	Sample ID	10NC09WA11	10NC09WA12	10NC09WA13	10NC09WA14	10NC09WA15[D]
				Location ID	09-01	09-02	09-03	09-04	09-04
				Lab ID	21220-1	21220-2	21220-3	21220-4	21220-5
				Date Collected	8/23/2010	8/24/2010	8/24/2010	8/24/2010	8/24/2010
AK101	GRO (C6-C10)	1.3	mg/L		0.044 U	0.044 U	0.044 U	0.044 U	0.044 U
AK102	DRO (nC10-<nC25)	1.5	mg/L		0.032 J	0.053 J	0.1	0.11	0.12
AK103	RRO (nC25-nC36)	1.1	mg/L		0.041 QH	0.048 QH	0.055 QH	0.12 QH	0.13 QH
Field Tested	Turbidity	NA	NTU		0.89	0.86	1.23	8.47	10.1

[D]Indicates duplicate of previous sample

B – Analyte was detected in the method blank at a concentration less than 10 times the reported value. Sample results less than the LOQ are reported as non-detect and are "B" flagged. Sample results above the LOQ are reported and also "B" flagged.

J – The analyte was identified; the quantitation is an estimate.

U – The analyte was not detected in the sample. The limit of detection (LOD) precedes the U.

µg/L = micrograms per liter

AK = Alaska Test Method

DRO = Diesel Range Organics

GRO = Gasoline Range Organics

ID = identification

mg/L = milligrams per liter

NA = Not Applicable

NTU = Nephelometric Turbidity Units

PCB = Polychlorinated biphenyl

QH = Estimated with a high bias.

QL= Estimated with a low bias.

RRO = Residual Range Organics

SIM = Selective Ionization Monitoring

Table 4 MOC Groundwater Results

Well ID					17MW-1	88-1	20MW-1	88-4	88-4
			Lab ID		20883-5	20883-3	20883-4	20883-1	20883-2
Matrix	Analysis Method	Analyte	Cleanup Level	Unit	10NC17WA01	10NC19WA01	10NC20WA01	10NC27WA01	10NC27WA02[D]
Water	8082	PCB-1260	5	µg/L	0.075 U	0.076 U	0.075 U	0.078 U	0.075 U
Water	8260B	Benzene	5	µg/L	0.15 U	0.15 U	0.15 U	2.4	2.2
Water	AK101	GRO (C6-C10)	1.3	mg/L	0.05 UB	0.05 UB	0.05 UB	0.24	0.23
Water	AK102	DRO (nC10-<nC25)	1.5	mg/L	0.057 U	0.75	0.024 J	**3.3**	**3.2**
Water	AK103	RRO (nC25-nC36)	1.1	mg/L	0.057 U	0.037 JM	0.03 JM	0.43 M	0.38 M
Water	RSK-175	Methane	---	µg/L	ND (0.19)	0.34	ND (0.19)	1900	2100

Notes:

Sample results above the LOQ are reported and also "B" flagged.

Sample results less than the LOQ are reported as non-detect and are "B" flagged.

B - The analyte was detected in the method blank at a concentration less than 10 times the reported value.

Bold indicates sample result is above site cleanup level.

[D] Indicates duplicate of previous sample

J - The analyte was identified; the quantitation is an estimate.

M - A matrix effect was present.

U - Undetected at the limit of detection

µg/L = micrograms per liter

AK = Alaska Test Method

DRO Diesel Range Organics

GRO = Gasoline Range Organics

ID = Identification

mg/L = milligrams per liter

ND = Non detect

QH-Estimated with a high bias.

QL - Estimated with a low bias.

RRO = Residual Range Organics

SIM = Selective Ion Monitoring

Table 4 MOC Groundwater Results (continued)

MW10-1	**88-10**	**22MW2**	**26MW1**	**88-5**
21052-2	**21052-4**	**21052-1**	**21052-5**	**21052-3**
10NC10WA01	**10NC19WA02**	**10NC22WA01**	**10NC26WA01**	**10NC27WA03**
0.077 U	0.076 U	0.076 U	0.077 U	0.075 U
0.15 U	0.15 U	0.15 U	0.15 U	**9.3**
0.044 U	0.044 U	0.044 U	0.044 U	0.19
0.68	**1.6**	ND (0.094)	0.057 U	**12**
0.43	0.036 J	0.027 J	0.057 U	**1.6**
0.48 M	0.4 M	0.76 JM	0.44 M	99 M

Notes:

Sample results above the LOQ are reported and also "B" flagged.

Sample results less than the LOQ are reported as non-detect and are "B" flagged.

B - The analyte was detected in the method blank at a concentration less than 10 times the reported value.

Bold indicates sample result is above site cleanup level.

[D] Indicates duplicate of previous sample

J - The analyte was identified; the quantitation is an estimate.

M - A matrix effect was present.

U - Undetected at the limit of detection

µg/L = micrograms per liter

AK = Alaska Test Method

DRO Diesel Range Organics

GRO = Gasoline Range Organics

ID = Identification

mg/L = milligrams per liter

ND = Non detect

QH-Estimated with a high bias.

QL - Estimated with a low bias.

RRO = Residual Range Organics

SIM = Selective Ion Monitoring

Table 5 MOC Monitored Natural Attenuation Parameter Results

Well ID	Sample ID	Manganese mg/L	Ferrous Iron mg/L	Sulfate mg/L	Nitrate mg/L	Alkalinity mg/L	Temp C	Conductance µS/cm	pH	ORP mV	DO mg/L	Methane ug/L
17MW1	17WA01	<0.2	0.01	16	0.2	0	3.09	68	5.76	160.8	7.32	ND(0.19)
88-1	19WA01	0.3	<0.01	7	0.3	40	2.85	68	5.59	190.1	1.26	0.34
88-4	27WA01	0.3	21.40	4	2.0	120	3.28	190	6.93	-72.1	0.68	1900
88-4	27WA02 Dup	0.5	20.00	1	<0.4	120	3.28	190	6.93	-72.1	0.68	2100
88-5	27WA03	<0.2	45.50	6	0.3	80	2.21	221	8.25	-69.3	0.81	99
MW10-1	10WA01	<0.2	<0.01	3.0	0.3	0.0	6.6	63.0	5.6	202.5	5.6	0.5
22MW2	22WA01	<0.2	<0.01	12.0	0.6	0.0	3.9	65.0	6.1	234.2	10.1	0.8
88-10	19WA02	1.0	<0.01	6.0	0.1	40.0	2.9	65.0	7.6	146.0	0.8	0.4
26MW1	26WA01	<0.2	<0.01	6.0	0.3	0.0	3.0	47.0	6.8	202.1	11.5	0.4
20MW1	20WA01	---	---	---	---	---	3.6	63.0	6.3	101.4	4.0	ND(0.19)
Method detection limit		0.2	0.01	2	0.4	0	---	---	---	---	---	---

Notes:

°C = Degrees celsius

DO = Dissolved Oxygen

Dup = Duplicate

ID = Identification

mg/L = milligram per liter

mS/cm = millisiemens per centimeter

mV = millivolt

ND = non-detect

ORP=Oxidation-Reduction Potential

Temp = Temperature

Table 6 Site 1 RRO Soil Results

Sample ID	Location ID	Laboratory ID	Date Collected	Analysis Method	Analyte	Cleanup Level	Unit	Result
10NC01SB01	01-01	580-21112-1	8/18/2010	AK103	RRO	9200	mg/kg	1400 M
10NC01SB02	01-02	580-21112-2	8/18/2010	AK103	RRO	9200	mg/kg	1900 M
10NC01SB03	01-03	580-21112-3	8/18/2010	AK103	RRO	9200	mg/kg	1500 M
10NC01SB04[D]	01-03	580-21112-4	8/18/2010	AK103	RRO	9200	mg/kg	1600 M
10NC01SB05	01-05	580-21112-5	8/18/2010	AK103	RRO	9200	mg/kg	4200 M
10NC01SB06	01-06	580-21112-6	8/18/2010	AK103	RRO	9200	mg/kg	1200 M
10NC01SB07	01-07	580-21112-7	8/18/2010	AK103	RRO	9200	mg/kg	2000 M
10NC01SB08	01-08	580-21112-8	8/18/2010	AK103	RRO	9200	mg/kg	830 M
10NC01SB09	01-09	580-21112-9	8/18/2010	AK103	RRO	9200	mg/kg	1000 M
10NC01SB10	01-10	580-21112-10	8/18/2010	AK103	RRO	9200	mg/kg	540 M
10NC01SB11	01-11	580-21112-11	8/18/2010	AK103	RRO	9200	mg/kg	2900 M
10NC01SB12[D]	01-11	580-21112-12	8/18/2010	AK103	RRO	9200	mg/kg	2700 M
10NC01SB13	01-13	580-21112-13	8/18/2010	AK103	RRO	9200	mg/kg	1400 M
10NC01SB14	01-14	580-21112-14	8/18/2010	AK103	RRO	9200	mg/kg	580 M
10NC01SB15	01-15	580-21112-15	8/18/2010	AK103	RRO	9200	mg/kg	2000 M

Notes:

AK = Alaska Test Method

[D] Indicates duplicate of previous sample

ID = Identification

M = A matrix effect was present.

mg/kg = milligrams per kilogram

RRO = residual range organics

Table 7 Site 3 Soil DRO and RRO Analytical Results

Sample ID	Location ID	Laboratory ID	Date Collected	DRO by AK102 (mg/kg)	DRO by AK102-Silica Gel (mg/kg)	RRO by AK103 (mg/kg)	RRO by AK103-Silica Gel (mg/kg)
10NC03SB01	03-1	580-21113-1	8/17/2010	1100 MJ	900 J	2300 J	720 J
10NC03SB02	03-2	580-21113-2	8/17/2010	2600 MJ	2500 J	1100 J	400 J
10NC03SB03	03-3	580-21113-3	8/17/2010	3700 MJ	3400 J	780 J	300 J
10NC03SB04	03-4	580-21113-4	8/17/2010	1700 MJ	1300 J	7000 QHJ	2300 J
10NC03SB05	03-5	580-21113-5	8/17/2010	640 MJ	1400 J	150 J	110 J
10NC03SB06[D]	03-5	580-21113-6	8/17/2010	2200 MJ	580 J	390 J	57 J
10NC03SB07	03-6	580-21113-7	8/17/2010	300 MJ	2300 J	520 J	250 J
10NC03SB08	03-7	580-21113-8	8/17/2010	1400 MJ	570 J	3900 J	380 J
10NC03SB09	03-8	580-21113-9	8/17/2010	3200 MJ	860 J	570 J	1000 J
10NC03SB010	03-7	580-21125-1	8/22/2010	2900 MJ	NR	2800 QHMJ	NR
10NC03SB011	03-8	580-21125-2	8/22/2010	4500 MJ	NR	3900 QHMJ	NR
10NC03SB012	03-9	580-21125-3	8/22/2010	2800 MJ	NR	1200 MJ	NR
10NC03SB013	03-10	580-21125-4	8/22/2010	6100 MJ	NR	3200 MJ	NR
10NC03SB014[D]	03-10	580-21125-5	8/22/2010	2500 MJ	NR	1800 MJ	NR
10NC03SB015	03-11	580-21125-6	8/22/2010	1700 MJ	NR	2000 MJ	NR
10NC03SB016	03-12	580-21125-7	8/22/2010	2300 MJ	NR	1400 MJ	NR
Cleanup Level				9200	9200	9200	9200

Notes:

[D]Indicates duplicate of previous sample

J - The analyte was positively identified; the quantitation is an estimate.

M - A matrix effect was present

NR - Analysis Not Requested

Q - the MS/MSD on this sample failed to meet recovery limits

QH - Estimated with a high bias.

AK = Alaska Test Method

DRO = diesel range organics

ID = Identification

mg/kg = milligrams per kilogram

RRO = residual range organics

Table 8 Site 3 Soil/Sediment DRO RRO Results

Sample ID	Location ID	Laboratory ID	Date Collected	DRO by AK102 (mg/kg)	RRO by AK103 (mg/kg)	DRO by AK102 Silica Gel (mg/kg)	RRO by AK103 Silica Gel (mg/kg)	Total Organic Carbon by EPA 9060
10NC03SB01	03-1	580-20788-1	7/31/2010	250 J	2100 J	140 J	930 J	190,000
10NC03SB02[D]	03-1	580-20788-2	7/31/2010	550 J	5000 QHJ	300 J	2100 J	190,000
10NC03SB03	03-3	580-20788-3	7/31/2010	270 J	2200 J	140 J	880 J	190,000
Soil Cleanup Level				9,200	9,200	9,200	9,200	NA
Sediment Cleanup Level				3,500	3,500	3,500	3,500	NA

Notes:

[D] Indicates duplicate of previous sample

J - The analyte was positively identified; the quantitation is an estimate.

QH - Estimated with a high bias.

AK = Alaska Test Method

DRO = Diesel Range Organics

EPA = Environmental Protection Agency

ID = Identification

mg/kg = milligrams per kilogram

NA = not applicable

RRO = Residual Range Organics

Table 9 Site 6 Soil Sample Results for DRO and RRO

Sample ID	Lab ID	Location ID	Date Collected	DRO by AK 102 (mg/kg)	RRO by AK 103 (mg/kg)
10NC06SB01	580-20786-1	06-1	8/1/10	290	2300
10NC06SB02	580-20786-2	06-2	8/1/10	470	4100
10NC06SB03	580-20786-3	06-3	8/1/10	220	1400
10NC06SB04	580-20786-4	06-4	8/1/10	3200	7200
10NC06SB05	580-20786-5	06-5	8/1/10	28 UB	100 B
10NC06SB06	580-20786-6	06-6	8/1/10	41	340
10NC06SB07	580-20786-7	06-7	8/1/10	53	77 UB
10NC06SB08	580-20954-1	06-8	8/8/10	50 J	270 J
10NC06SB09[D]	580-20954-2	06-8	8/8/10	27 JUB	85 J
10NC06SB10	580-20954-3	06-9	8/8/10	2400	8800
10NC06SB11	580-20954-4	06-10	8/8/10	22 UB	110
10NC06SB12	580-20954-5	06-11	8/8/10	21 UB	16 J
10NC06SB13	580-20954-6	06-12	8/8/10	20 UB	14 J
10NC06SB14	580-20954-7	06-13	8/8/10	32 B	280
10NC06SB15	580-20954-8	06-14	8/8/10	20 UB	56
10NC06SB16	580-20954-9	06-15	8/8/10	22 UB	15 J
10NC06SB17	580-20954-10	06-16	8/8/10	46	330
10NC06SB18	580-20954-11	06-17	8/8/10	22 UB	25 J
10NC06SB19	580-20954-12	06-18	8/8/10	22 UB	77
10NC06SB20	580-20954-13	06-19	8/8/10	88	420
10NC06SB21	580-20954-14	06-20	8/8/10	21 UB	120
10NC06SB22	580-20954-15	06-21	8/8/10	20 UB	23 J
10NC06SB23	580-20954-16	06-22	8/8/10	21 UB	11 J
10NC06SB24[D]	580-20954-17	06-22	8/8/10	21 UB	12 J
10NC06SB25	580-20954-18	06-23	8/8/10	180	1100
10NC06SB26	580-20954-19	06-24	8/8/10	2100	**10000**
10NC06SB27	580-20954-20	06-25	8/8/10	22 UB	80
10NC06SB28	580-20954-21	06-26	8/8/10	38	240
10NC06SB29	580-21126-1	06-27	8/22/10	22 UB	20 J
10NC06SB30	580-21126-2	06-28	8/22/10	23 UB	18 J
10NC06SB31	580-21126-3	06-29	8/22/10	22 UB	28 J
10NC06SB32	580-21126-4	06-30	8/22/10	22 UB	66
10NC06SB33	580-21126-5	06-31	8/22/10	24 JUB	87 J
10NC06SB34[D]	580-21126-6	06-31	8/22/10	27 JB	170 J
10NC06SB35	580-21126-7	06-32	8/22/10	21 UB	14 J
10NC06SB36	580-21126-8	06-33	8/22/10	21 UB	84
10NC06SB37	580-21126-9	06-34	8/22/10	24 B	100
10NC06SB38	580-21126-10	06-35	8/22/10	22 U B	25 J
10NC06SB39	580-21126-11	06-36	8/22/10	370	2100
10NC06SB40	580-21126-12	06-37	8/22/10	21 U B	36 J
10NC06SB41	580-21126-13	06-38	8/22/10	3300	**15000**
10NC06SB42	580-21126-14	06-39	8/22/10	160	920
10NC06SB43	580-21126-15	06-40	8/22/10	110	670
10NC06SB44	580-21126-16	06-41	8/22/10	21 U B	39 J
10NC06SB45	580-21126-17	06-42	8/22/10	21 U B	88
10NC06SB46	580-21126-18	06-43	8/22/10	810	5300
10NC06SB47	580-21126-19	06-44	8/22/10	23 U B	17 J

Table 9 Site 6 Soil Sample Results for DRO and RRO (continued)

Sample ID	Lab ID	Location ID	Date Collected	DRO by AK 102 (mg/kg)	RRO by AK 103 (mg/kg)
10NC06SB48	580-21126-20	06-45	8/22/10	21 U B	34 U
10NC06SB49	580-21126-21	06-46	8/22/10	23 B	130
10NC06SB50[D]	580-21126-22	06-46	8/22/10	23 B	130
10NC06SB51	580-21126-23	06-47	8/22/10	21 U B	48 J
10NC06SB52	580-21126-24	06-48	8/22/10	21 U B	36 J
10NC06SB55	580-21447-3	06-54	9/1/10	96	540
Site Cleanup Levels				9200	9200

Notes:

[D] Indicates duplicate of previous sample

BOLD indicates sample concentration exceeded site specific cleanup levels.

B - The analyte was detected in the method blank at a concentration less than 10 times the reported value.

J - The analyte was identified; the quantitation is an estimate.

Sample results above the LOQ are reported and also "B" flagged.

Sample results less than the LOQ are reported as non-detect and are "B: flagged.

U - The result is non-detect, the limit of detection (LOD) precedes the U.

AK = Alaska Test Method

ID = Identification

mg/kg = milligrams per kilogram

Table 10 Site 6 Sediment Sample Results

	Sample ID				10NC06SB53	10NC06SB54[D]
		Lab sample ID			580-21447-1	580-21447-2
			Location ID		06-53	06-53
Matrix	Analysis Method	Analyte	Cleanup Levels	Unit		
Sediment	8260B	Benzene	11,000	µg/kg	15 U	14 U
Sediment	8260B	Ethylbenzene	110,000	µg/kg	44 U	42 U
Sediment	8260B	Total Xylenes	63,000	µg/kg	88 U	84 U
Sediment	8260B	Toluene	220,000	µg/kg	44 U	42 U
Sediment	8270C SIM/DoD	1-Methylnaphthalene	280,000	µg/kg	2.5 U	2.3 U
Sediment	8270C SIM/DoD	2-Methylnaphthalene	600	µg/kg	2.5 U	2.3 U
Sediment	8270C SIM/DoD	Acenaphthene	500	µg/kg	1.2 U	1.2 U
Sediment	8270C SIM/DoD	Acenaphthylene	2,800,000	µg/kg	1.2 U	1.2 U
Sediment	8270C SIM/DoD	Anthracene	20,600,000	µg/kg	0.5 U	0.47 U
Sediment	8270C SIM/DoD	Benzo[a]anthracene	4,900	µg/kg	1.2 U	1.2 U
Sediment	8270C SIM/DoD	Benzo[a]pyrene	490	µg/kg	0.5 U	0.47 U
Sediment	8270C SIM/DoD	Benzo[b]fluoranthene	4,900	µg/kg	1.2 U	1.2 U
Sediment	8270C SIM/DoD	Benzo[g,h,i]perylene	1,700	µg/kg	1.2 UJ	3 J
Sediment	8270C SIM/DoD	Benzo[k]fluoranthene	---	µg/kg	1.2 U	1.2 U
Sediment	8270C SIM/DoD	Chrysene	---	µg/kg	4.5 J	8.1
Sediment	8270C SIM/DoD	Dibenz(a,h)anthracene	490	µg/kg	1.2 UJ	0.97 J
Sediment	8270C SIM/DoD	Fluoranthene	2,000	µg/kg	0.71 J	0.67 J
Sediment	8270C SIM/DoD	Fluorene	800	µg/kg	1.2 U	1.2 U
Sediment	8270C SIM/DoD	Indeno[1,2,3-cd]pyrene	3,200	µg/kg	0.82 J	1.3 J
Sediment	8270C SIM/DoD	Naphthalene	1,700	µg/kg	6.2 U	5.8 U
Sediment	8270C SIM/DoD	Phenanthrene	4,800	µg/kg	0.68 J	0.69 J
Sediment	8270C SIM/DoD	Pyrene	1,400,000	µg/kg	6.2 UB	5.8 UB
Sediment	AK101	GRO (C6-C10)	---	mg/kg	1.6 U	1.5 U
Sediment	AK102 & 103	DRO (nC10-<nC25)	3,500	mg/kg	160 M	100 M
Sediment	AK102 & 103	RRO (nC25-nC36)	3,500	mg/kg	1200 M	760 M

Notes:

[D] Indicates duplicate of previous sample

B - The analyte was detected in the method blank at a concentration less than 10 times the reported value.

J - The analyte was identified; the quantitation is an estimate.

M - A matrix effect was present.

Sample results above the LOQ are reported and also "B" flagged.

Sample results less than the LOQ are reported as non-detect and are "B: flagged.

U - The result is non-detect, the limit of quanititation precedes the U.

µg/kg = micrograms per kilogram

AK = Alaska Test method

DRO = Diesel Range organics

GRO = Gasoline Range Organics

mg/kg = milligrams per kilogram

RRO = Residual Range Organics

SIM/DoD = Selective Ion Monitoring/Department of Defense

Table 11 Site 6 Water Sample Results

Lab ID				580-21300-1	580-21300-2[D]
Loc ID				06-49	06-49
Matrix	Analysis Method	Analyte	Unit	10N06WA01	10N06WA02
Water	8260B	Benzene	µg/L	0.45 U	0.45 U
Water	8260B	Ethylbenzene	µg/L	0.45 U	0.45 U
Water	8260B	Total Xylenes	µg/L	1.35 U	1.35 U
Water	8260B	Toluene	µg/L	0.45 U	0.098 J
Total Aromatic Hydrocarbon (TAH)-(Sum of BTEX)			µg/L	2.6 U	.098 J
Total Aromatic Hydrocarbon (TAH) cleanup Level-Surface Water [1]			µg/L	10	10
Water	8270C SIM/DoD	1-Methylnaphthalene	µg/L	0.022 J	0.014 J
Water	8270C SIM/DoD	2-Methylnaphthalene	µg/L	0.048 U	0.049 U
Water	8270C SIM/DoD	Acenaphthene	µg/L	0.048 U	0.049 U
Water	8270C SIM/DoD	Acenaphthylene	µg/L	0.019 J	0.016 J
Water	8270C SIM/DoD	Anthracene	µg/L	0.019 U	0.02 U
Water	8270C SIM/DoD	Benzo[a]anthracene	µg/L	0.048 U	0.049 U
Water	8270C SIM/DoD	Benzo[a]pyrene	µg/L	0.048 U	0.049 U
Water	8270C SIM/DoD	Benzo[b]fluoranthene	µg/L	0.048 U	0.049 U
Water	8270C SIM/DoD	Benzo[g,h,i]perylene	µg/L	0.13 J	0.059 J
Water	8270C SIM/DoD	Benzo[k]fluoranthene	µg/L	0.048 U	0.049 U
Water	8270C SIM/DoD	Chrysene	µg/L	0.048 U	0.049 U
Water	8270C SIM/DoD	Dibenz(a,h)anthracene	µg/L	0.025 J	0.049 UJ
Water	8270C SIM/DoD	Fluoranthene	µg/L	0.048 U	0.049 U
Water	8270C SIM/DoD	Fluorene	µg/L	0.048 U	0.049 U
Water	8270C SIM/DoD	Indeno[1,2,3-cd]pyrene	µg/L	0.052 J	0.028 J
Water	8270C SIM/DoD	Naphthalene	µg/L	0.048 U	0.049 U
Water	8270C SIM/DoD	Phenanthrene	µg/L	0.019 U	0.02 U
Water	8270C SIM/DoD	Pyrene	µg/L	0.048 U	0.049 U
Total Aqueous Hydrocarbons (TAqH) Sum of BTEX and PAHs			µg/L	0.248	0.117 J
Total Aqueous Hydrocarbons (TAqH) Cleanup Levels -Surface Water [1]			µg/L	15	15
Water	AK101	GRO (C6-C10)	mg/L	0.044 U	0.044 U
Water	AK102 & 103	DRO (nC10-<nC25)	mg/L	1.5 M	1.5 M
Water	AK102 & 103	RRO (nC25-nC36)	mg/L	1.2 QH	1.3 QH

Notes:

[1]Surface Water Criteria as stated in AS.18.AAC.70 for fresh surface water

[D] Indicates duplicate of previous sample

J - The analyte was positively identified; the quantitation is an estimate.

M - A matrix effect was present.

QH - Estimated with a high bias.

U - The result is non-detect, the limit of detection (LOD) precedes the U.

µg/L = micrograms per liter

ID = Identification

mg/L = milligrams per liter

Table 12 Site 32 Confirmation Sample Results

Sample ID	Lab ID	Location ID	Date Collected	DRO by AK 102 (mg/kg)	RRO by AK103 (mg/kg)
10NC32SB01	580-21114-1	32-1	8/17/2010	43 B	62 B
10NC32SB02	580-21114-2	32-2	8/17/2010	84	160
10NC32SB03	580-21114-3	32-3	8/17/2010	970	160
10NC32SB04	580-21114-4	32-4	8/17/2010	240	740
10NC32SB05	580-21114-5	32-5	8/17/2010	ND (23) UB	130 B
10NC32SB06	580-21114-6	32-6	8/17/2010	38 B	250
10NC32SB07[D]	580-21114-7	32-6	8/17/2010	32 B	230
10NC32SB08	580-21114-8	32-7	8/17/2010	ND (24)UB	130 B
10NC32SB09	580-21114-9	32-8	8/17/2010	440	82 B
10NC32SB10	580-21114-10	32-9	8/17/2010	ND (25) UB	120 B
10NC32SB11	580-21114-11	32-10	8/17/2010	ND (25) UB	86 B
10NC32SB12	580-21114-12	32-11	8/17/2010	260	150 B
10NC32SB13	580-21114-13	32-12	8/17/2010	26 BJ	100 B
10NC32SB14[D]	580-21114-14	32-12	8/17/2010	ND (23) UBJ	82 B
10NC32SB15	580-21114-15	32-13	8/17/2010	68	310
10NC32SB16	580-21114-16	32-14	8/17/2010	42 B	150 B
Cleanup Level				9200	9200

Notes:

[D] Indicates duplicate of previous sample

B - The analyte was detected in the method blank at a concentration less than 10 times the reported value.

J - The analyte was identified; the quantitation is an estimate.

Sample results above the LOQ are reported and also "B" flagged.

Sample results less than the LOQ are reported as non-detect and are "B: flagged.

AK = Alaska Method

DRO = diesel range organics

ID = Identification

mg/kg = milligrams per kilogram

ND = Sample result is non-detect, the limit of detection is in parentheses ().

RRO = residual range organics

Table 13 Site 13 PCB Sample Results

Sample ID	Lab ID	Date Collected	EPA Method 8082 Results (mg/kg)						
			Analyte (Aroclor)						
			PCB-1016	PCB-1221	PCB-1232	PCB-1242	PCB-1248	PCB-1254	PCB-1260
Composite # 1	21440-154	9/2/2010	0.0082 U	0.01 U	0.01 U	0.0061 U	0.0031 U	0.0061 U	0.35
Composite # 20[D]	21440-173	9/2/2010	0.0084 U	0.011 U	0.011 U	0.0063 U	0.0032 U	0.0063 U	0.42 QH
Composite # 2	21440-155	9/2/2010	0.0083 U	0.01 U	0.01 U	0.0062 U	0.0031 U	0.0062 U	**1.6**
Composite # 3	21440-156	9/2/2010	0.0091 U	0.011 U	0.011 U	0.0068 U	0.0034 U	0.0068 U	**5.9**
Composite # 4	21440-157	9/2/2010	0.0088 U	0.011 U	0.011 U	0.0066 U	0.0033 U	0.0066 U	**39**
Composite # 5	21440-158	9/2/2010	0.0089 U	0.011 U	0.011 U	0.0066 U	0.0033 U	0.0066 U	**80**
Composite # 6	21440-159	9/2/2010	0.0087 U	0.011 U	0.011 U	0.0065 U	0.0033 U	0.0065 U	0.89
Composite # 7	21440-160	9/2/2010	0.0083 U	0.01 U	0.01 U	0.0062 U	0.0031 U	0.0062 U	**1.7**
Composite # 8	21440-161	9/2/2010	0.0083 U	0.01 U	0.01 U	0.0062 U	0.0031 U	0.0062 U	0.59 J
Composite # 9	21440-162	9/2/2010	0.0083 U	0.01 U	0.01 U	0.0063 U	0.0031 U	0.0063 U	**12**
Composite # 10	21440-163	9/2/2010	0.0086 U	0.011 U	0.011 U	0.0064 U	0.0032 U	0.0064 U	**8.7**
Composite # 11	21440-164	9/2/2010	0.0089 U	0.011 U	0.011 U	0.0066 U	0.0033 U	0.0066 U	**48**
Composite # 12	21440-165	9/2/2010	0.0088 U	0.011 U	0.011 U	0.0066 U	0.0033 U	0.0066 U	**4.4**
Composite # 13	21440-166	9/2/2010	0.0082 U	0.01 U	0.01 U	0.0062 U	0.0031 U	0.0062 U	**3.3**
Composite # 14	21440-167	9/2/2010	0.0084 U	0.011 U	0.011 U	0.0063 U	0.0032 U	0.0063 U	**3**
Composite # 15	21440-168	9/2/2010	0.0084 U	0.011 U	0.011 U	0.0063 U	0.0032 U	0.0063 U	**8.2 J**
Composite # 19[D]	21440-172	9/2/2010	0.0087 U	0.011 U	0.011 U	0.0065 U	0.0033 U	0.0065 U	**15 J**
Composite # 16	21440-169	9/2/2010	0.0087 U	0.011 U	0.011 U	0.0065 U	0.0033 U	0.0065 U	**3**
Composite # 17	21440-170	9/2/2010	0.0088 U	0.011 U	0.011 U	0.0066 U	0.0033 U	0.0066 U	**35**
Composite # 18	21440-171	9/2/2010	0.0084 U	0.011 U	0.011 U	0.0063 U	0.0032 U	0.0063 U	**2.5**
Cleanup Level (mg/kg)			1	1	1	1	1	1	1

Notes:

[D] Indicates duplicate of previous sample

Bold indicates sample result is above site cleanup level.

J The analyte was positively identified; the quantitation is an estimate.

QH-Estimated with a high bias.

The Location IDs are provided on the chain of custody. Samples were composited at the lab.

U-Result is non-detect, the limit of detection (LOD) precedes the U.

EPA = U.S. Environmental Protection Agency

ID = identification

mg/kg = milligrams per kilogram

PCBs = Polychlorinated biphenyls

Table 14 - Site 16 PCB Soil Results

Sample ID	Lab ID	Location ID	Date Collected	EPA method 8082 Soil Results (mg/kg) – Analyte (Aroclor) PCB-1016	PCB-1221	PCB-1232	PCB-1242	PCB-1248	PCB-1254	PCB-1260
10NC16SB01	580-21107-1	16-1	8/18/10	0.0079 U	0.0098 U	0.0098 U	0.0059 U	0.003 U	0.0059 U	0.0051 J QHM
10NC16SB14[D]	580-21107-14	16-1	8/18/10	0.008 U	0.01 U	0.01 U	0.006 U	0.003 U	0.006 U	0.008 UJ
10NC16SB02	580-21107-2	16-2	8/18/10	0.0078 U	0.0097 U	0.0097 U	0.0058 U	0.0029 U	0.0058 U	0.014 MJ
10NC16SB03	580-21107-3	16-3	8/18/10	0.008 U	0.01 U	0.01 U	0.006 U	0.003 U	0.006 U	0.017 MJ
10NC16SB04	580-21107-4	16-4	8/18/10	0.0081 U	0.01 U	0.01 U	0.0061 U	0.003 U	0.0061 U	0.02 MJ
10NC16SB05	580-21107-5	16-5	8/18/10	0.0081 U	0.01 U	0.01 U	0.0061 U	0.003 U	0.0061 U	0.066 MJ
10NC16SB06	580-21107-6	16-6	8/18/10	0.0092 U	0.011 U	0.011 U	0.0069 U	0.0034 U	0.0069 U	0.0092 UJ
10NC16SB07	580-21107-7	16-7	8/18/10	0.0091 U	0.011 U	0.011 U	0.0069 U	0.0034 U	0.0069 U	0.0091 UJ
10NC16SB08	580-21107-8	16-8	8/18/10	0.0084 U	0.01 U	0.01 U	0.0063 U	0.0031 U	0.0063 U	0.047 MJ
10NC16SB09	580-21107-9	16-9	8/18/10	0.0079 U	0.0099 U	0.0099 U	0.0059 U	0.003 U	**1.2**	0.16 MJ
10NC16SB10	580-21107-10	16-10	8/18/10	0.0078 U	0.0098 U	0.0098 U	0.0059 U	0.0029 U	0.0059 U	0.0078 UJ
10NC16SB11	580-21107-11	16-11	8/18/10	0.0084 U	0.011 U	0.011 U	0.0063 U	0.0032 U	0.0063 U	0.026 MJ
10NC16SB12	580-21107-12	16-12	8/18/10	0.0089 U	0.011 U	0.011 U	0.0067 U	0.0033 U	0.0067 U	0.025 MJ
10NC16SB13[D]	580-21107-13	16-12	8/18/10	0.0091 U	0.011 U	0.011 U	0.0068 U	0.0034 U	0.0068 U	0.044 MJ
10NC16SB12	580-21448-1	16-12	8/31/10	0.0081 U	0.01 U	0.01 U	0.006 U	0.003 U	0.049 J	0.02 J
10NC16SB15[D]	580-21448-4	16-12	8/31/10	0.008 U	0.0099 U	0.0099 U	0.006 U	0.003 U	0.006 UJ	0.0054 J
10NC16SB13	580-21448-2	16-13	8/31/10	0.0089 U	0.011 U	0.011 U	0.0067 U	0.0033 U	0.0067 U	0.004 J
10NC16SB14	580-21448-3	16-14	8/31/10	0.0083 U	0.01 U	0.01 U	0.0062 U	0.0031 U	0.0062 U	0.013 JQH
Cleanup Level (mg/kg)				1	1	1	1	1	1	1

Notes:

Bold indicates sample result is above site cleanup level.

[D] Indicates duplicate of previous sample

ID = identification

J The analyte was positively identified; the quantitation is an estimate.

Location ID 16-9 was a sidewall sample initially and became Location ID 16-12 (floor) after re-excavation (note for report)

M-A matrix effect was present.

mg/kg = milligrams per kilogram

PCB = Polychlorinated biphenyls

QH-Estimated with a high bias.

U-Analyte was not detected. The limit of detecttion (LOD) precedes the U.

Table 15 Site 21 PCB Results

Sample ID	Location ID	Laboratory ID	Date Collected	EPA Method 8082 Results (mg/kg)						
				Analyte (Aroclor)						
				PCB-1016	PCB-1221	PCB-1232	PCB-1242	PCB-1248	PCB-1254	PCB-1260
10NC21SB09	21-09	580-21111-9	8/18/2010	0.011 U	0.014 U	0.014 U	0.0083 U	0.0042 U	0.091	0.032
10NC21SB10	21-10	580-21111-10	8/18/2010	0.01 U	0.013 U	0.013 U	0.0078 U	0.0039 U	0.038	0.011 J
10NC21SB17[D]	21-10	580-21111-17	8/18/2010	0.01 U	0.013 U	0.013 U	0.0076 U	0.0038 U	0.035	0.013
10NC21SB11	21-11	580-21111-11	8/18/2010	0.01 U	0.013 U	0.013 U	0.0078 U	0.0039 U	0.029	0.017
10NC21SB12	21-12	580-21111-12	8/18/2010	0.0095 U	0.012 U	0.012 U	0.0071 U	0.0036 U	0.049	0.073
10NC21SB13	21-13	580-21111-13	8/18/2010	0.011 U	0.014 U	0.014 U	0.0082 U	0.0041 U	0.03	0.0073 J
10NC21SB14	21-14	580-21111-14	8/18/2010	0.01 U	0.013 U	0.013 U	0.0075 U	0.0038 U	0.042	0.0088 J
10NC21SB15	21-15	580-21111-15	8/18/2010	0.0099 U	0.012 U	0.012 U	0.0074 U	0.0037 U	0.048	0.033
10NC21SB16	21-16	580-21111-16	8/18/2010	0.011 U	0.014 U	0.014 U	0.0084 U	0.0042 U	0.02	0.0055 J
10NC21SB18	21-18	580-21189-1	8/25/2010	0.017 U	0.022 U	0.022 U	0.013 U	0.0065 U	0.013 U	0.017 U
10NC21SB19	21-19	580-21189-2	8/25/2010	0.011 U	0.014 U	0.014 U	0.0084 U	0.0042 U	0.0084 U	0.011 U
10NC21SB20	21-20	580-21189-3	8/25/2010	0.011 U	0.014 U	0.014 U	0.0082 U	0.0041 U	0.0082 U	0.011 U
10NC21SB21	21-21	580-21189-4	8/25/2010	0.015 U	0.019 U	0.019 U	0.011 U	0.0057 U	0.011 U	0.015 U
10NC21SB22	21-22	580-21189-5	8/25/2010	0.012 U	0.015 U	0.015 U	0.0089 U	0.0045 U	0.0089 U	0.012 U
10NC21SB23	21-23	580-21189-6	8/25/2010	0.023 U	0.029 U	0.029 U	0.017 U	0.0087 U	0.017 U	0.023 U
10NC21SB24	21-24	580-21189-7	8/25/2010	0.027 U	0.034 U	0.034 U	0.02 U	0.01 U	0.02 U	0.027 U
10NC21SB25	21-25	580-21189-8	8/25/2010	0.029 U	0.036 U	0.036 U	0.022 U	0.011 U	0.022 U	0.029 U
10NC21SB26	21-26	580-21189-9	8/25/2010	0.019 U	0.024 U	0.024 U	0.014 U	0.0072 U	0.014 U	0.019 U
10NC21SB27	21-27	580-21189-10	8/25/2010	0.017 U	0.021 U	0.021 U	0.013 U	0.0063 U	0.013 U	0.017 U
10NC21SB28	21-28	580-21189-11	8/25/2010	0.029 U	0.036 U	0.036 U	0.022 U	0.011 U	0.022 U	0.029 U
10NC21SB29	21-29	580-21189-12	8/25/2010	0.03 U	0.038 U	0.038 U	0.023 U	0.011 U	0.023 U	0.03 U
10NC21SB41[D]	21-29	580-21189-24	8/25/2010	0.026 U	0.033 U	0.033 U	0.02 U	0.0098 U	0.02 U	0.026 U
10NC21SB30	21-30	580-21189-13	8/25/2010	0.01 U	0.013 U	0.013 U	0.0077 U	0.0038 U	0.0077 U	0.01 U
10NC21SB31	21-31	580-21189-14	8/25/2010	0.01 U	0.013 U	0.013 U	0.0079 U	0.0039 U	0.0079 U	0.01 U
10NC21SB32	21-32	580-21189-15	8/25/2010	0.011 U	0.014 U	0.014 U	0.0083 U	0.0041 U	0.0083 U	0.011 U
10NC21SB33	21-33	580-21189-16	8/25/2010	0.01 U	0.013 U	0.013 U	0.0077 U	0.0038 U	0.0077 U	0.01 U
10NC21SB34	21-34	580-21189-17	8/25/2010	0.011 U	0.014 U	0.014 U	0.0086 U	0.0043 U	0.0086 U	0.011 U
10NC21SB35	21-35	580-21189-18	8/25/2010	0.01 U	0.013 U	0.013 U	0.0076 U	0.0038 U	0.0076 U	0.01 U
10NC21SB36	21-36	580-21189-19	8/25/2010	0.012 U	0.015 U	0.015 U	0.0091 U	0.0046 U	0.0091 U	0.012 U
10NC21SB37	21-37	580-21189-20	8/25/2010	0.0097 U	0.012 U	0.012 U	0.0072 U	0.0036 U	0.0072 U	0.0097 U
10NC21SB38	21-38	580-21189-21	8/25/2010	0.011 U	0.014 U	0.014 U	0.0081 U	0.0041 U	0.0081 U	0.011 U
10NC21SB39	21-39	580-21189-22	8/25/2010	0.01 U	0.013 U	0.013 U	0.0075 U	0.0038 U	0.0075 U	0.01 U
10NC21SB40[D]	21-39	580-21189-23	8/25/2010	0.011 U	0.013 U	0.013 U	0.0079 U	0.0039 U	0.0079 U	0.011 U
Cleanup Level				1	1	1	1	1	1	1

Notes:

[D] Indicates duplicate of previous sample

U - Sample was non-detect. The Limit of Detection (LOD) precedes the U

ID = identification

mg/kg = milligrams per kilogram

PCB = Polychlorinated biphenyls

Table 16 Site 21 Arsenic Soil Sample Results

Client Sample ID	Location ID	Laboratory ID	Date Collected	Analysis Method	Analyte	Cleanup Level	Unit	Result
10NC21SB01	21-01	21111-1	8/17/2010	6020	Arsenic	11	mg/kg	**12**
10NC21SB02	21-02	21111-2	8/17/2010	6020	Arsenic	11	mg/kg	**180**
10NC21SB03	21-03	21111-3	8/17/2010	6020	Arsenic	11	mg/kg	4
10NC21SB08[D]	21-03	21111-8	8/17/2010	6020	Arsenic	11	mg/kg	4.2
10NC21SB04	21-04	21111-4	8/17/2010	6020	Arsenic	11	mg/kg	4.9
10NC21SB05	21-05	21111-5	8/17/2010	6020	Arsenic	11	mg/kg	**170**
10NC21SB06	21-06	21111-6	8/17/2010	6020	Arsenic	11	mg/kg	**120**
10NC21SB07	21-07	21111-7	8/17/2010	6020	Arsenic	11	mg/kg	**54**
10NC21SB42	21-42	21446-1	8/31/2010	6020	Arsenic	11	mg/kg	**11 J**
10NC21SB43[D]	21-42	21446-2	8/31/2010	6020	Arsenic	11	mg/kg	**17 J**

Notes:

[D] Indicates duplicate of previous sample

BOLD indicates sample concentration exceeded site specific cleanup levels.

J - The analyte was positively identified; the quantitation is an estimate.

ID = identification

mg/kg = milligrams per kilogram

Table 17 Site 31 PCB Soil Composite Sample Results

Sample ID	Lab ID	Date Collected	EPA method 8082 Soil Results (mg/kg)						
			Analyte (Aroclor)						
			PCB-1016	PCB-1221	PCB-1232	PCB-1242	PCB-1248	PCB-1254	PCB-1260
Composite #1	21449-159	9/4/2010	0.0085 U	0.011 U	0.011 U	0.0064 U	0.0032 U	0.0064 U	0.68 J
Composite #2[D]	21449-160	9/4/2010	0.0085 U	0.011 U	0.011 U	0.0064 U	0.0032 U	0.0064 U	0.33 J
Composite #3	21449-161	9/4/2010	0.009 U	0.011 U	0.011 U	0.0067 U	0.0034 U	0.0067 U	0.56 J
Composite #4[D]	21449-162	9/4/2010	0.0091 U	0.011 U	0.011 U	0.0068 U	0.0034 U	0.0068 U	0.31 J
Composite #5	21449-163	9/4/2010	0.0084 U	0.01 U	0.01 U	0.0063 U	0.0031 U	0.0063 U	0.34 J
Composite #6	21449-164	9/4/2010	0.0085 U	0.011 U	0.011 U	0.0064 U	0.0032 U	0.0064 U	0.19 J
Composite #7	21449-165	9/4/2010	0.0087 U	0.011 U	0.011 U	0.0065 U	0.0033 U	0.0065 U	0.34 J
Composite #8	21449-166	9/4/2010	0.0089 U	0.011 U	0.011 U	0.0067 U	0.0033 U	0.0067 U	0.18 J
Composite #9	21449-167	9/4/2010	0.0095 U	0.012 U	0.012 U	0.0071 U	0.0036 U	0.0071 U	0.29 J
Composite #10	21449-168	9/4/2010	0.0092 U	0.011 U	0.011 U	0.0069 U	0.0034 U	0.0069 U	**5 J**
Composite #11	21449-169	9/4/2010	0.009 U	0.011 U	0.011 U	0.0068 U	0.0034 U	0.0068 U	0.7 J
Composite #12	21449-170	9/4/2010	0.0087 U	0.011 U	0.011 U	0.0065 U	0.0033 U	0.0065 U	**1.6 J**
Composite #13	21449-171	9/4/2010	0.0083 U	0.01 U	0.01 U	0.0062 U	0.0031 U	0.0062 U	0.37 J
Composite #14	21449-172	9/4/2010	0.0088 U	0.011 U	0.011 U	0.0066 U	0.0033 U	0.0066 U	**1.9 J**
Composite #15	21449-173	9/4/2010	0.0086 U	0.011 U	0.011 U	0.0065 U	0.0032 U	0.0065 U	**2.7 J**
Composite #16	21449-174	9/4/2010	0.0082 U	0.01 U	0.01 U	0.0061 U	0.0031 U	0.0061 U	0.08 J
Composite #17	21449-175	9/4/2010	0.009 U	0.011 U	0.011 U	0.0067 U	0.0034 U	0.0067 U	**4.3 J**
Composite #18	21449-176	9/4/2010	0.017 U Q	0.021 U	0.021 U	0.013 U	0.0064 U	0.013 U	**1.3 J**
Composite #19	21449-177	9/4/2010	0.0086 U	0.011 U	0.011 U	0.0065 U	0.0032 U	0.0065 U	**3.6 J**
Cleanup Level			1	1	1	1	1	1	1

Notes:

[D] Indicates duplicate of previous sample

Bold indicates sample result is above site cleanup level.

J - Result is an estimate due to field duplicate imprecision.

U - Result is non-detect, the limit of detection (LOD) precedes the U.

ID = identification

mg/kg = milligrams per kilogram

PCB = Polychlorinated biphenyls

Table 18 Site 8 Monitored Natural Attenuation Parameter Results

Sample Location	Sample ID	Manganese	Ferrous Iron	Sulfate	Nitrate	Alkalinity	Temp	Specific Cond	pH	ORP	DO	Methane
		mg/L	mg/L	mg/L	mg/L	mg/L	C	mS/cm		mV	mg/L	µg/L
UDU B10	19	<0.2	0.04	5	0.5	0	7.91	0.076	5.35	177	5.9	ND(0.19)
UDU C09	20	<0.2	0.10	2	0.4	0	8.37	0.105	5.78	46.3	4.46	ND(0.19)
UDU A08	21	<0.2	<0.01	<2	0.2	0	7.23	0.078	5.76	115.1	6.1	5.9
UDU C07	22	<0.2	0.04	<2	0.5	0	7.68	0.072	5.58	102	7.82	ND(0.19)
UDU A06	23	<0.2	0.02	<2	0.7	0	6.39	0.059	5.23	194.9	8.9	0.48
UDU D05	24	<0.2	<0.01	7	0.3	0	8.3	0.066	5.71	116.7	5.97	2.9
UDU D04	25	<0.2	0.03	<2	0.4	0	8.37	0.067	5.8	128.4	5.43	3.8
UDU A08	26 (Field Dup)	<0.2	0.03	<2	0.2	0	7.23	0.078	5.76	115.1	6.1	1.6
UDU C02	27	<0.2	0.03	2	0.4	0	8.01	0.076	5.48	51.2	8.28	0.52
UDU C02	27 (Lab Dup)	<0.2	0.03	3	0.3	0	8.01	0.076	5.48	51.2	8.28	ND(0.19)
MDU D09	10	<0.2	0.05	<2	0.5	0	11	0.078*	5.7	38.9	4.323	0.25
MDU D08	11	<0.2	0.02	<2	0.5	0	11.01	0.084*	6.08	-19.5	4.477	ND(0.19)
MDU D04	12	<0.2	0.01	<2	0.9	0	11.09	0.073*	5.4	-31	2.86	1.9
MDU D04	13 (Field Dup)	<0.2	0.01	<2	0.9	0	11.09	0.073*	5.4	-31	2.86	2
MDU A03	14	<0.2	0.01	<2	0.3	0	10.31	0.073*	5.43	42	3.3966	0.24
MDU C02	15	<0.2	0.01	<2	1.1	0	11	0.077*	5.46	36	3.322	ND(0.19)
MDU C01	16	<0.2	0.02	<2	0.2	0	10.13	0.073*	5.55	-8.6	1.8645	ND(0.19)
MDU B08	17	<0.2	0.09	<2	0.3	0	11.31	0.0311*	5.56	42.8	2.7032	96
MDU D06	18	<0.2	0.11	<2	0.3	0	10.95	0.092*	5.64	5.8	4.697	ND(0.19)
MDU D06	18 (Lab Dup)	<0.2	0.11	<2	0.4	0	10.95	0.092*	5.64	5.8	4.697	ND(0.19)
LDU A09	2	<0.2	0.08	80	0.0	80	9.09	0.185	6.37	-42.6	1	0.55
LDU B05	6	<0.2	0.01	<2	0.3	0	12.79	0.074	5.96	-48.8	2.53	ND(0.19)
LDU B06	5	<0.2	0.04	<2	0.2	0	12.48	0.145	5.8	39.8	3.27	ND(0.19)
LDU C03	8	<0.2	0.05	1	0.2	0	10.04	0.183	6.28	-44.6	2.55	ND(0.19)
LDU C03	9 (Field Dup)	<0.2	0.02	<2	0.2	0	10.04	0.183	6.28	-44.6	2.55	ND(0.19)
LDU C08	3	<0.2	0.04	<2	0.6	0	9.5	0.215	5.8	-21.3	3.23	1.1
LDU C10	1	<0.2	<0.01	6	0.1	180	11.04	0.869	8.86	-203.5	0.72	ND(0.19)
LDU D04	7	<0.2	0.02	<2	0.2	0	11.14	0.166	5.99	-28	1.34	ND(0.19)
LDU D07	4	<0.2	0.07	<2	0.1	0	11.42	0.176	5.3	38.9	2.63	ND(0.19)
LDU C10Dup	1 (Lab Dup)	<0.2	0.02	16	0.1	180	11.04	0.869	8.86	-204	0.72	ND(0.19)
Method detection limit		0.2	0.01	2	0.4	0						

Notes:

*conductance in ms/cm
ND=non-detect
DO=Dissolved Oxygen
mg/L = milligram per liter
C = Degrees celsius
mS/cm = millisiemens per centimeter
Temp = Temperature

LDU=Lower Decision Unit
MDU=Middle Decision Unit
UDU=Upper Decision Unit
ORP=Oxidation-Reduction Potential

	do avg	orp avg	Fe II avg
LDU	2.20	-39.4	0.0413
MDU	3.39	8.4	0.0367
UDU	6.55	109.8	0.0414

Table 19 Site 8 Soil Composite Results

Matrix	Analysis Method	Analyte	Sample ID		10NC08SB01	10NC08SB02	10NC08SB03[D]	10NC08SB04
			Lab ID		20762-28	20762-29	20762-30	20762-31
			Location ID		08-LDU	08-MDU	08-MDU	08-UDU
			Date Collected		7/25/2010	7/26/2010	7/26/2010	7/27/2010
			Cleanup Level	Unit				
Soil	8270C SIM/DoD	1-Methylnaphthalene	6,200	µg/kg	1200 M	5000	5100	4 J
Soil	8270C SIM/DoD	2-Methylnaphthalene	6,100	µg/kg	1200 M	**7500**	**7600 M**	6.8 J
Soil	8270C SIM/DoD	Acenaphthene	180,000	µg/kg	72	220	240	1.7 U
Soil	8270C SIM/DoD	Acenaphthylene	180,000	µg/kg	56 J	1.9 U J	100 J	3.4 J
Soil	8270C SIM/DoD	Anthracene	3,000,000	µg/kg	1.7 U J	180 J	0.82 U J	0.68 U J
Soil	8270C SIM/DoD	Benzo[a]anthracene	3,600	µg/kg	4.3 U	5.5 J	7.1 J	2.4 J
Soil	8270C SIM/DoD	Benzo[a]pyrene	2,100	µg/kg	1.7 U J	6.6 J	0.82 U J	0.68 U J
Soil	8270C SIM/DoD	Benzo[b]fluoranthene	12,000	µg/kg	4.3 U	9.3 J	13	1.7 U
Soil	8270C SIM/DoD	Benzo[g,h,i]perylene	38,700,000	µg/kg	4.3 U	1.9 U	2 U	1.7 U
Soil	8270C SIM/DoD	Benzo[k]fluoranthene	120,000	µg/kg	4.3 U	5.4 J	14	1.7 U
Soil	8270C SIM/DoD	Chrysene	360,000	µg/kg	4.3 U	26	24	6.4 J
Soil	8270C SIM/DoD	Dibenz(a,h)anthracene	4,000	µg/kg	4.3 U	1.9 U	2 U	1.7 U
Soil	8270C SIM/DoD	Fluoranthene	1,400,000	µg/kg	11 J	37	37	3.2 J
Soil	8270C SIM/DoD	Fluorene	220,000	µg/kg	200	630 M	**820**	13
Soil	8270C SIM/DoD	Indeno[1,2,3-cd]pyrene	41,000	µg/kg	4.3 U	2.8 J	2.9 J	1.8 J
Soil	8270C SIM/DoD	Naphthalene	20,000	µg/kg	340 M	1600	1600	ND (8.5)
Soil	8270C SIM/DoD	Phenanthrene	3,000,000	µg/kg	120	520	460	1.7 U
Soil	8270C SIM/DoD	Pyrene	1,000,000	µg/kg	19 J	26	42	3.9 J
Soil	EPA 9060	Total Organic Carbon - Quad	NA	mg/kg	130000	100000	100000	100000
Soil	AK102	DRO (nC10-<nC25)	9,200	mg/kg	2800	7100	**9300**	660
Soil	AK103	RRO (nC25-nC36)	9,200	mg/kg	1600 M	3300	5300 QH	6300 QH
Soil	AK102-SG	DRO with Silica Gel	9,200	mg/kg	3100 HL	6700 HL	8500 HL	310 HL
Soil	AK103-SG	RRO with Silica Gel	9,200	mg/kg	1000 HL	1300 M, HL	2100 M, HL	3000 M QH, HL

Notes:

µg/kg = microgram per kilogram

AK = Alaska Test Method

BOLD indicates sample concentration exceeded site specific cleanup levels.

[D] Indicates duplicate of previous sample

EPA = Environmental Protection Agency

ID = identification

J-The analyte was positively identified, the quantitation is an estimation.

LDU = Lower Decision Unit

M-A matrix effect was present.

MDU = middle decision unit

mg/kg = milligrams per kilogram

QH-Estimated with a high bias.

SG = Silica Gel

SIM/DoD = Selective Ion Monitoring/Department of Defense

UDU = Upper Decision Unit

U-The result is non-detect, the limit of detection (LOD) precedes the U.

HL-Sample result is an estimate due to analytical holding time exceedence, the result may have a low bias.

Table 20 Site 8 Surface Water Results

Analysis Method	Analyte	Cleanup Level *	Unit	10NC08WA28 08-1	10NC08WA29 08-10	10NC08WA30[D] 08-10
8270C SIM/DoD	1-Methylnaphthalene	150	µg/L	0.019 U	0.019 U	0.019 U
8270C SIM/DoD	2-Methylnaphthalene	150	µg/L	0.047 U	0.047 U	0.049 U
8270C SIM/DoD	Acenaphthene	2,200	µg/L	0.047 U	0.047 U	0.049 U
8270C SIM/DoD	Acenaphthylene	2,200	µg/L	0.019 U	0.019 U	0.019 U
8270C SIM/DoD	Anthracene	11,000	µg/L	0.019 U	0.019 U	0.019 U
8270C SIM/DoD	Benzo[a]anthracene	1.2	µg/L	0.047 U	0.029 J	0.049 U
8270C SIM/DoD	Benzo[a]pyrene	0.2	µg/L	0.047 U	0.037 J	0.049 U
8270C SIM/DoD	Benzo[b]fluoranthene	1.2	µg/L	0.047 U	0.039 J	0.026 J
8270C SIM/DoD	Benzo[g,h,i]perylene	1,100	µg/L	0.047 U	0.047 U	0.049 U
8270C SIM/DoD	Benzo[k]fluoranthene	1.2	µg/L	0.047 U	0.047 U	0.049 U
8270C SIM/DoD	Chrysene	120	µg/L	0.047 U	0.036 J	0.031 J
8270C SIM/DoD	Dibenz(a,h)anthracene	0.12	µg/L	0.047 U	0.047 U	0.049 U
8270C SIM/DoD	Fluoranthene	1,500	µg/L	0.047 U	0.047 U	0.049 U
8270C SIM/DoD	Fluorene	1,500	µg/L	0.047 U	0.047 U	0.049 U
8270C SIM/DoD	Indeno[1,2,3-cd]pyrene	1.2	µg/L	0.047 U	0.047 U	0.049 U
8270C SIM/DoD	Naphthalene	730	µg/L	0.047 U	0.047 U	0.049 U
8270C SIM/DoD	Phenanthrene	11,000	µg/L	0.019 U	0.019 U	0.019 U
8270C SIM/DoD	Pyrene	1,100	µg/L	0.047 U	0.047 U	0.049 U
AK102	DRO (nC10-<nC25)	1.5	mg/L	0.064 J	0.38	0.44
AK103	RRO (nC25-nC36)	1.1	mg/L	0.055 J	0.56	0.7

Notes:

µg/kg = microgram per liter

AK = Alaska Test Method

[D] Indicates duplicate of previous sample

DRO = Diesel Range Organics

ID = identification

J-The analyte was positively identified, the quantitation is an estimation.

LDU = Lower Decision Unit

MDU = middle decision unit

mg/L = milligrams per liter

RRO = Residual Range Organics

SIM/DoD = Selective Ion Monitoring/Department of Defense

UDU = Upper Decision Unit

U-The result is non-detect, the limit of detection (LOD) precedes the U.

Table 21 Site 28 Sludge Results

Matrix	Analysis Method	Analyte	Cleanup Level	Unit	10NC28BW01	10NC28BW02
			Laboratory ID		20758-1	20758-2
			Date Collected		7/27/2010	7/27/2010
Solid	6020	Arsenic	11	mg/kg	**41**	**40**
Solid	6020	Barium	1100	mg/kg	820 JM	410 JM
Solid	6020	Cadmium	5	mg/kg	**18 JM**	**18 JM**
Solid	6020	Chromium	270	mg/kg	180 J	110 J
Solid	6020	Lead	400	mg/kg	**5000**	**1900**
Solid	6020	Selenium	3.4	mg/kg	2.8 J	3 J
Solid	6020	Silver	11.2	mg/kg	**16 J**	9.6 J
Solid	7471A	Mercury	1.4	mg/kg	**15 J**	**6.4**
Solid	8082	PCB-1016	1	mg/kg	0.016 U	0.015 U
Solid	8082	PCB-1221	1	mg/kg	0.019 U	0.019 U
Solid	8082	PCB-1232	1	mg/kg	0.019 U	0.019 U
Solid	8082	PCB-1242	1	mg/kg	0.012 U	0.011 U
Solid	8082	PCB-1248	1	mg/kg	0.0058 U	0.0057 U
Solid	8082	PCB-1254	1	mg/kg	**20**	**23**
Solid	8082	PCB-1260	1	mg/kg	0.016 U	0.015 U
Solid	AK102	DRO (nC10-<nC25)	9200	mg/kg	**100000**	**68000**

Notes:

BOLD indicates sample concentration exceeded site specific cleanup levels.

J - The analyte was positively identified, the quantitation is an estimation.

M - A matrix effect was present.

U - Sample was non-detect. The Limit of Detection (LOD) precedes the U

µg/kg = microgram per kilogram
AK = Alaska Test Method
ID = identification
mg/kg = milligrams per kilogram
PCB = Polychlorinated biphenyls

Table 22 Site 28 Concrete Sample Results

Matrix	Analysis Method	Analyte	Unit	10NC28BW-concrete-1	10NC28BW-concrete-2[D]
Solid	6010B	Arsenic	mg/L	0.05 J	0.068
Solid	6010B	Barium	mg/L	0.27	0.26
Solid	6010B	Cadmium	mg/L	0.003 U QL	0.003 U QL
Solid	6010B	Chromium	mg/L	0.0047 J	0.0066 UJ
Solid	6010B	Lead	mg/L	0.0034 U QL	0.0034 U QL
Solid	6010B	Selenium	mg/L	0.1 UB QL	0.028 UB QL
Solid	6010B	Silver	mg/L	0.0025 J	0.0016 J
Solid	7470A	Mercury	mg/L	0.001 U	0.001 U
Solid	8082	PCB-1016	µg/L	0.8 U	0.8 U
Solid	8082	PCB-1221	µg/L	0.62 U	0.62 U
Solid	8082	PCB-1232	µg/L	0.5 U	0.5 U
Solid	8082	PCB-1242	µg/L	0.6 U	0.6 U
Solid	8082	PCB-1248	µg/L	0.6 U	0.6 U
Solid	8082	PCB-1254	µg/L	0.6 U	0.6 U
Solid	8082	PCB-1260	µg/L	0.8 U	0.8 U

Notes:

[D] Indicates duplicate of previous sample

B-The analyte was detected in the method blank at a concentration less than 10 times the reported value.

J-The analyte was identified; the quantitation is an estimate.

QL-Estimated with a low bias.

Sample results less than the LOQ are reported as non-detect and are "B: flagged.

U-Result is non-detect, the number preceding it in the limit of detection (LOD).

µg/L = micrograms per liter

mg/L = milligrams per liter

PCB = Polychlorinated biphenyls

Table 23 NE Cape MOC UVOST Guided Excavation Volume and Tonnage Estimates by Excavation Unit

Excavation Unit	Area (sq ft)	top (ft bgs)	bottom (ft bgs)	bottom (ft bgs)	top 2 (ft bgs)	bottom 2 (ft bgs)	thickness (ft)	cubic yards	tons	cubic yards	tons	Overburden cubic yards	Overburden tons
			low water table	high water table	low water table	low water table	low water table	low water table	low water table	high water table	high water table	low water table	low water table
D1	2200	12	15	12			3	244.2	391	0	0	977	1563
D2	2000	2	7	7	13	15	7	518	829	370	592	592	947
D3	3500	5	11	8			6	777	1243	389	622	648	1036
D4	700	0	4	4			4	103.6	166	104	166	0	0
E4	1400	5	13	11			8	414.4	663	311	497	259	414
E3	6200	2	8	8			6	1376.4	2202	1376	2202	459	734
E2	6200	4	11	10			7	1605.8	2569	1376	2202	918	1468
E1	3700	7	15	9			8	1095.2	1752	274	438	958	1533
I1	3000	10	15	10			5	555	888	0	0	1110	1776
I2	3800	0	9	7			9	1265.4	2025	984	1575	0	0
I3	3000	8	10	8			2	222	355	0	0	888	1421
I4	8800	7	10	7			3	976.8	1563	0	0	2279	3647
I5	7900	0	10	7			10	2923	4677	2046	3274	0	0
I6	3100	4	7	7			3	344.1	551	344	551	459	734
I7	2400	6	11	9			5	444	710	266	426	533	852
I8	1900	8	11	10			3	210.9	337	141	225	562	900
I9	7600	0	11	7			11	3093.2	4949	1968	3149	0	0
J4	5000	7	11	11			4	740	1184	740	1184	1295	2072
J5	2300	3	7	5			4	340.4	545	170	272	255	408
J1	7300	0	15	11			15	4051.5	6482	2971	4754	0	0
J2	2200	8	15	8			7	569.8	912	0	0	651	1042
J3	1600	0	3	3	8	12	7	414.4	663	178	284	296	474
A1	8400	12	15	14			3	932.4	1492	622	995	3730	5967
A2	3600	8	15	14			7	932.4	1492	799	1279	1066	1705
B1	800	11	14	14			3	88.8	142	89	142	326	521
B2	1800	7	15	15			8	532.8	852	533	852	466	746
C	1800	10	14	14			4	266.4	426	266	426	666	1066
F	600	11	15	15			4	88.8	142	89	142	244	391
G2	1500	8	15	9			7	388.5	622	56	89	444	710
G1	1000	10	12	10			2	74	118	0	0	370	592
H	1400	6	12	9			6	310.8	497	155	249	311	497
								25900	**41440**	**16617**	**26587**	**20761**	**33217**
									On pad tonnage		On pad tonnage		
									13196		9016		
									Off pad tonnage		Off pad tonnage		
									28244		17571		

APPENDIX G

Chemical Data Quality Review

TABLE OF CONTENTS

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TABLES

ACRONYMS AND ABBREVIATIONS

SW	U.S. EPA Solid Waste Method
%R	percent recovery
°C	degrees Celsius
ADEC	Alaska Department of Environmental Conservation
Bristol	Bristol Environmental Remediation Services, LLC
BTEX	benzene, toluene, ethylbenzene, and xylenes
CoC	chain-of-custody
DoD	Department of Defense
DQOs	data quality objectives
DRO	diesel range organics
EPA	U.S. Environmental Protection Agency
FD	field duplicate
GRO	gasoline range organics
HTRW	hazardous, toxic, and radioactive waste
ICP-MS	inductively coupled plasma mass spectroscopy
ICSA	Interface Check Standard A
IDs	identifications
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LocID	location identification
LOD	limit of detection
LOQ	limit of quantitation
MBs	method blanks
MOC	Main Operations Complex
MS	matrix spike
MSD	matrix spike duplicate
NE Cape	Northeast Cape
PAHs	polynuclear aromatic hydrocarbons
PCBs	polychlorinated biphenyls
QC	quality control

ACRONYMS AND ABBREVIATIONS (continued)

Report	Data Verification Report
RL	reporting limit
RPD	relative percent difference
RRO	residual range organics
SAP	Sampling and Analysis Plan
SIM	selective ion monitoring
SW	EPA Solid Waste Method
TCLP	Toxicity Characterization Leaching Procedure
TestAmerica	TestAmerica Laboratories, Inc.
TOC	total organic carbon
USACE	U.S. Army Corps of Engineers
VOC	volatile organic compound

1.0 INTRODUCTION

This Chemical Data Quality Review Report (Report) has been completed on the submitted data packages in accordance with an agreement between Bristol Environmental Remediation Services, LLC (Bristol), and the U.S. Army Corps of Engineers (USACE), Alaska District. As per this agreement, all laboratory results were generated as part of work on the Remedial Actions at Northeast Cape (NE Cape), St. Lawrence Island, Alaska. The USACE assigned this project to Bristol under Contract No. W911KB-10-C-0002.

Data verification for this report was performed on the data collected as part of the Remedial Actions at NE Cape in 2010. Data verification is a process for evaluating the completeness, correctness, consistency, compliance with method procedures and quality control (QC) requirements, and identification of anomalous data. The reported project sample values, as well as any method laboratory control samples extracted or prepared with the project samples were reviewed. Specifically, the following items were reviewed in this data verification:

- Sample receipt conditions:
  - Sample preservation,
  - Cooler temperatures upon receipt,
  - Chain-of-custody (CoC) condition/correspondence to submitted sample set,
  - Presence/absence of custody seals.
- Extraction and analytical procedures:
  - Holding times,
  - Method blanks (MBs),
  - Laboratory control samples (LCSs)/laboratory control sample duplicates (LCSDs),
  - Matrix spike (MS)/matrix spike duplicate (MSD),
  - Duplicate samples,
  - Surrogate recoveries.
- Sampling procedures:
  - Field blanks,
  - Trip blanks,
  - Equipment blanks,
  - Field duplicate samples.

- Correspondence to method criteria and project data quality objectives (DQOs).

Unless otherwise discussed in this document, the above parameters were within Sampling and Analysis Plan (SAP)/method criteria, and were within SAP specified control limits. If control limits were not specified in the SAP, laboratory control limits were used for review.

Other than the analytical procedures listed above, no information on internal standards, calibrations, instrument tunes, chromatograms, quantitation reports, spectra, nor summaries identifying any analytical irregularities and the subsequent corrective action taken by the laboratories were reviewed or addressed in this Report.

Data verification was performed in accordance with:

- EM 200-1-6, *Chemical Quality Assurance of Hazardous, Toxic, and Radioactive Waste (HTRW) Projects* (USACE, 1997);
- *The Northeast Cape HTRW Remedial Actions, NE Cape, St. Lawrence Island, Alaska SAP, Revision 1* (July 2010);
- *Department of Defense (DoD) Quality Systems Manual*, Version 4.1 (2009);
- ER 1110-1-263, *Chemical Data Quality Management for HTRW Remedial Activities* (April 1998);
- Alaska Department of Environmental Conservation (ADEC) Technical Memorandum: *Environmental Laboratory and Quality Assurance Requirements* (Updated March 2009).

Precision and accuracy were assessed by comparing surrogate, MS/MSD and LCS/LCSD recoveries and relative percent differences (RPDs) to the SAP-specified control limits. The frequency of QC samples was compared to the frequency specified in the SAP. The MS/MSDs performed on non-project samples are not applicable, and were not evaluated.

The reviewed data sets include data from samples collected for the NE Cape Remedial Actions from July through September 2010 which were analyzed by TestAmerica Laboratories, Inc., (TestAmerica) Tacoma, Washington by the following methods:

- Benzene, toluene, ethylbenzene, and xylenes (BTEX) by U.S. Environmental Protection Agency (EPA) Solid Waste (SW-846) Methods 5030B/ 8260B;
- Volatile organic compounds (VOCs) by SW-846 methods 5030B/8260B;
- Gasoline range organics (GRO) by ADEC method AK101;

- Diesel range organics (DRO) and residual range organics (RRO) by ADEC Method AK102/103;
- DRO and RRO by ADEC Method AK102/103 with silica gel clean-up;
- Methane by RSK 175;
- Polynuclear aromatic hydrocarbons (PAHs) by SW-846 Method 3520C/8270C selective ion monitoring (SIM);
- Polychlorinated biphenyls (PCBs) by SW-846 Method 3520C/8082 (waters) or 3550B/8082 (soils);
- Toxicity characteristic leaching procedure (TCLP) PCBs by SW-846 Method 1311/8082;
- Total organic carbon (TOC)-Quad by SW-846 9060;
- Metals by SW-846 methods 3005A/6020 (waters) or 3050B/6020 (soils);
- Mercury by SW-846 methods 7470A (waters) or 7471A (soils);
- TCLP metals by SW-846 methods 1311/6010B and 1311/7470A.

Discrepancies between the analyses requested on the CoC and the reported results were as follows:

- For Site 3, Lab Work Order 580-20788, DRO and RRO without silica gel cleanup were not requested on the CoC. Sample results for DRO/RRO with and without silica gel treatment were included in the lab report for all three samples.
- For Site 9, Lab Work Orders 580-20582, 580-20690, and 580-21220, the CoC form specified VOCs but BTEX was reported. For Lab Work Order 580-21220, a second data package was submitted with the full VOC list analyzed outside holding time requirements.
- Site MOC Groundwater, Lab Work Order 580-20883, the CoC form specified VOCs but BTEX was reported.
- Site 28, Lab Work Order 580-21184, the sample was shipped in a 5-gallon bucket. The sample was a piece of concrete from the manhole removed at Site 28. The sample was submitted for metals and PCB analysis following a TCLP extraction. The purpose of the analysis was to determine the proper disposal of the concrete manhole.

The sampling event and laboratory work order numbers are presented in Table 1-0.

Table 1-0 Laboratory Work Order Numbers

Sampling Event	Sample Matrix	Work Order Number
Site 1	Soil	580-21112
Site 3	Soil	580-20788
	Soil	580-21113
	Soil	580-21125
Site 6	Soil	580-20786
	Soil	580-20954
	Soil	580-21126
	Soil	580-21447
	Water	580-21300
Site 8	Water and Sediment	580-20762-1 580-20762-2
	Water	580-20809
Site 9	Water	580-20582
	Water	580-20690
	Water	580-21220-1 580-21220-2
Site 13	Soil	580-21440
Site 16	Soil	580-21107
	Soil	580-21448
Site 21	Soil	580-21111
	Soil	580-21189
	Soil	580-21446
Site 28	Sludge	580-20758
	Concrete	580-21184
Site 31	Soil	580-21449
Site 32	Soil	580-21114
MOC Groundwater	Groundwater	580-20883
	Groundwater	580-21052

Notes:
MOC = Main Operations Complex

Analytical results tables are presented in Appendix A. The tables include sample identifications (IDs), which reference the year (10), the project (NC) for NE Cape, the site

(-09 for site 9), the matrix (SB for soil boring), and the sample location ID (LocID). The LocID indicates the specific site at NE Cape, as well as a specific location within the sites. LocIDs may be used more than once such as the pre- and post-construction monitoring well samples at site 9, which use the same LocID for differing sample events.

The following data qualifiers may be used to identify data points when data verification determines that results should be qualified because of a potential bias in the result, or a deviation from method or SAP QC procedures:

- J – The analyte was positively identified; the quantitation is an estimation.
- U – The analyte was analyzed for, but not detected at the limit of detection (LOD).
- R – The data are unusable because of deficiencies in the ability to analyze the sample and meet QC criteria.
- B – The analyte was detected in an associated blank at a concentration less than 10 times the reported concentration in the sample.
- M – A matrix effect was present.
- Q – One or more QC criteria failed, bias is unknown.
- QH – One or more QC criteria, such as a surrogate or LCS recovery, failed with a potential high bias.
- QL – One or more QC criteria, such as a surrogate or LCS recovery, failed with a potential low bias.

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2.0 DATA VERIFICATION

A total of 11 sites and the Main Operations Complex (MOC) groundwater were sampled. The samples collected were as follows:

- Site 1: 15 soil samples, including 2 field duplicates (FDs);
- Site 3: 19 soil samples, including 3 FDs;
- Site 6: 55 soil samples and 2 water samples, including 3 soil FDs, 1 water FD, and 2 trip blanks;
- Site 8: 4 sediment samples and 30 water samples, including 1 sediment FD and 4 water FDs;
- Site 9: 6 water samples, including 3 FDs and a trip blank collected for each of the 3 separate sample events;
- Site 13: 20 composite soil samples and 2 FDs;
- Site 16: 18 soil samples and 3 FDs;
- Site 21: 44 soil samples and 5 FDs;
- Site 28: 2 sludge samples, 1 concrete sample and 1 concrete FD;
- Site 31: 19 composite soil samples with 2 FDs;
- Site 32: 16 soil samples with 2 FDs;
- MOC groundwater: 13 water samples including 1 FD and 3 trip blanks.

Field sample numbers, corresponding laboratory numbers, and analyses are presented in Tables 2-0.1 through 2-0.12.

Table 2-0.1 Site 1

Field Sample ID	Laboratory Sample Number	Location ID	RRO (AK103)	Remarks
Site 1 Soil:				
10NC01SB01	580-21112-1	01-01	X	
10NC01SB02	580-21112-2	01-02	X	
10NC01SB03	580-21112-3	01-03	X	
10NC01SB04	580-21112-4	01-03	X	FD of 10NC01SB03
10NC01SB05	580-21112-5	01-05	X	
10NC01SB06	580-21112-6	01-06	X	
10NC01SB07	580-21112-7	01-07	X	MS/MSD
10NC01SB08	580-21112-8	01-08	X	
10NC01SB09	580-21112-9	01-09	X	
10NC01SB10	580-21112-10	01-10	X	
10NC01SB11	580-21112-11	01-11	X	
10NC01SB12	580-21112-12	01-11	X	FD of 10NC01SB11
10NC01SB13	580-21112-13	01-13	X	
10NC01SB14	580-21112-14	01-14	X	
10NC01SB15	580-21112-15	01-15	X	

Notes:

AK = Alaska Test Method
FD = field duplicate
ID = identification
MS = matrix spike
MSD = matrix spike duplicate
RRO = residual range organics

Table 2-0.2 Site 3

Field Sample ID	Laboratory Sample Number	Location ID	TOC (9060)	DRO/RRO (AK102/103)	DRO/RRO with Silica Gel (AK102/103)	Remarks
Site 3 Soil:						
10NC03SB01	580-20788-1	03-1	X	X	X	MS/MSD
10NC03SB02	580-20788-2	03-1	X	X	X	FD of 10NC03SB01
10NC03SB03	580-20788-3	03-3	X	X	X	
10NC03SB01	580-21113-1	03-1		X	X	MS/MSD
10NC03SB02	580-21113-2	03-2		X	X	
10NC03SB03	580-21113-3	03-3		X	X	
10NC03SB04	580-21113-4	03-4		X	X	
10NC03SB05	580-21113-5	03-5		X	X	
10NC03SB06	580-21113-6	03-5		X	X	FD of 10NC03SB05
10NC03SB07	580-21113-7	03-6		X	X	
10NC03SB08	580-21113-8	03-7		X	X	
10NC03SB09	580-21113-9	03-8		X	X	
10NC03SB010	580-21125-1	03-7		X		MS/MSD
10NC03SB011	580-21125-2	03-8		X		
10NC03SB012	580-21125-3	03-9		X		
10NC03SB013	580-21125-4	03-10		X		
10NC03SB014	580-21125-5	03-10		X		FD of 10NC03SB013
10NC03SB015	580-21125-6	03-11		X		
10NC03SB016	580-21125-7	03-12		X		

Notes:

AK	=	Alaska Test Method	MS	=	matrix spike
FD	=	field duplicate	MSD	=	matrix spike duplicate
DRO	=	diesel range organics	RRO	=	residual range organics
ID	=	identification	TOC	=	total organic carbon

Table 2-0.3 Site 6

Field Sample ID	Laboratory Sample Number	Location ID	BTEX (SW8260B)	GRO (AK101)	DRO/RRO (AK102/103)	PAHs (8270C SIM)	Remarks
Site 6 Soil:							
10NC06SB01	580-20786-1	06-1			X		MS/MSD
10NC06SB02	580-20786-2	06-2			X		
10NC06SB03	580-20786-3	06-3			X		
10NC06SB04	580-20786-4	06-4			X		
10NC06SB05	580-20786-5	06-5			X		
10NC06SB06	580-20786-6	06-6			X		
10NC06SB07	580-20786-7	06-7			X		
10NC06SB08	580-20954-1	06-8			X		MS/MSD
10NC06SB09	580-20954-2	06-8			X		FD of 10NC06SB08
10NC06SB10	580-20954-3	06-9			X		
10NC06SB11	580-20954-4	06-10			X		
10NC06SB12	580-20954-5	06-11			X		
10NC06SB13	580-20954-6	06-12			X		MS/MSD
10NC06SB14	580-20954-7	06-13			X		
10NC06SB15	580-20954-8	06-14			X		
10NC06SB16	580-20954-9	06-15			X		
10NC06SB17	580-20954-10	06-16			X		FD of 10NC06SB16
10NC06SB18	580-20954-11	06-17			X		
10NC06SB19	580-20954-12	06-18			X		
10NC06SB20	580-20954-13	06-19			X		
10NC06SB21	580-20954-14	06-20			X		
10NC06SB22	580-20954-15	06-21			X		
10NC06SB23	580-20954-16	06-22			X		
10NC06SB24	580-20954-17	06-22			X		*continued*
10NC06SB25	580-20954-18	06-23			X		

Table 2-0.3 Site 6 (continued)

Field Sample ID	Laboratory Sample Number	Location ID	BTEX (SW8260B)	GRO (AK101)	DRO/RRO (AK102/103)	PAHs (8270C SIM)	Remarks
Site 6 Soil:							
10NC06SB26	580-20954-19	06-24			X		
10NC06SB27	580-20954-20	06-25			X		
10NC06SB28	580-20954-21	06-26			X		
10NC06SB29	580-21126-1	06-27			X		MS/MSD
10NC06SB30	580-21126-2	06-28			X		
10NC06SB31	580-21126-3	06-29			X		
10NC06SB32	580-21126-4	06-30			X		
10NC06SB33	580-21126-5	06-31			X		
10NC06SB34	580-21126-6	06-31			X		FD of 10NC06SB33
10NC06SB35	580-21126-7	06-32			X		
10NC06SB36	580-21126-8	06-33			X		
10NC06SB37	580-21126-9	06-34			X		
10NC06SB38	580-21126-10	06-35			X		
10NC06SB39	580-21126-11	06-36			X		
10NC06SB40	580-21126-12	06-37			X		
10NC06SB41	580-21126-13	06-38			X		
10NC06SB42	580-21126-14	06-39			X		
10NC06SB43	580-21126-15	06-40			X		
10NC06SB44	580-21126-16	06-41			X		MS/MSD
10NC06SB45	580-21126-17	06-42			X		
10NC06SB46	580-21126-18	06-43			X		
10NC06SB47	580-21126-19	06-44			X		
10NC06SB48	580-21126-20	06-45			X		
10NC06SB49	580-21126-21	06-46			X		*continued*
10NC06SB50	580-21126-22	06-46			X		FD of 10NC06SB49

Table 2-0.3 Site 6 (continued)

Field Sample ID	Laboratory Sample Number	Location ID	BTEX (SW8260B)	GRO (AK101)	DRO/RRO (AK102/103)	PAHs (8270C SIM)	Remarks
Site 6 Soil:							
10NC06SB51	580-21126-23	06-47			X		
10NC06SB52	580-21126-24	06-48			X		
10NC06SB53	580-21447-1	06-53	X	X	X	X	MS/MSD
10NC06SB54	580-21447-2	06-53	X	X	X	X	FD of 10NC06SB53
10NC06SB55	580-21447-3	06-54			X		
Trip Blank	580-21447-4		X	X			
Site 6 Water:							
10N06WA01	580-21300-1	06-49	X	X	X	X	MS/MSD
10N06WA02	580-21300-2	06-49	X	X	X	X	FD of 10N06WA01
Trip Blank	580-21300-3		X	X			

Notes:

AK	=	Alaska Test Method	MS	=	matrix spike
BTEX	=	benzene, toluene, ethylbenzene, xylenes	MSD	=	matrix spike duplicate
DRO	=	diesel range organics	PAHs	=	polynuclear aromatic hydrocarbons
FD	=	field duplicate	RRO	=	residual range organics
GRO	=	gasoline range organics	SIM	=	selective ion monitoring
ID	=	identification	SW	=	EPA Solid Waste Test Method

Table 2-0.4 Site 8

Field Sample ID	Laboratory Sample Number	Location ID	Methane (RSK 175)	TOC (9060)	DRO/RRO (AK102/103)	DRO/RRO with Silica Gel (AK102/103)	PAHs (8270C SIM)	Remarks
Site 8 Water:								
10NC08WA01	580-20762-1	08-1	X					
10NC08WA02	580-20762-2	08-2	X					
10NC08WA03	580-20762-3	08-3	X					
10NC08WA04	580-20762-4	08-4	X					
10NC08WA05	580-20762-5	08-5	X					
10NC08WA06	580-20762-6	08-6	X					
10NC08WA07	580-20762-7	08-7	X					
10NC08WA08	580-20762-8	08-8	X					
10NC08WA09	580-20762-9	08-8	X					FD of 10NC08WA08
10NC08WA10	580-20762-10	08-9	X					
10NC08WA11	580-20762-11	08-10	X					
10NC08WA12	580-20762-12	08-11	X					
10NC08WA13	580-20762-13	08-11	X					FD of 10NC08WA12
10NC08WA14	580-20762-14	08-12	X					
10NC08WA15	580-20762-15	08-13	X					
10NC08WA16	580-20762-16	08-14	X					
10NC08WA17	580-20762-17	08-15	X					
10NC08WA18	580-20762-18	08-16	X					
10NC08WA19	580-20762-19	08-17	X					
10NC08WA20	580-20762-20	08-18	X					
10NC08WA21	580-20762-21	08-19	X					
10NC08WA26	580-20762-22	08-19	X					FD of 10NC08WA21
10NC08WA22	580-20762-23	08-20	X					*continued*

Table 2-0.4 Site 8 (continued)

Field Sample ID	Laboratory Sample Number	Location ID	Methane (RSK 175)	TOC (9060)	DRO/RRO (AK102/103)	DRO/RRO with Silica Gel (AK102/103)	PAHs (8270C SIM)	Remarks
Site 8 Water:								
10NC08WA23	580-20762-24	08-21	X					
10NC08WA24	580-20762-25	08-22	X					
10NC08WA25	580-20762-26	08-23	X					
10NC08WA27	580-20762-27	08-24	X	X	X	X	X	
Trip Blank-Methane	580-20762-32		X					
10NC08WA28	580-20809-1	08-1			X		X	MS/MSD
10NC08WA29	580-20809-2	08-10			X		X	
10NC08WA30	580-20809-3	08-10			X		X	FD of 10NC08WA29
Site 8 Sediment:								
10NC08SB01	580-20762-28	08-LDU		X	X	X	X	MS/MSD
10NC08SB02	580-20762-29	08-MDU		X	X	X	X	MS/MSD
10NC08SB03	580-20762-30	08-MDU		X	X	X	X	FD of 10NC08SB02; MS/MSD
10NC08SB04	580-20762-31	08-UDU		X	X	X	X	MS/MSD

Notes:

AK = Alaska Test Method
DRO = diesel range organics
FD = field duplicate
ID = identification
MS = matrix spike
MSD = matrix spike duplicate
PAHs = polynuclear aromatic hydrocarbons
RRO = residual range organics
SIM = selective ion monitoring
TOC = total organic carbon

Table 2-0.5 Site 9

Field Sample ID	Laboratory Sample Number	Location ID	BTEX (SW8260B)	VOCs (SW8260B)	GRO (AK101)	DRO/RRO (AK102/103)	PAHs (8270C SIM)	PCB (SW8082)	Total Metals (SW6020/7470A)	Dissolved Metals (SW6020/7470A))	Remarks
Site 9 Water:											
10NC09WA01	580-20582-1	09-01	X		X	X	X	X	X	X	MS/MSD
10NC09WA02	580-20582-4	09-02	X		X	X	X	X	X	X	
10NC09WA03	580-20582-5	09-03	X		X	X	X	X	X	X	
10NC09WA04	580-20582-6	09-04	X		X	X	X	X	X	X	
10NC09WA05	580-20582-7	09-04	X		X	X	X	X	X	X	FD of 10NC09WA04
Trip Blank	580-20582-8		X		X						
10NC09WA06	580-20690-1	09-01	X		X	X	X	X	X	X	MS/MSD
10NC09WA07	580-20690-2	09-02	X		X	X	X	X	X	X	
10NC09WA08	580-20690-3	09-03	X		X	X	X	X	X	X	
10NC09WA09	580-20690-4	09-04	X		X	X	X	X	X	X	
10NC09WA10	580-20690-5	09-04	X		X	X	X	X	X	X	FD of 10NC09WA09
Trip Blank	580-20690-6		X		X						
10NC09WA11	580-21220-1	09-01	X	X	X	X	X	X	X	X	MS/MSD
10NC09WA12	580-21220-2	09-02	X	X	X	X	X	X	X	X	
10NC09WA13	580-21220-3	09-03	X	X	X	X	X	X	X	X	
10NC09WA14	580-21220-4	09-04	X	X	X	X	X	X	X	X	
10NC09WA15	580-21220-5	09-04	X	X	X	X	X	X	X	X	FD of 10NC09WA14
Trip Blank	580-21220-6		X	X	X						

Notes:

AK = Alaska Test Method
BTEX = benzene, toluene, ethylbenzene, xylenes
DRO = diesel range organics
FD = field duplicate
GRO = gasoline range organics
ID = identification
MS = matrix spike
MSD = matrix spike duplicate
PAHs = polynuclear aromatic hydrocarbons
PCB = polychlorinated biphenyl
RRO = residual range organics
SIM = selective ion monitoring
SW = EPA Solid Waste Test Method
VOCs = volatile organic compounds

Table 2-0.6 Site 13

Field Sample ID	Laboratory Sample Number	Location ID	PCB (SW8082)	Remarks
Site 13 Soil:				
Composite # 1	580-21440-154	13-01 – 13-09	X	
Composite # 20	580-21440-173	13-01 – 13-09	X	FD of Composite # 1
Composite # 2	580-21440-155	13-10 – 13-18	X	
Composite # 3	580-21440-156	13-19 – 13-27	X	
Composite # 4	580-21440-157	13-28 – 13-30	X	
Composite # 5	580-21440-158	13-31, 13-32, 13-41,13-42, 113-51, 13-52, 13-61, 13-62, 13-71	X	
Composite # 6	580-21440-159	13-33, 13-34, 13-43, 13-44, 13-53, 13-54, 13-63, 13-72, 13-73	X	
Composite # 7	580-21440-160	13-35, 13-36, 13-45, 13-46, 13-55, 13-56, 13-64, 13-65, 13-74	X	
Composite # 8	580-21440-161	13-37, 13-38, 13-47, 13-48, 13-57, 13-58, 13-66, 13-67, 13-68	X	MS/MSD
Composite # 9	580-21440-162	13-39, 13-40, 13-49, 13-50, 13-59, 13-60, 13-69, 13-70, 13-75	X	
Composite # 10	580-21440-163	13-76	X	
Composite # 11	580-21440-164	13-77 – 13-83	X	
Composite # 12	580-21440-165	13-84 – 13-87	X	
Composite # 13	580-21440-166	13-88 – 13-95; 13-102	X	
Composite # 14	580-21440-167	13-96 – 13-101	X	
Composite # 15	580-21440-168	13-103 – 13-111	X	
Composite # 19	580-21440-172	13-103 – 13-111	X	FD of Composite # 15
Composite # 16	580-21440-169	13-112, 13-113, 13-114; 13-116 – 13-119	X	
Composite # 17	580-21440-170	13-120 – 13-127; 13-115	X	
Composite # 18	580-21440-171	13-128 – 13-135	X	

Notes:

FD = field duplicate
ID = identification
MS = matrix spike
MSD = matrix spike duplicate
PCB = polychlorinated biphenyl
SW = EPA Solid Waste Test Method

Table 2-0.7 Site 16

Field Sample ID	Laboratory Sample Number	Location ID	PCB (SW8082)	Remarks
Site 16 Soil:				
10NC16SB01	580-21107-1	16-1	X	
10NC16SB14	580-21107-14	16-1	X	FD of 10NC16SB01
10NC16SB02	580-21107-2	16-2	X	
10NC16SB03	580-21107-3	16-3	X	
10NC16SB04	580-21107-4	16-4	X	
10NC16SB05	580-21107-5	16-5	X	
10NC16SB06	580-21107-6	16-6	X	
10NC16SB07	580-21107-7	16-7	X	
10NC16SB08	580-21107-8	16-8	X	
10NC16SB09	580-21107-9	16-9	X	
10NC16SB10	580-21107-10	16-10	X	
10NC16SB11	580-21107-11	16-11	X	MS/MSD
10NC16SB12	580-21107-12	16-12	X	
10NC16SB13	580-21107-13	16-12	X	FD of 10NC16SB12
10NC16SB12	580-21448-1	16-12	X	MS/MSD
10NC16SB15	580-21448-4	16-12	X	FD of 10NC16SB12
10NC16SB13	580-21448-2	16-13	X	
10NC16SB14	580-21448-3	16-14	X	

Notes:

FD = field duplicate
ID = identification
MS = matrix spike
MSD = matrix spike duplicate
PCB = polychlorinated biphenyl
SW = EPA Solid Waste Test Method

Table 2-0.8 Site 21

Field Sample ID	Laboratory Sample Number	Location ID	PCB (SW8082)	Arsenic (6020)	RCRA Metals (SW6020/7470A)	Remarks
Site 21 Soil:						
10NC21SB01	580-21111-1	21-01		X		
10NC21SB02	580-21111-2	21-02		X		
10NC21SB03	580-21111-3	21-03		X		
10NC21SB08	580-21111-8	21-03		X		FD of 10NC21SB03
10NC21SB04	580-21111-4	21-04		X		
10NC21SB05	580-21111-5	21-05		X		
10NC21SB06	580-21111-6	21-06		X		MS/MSD
10NC21SB07	580-21111-7	21-07		X		
10NC21SB09	580-21111-9	21-09	X			
10NC21SB10	580-21111-10	21-10	X			
10NC21SB17	580-21111-17	21-10	X			MS/MSD FD of 10NC21SB10
10NC21SB11	580-21111-11	21-11	X			
10NC21SB12	580-21111-12	21-12	X			
10NC21SB13	580-21111-13	21-13	X			
10NC21SB14	580-21111-14	21-14	X			
10NC21SB15	580-21111-15	21-15	X			
10NC21SB16	580-21111-16	21-16	X			
10NC21BW01	580-21111-18			X		
10NC21SB18	580-21189-1	21-18	X			MS/MSD
10NC21SB19	580-21189-2	21-19	X			
10NC21SB20	580-21189-3	21-20	X			
10NC21SB21	580-21189-4	21-21	X			
10NC21SB22	580-21189-5	21-22	X			
10NC21SB23	580-21189-6	21-23	X			*continued*

Table 2-0.8 Site 21

Field Sample ID	Laboratory Sample Number	Location ID	PCB (SW8082)	Arsenic (6020)	RCRA Metals (SW6020/7470A)	Remarks
Site 21 Soil:						
10NC21SB24	580-21189-7	21-24	X			
10NC21SB25	580-21189-8	21-25	X			
10NC21SB26	580-21189-9	21-26	X			
10NC21SB27	580-21189-10	21-27	X			
10NC21SB28	580-21189-11	21-28	X			
10NC21SB29	580-21189-12	21-29	X			
10NC21SB41	580-21189-24	21-29	X			FD of 10NC21SB29
10NC21SB30	580-21189-13	21-30	X			
10NC21SB31	580-21189-14	21-31	X			
10NC21SB32	580-21189-15	21-32	X			
10NC21SB33	580-21189-16	21-33	X			
10NC21SB34	580-21189-17	21-34	X			
10NC21SB35	580-21189-18	21-35	X			
10NC21SB36	580-21189-19	21-36	X			
10NC21SB37	580-21189-20	21-37	X			
10NC21SB38	580-21189-21	21-38	X			MS/MSD
10NC21SB39	580-21189-22	21-39	X			
10NC21SB40	580-21189-23	21-39	X			FD of 10NC21SB39
10NC21SB42	580-21446-1	21-42		X		MS/MSD
10NC21SB43	580-21446-2	21-42		X		FD of 10NC21SB42

Notes:

FD = field duplicate
ID = identification
MS = matrix spike
MSD = matrix spike duplicate
PCB = polychlorinated biphenyl
RCRA = Resource Conservation and Recovery Act
SW = EPA Solid Waste Test Method

Table 2-0.9 Site 28

Field Sample ID	Laboratory Sample Number	Location ID	PCBs (SW8082)	RCRA Metals (SW6010B/7470A)	DRO/ (AK102)	TCLP PCBs (SW8082)	TCLP RCRA Metals (SW6010B/7470A)	Remarks
Site 28 Concrete:								
10NC28BW01	580-20758-1		X	X	X			MS/MSD for PCBs and RCRA metals
10NC28BW02	580-20758-2		X	X	X			
10NC28BW-concrete-1	580-21184-1					X	X	MS/MSD for RCRA metals
10NC28BW-concrete-2	580-2184-2					X	X	FD of 10NC28BW-concrete-1 MS/MSD for PCBs

Notes:

DRO	=	diesel range organics	PCBs	=	polychlorinated biphenyls
FD	=	field duplicate	RCRA	=	Resource Conservation and Recovery Act
ID	=	identification	SW	=	EPA Solid Waste Test Method
MS	=	matrix spike	TCLP	=	toxicity characteristic leaching procedure
MSD	=	matrix spike duplicate			

Table 2-0.10 Site 31

Field Sample ID	Laboratory Sample Number	Location ID	PCB (SW8082)	Remarks
Site 31 Soil:				
Composite #1	21449-159	31-1 – 31-9	X	MS/MSD
Composite #2	21449-160	31-1 – 31-9	X	FD of Composite #1
Composite #3	21449-161	31-10 – 31-18	X	
Composite #4	21449-162	31-10 – 31-18	X	FD of Composite #3
Composite #5	21449-163	31-19 – 31-27	X	
Composite #6	21449-164	31-28 – 31-36	X	
Composite #7	21449-165	31-37 – 31-45	X	
Composite #8	21449-166	31-46 – 21-54	X	
Composite #9	21449-167	31-55 – 31-63	X	
Composite #10	21449-168	31-64 – 31-72	X	
Composite #11	21449-169	31-74 – 31-82	X	
Composite #12	21449-170	31-83 – 31-91	X	
Composite #13	21449-171	31-92 – 31-100	X	
Composite #14	21449-172	31-101 – 31-109	X	
Composite #15	21449-173	31-110 – 31-118	X	
Composite #16	21449-174	31-120 – 31-127	X	
Composite #17	21449-175	31-128 – 31-133	X	
Composite #18	21449-176	31-134 – 31-137	X	
Composite #19	21449-177	31-73; 31-138 – 31-140	X	

Notes:

FD	=	field duplicate	MSD	=	matrix spike duplicate
ID	=	identification	PCB	=	polychlorinated biphenyl
MS	=	matrix spike	SW	=	EPA Solid Waste Test Method

Table 2-0.11 Site 32

Field Sample ID	Laboratory Sample Number	Location ID	DRO/RRO (AK102/103)	Remarks
Site 32 Soil:				
10NC32SB01	580-21114-1	32-1	X	MS/MSD
10NC32SB02	580-21114-2	32-2	X	
10NC32SB03	580-21114-3	32-3	X	
10NC32SB04	580-21114-4	32-4	X	
10NC32SB05	580-21114-5	32-5	X	
10NC32SB06	580-21114-6	32-6	X	
10NC32SB07[D]	580-21114-7	32-6	X	FD of 10NC32SB06
10NC32SB08	580-21114-8	32-7	X	
10NC32SB09	580-21114-9	32-8	X	
10NC32SB10	580-21114-10	32-9	X	
10NC32SB11	580-21114-11	32-10	X	
10NC32SB12	580-21114-12	32-11	X	
10NC32SB13	580-21114-13	32-12	X	
10NC32SB14	580-21114-14	32-12	X	FD of 10NC32SB13
10NC32SB15	580-21114-15	32-13	X	
10NC32SB16	580-21114-16	32-14	X	

Notes: [D]designates field duplicate of previous sample

AK = Alaska Test Method
DRO = diesel range organics
FD = field duplicate
ID = identification
MS = matrix spike
MSD = matrix spike duplicate
RRO = residual range organics

Table 2-0.12 Site MOC Groundwater

Field Sample ID	Laboratory Sample Number	Location ID	BTEX (SW8260B)	Methane (RSK 175)	GRO (AK101)	DRO/RRO (AK102/103)	PAHs (8270C SIM)	PCB (SW8082)	Total Metals (SW6020/7470A)	Dissolved Metals (SW6020/7470A))	Remarks
MOC Ground Water:											
10NC27WA01	580-20883-1	MW88-4	X	X	X	X	X	X	X	X	
10NC27WA02	580-20883-2	MW88-4	X	X	X	X	X	X	X	X	FD of 10NC27WA01
10NC19WA01	580-20883-3	MW88-1	X	X	X	X	X	X	X	X	MS/MSD for all except methane
10NC20WA01	580-20883-4	20MW-1	X	X	X	X	X	X	X	X	
10NC17WA01	580-20883-5	MW17-1	X	X	X	X	X	X	X	X	
Trip Blank	580-20883-6		X	X							
10NC22WA01	580-21052-1	22MW2	X	X	X	X	X	X	X	X	MS/MSD
10NC10WA01	580-21052-2	MW-10-1	X	X	X	X	X	X	X	X	
10NC27WA03	580-21052-3	MW88-5	X	X	X	X	X	X	X	X	
10NC19WA02	580-21052-4	MW88-10	X	X	X	X	X	X	X	X	
10NC26WA01	580-21052-5	26MW1	X	X	X	X	X	X	X	X	
Trip Blank	580-21052-6		X		X						
Methane Trip blank	580-21052-7			X							

Notes:

AK	=	Alaska Test Method	MS	=	matrix spike
BTEX	=	benzene, toluene, ethylbenzene, xylenes	MSD	=	matrix spike duplicate
DRO	=	diesel range organics	PAHs	=	polynuclear aromatic hydrocarbons
FD	=	field duplicate	PCB	=	polychlorinated biphenyl
GRO	=	gasoline range organics	RRO	=	residual range organics
ID	=	identification	SIM	=	selective ion monitoring
MOC	=	Main Operations Complex	SW	=	EPA Solid Waste Test Method

2.1 SAMPLE RECEIPT CONDITIONS

With the exceptions listed below, samples were received within 0-6 degrees Celsius (°C), and in good condition.

Site 8 (Lab Work Order 580-20762): Air bubbles were observed in sample vials as follows:

Sample No.	No. of Vials	Size	Analysis
10NC08WA02	1	>1/4 inch	Methane
10NC08WA03	1	>1/4 inch	Methane
10NC08WA08	1	>1/4 inch	Methane
10NC08WA10	1	Unknown	Methane
10NC08WA12	2	>1/4 inch	Methane
10NC08WA16	1	>1/4 inch	Methane

Three vials were collected at each location, and it is assumed that the laboratory used vials that did not contain air bubbles to perform the analyses. No data qualifiers were assigned.

Site 9 Preconstruction (Lab Work Order 580-20852): 3 of 5 cooler receipt forms indicated insufficient ice was used. The temperature for the cooler containing the BTEX and GRO vials was acceptable. Coolers indicated as having insufficient ice had temperature measurements of 6.1/6.5 °C, 5.9/6.9 °C, and 5.7/6.0 °C. Since at least one of the measured temperatures was within a rounding error of 6 °C, and BTEX and GRO compounds were unaffected, no data qualifiers were assigned.

Site 9 Mid-Construction (Lab Work Order 580-20690): The laboratory case narrative noted a discrepancy between the containers received and the CoC documentation. The laboratory received 9 vials of sample 10NC09WA08, although 6 vials were expected. The laboratory received only 3 vials of sample 10NC09WA09, and 6 vials were expected. However, 3 of the 9 vials of sample 10NC09WA08 had the number “4” on the caps, which correspond with all other container caps of sample 10NC09WA09. No corrective action was discussed. It is assumed that the vials with an ambiguous identity were not used for analysis, and no qualifiers were assigned.

Site 21 (Lab Work Order 580-21189): The CoC forms were not signed by the samplers to relinquish custody and the Cooler Receipt Form was only partially completed by the laboratory. The laboratory did note that the samples arrived with custody seals intact and no action was taken to address the unsigned CoC form.

Site 28 (Lab Work Order 580-21184): The CoC form was not included with the samples; it was provided to the laboratory the following day once the correct analyses were determined. The CoC was received by the laboratory electronically and the form was not signed to relinquish samples. One sample was provided in an unlabeled bucket which had two secure custody seals; the laboratory was instructed to split this sample into two samples. Results were not qualified due to these unconventional sample receipt conditions. The analytical results were used for proper disposal of the concrete manhole.

The temperature of the cooler was 15.3 °C. The use of ice is not specified in the SAP for PCB or metals TCLP analysis, no qualifiers were assigned.

Site 32 (Lab Work Order 580-21114): The container labels did not match the CoC as follows:

Container Label	Time Collected	CoC Label	CoC Listed Time Collected
10NC**32**SB13	1150	10NC**03**SB13	1600
10NC**32**SB14	1155	10NC**03**SB14	1610
10NC**32**SB15	1200	10NC**03**SB15	1620
10NC**32**SB16	1205	10NC**03**SB16	1630

Per the laboratory's discussion with Bristol, the identifiers and times listed on the sample containers were used.

The sample container for sample 10NC32SB16 was received at the laboratory broken, however the laboratory determined the sample was usable for DRO/RRO analysis. The laboratory indicated that the sample did not appear to be compromised, and no data qualifiers were assigned.

MOC Groundwater (Lab Work Order 580-20883): The cooler receipt form noted the presence of “many vials in many samples with air bubbles <1/4 inch.” Affected samples or methods were not noted. Since bubbles were <1/4 inch, no action was taken to qualify the results.

Only 1 vial of the minimum of 2 necessary was provided for the trip blank for VOC and GRO analysis. The trip blank GRO analysis was not performed.

2.2 BTEX Analyses

TestAmerica analyzed samples for BTEX by SW-846 method 8260B. The sample QC batches are summarized in Table 2-2.1.

Table 2-2.1 BTEX QC Batches

Site	QC Batch	QC Batch Date	Matrix
Site 6	580-71469	9/13/10	Soil
Site 6	580-70921	9/2/10	Water
Site 9	580-68531	7/28/10	Water
Site 9	580-68876	8/2/10	Water
Site 9	580-70806	9/1/10	Water
MOC Groundwater	580-69554	8/11/10	Water
MOC Groundwater	580-70246	8/23/10	Water

Notes:
BTEX = benzene, toluene, ethylbenzene, and xylenes
MOC = Main Operations Complex
QC = quality control

Required QC for an analytical batch of up to 20 samples includes an MB, LCS, and MS/MSD pair. An MB, LCS/LCSD, and MS/MSD pair were analyzed with each batch with the exception that no LCSD was analyzed with batch 580-71469.

The following items were reviewed and met QAPP/method criteria and were within laboratory control limits: holding times, surrogate recoveries, LCS/LCSD recoveries and RPDs, and MS/MSD recoveries and RPDs.

For the MOC groundwater samples analyzed in Lab Work Order 580-20883, batch 580-69554, benzene (0.0662 µg/L), ethylbenzene (0.0813 µg/L), and m&p xylene (0.176 µg/L) were detected in the associated MB. Results for benzene and ethylbenzene were either not detected or were >10x the blank concentration, and qualification was not required. For the m&p xylene detection, total xylene results <10x the blank concentration were B qualified. For sample results detected at concentrations less than the limit of quantitation (LOQ), the result was reported as not detected at the LOQ.

2.3 VOC ANALYSES

TestAmerica analyzed samples for VOCs by SW-846 method 8260B. The sample QC batch is summarized in Table 2-3.1.

Table 2-3.1 VOC QC Batches

Site	QC Batch	QC Batch Date	Matrix
Site 9	580-75208	11/6/10	Water

Notes:
QC = quality control
VOC = volatile organic compound

Due to a laboratory oversight, samples were received at the laboratory August 6, 2010 for VOC analysis were analyzed for BTEX only. The analysis for the full list of VOCs was performed 59 days beyond the 14 day holding time. Due to the holding time exceedance, all VOC results for this analysis were qualified as rejected (R). BTEX results from the original analysis were not affected by this hold time exceedance (QC discussed in Section 2.2).

No further evaluation of data quality was performed for these results.

2.4 METHANE ANALYSES

TestAmerica analyzed samples for methane by EPA Test Method RSK 175. The sample QC batches are summarized in Table 2-4.1.

Table 2-4.1 Methane QC Batches

Site	QC Batch	QC Batch Date	Matrix
Site 8	680-176402	8/5/10	Water
Site 8	680-176414	8/5/10	Water
MOC Groundwater	680-176986	8/11/10	Water
MOC Groundwater	680-178164	8/24/10	Water
MOC Groundwater	680-178199	8/25/10	Water

Notes:
MOC = Main Operations Complex
QC = quality control

A MB and LCS/LCSD were performed with each batch. An MS/MSD was also provided with batch 680-178164 (Site: MOC Groundwater).

The following items were reviewed and met QAPP/method criteria, and were within laboratory control limits: holding times, MBs, and LCS/LCSD recoveries and RPDs.

An MS/MSD was performed on the MOC Groundwater site sample 10NC22WA01, QC batch 680-178164. The MS recovery was below acceptance limits. Associated methane results were M flagged to indicate the potential for matrix interference. Associated results were considered to be those contained in the same sample shipment.

2.5 GRO Analyses

TestAmerica analyzed samples for GRO by ADEC method AK101. The sample QC batches are summarized in Table 2-5.1.

Table 2-5.1 GRO QC Batches

Site	QC Batch	QC Batch Date	Matrix
Site 6	580-71469	9/13/10	Soil
Site 6	580-70923	9/2/10	Water
Site 9	580-68529	7/27/10	Water
Site 9	580-68874	8/2/10	Water
Site 9	580-70807	9/1/10	Water
MOC Groundwater	580-69463	8/10/10	Water
MOC Groundwater	580-70245	8/23/10	Water

Notes:
GRO = gasoline range organics
MOC = Main Operations Complex
QC = quality control

Required QC for an analytical batch of up to 20 samples includes an MB, LCS/LCSD, and MS/MSD pair. An MB, LCS/LCSD pair, and MS/MSD pair were performed with each batch.

The following items were reviewed and met QAPP/method criteria, and were within laboratory control limits: holding times, surrogate recoveries, LCS/LCSD recoveries and RPDs, and MS/MSD recoveries and RPDs.

For the MOC groundwater samples, Lab Work Order 580-20883, batch 580-69463, GRO (0.0161 mg/L) was detected in the associated method blank Associated detected results were <10x the blank concentration and were qualified B to indicate the potential for a false positive. For results detected at concentrations less than the LOQ, the result was reported as not detected at the LOQ.

Laboratory reports noted surrogate control limits for field samples of 60-120%. The laboratory narratives indicate that this is a limitation in their software and that the method limits are 50-150%. The control limits in Method AK101 of 50-150% were used for data evaluation.

2.6 PCB ANALYSES

TestAmerica analyzed samples by Method SW-846 8082. The extraction batches are summarized in Table 2-6.1.

Table 2-6.1 PCB QC Batches

Site	QC Batch	QC Batch Dates	Matrix
Site 9	580-68305	7/23/10	Water
Site 9	580-68744	7/29/10	Water
Site 9	580-70706	8/30/10	Water
Site 13	580-71461	9/13/10	Soil
Site 16	580-70252	8/23/10	Soil
Site 16	580-71534	9/14/10	Soil
Site 21	580-70369	8/24/10	Soil
Site 21	580-70540	8/26/10	Soil
Site 21	580-70550	8/26/10	Soil
Site 28	580-69057	8/4/10	Sludge
Site 31	580-71555	9/14/10	Soil
MOC Groundwater	580-69434	8/10/10	Water
MOC Groundwater	580-70092	8/19/10	Water

Notes:
MOC = Main Operations Complex
PCB = polychlorinated biphenyls
QC = quality control

Required QC for an analytical batch of up to 20 samples includes an MB, LCS, and MS/MSD pair. An MB, LCS/LCSD, and MS/MSD pair were performed with each QC batch, with the exception that an LCSD was not included with QC batches 580-68305 or 580-70252.

The following items were reviewed and met SAP/method criteria, and were within laboratory control limits: holding times, MBs, LCS/LCSD recoveries and RPDs, and MS/MSD RPDs.

Surrogate recoveries were outside SAP control limits as follows:

Site	Sample No.	Affected Analyte	Surrogate	Percent Recovery (%R)	Control Limits
Site 13	Composite #20	Detected PCBs	DCB Decachlorobiphenyl	158	60-125
Site 16	10NC16SB01	Detected PCBs	DCB Decachlorobiphenyl	129	60-125
Site 16	10NC16SB14	Detected PCBs	DCB Decachlorobiphenyl	132	60-125
Site 28	10NC28BW01	None	Tetrachloro-m-xylene	413	45-155
Site 28	10NC28BW02	None	Tetrachloro-m-xylene	629	45-155

The recoveries of surrogate tetrachloro-m-xylene in Site 28 samples exceeded the acceptance limit. For these samples, recoveries of surrogate decachlorobiphenyl, which is more closely associated with PCBs, were within acceptance criteria. Qualification of the Site 28 samples is not necessary. Detected PCB results associated with high surrogate DCB recoveries were QH qualified to indicate the potential for high bias.

For SDG 21107, 13 of 14 samples analyzed in this batch had surrogate (decachlrorobiphenyl) recoveries greater than 100%. Two of the 14 samples had surrogate recoveries exceed the upper control limit for decachlorobiphenyl. TCMX (secondary surrogate) was within limits for all samples in this SDG. 10NC16SB14 was non-detect for PCBs, 10NC16SB01 had Aroclor 1260 reported between the DL and LOQ.

Samples 10NC28BW01 and –BW02 were duplicate sludge samples submitted for TCLP analysis including PCB analysis. The recovery of TCMX (surrogate) greatly exceeded % recovery limits. The case narrative noted matrix interference is present. The % recovery for decachlorobiphenyl (surrogate) was within acceptance limits. Both samples had high concentrations of Aroclor 1254 (20 and 23 mg/kg).

MS/MSD recoveries were outside SAP Table 5-1 control limits as follows:

Location	Spiked Sample	Analyte	%R	Control Limits	Comments
Site 13	Composite 8	PCB-1016	169/185	40-140	All sample results not detected; no qualifiers
Site 16	10NC16SB11	PCB-1260	141/--	60-130	

Notes:
-- = in control

Associated detected PCB-1260 results were M qualified to indicate the potential for bias due to matrix. Associated samples were those collected in the same day and from the same site and matrix.

For Site 28, the spiked sample 10NC28BW01, was diluted 50x due to high PCB-1254 concentrations. The spike solution was diluted out and results for the MS/MSD were not evaluated.

No qualifiers were assigned due to MS/MSD recoveries outside control limits if the sample concentration was >4x the spike concentration. The MS/MSD spiked samples this applies to were: Site 13, Composite #8 for PCB 1260 and Site 31, Composite #1 for PCB 1260. Composite 8-Site 13 MS/MSD the parent sample concentrations of Aroclor 1260 (0.59 mg/kg) were more than 5 times greater than the spike amount (0.10 and 0.104 mg/kg) in the MS/MSD, the parent sample result for Aroclor 1260 is J flagged. The recoveries of Aroclor 1016 in the same MS/MSD sample also exceeded % recovery criteria. The sample was non-detect for Aroclor 1016 and no qualification is necessary.

2.7 TCLP PCB ANALYSES

TestAmerica analyzed concrete samples for TCLP PCBs by SW-846 method 1311/8082. The QC batches are summarized in Table 2-7.1.

Table 2-7.1 TCLP PCB QC Batches

Site	QC Batch	QC Batch Date	Matrix
Site 28	580-70629	8/27/10	Concrete

Notes:
PCB = polychlorinated biphenyl
QC = quality control
TCLP = Toxicity Characteristic Leaching Procedure

Required QC for a batch of up to 20 samples includes an MB, LCS, and MS/MSD pair. An MB, MS, and LCS were analyzed.

The following items were reviewed and were within laboratory control limits: holding time, MB, surrogate recoveries, MS recoveries, and LCS recoveries.

No laboratory batch duplicate information was provided for Lab Work Order 580-21184, batch 580-70629. The project sample was analyzed in duplicate and all TCLP PCB results were "not detected." The lack of an LCSD or MSD will not affect data usability.

2.8 PAH Analyses

TestAmerica analyzed samples by SW-846 method 8270C SIM for PAHs. The extraction batches are summarized in Table 2-8-1.

Table 2-8.1 PAH QC Batches

Site	QC Batch	QC Batch Dates	Matrix
Site 6	580-71476	9/13/10	Soil
Site 6	580-71002	9/3/10	Water
Site 8	580-69216	8/6/10	Sediment
Site 8	580-69290	8/6/10	Water
Site 9	580-68303	7/23/10	Water
Site 9	580-68742	7/29/10	Water
Site 9	580-70627	8/27/10	Water
MOC Groundwater	580-69437	8/10/10	Water
MOC Groundwater	580-70002	8/18/10	Water

Notes:
MOC = Main Operations Complex
PAH = polynuclear aromatic hydrocarbons
QC = quality control

Required QC for an analytical batch of up to 20 samples includes an MB, LCS, and MS/MSD pair. A MB, LCS/LCSD, and MS/MSD pairs were performed with each batch, with the exception that no LCSD was performed with batch 580-71476.

The following items were reviewed and met QAPP/method criteria, and were within laboratory control limits: holding times, surrogates, LCS/LCSD recoveries and RPDs and MS/MSD recoveries and RPDs.

PAH compounds were detected in the MBs as shown below. Associated detected results were <10 times the blank concentrations and were qualified B to indicate the potential for a false positive. For sample results detected at concentrations less than the LOQ, the result was reported as not detected at the LOQ.

Site	Laboratory Work Order	Preparation Batch	Analytes	Units	Concentration
Site 6	580-21447	580-71476	Pyrene	µg/kg	1.02
Site 9	580-20690	580-68742	Chrysene	µg/L	0.0438
			Indeno(1,2,3-cd)pyrene	µg/L	0.0205
	580-21220	580-70627	Chrysene	µg/L	0.0370
MOC Groundwater	580-20883	580-69437	Indeno(1,2,3-cd)pyrene	µg/L	0.0242
	580-21052	580-70002	Indeno(1,2,3-cd)pyrene	µg/L	0.0288

LCS/LCSD recoveries were outside control limits as follows:

Site	QC Batch	Analyte	%R	Control Limits
MOC Groundwater	580-69437	Acenaphthylene	109/113	50-105
		Fluoranthene	121/124	55-115
		Benzo(a)anthracene	--/114	55-110
		Benzo(a) pyrene	--/113	55-110

Notes:
-- = in control

Associated detected results were QH qualified to indicate an estimated value with a potential high bias.

MS/MSD recoveries were outside control limits as follows:

Site/Spiked Sample	Analyte	%R	Control Limits	RPD	RPD Limit	Comment
Site 8/ 10NC08SB01	Naphthalene	--/118	40-105	31	30	Results apply to spiked sample only; all sediment samples in Lab Work Order spiked
	2-Methylnaphthalene	113/300	45-105	78	30	
	1-Methylnaphthalene	--/216	50-150	66	30	
Site 8/ 10NC08SB02	Fluorene	42/--	50-110	44	30	Results apply to spiked sample only; all sediment samples in Lab Work Order spiked
Site 8/ 10NC08SB03	2-Methylnaphthalene	120/126	45-105	--	--	Results apply to spiked sample only; all sediment samples in Lab Work Order spiked
MOC Groundwater/ 10NC19WA01	2-Methylnaphthalene	107/106	45-105	--	--	
	Acenaphthylene	113/108	50-105	--	--	
	Fluoranthene	121/120	55-115	--	--	
	Benzo(a)anthracene	115/116	5-110	--	--	

Notes:
-- = in control

Detected results associated with an MS or MSD recovery greater than the upper control limit and all results associated with MS or MSD recoveries less than the lower control limit were M qualified to indicate the potential for bias due to matrix. Unless otherwise indicated, associated samples were those collected from the same site and from the same matrix.

2.9 DRO/RRO ANALYSES

TestAmerica analyzed samples for DRO/RRO following ADEC methods AK102/103. The QC batches are summarized in Table 2-9.1.

Table 2-9.1 DRO/RRO QC Batches

Site	Analysis	QC Batch	QC Batch Date	Matrix
Site 1	RRO only	580-70328	8/24/10	Soil
Site 1	RRO only	580-70333	8/24/10	Soil
Site 3	DRO/RRO	580-69146A	8/5/10	Soil
Site 3	DRO/RRO with silica gel cleanup	580-69146B	8/5/10	Soil
Site 3	DRO/RRO	580-70333A	8/24/10	Soil
Site 3	DRO/RRO with silica gel cleanup	580-70333B	8/24/10	Soil
Site 3	DRO/RRO	580-70393	8/24/10	Soil
Site 6	DRO/RRO	580-69059	8/4/10	Soil
Site 6	DRO/RRO	580-69608	8/12/10	Soil
Site 6	DRO/RRO	580-69654	8/12/10	Soil
Site 6	DRO/RRO	580-70393	8/24/10	Soil
Site 6	DRO/RRO	580-70396	8/24/10	Soil
Site 6	DRO/RRO	580-71340	9/10/10	Soil
Site 6	DRO/RRO	580-70996	9/3/10	Water
Site 8	DRO/RRO	580-69059	8/4/10	Sediment
Site 8	DRO/RRO with silica gel cleanup	580-71457	8/4/10	Sediment
Site 8	DRO/RRO	580-69435	8/10/10	Water
Site 9	DRO/RRO	580-68479	7/27/10	Water
Site 9	DRO/RRO	580-68699	7/29/10	Water
Site 9	DRO/RRO	580-70996	9/3/10	Water
Site 28	DRO	580-69059	8/4/10	Sludge
Site 32	DRO/RRO	580-70346	8/24/10	Soil
MOC Groundwater	DRO/RRO	580-69435	8/10/10	Water
MOC Groundwater	DRO/RRO	580-70006	8/18/10	Water

Notes:
DRO = diesel-range organics
MOC = Main Operations Complex
QC = quality control
RRO = residual range organics

Required QC for a batch of up to 20 samples includes an MB, LCS /LCSD, and MS/MSD pair. An MB, LCS/LCSD, and MS/MSD were analyzed with each batch, with the exception that no MS/MSD information was provided for batch 580-70328 or for Site 28. Precision and accuracy were assessed using the LCS/LCSD information.

The following items were reviewed and met QAPP/method criteria, and were within control limits: LCS/LCSD RPDs, and MS/MSD RPDs.

The holding time of 40 days from collection to analysis was exceeded by one day for samples 10NC08SB01, -SB02, -SB03 and –SB04 from Site 8 for DRO/RRO with silica gel treatment due to oversight by the laboratory. DRO and RRO results were HL qualified and are considered to be estimated with a low bias.

Surrogate recoveries were outside SAP control limits as follows:

Site	Sample No.	Affected Analyte	Surrogate	%R	Control Limits
Site 3	10NC03SB02	RRO	n-triacontane-d62	155	50-150
Site 3	10NC03SB04	RRO	n-triacontane-d62	181	50-150
Site 3	10NC03SB10	RRO	n-triacontane-d62	165	50-150
Site 3	10NC03SB11	RRO	n-triacontane-d62	199	50-150
Site 8	10NC08SB03	RRO	n-triacontane-d62	174	50-150
Site 8	10NC08SB04	RRO	n-triacontane-d62	177	50-150
Site 8	10NC08SB04	RRO with silica gel cleanup	n-triacontane-d62	162	50-150

Detected RRO results for the affected samples were QH qualified to indicate the potential for a high bias.

DRO and RRO were detected in the batch method blanks as shown below. Associated sample results detected at <10x the blank concentration were qualified B to indicate the potential for a false positive. For results detected at concentrations less than the LOQ, the result was reported as not detected at the LOQ.

Site	Laboratory Work Order	Preparation Batch	Analytes	Units	Concentration
Site 3	580-20788	580-69146A	DRO	mg/kg	2.88
Site 3	580-20788	580-69146B	DRO with silica gel cleanup	mg/kg	4.89
Site 3	580-20788	580-69146B	RRO with silica gel cleanup	mg/kg	18.5
Site 3	580-21113	580-70333A	DRO	mg/kg	5.85
Site 3	580-21113	580-70333B	DRO with silica gel cleanup	mg/kg	7.9
Site 6	580-20786	580-69059	DRO	mg/kg	5.09
Site 6	580-20786	580-69059	RRO	mg/kg	13
Site 6	580-20954	580-69608	DRO	mg/kg	3.47
Site 6	580-20954	580-69654	DRO	mg/kg	3.50
Site 6	580-21126	580-70393	DRO	mg/kg	6.38
Site 6	580-21126	580-70396	DRO	mg/kg	4.38
Site 6	580-21447	580-71340	RRO	mg/kg	15.4
Site 8	580-20762	580-69059	DRO	mg/kg	5.09
Site 8	580-20762	580-69059	RRO	mg/kg	13
Site 28	580-20758	580-69059	DRO	mg/kg	5.09
Site 32	580-21114	580-70346	DRO	mg/kg	5.58
Site 32	580-21114	580-70346	RRO	mg/kg	15.3

The RRO LCS/LCSD recoveries for Site 9, Lab Work Order 580-21220, QC batch 580-70996, were 122/127%, which is outside laboratory control limits of 60-120%. The RRO MSD spiked sample associated with this batch, 10NC09WA11, also had a high recovery. All associated detected RRO results were QH qualified to indicate the potential for a high bias.

The RRO LCS/LCSD recoveries for Site 6, Lab Work Order 580-21300, QC batch 580-70996, were 122/127%, which is outside laboratory control limits of 60-120%. All associated detected RRO results were QH qualified to indicate the potential for a high bias.

MS/MSD recoveries were outside SAP Table 5-1 control limits as follows:

Site	Spiked Sample	Analyte	%R	Control Limits	Comment
Site 1	10NC01SB07	RRO	38/30	60-120	
Site 3	10NC03SB01	DRO	--/153	50-150	
Site 3	10NC03SB10	DRO	279/534	50-150	
Site 3	10NC03SB10	RRO	17/7	60-120	
Site 6	10NC06SB53	RRO	30/-60.	60-120	
Site 6	10NC06SB53	DRO	49/47	50-150	
Site 6	10N06WA01	DRO	26/--		
Site 8	10NC08SB01	RRO	--/130	60-120	All Site sediment samples were analyzed as MS/MSDs and only the source sample was qualified M.
Site 8	10NC08SB02	RRO with silica gel cleanup	--/121	60-120	All Site sediment samples were analyzed as MS/MSDs and only the source sample was qualified M.
Site 8	10NC08SB03	RRO with silica gel cleanup	49/--	60-120	All Site sediment samples were analyzed as MS/MSDs and only the source sample was qualified M.
Site 8	10NC08SB04	RRO with silica gel cleanup	-3/12	60-120	All Site sediment samples were analyzed as MS/MSDs and only the source sample was qualified M.
MOC Groundwater	10NC19WA01	RRO	119/129	53-118	

Notes:
-- = in control

Detected results associated with an exceedance of the upper control limit and all results associated with an exceedance of a lower control limit were M qualified to indicate the potential for bias due to matrix. Unless otherwise noted, associated samples were those collected in the same day and from the same site and matrix.

No qualifiers were assigned to MS/MSD recoveries outside control limits if the sample concentration was >4x the spike concentration. The MS/MSD spiked samples this rule applies to were:

Site	Spiked Sample	Analyte
Site 8	10NC08SB02	DRO
Site 8	10NC08SB03	DRO/RRO
Site 8	10NC08SB04	RRO
Site 8	10NC08SB02	DRO with silica gel cleanup
Site 8	10NC08SB03	DRO with silica gel cleanup

Two DRO results were B-flagged by the laboratory but were not associated with blank contamination. The laboratory case narrative indicated the DRO and RRO detections appeared to be weathered bunker c/heavy fuel oil or biogenic interference. The B flag was removed since that qualifier is used to indicate associated blank contamination. Affected samples were from Site 9 and were:

Sample ID	Laboratory ID
10NC09WA09	580-20690-4
10NC09WA10	580-20690-5

2.10 TOC Analyses

TestAmerica analyzed samples for TOC-Quad by SW-846 method 9060. The QC batches are summarized in Table 2-10.1.

Table 2-10.1 TOC QC Batches

Site	QC Batch	QC Batch Date	Matrix
Site 3	580-69269	8/19/10	Soil
Site 8	580-69953	8/18/10	Sediment

Notes:
QC = quality control
TOC = total organic carbon

An MB, LCS, MS/MSD, and laboratory duplicate were analyzed with each batch. The following items were reviewed and met QAPP/method criteria, and were within control limits: holding time, MB, and LCS %Rs.

In accordance with the SAP, no qualifiers were assigned to MS/MSD recoveries outside control limits if the sample concentration was >4x the spike concentration. All samples used for the MS/MSD spikes had concentrations >4x the spike concentration and recoveries, and RPDs were not evaluated. The MS/MSD source samples were:

Site	Spiked Sample
Site 3	10NC03SB01
Site 8	10NC08SB01
Site 8	10NC08SB02
Site 8	10NC08SB03
Site 8	10NC08SB04

2.11 TOTAL AND DISSOLVED METALS ANALYSES

TestAmerica analyzed water and soil samples by SW-846 method 6020; the waters were analyzed for both total and dissolved (field filtered) metals. The QC batches are summarized in Table 2-11.1.

Table 2-11.1 Total and Dissolved Metals QC Batches

Site	QC Batch	QC Batch Date	Matrix
Site 9	580-68551	7/28/10	Water
Site 9	580-69362	8/9/10	Water
Site 9	580-71292	9/10/10	Water
Site 21	580-70336	8/24/10	Soil
Site 21	589-71358	9/11/10	Soil
Site 28	589-69226	8/6/10	Sludge
MOC Groundwater	580-69604	8/12/10	Water
MOC Groundwater	580-70119	8/20/10	Water

Note:
MOC = Main Operations Complex
QC = quality control

Required QC for a batch of up to 20 samples includes an MB, LCS, and MS/MSD pair. An MB, MS/MSD, and LCS/LCSD were analyzed per batch.

The following items were reviewed and met QAPP/method criteria, and were within control limits: holding time and LCS/LCSD %Rs and RPDs.

For Site 9, Lab Work Order 580-20690, arsenic (0.00198 mg/L) was detected in the MB associated with preparation batch 580-69362. Associated detected results <10 times the blank concentration were qualified B to indicate the potential for a false positive. For results detected at concentrations less than the LOQ, the result was reported as not detected at the LOQ.

For Site 21, Lab Work Order 580-21111, arsenic (0.0715 mg/kg) was detected in the method blank associated with preparation batch 580-70336. Associated detected results were >10 times the blank concentration, thus qualification was not required.

For Site 28, Lab Work Order 580-20758, barium (0.0685 mg/kg) and selenium (0.029 mg/kg) were detected in the method blank associated with preparation batch 580-69226. Associated barium and selenium detected results were >10 times the blank concentration and qualification was not required.

For Site MOC groundwater, Lab Work Order 580-20883, arsenic (0.001 mg/L) was detected in the method blank associated with preparation batch 580-69604. Associated detected results were >LOQ but <10 times the blank concentration and were B qualified.

For Site MOC groundwater, Lab Work Order 580-21052, chromium (0.000575 mg/L) was detected in the method blank associated with preparation batch 580-70119. Associated detected results were >LOQ but <10 times the blank concentration and were B qualified.

The laboratory narratives indicated the presence of impurities in the inductively coupled plasma mass spectroscopy (ICP-MS) interference check standard A (ICSA) solutions, and thus qualified associated results Q. The Q qualifiers were changed to a J for detects to indicate an estimated value, and to QL for non-detects to indicate the potential for negative interference. Because the impurities have the potential to hide either instrument suppression or enhancement of a signal, the bias is unknown. Affected data packages, preparation batches and analytes are as follows:

Site	Laboratory Work Order	Preparation Batch	Analytes
Site 9	580-20582	580-68551	Arsenic, chromium
Site 9	580-20690	580-69362	Cadmium, chromium, selenium
Site 9	580-21220	580-70996	Arsenic, chromiuma
Site 21	580-21446	580-71358	Arsenic
Site 28	580-20758	580-69226	Barium, cadmium, chromium and selenium
MOC GW	580-20883	580-69604	Arsenic, barium, cadmium, chromium and selenium
MOC GW	580-21052	580-70119	Barium, cadmium, chromium and selenium

Notes:

a – Narrative indicated cadmium was detected but chromium results had been qualified by the laboratory. Review of the Interference Check Standard form indicated chromium was detected.

For Site 28, Lab Work Order 580-20758, an MS/MSD was performed on sample 10NC28BW01, QC batch 580-69226. The MS and/or MSD recoveries were outside of acceptance limits of 75-125% for barium (63/178 %R) and cadmium (3240 %R for the MSD). The RPD acceptance limit of <35% between the MS and MSD was also exceeded for cadmium (169%). Associated barium and cadmium results were M flagged to indicate the potential for matrix interference.

In accordance with the SAP, no qualifiers were assigned to MS/MSD recoveries outside control limits if the sample concentration was >4x the spike concentration. The MS/MSD spiked sample this applies to was collected at Site 28, sample 10NC28BW01 for chromium and lead.

For Site 21, Lab Work Order 580-21446, analytical batch 580-71358, the laboratory duplicate for arsenic had an RPD of 43% which is outside the control limits of <20%. The project sample was used as the laboratory duplicate. This sample and its FD were J qualified to indicate the matrix may be non-homogenous.

For Site 28, Lab Work Order 580-20758, analytical batch 580-69226, the laboratory duplicate for silver had an RPD of 131% which is outside the laboratory control limits of <35%. This sample was J qualified to indicate the matrix may be non-homogenous.

For Site MOC groundwater, Lab Work Order 580-21052, analytical batch 580-70665, the laboratory duplicate for chromium had an RPD of 28% which is outside the laboratory control limits of <20%. Chromium results had been J qualified due to an impurity in the ICSA standard, and further qualifiers were not assigned.

2.12 TCLP METALS ANALYSES

TestAmerica analyzed soil and sludge samples for TCLP metals by SW-846 Method 1311/6010B. The QC batches are summarized in Table 2-12.1.

Table 2-12.1 TCLP Metals QC Batches

Site	QC Batch	QC Batch Date	Matrix
Site 28	580-70596	8/27/10	Concrete

Note:
QC = quality control
TCLP = Toxicity Characterization Leaching Procedure

Required QC for a batch of up to 20 samples includes an MB, LCS, and MS/MSD. An MB, MS/MSD, and LCS were analyzed per batch.

The following items were reviewed and were within laboratory control limits: MS/MSD %Rs and RPDs, and LCS %Rs.

For Lab Work Order 580-21184, selenium (0.0140 mg/L) was detected in the MB associated with preparation batch 580-70596. Associated detected results <10 times the blank concentration were qualified B to indicate the potential for a false positive. For results detected at concentrations less than the LOQ, the result was reported as not detected at the LOQ.

The laboratory narratives indicated the presence of impurities in the ICP-MS ICSA standard solutions, and qualified associated results Q. The Q qualifiers were changed to a J for detects to indicate an estimated value, and to QL for non-detects to indicate the potential for negative interference. The affected work order, preparation batch and analytes are:

Laboratory Work Order	Preparation Batch	Analytes
580-21184	580-70596	cadmium, lead, selenium

2.13 MERCURY ANALYSES

TestAmerica analyzed soil samples for mercury by SW-846 Method 7471A, and total and dissolved mercury in water samples by SW-846 Method 7470A. The QC batches are summarized in Table 2-13.1.

Table 2-13.1 Mercury QC Batches

Site	QC Batch	QC Batch Date	Matrix
Site 9	580-68765	7/30/10	Water
Site 9	580-68796	7/30/10	Water
Site 9	580-71302	9/10/10	Water
Site 28	580-69236	8/6/10	Sludge
MOC Groundwater	580-69697	8/13/10	Water
MOC Groundwater	580-70665	8/30/10	Water

Note:
MOC = Main Operations Complex
QC = quality control

Required QC for a batch of up to 20 samples includes an MB, LCS, and MS/MSD pair. An MB, MS/MSD, and LCS/LCSD were analyzed per batch.

The following items were reviewed and met SAP criteria, and were within laboratory control limits: MB, MS/MSD recoveries and RPDs, and LCS/LCSD recoveries and RPDs.

In accordance with the SAP, no qualifiers were assigned to MS/MSD recoveries outside control limits if the sample concentration was >4x the spike concentration. This applies to the Site 28 spiked sample 10NC28BW01.

2.14 TCLP MERCURY ANALYSES

TestAmerica analyzed concrete samples for TCLP mercury by SW-846 Method 1311/7470A. The QC batch is summarized in Table 2-14.1.

Table 2-14.1 TCLP Mercury QC Batches

	QC Batch	QC Batch Date	Matrix
Site 28	580-70603	8/27/10	Concrete

Note:
QC = quality control
TCLP = Toxicity Characterization Leaching Procedure

Required QC for a batch of up to 20 samples includes an MB and an LCS. An MB, MS/MSD, and LCS/LCSD were analyzed per batch.

The following items were reviewed and were within laboratory control limits: MB, MS/MSD recoveries and RPDs, and LCS/LCSD recoveries and RPDs.

2.15 FIELD QA/QC

Field QC samples included FD pairs and MS/MSD pairs. The same methods used to analyze the investigative samples were used to analyze the field QC samples.

2.15.1 Field Sample Duplicates

Comparison of field sample duplicate results to the associated parent sample results provides precision information for the overall sample collection and analytical process, including possible variability related to sample collection, handling, shipping, storage, preparation, and analysis. The RPD between the primary (parent) sample and field duplicate sample also accounts for the variation of target analyte concentrations within a matrix. This variability is assessed by evaluating the calculated RPDs between the FDs and the associated parent samples. In cases where a target analyte was not detected above the limit of quantitation (LOQ) in both the FD and parent sample, an RPD result would not be valid due to decreased accuracy below the LOQ, and therefore was not calculated and evaluated. However, if target analytes were detected in one sample below the LOQ and not detected in the duplicate, both detected and non-detected results should be flagged to indicate imprecision. The RPD assessment criteria in the SAP of ≤30% for water matrices and ≤50% for soils and sediments were used to evaluate the FDs.

Field Duplicate Frequencies

Field sample duplicate pairs are required by the QAPP at a rate of 10 percent. FDs were collected at each site for the following frequencies per method:

- Site 1: Two FD pairs were collected for the soil matrix and submitted to the laboratory, at a frequency of 15% per method.
- Site 3: Three soil DRO/RRO FD pairs were collected, at a frequency of 19%. Two soil FD pairs were collected for DRO/RRO analysis using a silica gel cleanup, at a frequency of 20%. One soil FD pair was collected for TOC analysis, at a frequency of 50%.
- Site 6: Five soil matrix FD pairs were collected for DRO/RRO, at a frequency of 10%. One soil FD pair was collected for BTEX, GRO, and PAHs at a frequency of 100%. One aqueous FD pair was collected for DRO/RRO, BTEX, GRO and PAH analysis, at a frequency of 100%.
- Site 8: Three aqueous FD pairs were collected for methane analysis at a frequency of 13%. One aqueous FD pair was collected for DRO/RRO and PAHs, at a frequency of 50%. No aqueous FD pair was associated with the TOC and DRO/RRO with silica gel cleanup methods for this site. One sediment FD pair was collected for TOC, DRO/RRO, DRO/RRO with silica gel cleanup, and PAHs, at a frequency of 33%.
- Site 9: One aqueous FD pair was collected during each of three sampling events at this site for analysis of all methods with a frequency of 25%.
- Site 13: Two soil FD pairs were collected for all methods at a frequency of 11%.
- Site 16: Three soil FD pairs were collected for all methods at a frequency of 20%.
- Site 21: Three soil FD pairs were collected for analysis of PCBs at a frequency of 10%. Two soil FD pairs were collected for analysis of arsenic at a frequency of 22%.
- Site 28: One concrete matrix FD pair was collected for analysis of all methods at a frequency of 100%. One FD of containerized sludge was collected for all methods at a frequency of 100%.
- Site 31: Two soil FD pairs were collected for analysis of PCBs at a frequency of 12%.
- Site 32: Two soil FD pairs were collected for analysis of DRO/RRO at a frequency of 14%.
- Site MOC Groundwater: One aqueous FD pair was collected for analysis of all methods at a frequency of 11%.

Field Duplicate RPDs

Tables 2-15.1 lists the RPDs calculated between the FD and parent sample results for target analytes that were detected above the LOQ in both the parent and FD sample.

Table 2-15.1 Field Sample Duplicate Pair Results

Parent Sample ID/ Laboratory Sample ID	Field Duplicate Sample ID/ Laboratory Sample ID	Compound	Units	Parent Field Sample Result	Field Duplicate Result	RPD (%)
Site 1:						
10NC01SB03 580-21112-3	10NC01SB04 580-21112-4	RRO	mg/kg	1,500 M	1,600 M	6
10NC01SB11 580-21112-11	10NC01SB12 580-21112-12	RRO	mg/kg	2,900 M	2,700 M	7
Site 3:						
10NC03SB01 508-20788-1	10NC03SB02 508-20788-2	DRO (nC10-<nC25)	mg/kg	250	550	**75**
		RRO (nC25-nC36)	mg/kg	2,100	5,000 QH	**82**
		DRO with Silica Gel	mg/kg	140	300	**73**
		RRO with Silica Gel	mg/kg	930	2100	**77**
		Total Organic Carbon	mg/kg	190,000	190,000	0
10NC03SB05 580-21113-5	10NC03SB06 580-21113-6	DRO (nC10-<nC25)	mg/kg	640 M	2,200 M	**110**
		RRO (nC25-nC36)	mg/kg	1,400	580	**83**
		DRO with Silica Gel	mg/kg	150	390	**89**
		RRO with Silica Gel	mg/kg	110	57 J	**63**
10NC03SB013 580-21125-4	10NC03SB014 580-21125-5	DRO (nC10-<nC25)	mg/kg	6,100 M	2,500 M	**84**
		RRO (nC25-nC36)	mg/kg	3,200 M	1,800 M	**56**
Site 6:						
10NC06SB08 580-20954-1	10NC06SB09 580-20954-2	DRO (nC10-<nC25)	mg/kg	50	27 U B	**nc**
		RRO (nC25-nC36)	mg/kg	270	85	**104**
10NC06SB23 580-20954-16	10NC06SB24 580-20954-17	RRO (nC25-nC36)	mg/kg	11 J	12 J	9
10NC06SB33 580-21126-5	10NC06SB34 580-21126-6	DRO (nC10-<nC25)	mg/kg	24 U B	27 B	**nc**
		RRO (nC25-nC36)	mg/kg	87	170	**65**
10NC06SB49 580-21126-21	10NC06SB50 580-21126-22	DRO (nC10-<nC25)	mg/kg	23 B	23 B	0
		RRO (nC25-nC36)	mg/kg	130	130	0
10NC06SB53 580-21447-1	10NC06SB54 580-21447-2	Benzo[g,h,i]perylene	µg/kg	1.2 U	3 J	**nc**
		Chrysene	µg/kg	4.5 J	8.1	nc
		Dibenz(a,h)anthracene	µg/kg	1.2 U	0.97 J	**nc**
		Fluoranthene	µg/kg	0.71 J	0.67 J	nc

Table 2-15.1 Field Sample Duplicate Pair Results (continued)

Parent Sample ID/ Laboratory Sample ID	Field Duplicate Sample ID/ Laboratory Sample ID	Compound	Units	Parent Field Sample Result	Field Duplicate Result	RPD (%)
Site 6 (cont.):						
10NC06SB53 580-21447-1	10NC06SB54 580-21447-2	Indeno[1,2,3-cd]pyrene	µg/kg	0.82 J	1.3 J	nc
		Phenanthrene	µg/kg	0.68 J	0.69 J	nc
		DRO (nC10-<nC25)	mg/kg	160	100	46
		RRO (nC25-nC36)	mg/kg	1200	760	45
10N06WA01 580-21300-1	10N06WA02 580-21300-2	Toluene	µg/L	0.45 U	0.098 J	nc
		1-Methylnaphthalene	µg/L	0.022 J	0.014 J	nc
		Acenaphthylene	µg/L	0.019 J	0.016 J	nc
		Benzo[g,h,i]perylene	µg/L	0.13	0.059	**75**
		Dibenz(a,h)anthracene	µg/L	0.025 J	0.049 U	**nc**
		Indeno[1,2,3-cd]pyrene	µg/L	0.052 J	0.028 J	nc
		DRO (nC10-<nC25)	mg/L	1.5	1.5	0
		RRO (nC25-nC36)	mg/L	1.2	1.3	8
Site 8:						
10NC08WA12 580-20762-12	10NC08WA13 580-20762-13	Methane	µg/L	1.9	2	5
10NC08WA21 580-20762-21	10NC08WA26 580-20762-22	Methane	µg/L	5.9	1.6	**115**
10NC08WA29 580-20809-2	10NC08WA30 580-20809-3	Benzo[a]anthracene	µg/L	0.029 J	0.049 U	**nc**
		Benzo[a]pyrene	µg/L	0.037 J	0.049 U	**nc**
		Benzo[b]fluoranthene	µg/L	0.039 J	0.026 J	nc
		Chrysene	µg/L	0.036 J	0.031 J	nc
		DRO (nC10-<nC25)	mg/L	0.38	0.44	15
		RRO (nC25-nC36)	mg/L	0.56	0.7	22

Table 2-15.1 Field Sample Duplicate Pair Results (continued)

Parent Sample ID/ Laboratory Sample ID	Field Duplicate Sample ID/ Laboratory Sample ID	Compound	Units	Parent Field Sample Result	Field Duplicate Result	RPD (%)
Site 8 (cont.):						
10NC08SB02 20762-29	10NC08SB03 20762-30	1-Methylnaphthalene	µg/kg	5,000	5,100	2
		2-Methylnaphthalene	µg/kg	7,500	7,600	1
		Acenaphthene	µg/kg	220	240	9
		Acenaphthylene	µg/kg	1.9 U	100	**nc**
		Anthracene	µg/kg	180	0.82 U	**nc**
		Benzo[a]anthracene	µg/kg	5.5 J	7.1 J	nc
		Benzo[a]pyrene	µg/kg	6.6 J	0.82 U	nc
		Benzo[b]fluoranthene	µg/kg	9.3 J	13	33
		Benzo[k]fluoranthene	µg/kg	5.4 J	14	nc
		Chrysene	µg/kg	26	24	8
		Fluoranthene	µg/kg	37	37	0
		Fluorene	µg/kg	630	820	26
		Indeno[1,2,3-cd]pyrene	µg/kg	2.8 J	2.9 J	nc
		Naphthalene	µg/kg	1,600	1,600	0
		Phenanthrene	µg/kg	520	460	12
		Pyrene	µg/kg	26	42	47
		Total Organic Carbon - Quad	mg/kg	100,000	100,000	0
		DRO (nC10-<nC25)	mg/kg	7,100	9,300	27
		RRO (nC25-nC36)	mg/kg	3,300	5,300	47
		DRO with Silica Gel	mg/kg	6700	8,500	24
		RRO with Silica Gel	mg/kg	1,300 M	2,100 M	47

Table 2-15.1 Field Sample Duplicate Pair Results (continued)

Parent Sample ID/ Laboratory Sample ID	Field Duplicate Sample ID/ Laboratory Sample ID	Compound	Units	Parent Field Sample Result	Field Duplicate Result	RPD (%)
Site 9:						
10NC09WA04 580-20582-6	10NC09WA05 580-20582-7	Arsenic-dissolved	mg/L	0.0057 J	0.0053 J	7
		Barium-dissolved	mg/L	0.009	0.0093	3
		Cadmium-dissolved	mg/L	0.00019 J	<0.0004	nc
		Chromium-dissolved	mg/L	0.003 J	0.0032 J	6
		Lead-dissolved	mg/L	0.00045 J	0.00049 J	9
		Arsenic-total	mg/L	0.0053 J	0.0059 J	11
		Barium-total	mg/L	0.013	0.013	0
		Cadmium-total	mg/L	0.00026 J	0.00022 J	17
		Chromium-total	mg/L	0.003 J	0.0031 J	3
		Lead-total	mg/L	0.0012 J	0.0012 J	0
		Mercury-total	mg/L	<0.0001	0.000069 J	nc
		DRO (nC10-<nC25)	mg/L	0.052 J	0.049 J	6
		RRO (nC25-nC36)	mg/L	0.059 J	0.059 J	0
10NC09WA09 20690-4	10NC09WA010 20690-5	Barium-dissolved	mg/L	0.014	0.014	0
		Chromium-dissolved	mg/L	0.0041 J	0.0042 J	2
		Lead-dissolved	mg/L	0.00056 J	0.0006 J	7
		Selenium-dissolved	mg/L	0.0004 U QL	0.00083 J	nc
		Mercury-dissolved	mg/L	0.0001 U	0.000065 J	nc
		Arsenic-total	mg/L	0.002 UB	0.002 UB	nc
		Barium-total	mg/L	0.018	0.018	0
		Cadmium-total	mg/L	0.00018 J	0.0004 U QL	nc
		Chromium-total	mg/L	0.0043 J	0.0044 J	2
		Lead-total	mg/L	0.0024	0.0023	4
		Selenium-total	mg/L	0.0019 J	0.00098 J	nc
		DRO (nC10-<nC25)	mg/L	0.11	0.12	9
		RRO (nC25-nC36)	mg/L	0.17	0.2	16

Table 2-15.1 Field Sample Duplicate Pair Results (continued)

Parent Sample ID/ Laboratory Sample ID	Field Duplicate Sample ID/ Laboratory Sample ID	Compound	Units	Parent Field Sample Result	Field Duplicate Result	RPD (%)
Site 9 (cont.):						
10NC09WA14 580-21220-4	10NC09WA15 580-21220-5	Arsenic-dissolved	mg/L	0.0004 U QL	0.0004 J	nc
		Barium-dissolved	mg/L	0.016	0.018	12
		Chromium-dissolved	mg/L	0.00041 J	0.0004 U QL	nc
		Lead-dissolved	mg/L	0.0004 J	0.0004 U	nc
		Arsenic-total	mg/L	0.00086 J	0.00026 J	nc
		Barium-total	mg/L	0.018	0.017	6
		Cadmium-total	mg/L	0.0004 U	0.00031 J	nc
		Chromium-total	mg/L	0.00046 J	0.00049 J	6
		Lead-total	mg/L	0.00074 J	0.00076 J	3
		Indeno[1,2,3-cd]pyrene	µg/L	0.027 J	0.024 J	12
		DRO (nC10-<nC25)	mg/L	0.11	0.12	9
		RRO (nC25-nC36)	mg/L	0.12 QH	0.13 QH	8
Site 13:						
Composite # 1 21440-154	Composite # 20 21440-173	PCB-1260	mg/kg	0.35	0.42 QH	18
Composite # 15 21440-168	Composite # 19 21440-172	PCB-1260	mg/kg	8.2	15	**59**
Site 16:						
10NC16SB01 580-21107-1	10NC16SB14 580-21107-14	PCB-1260	mg/kg	0.0051 J QHM	0.008 U	**nc**
10NC16SB12 580-21107-12	10NC16SB13 580-21107-13	PCB-1260	mg/kg	0.025 M	0.044 M	**55**
10NC16SB12 580-21448-1	10NC16SB15 580-21448-4	PCB-1254	mg/kg	0.049	0.006 U	**nc**
		PCB-1260	mg/kg	0.02	0.0054 J	**nc**
Site 21:						
10NC21SB03 580-21111-3	10NC21SB08 580-21111-8	Arsenic	mg/kg	4	4.2	5
10NC21SB10 580-21111-10	10NC21SB17 580-21111-17	PCB-1254	mg/kg	0.038	0.035	8
		PCB-1260	mg/kg	0.011	0.013	17
10NC21SB42 21446-1	10NC21SB43 21446-2	Arsenic	mg/kg	11 J	17 J	43

Table 2-15.1 Field Sample Duplicate Pair Results (continued)

Parent Sample ID/ Laboratory Sample ID	Field Duplicate Sample ID/ Laboratory Sample ID	Compound	Units	Parent Field Sample Result	Field Duplicate Result	RPD (%)
Site 28:						
10NC28BW-580-21184-1	10NC28BW-580-21184-2	TCLP Arsenic	mg/L	0.05 J	0.068	31
		TCLP Barium	mg/L	0.27	0.26	4
		TCLP Chromium	mg/L	0.0047 J	0.0066 U	**nc**
		TCLP Silver	mg/L	0.0025 J	0.0016 J	nc
Site 31:						
Composite #1 21449-159	Composite #2 21449-160	PCB-1260	mg/kg	0.68	0.33	**69**
Composite #3 21449-161	Composite #4 21449-162	PCB-1260	mg/kg	0.56	0.31	**57**
Site 32:						
10NC32SB06 580-21114-6	10NC32SB07 580-21114-7	DRO (nC10-<nC25)	mg/kg	38 B	32 B	17
		RRO (nC25-nC36)	mg/kg	250	230	8
10NC32SB13 580-21114-13	10NC32SB14 580-21114-14	DRO (nC10-<nC25)	mg/kg	26 B	23 UB	**nc**
		RRO (nC25-nC36)	mg/kg	100 B	82 B	20
MOC Groundwater:						
10NC27WA01 580-20883-1	10NC27WA02 580-20883-2	Arsenic-Dissolved	mg/L	0.0085 JB	0.0094 JB	10
		Barium-Dissolved	mg/L	0.034 J	0.035 J	3
		Chromium-Dissolved	mg/L	0.0012 J	0.0016 J	29
		Lead-Dissolved	mg/L	0.00066 J	0.0007 J	nc
		Selenium-Dissolved	mg/L	0.00094 J	0.0009 J	4
		Arsenic-Total	mg/L	0.012 J	0.01 JB	18
		Barium-Total	mg/L	0.039 J	0.038 J	3
		Chromium-Total	mg/L	0.0018 J	0.0014 J	25
		Lead-Total	mg/L	0.002	0.0018 J	11
		Selenium-Total	mg/L	0.0013 J	0.0008 J	nc
		Benzene	µg/L	2.4	2.2	9
		Ethylbenzene	µg/L	11	11	0

Table 2-15.1 Field Sample Duplicate Pair Results (continued)

Parent Sample ID/ Laboratory Sample ID	Field Duplicate Sample ID/ Laboratory Sample ID	Compound	Units	Parent Field Sample Result	Field Duplicate Result	RPD (%)
MOC Groundwater (cont.):						
10NC27WA01 580-20883-1	10NC27WA02 580-20883-2	Total Xylenes	µg/L	11.7	12.8	9
		Toluene	µg/L	2	1.9	5
		1-Methylnaphthalene	µg/L	15	15	0
		2-Methylnaphthalene	µg/L	13 M	11 M	17
		Acenaphthene	µg/L	0.33	0.34	3
		Acenaphthylene	µg/L	0.095 JQHM	0.09 JQHM	5
		Anthracene	µg/L	0.0087 J	0.014 J	nc
		Benzo[a]anthracene	µg/L	0.05 JQHM	0.028 JQHM	nc
		Chrysene	µg/L	0.056 J	0.037 J	nc
		Fluorene	µg/L	0.5	0.51	2
		Naphthalene	µg/L	36	36	0
		Phenanthrene	µg/L	0.11	0.091 J	19
		GRO (C6-C10)	mg/L	0.24	0.23	4
		DRO (nC10-<nC25)	mg/L	3.3	3.2	3
		RRO (nC25-nC36)	mg/L	0.43 M	0.38 M	12
		Methane	µg/L	1,900	2,100	10

Notes:

BOLD	=	exceeds acceptance criteria	mg/kg	=	milligrams per kilogram
µg/kg	=	micrograms per kilogram	nc	=	not calculated, one or more concentration below the LOQ
µg/L	=	micrograms per liter	PCBs	=	polychlorinated biphenyls
B	=	also detected in the blank at a concentration <10x the sample concentration	QH	=	estimated with a high bias
DRO	=	diesel range organics	QL	=	estimated with a low bias
GRO	=	gasoline range organics	RPD	=	relative percent difference
ID	=	identification	RRO	=	residual range organics
J	=	The analyte was positively identified; the quantitation is an estimation	TCLP	=	Toxicity Characterization Leaching Procedure
mg/L	=	milligrams per liter	U	=	not detected at the LOD
LOD	=	limit of detection	UB	=	not detected at the LOQ and associated with blank contamination
LOQ	=	limit or quantitation	UB	=	not detected at the LOQ and associated with blank contamination
M	=	a matrix effect was present	µg/kg	=	micrograms per kilogram
mg/kg	=	milligrams per kilogram	µg/L	=	micrograms per liter
mg/L	=	milligrams per liter	nc	=	not calculated, one or more concentration below the LOQ
MOC	=	Main Operations Complex	PCBs	=	polychlorinated biphenyls

For Site 3 soil samples, the calculated RPD for DRO/RRO and DRO/RRO with silica gel cleanup exceeded the SAP RPD criteria of 50% in all duplicate pairs, as indicated in bold in Table 2-15.1. Because of the observed imprecision, all detected results for these analytes at Site 3 were qualified J to indicate the results are usable but estimated.

For the Site 6 soil samples, the calculated RPD for RRO exceeded the SAP RPD criteria of 50% as indicated in bold in Table 2-15.1. Three of the five duplicate pair RPDs were in control, and qualification was limited to the outlier parent and FD results. Because of the observed imprecision, detected RRO results in the two duplicate pairs were qualified J to indicate the results are still usable but estimated.

For the Site 6 soil samples, DRO was not detected in one sample but detected in the duplicate for two of the five duplicate pairs. Because of the observed imprecision, all DRO results in the two duplicate pairs were qualified J to indicate the results are usable but estimated.

For the Site 6 soil samples, results for benzo[g,h,i]perylene and dibenz(a,h)anthracene were not detected in the parent sample but were detected in the duplicate. Because of the observed imprecision, benzo[g,h,i]perylene and dibenz(a,h)anthracene results in the sample and duplicate were qualified J to indicate the results are usable but estimated.

For the Site 6 water duplicate pair, the calculated RPD for benzo[g,h,i]perylene exceeded the SAP RPD criteria of 30% as indicated in bold in Table 2-15.1. Additionally, dibenz(a,h)anthracene was detected in the parent sample but was not detected in the duplicate. Because of the observed imprecision, benz[g,h,i]perylene and dibenz(a,h)anthracene results in the parent sample and duplicate were qualified J to indicate the results are usable but estimated.

For the Site 8 soil samples, results for acenaphthylene, anthracene, and benzo[a]pyrene were not detected in one sample but detected in the duplicate pair. No other FDs were collected from this site for these analytes. Because of the observed imprecision, acenaphthylene, anthracene, and benzo[a]pyrene results in all Site 8 sediment samples were qualified J to indicate the results are usable but estimated.

For the Site 8 water samples, the calculated RPD for methane exceeded the SAP RPD criteria of 30% as indicated in bold in Table 2-15.1. Two of the three duplicate results were in control, and qualification was limited to the duplicate pair methane results. Because of the observed imprecision, results in the sample and duplicate pair were qualified J to indicate the results are usable but estimated.

For Site 13, two soil duplicates were collected. For PCB-1260, the calculated RPD exceeded the RPD criteria of 50% in one of the duplicate pairs as indicated in bold in Table 2-15.1. One of the two duplicate results was in control, and qualification was limited to the out-of-control parent and duplicate results. Detected PCB-1260 results were qualified J to indicate the results are usable but estimated.

For Site 16, three soil duplicates were provided. For PCB-1260, the calculated RPD either exceeded the RPD criteria of 50% or PCB-1260 was detected in one sample but not the duplicate pair. Because of the observed imprecision, all PCB-1260 results were qualified J to indicate the results are usable but estimated. For one of the duplicate pairs, PCB-1254 was detected in one sample but not the duplicate pair. PCB-1254 precision for the other two FD pairs was acceptable and results in the sample and duplicate pair only were qualified J to indicate the results are usable but estimated.

For Site 28, one concrete sample and a duplicate were analyzed. Results for TCLP chromium were not detected in one sample but detected in the duplicate pair. Because of the observed imprecision, TCLP chromium results for both samples were qualified J to indicate the results are usable as estimated.

For Site 31, two soil duplicates were provided. For PCB-1260, the calculated RPD exceeded the RPD criteria of 50% for both duplicate pairs. Because of the observed imprecision, all PCB-1260 results were qualified J to indicate the results are usable but estimated.

For Site 32, two soil duplicates were provided. For one of the duplicate pairs, DRO was detected in one sample but not the duplicate pair. DRO precision for the other duplicate pair was acceptable, and results in the sample and duplicate pair that showed imprecision were J qualified only to indicate that the results are usable as estimates.

2.15.2 Matrix Spikes and Matrix Spike Duplicates

The MS/MSD samples are spiked in the laboratory with known concentrations of target analytes. The MS/MSD sample results provide information on possible matrix effects encountered during sample extraction, digestion, and analysis. Analytical results from MS/MSD samples are used to evaluate the sample matrix, method efficiency and applicability, accuracy, and precision. Accuracy was assessed by calculating the percent recovery of the target analytes added to the primary sample; precision was assessed by calculating the RPD for the MS/MSD sample pairs.

The MS/MSD sample pairs are required by the SAP at a rate of one MS/MSD pair per 20 samples per matrix. The MS/MSD sample pairs were collected at the following frequencies:

- Site 1: One soil MS/MSD was analyzed for all methods at a frequency of 7%.
- Site 3: Three soil MS/MSDs were analyzed for DRO/RRO at a frequency of 16%. Two soil MS/MSDs were analyzed for DRO/RRO with silica gel cleanup at a frequency of 11%. One soil MS/MSD was analyzed for TOC at a frequency of 50%.
- Site 6: Six soil MS/MSDs were analyzed for DRO/RRO at a frequency of 11%. One soil MS/MSD was analyzed for BTEX, GRO, and PAHs at a frequency of 100%. One aqueous MS/MSD was analyzed for all methods at a frequency of 100%.
- Site 8: No aqueous MS/MSDs were analyzed for methane, TOC, or DRO/RRO with silica gel cleanup. One aqueous MS/MSD was analyzed for DRO and PAHs at a frequency of 25%. Four sediment MS/MSDs were analyzed for TOC, DRO/RRO, DRO/RRO with silica gel cleanup, and PAHs at a frequency of 100%.
- Site 9: One aqueous MS/MSD per each of three sampling events was analyzed for all methods at a frequency of 25%.
- Site 13: One soil MS/MSD was analyzed for all methods at a frequency of 6%.
- Site 16: Two soil MS/MSDs were analyzed for all methods at a frequency of 13%.
- Site 21: Three soil MS/MSDs were analyzed for PCBs at a frequency of 10%. Two soil MS/MSDs were analyzed for arsenic at a frequency of 22%.
- Site 28: One MS/MSD was analyzed for the concrete matrix and one from the sludge matrix for analysis of all methods at a frequency of 100%.
- Site 31: One soil matrix MS/MSD was analyzed for PCBs at a frequency of 5%.
- Site 32: One soil matrix MS/MSD was analyzed for DRO/RRO at a frequency of 7%.
- MOC groundwater: Two aqueous MS/MSDs were analyzed for all methods except methane at a frequency of 20%. One aqueous MS/MSD was analyzed for methane at a frequency of 10%.

The MS and MSD recoveries and RPDs are discussed in Sections 2.2 through 2.14.

2.15.3 Trip Blanks

Aqueous and soil trip blanks are included in shipments containing samples which are submitted to the laboratory for VOC and GRO analyses. Trip blanks are collected to assess the potential for VOC or GRO cross-contamination introduced by sample bottles as a result of sample handling during field operations, shipping, or storage at the laboratory.

Trip blanks were included with shipments containing samples for VOC and GRO analysis, and were free of target analytes with the exceptions noted below.

Toluene was detected at a concentration greater than the detection limit but less than the LOQ (0.092 µg/L) in the aqueous trip blank shipped with water samples on August 5, 2010 from Site MOC Groundwater (Lab Work Order 580-20883). Associated detected results <10 times the blank concentration were less than the LOQ, and were UB qualified and reported as not detected at the LOQ. No qualifiers were assigned to toluene results >10 times the trip blank concentration.

GRO was detected in the aqueous trip blank at a concentration greater than the detection limit, but less than the LOQ with water samples shipped on July 20, 2010 from Site 9 (Lab Work Order 580-20582). GRO was also detected in the associated methanol soil trip blank at a concentration greater than the detection limit but less than the LOQ with soil samples shipped on September 7, 2010 from Site 6 (Lab Work Order 580-21447). All associated GRO results were not detected and qualification was not necessary.

Insufficient volume was provided to perform the trip blank analysis for GRO for samples shipped with the MOC Groundwater on August 5, 2010 (Lab Work Order 580-20883). Low level GRO detections in associated samples had been UB qualified due to MB contamination, and the lack of trip blank information will not affect data usability for these samples. For results detected above the LOQ, the effect of shipping or storage on sample results cannot be assessed.

2.16 Sample Qualifiers

Sample qualifiers are presented in Table 2-16.

Table 2-16 Sample Qualifiers

Field Sample ID	Laboratory Sample Number	Compounds Affected	Reason	Flag	Bias
Site 1:					
10NC01SB01 10NC01SB02 10NC01SB03 10NC01SB04 10NC01SB05 10NC01SB06 10NC01SB07 10NC01SB08 10NC01SB09 10NC01SB10 10NC01SB11 10NC01SB12 10NC01SB13 10NC01SB14 10NC01SB15	580-21112-1 580-21112-2 580-21112-3 580-21112-4 580-21112-5 580-21112-6 580-21112-7 580-21112-8 580-21112-9 580-21112-10 580-21112-11 580-21112-12 580-21112-13 580-21112-14 580-21112-15	RRO	Low MS/MSD recovery	M	Low
Site 3:					
10NC03SB02 10NC03SB04 10NC03SB10 10NC03SB11	508-20788-2 580-21113-4 580-21125-1 580-21125-2	RRO	High surrogate recovery	QH	High
10NC03SB01 10NC03SB02 10NC03SB03 10NC03SB04 10NC03SB05 10NC03SB06 10NC03SB07 10NC03SB08 10NC03SB09 10NC03SB010 10NC03SB011 10NC03SB012 10NC03SB013 10NC03SB014 10NC03SB015 10NC03SB016	580-21113-1 580-21113-2 580-21113-3 580-21113-4 580-21113-5 580-21113-6 580-21113-7 580-21113-8 580-21113-9 580-21125-1 580-21125-2 580-21125-3 580-21125-4 580-21125-5 580-21125-6 580-21125-7	DRO	High MS or MSD recovery	M	High

Table 2-16 Sample Qualifiers (continued)

Field Sample ID	Laboratory Sample Number	Compounds Affected	Reason	Flag	Bias
Site 3:					
10NC03SB010	580-21125-1	RRO	Low MS/MSD recovery	M	Low
All detected results for Site 3 soil samples	All detected results for Site 3 soil samples	DRO RRO DRO with silica gel cleanup RRO with silica gel cleanup	Field duplicate imprecision	J	Unknown
Site 6:					
10NC06SB53 10NC06SB54	580-21447-1 580-21447-2	Pyrene	Detected at similar concentration in method blank	Results <LOQ, UB Results ≥LOQ, B	High
10NC06SB53 10NC06SB54	580-21447-1 580-21447-2	Benzo[g,h,i]perylene Dibenz(a,h)anthracene	Field duplicate imprecision	J	Unknown
10NC06SB05 10NC06SB09 10NC06SB11 10NC06SB12 10NC06SB13 10NC06SB14 10NC06SB15 10NC06SB16 10NC06SB18 10NC06SB19 10NC06SB21 10NC06SB22 10NC06SB23 10NC06SB24 10NC06SB27 10NC06SB29 10NC06SB30 10NC06SB31 10NC06SB32 10NC06SB33 10NC06SB34 10NC06SB35	580-20786-5 580-20954-2 580-20954-4 580-20954-5 580-20954-6 580-20954-7 580-20954-8 580-20954-9 580-20954-11 580-20954-12 580-20954-14 580-20954-15 580-20954-16 580-20954-17 580-20954-20 580-21126-1 580-21126-2 580-21126-3 580-21126-4 580-21126-5 580-21126-6 580-21126-7	DRO	Detected at similar concentration in method blank	Results <LOQ, UB Results ≥LOQ, B	High

Table 2-16 Sample Qualifiers (continued)

Field Sample ID	Laboratory Sample Number	Compounds Affected	Reason	Flag	Bias
Site 6 (cont.):					
10NC06SB36 10NC06SB37 10NC06SB38 10NC06SB40 10NC06SB44 10NC06SB45 10NC06SB47 10NC06SB48 10NC06SB49 10NC06SB50 10NC06SB51 10NC06SB52	580-21126-8 580-21126-9 580-21126-10 580-21126-12 580-21126-16 580-21126-17 580-21126-19 580-21126-20 580-21126-21 580-21126-22 580-21126-23 580-21126-24				
10NC06SB05 10NC06SB07	580-20786-5 580-20786-7	RRO	Detected at similar concentration in method blank	Results <LOQ, UB Results ≥LOQ, B	High
10NC06SB53 10NC06SB54	580-21447-1 580-21447-2	DRO RRO	Low MS/MSD recovery	M	Low
10NC06SB08 10NC06SB09 10NC06SB33 10NC06SB34	580-20954-1 580-20954-2 580-21126-5 580-21126-6	RRO DRO	Field duplicate imprecision	J	Unknown
10N06WA01 10N06WA02	580-21300-1 580-21300-2	RRO	High LCS/LCSD recovery	QH	High
10N06WA01 10N06WA02	580-21300-1 580-21300-2	DRO	Low MS recovery	M	Low
10N06WA01 10N06WA02	580-21300-1 580-21300-2	Benzo[g,h,i]perylene Dibenz(a,h)anthracene	Field duplicate imprecision	J	Unknown

Table 2-16 Sample Qualifiers (continued)

Field Sample ID	Laboratory Sample Number	Compounds Affected	Reason	Flag	Bias
Site 8:					
10NC08WA21 10NC08WA26	580-20762-21 580-20762-22	Methane	Field duplicate imprecision	J	Unknown
10NC08SB01	580-20762-28	DRO with silica gel cleanup RRO with silica gel cleanup	Hold time exceedance	J	Low
10NC08SB03 10NC08SB04	580-20762-30 580-20762-31	RRO	High surrogate recovery	QH	High
10NC08SB04	580-20762-31	RRO with silica gel cleanup	High surrogate recovery	QH	High
10NC08SB01	580-20762-28	RRO	High MSD recovery	M	High
10NC08SB02	580-20762-29	RRO with silica gel cleanup	High MSD recovery	M	High
10NC08SB03	580-20762-30	RRO with silica gel cleanup	Low MS recovery	M	Low
10NC08SB04	580-20762-31	RRO with silica gel cleanup	Low MS/MSD recovery	M	Low
10NC08SB01	580-20762-28	Naphthalene 2-Methylnaphthalene 1-Methylnaphthalene	High MS or MSD recovery	M	HIgh
10NC08SB02	580-20762-29	Fluorene	Low MS/MSD recovery	M	Low
10NC08SB03	580-20762-30	2-Methylnaphthalene	High MS/MSD recovery	M	High
10NC08SB01 10NC08SB02 10NC08SB03 10NC08SB04	580-20762-28 580-20762-29 580-20762-30 580-20762-31	Acenaphthylene Anthracene Benzo[a]pyrene	Field duplicate imprecision	J	Unknown

Table 2-16 Sample Qualifiers (continued)

Field Sample ID	Laboratory Sample Number	Compounds Affected	Reason	Flag	Bias
Site 9:					
10NC09WA11 10NC09WA12 10NC09WA13 10NC09WA14 10NC09WA15	580-21220-1 580-21220-2 580-21220-3 580-21220-4 580-21220-5	All VOCs analyzed 11/6/10	Hold time exceedance	R	Low
10NC09WA01 10NC09WA02 10NC09WA03 10NC09WA04 10NC09WA05	580-20582-1 580-20582-4 580-20582-5 580-20582-6 580-20582-7	Total and dissolved results for: Arsenic Chromium	ICP-MS ICSA standard impurities	J	Unknown
10NC09WA06 10NC09WA07 10NC09WA08 10NC09WA09 10NC09WA10	580-20690-1 580-20690-2 580-20690-3 580-20690-4 580-20690-5	Chrysene Indeno(1,2,3-cd) pyrene	Detected at similar concentration in method blank	Results <LOQ, UB Results ≥LOQ, B	High
10NC09WA06 10NC09WA07 10NC09WA08 10NC09WA09 10NC09WA10	580-20690-1 580-20690-2 580-20690-3 580-20690-4 580-20690-5	Total and dissolved: Cadmium Chromium Selenium	ICP-MS ICSA standard impurities	J:detects QL:Nondetects	Detects: Unknown Nondetects: low
10NC09WA09 10NC09WA10	580-20690-4 580-20690-5	Arsenic, total	Detected at similar concentration in method blank	Results <LOQ, UB Results ≥LOQ, B	High
10NC09WA06 10NC09WA08 10NC09WA09 10NC09WA10	580-20690-1 580-20690-3 580-20690-4 580-20690-5	Arsenic, dissolved	Detected at similar concentration in method blank	Results <LOQ, UB Results ≥LOQ, B	High
10NC09WA12 10NC09WA13	580-21220-2 580-21220-3	Chrysene	Detected at similar concentration in method blank	Results <LOQ, UB Results ≥LOQ, B	High
10NC09WA11 10NC09WA12 10NC09WA13 10NC09WA14 10NC09WA15	580-21220-1 580-21220-2 580-21220-3 580-21220-4 580-21220-5	Total and dissolved: Arsenic Chromium	ICP-MS ICSA standard impurities	J: detects QL: Nondetects	Detects: Unknown Nondetects: low

Table 2-16 Sample Qualifiers (continued)

Field Sample ID	Laboratory Sample Number	Compounds Affected	Reason	Flag	Bias
Site 9 (cont.):					
10NC09WA11 10NC09WA12 10NC09WA13 10NC09WA14 10NC09WA15	580-21220-1 580-21220-2 580-21220-3 580-21220-4 580-21220-5	RRO	High LCS/LCSD and MSD recovery	QH	High
Site 13:					
Composite # 20	21440-173	All detected PCBs	High surrogate recovery	QH	High
Composite # 15 Composite # 19	21440-168 21440-172	PCB-1260	Field duplicate imprecision	J	Unknown
Site 16:					
10NC16SB01 10NC16SB14	580-21107-1 580-21448-3	All detected PCBs	High surrogate recovery	QH	High
10NC16SB01 10NC16SB02 10NC16SB03 10NC16SB04 10NC16SB05 10NC16SB08 10NC16SB09 10NC16SB11 10NC16SB12 10NC16SB13	580-21107-1 580-21107-2 580-21107-3 580-21107-4 580-21107-5 580-21107-8 580-21107-9 580-21107-11 580-21107-12 580-21107-13	PCB-1260	High MS recovery	M	High

Table 2-16 Sample Qualifiers (continued)

Field Sample ID	Laboratory Sample Number	Compounds Affected	Reason	Flag	Bias
Site 16 (cont.):					
10NC16SB01 10NC16SB14 10NC16SB02 10NC16SB03 10NC16SB04 10NC16SB05 10NC16SB06 10NC16SB07 10NC16SB08 10NC16SB09 10NC16SB10 10NC16SB11 10NC16SB12 10NC16SB13 10NC16SB12 10NC16SB15 10NC16SB13 10NC16SB14	580-21107-1 580-21107-14 580-21107-2 580-21107-3 580-21107-4 580-21107-5 580-21107-6 580-21107-7 580-21107-8 580-21107-9 580-21107-10 580-21107-11 580-21107-12 580-21107-13 580-21448-1 580-21448-4 580-21448-2 580-21448-3	PCB-1260	Field duplicate imprecision	J	Unknown
10NC16SB12 10NC16SB15	580-21448-1 580-21448-4	PCB-1254	Field duplicate imprecision	J	Unknown
Site 21:					
10NC21SB42 10NC21SB43	580-21446-1 580-21446-2	Arsenic	Laboratory duplicate imprecision; ICP-MS ICSA standard impurities	J	Unknown
Site 28:					
10NC28BW-concrete-1 10NC28BW-concrete-2	580-21184-1 580-21184-2	TCLP Selenium	Detected at similar concentration in method blank	Results <LOQ, UB Results ≥LOQ, B	High
10NC28BW-concrete-1 10NC28BW-concrete-2	580-21184-1 580-21184-2	TCLP Cadmium TCLP Lead TCLP Selenium	ICP-MS ICSA standard impurities	J: detects QL: Nondetects	Detects: Unknown Nondetects: low
10NC28BW-concrete-1 10NC28BW-concrete-2	580-21184-1 580-21184-2	TCLP Chromium	Field duplicate imprecision	J	Unknown

Table 2-16 Sample Qualifiers (continued)

Field Sample ID	Laboratory Sample Number	Compounds Affected	Reason	Flag	Bias
Site 28 (cont.):					
10NC28BW01 10NC28BW02	580-20758-1 580-20758-2	Barium Cadmium Chromium Selenium	ICP-MS ICSA standard impurities	J: detects QL: Nondetects	Detects: Unknown Nondetects: low
10NC28BW01 10NC28BW02	580-20758-1 580-20758-2	Barium	Low MS recovery, high MSD recovery	M	Unknown
10NC28BW01 10NC28BW02	580-20758-1 580-20758-2	Cadmium	High MSD recovery, High RPD	M	High
10NC28BW01	580-20758-1	Silver	Laboratory duplicate imprecision	J	Unknown
Site 31:					
Composite #1 Composite #2 Composite #3 Composite #4 Composite #5 Composite #6 Composite #7 Composite #8 Composite #9 Composite #10 Composite #11 Composite #12 Composite #13 Composite #14 Composite #15 Composite #16 Composite #17 Composite #18 Composite #19	580-21449-159 580-21449-160 580-21449-161 580-21449-162 580-21449-163 580-21449-164 580-21449-165 580-21449-166 580-21449-167 580-21449-168 580-21449-169 580-21449-170 580-21449-171 580-21449-172 580-21449-173 580-21449-174 580-21449-175 580-21449-176 580-21449-177	PCB-1260	Field duplicate imprecision	J	Unknown

Table 2-16 Sample Qualifiers (continued)

Field Sample ID	Laboratory Sample Number	Compounds Affected	Reason	Flag	Bias
Site 32:					
10NC32SB01 10NC32SB05 10NC32SB06 10NC32SB07 10NC32SB08 10NC32SB10 10NC32SB11 10NC32SB13 10NC32SB14 10NC32SB16	580-21114-1 580-21114-5 580-21114-6 580-21114-7 580-21114-8 580-21114-10 580-21114-11 580-21114-13 580-21114-14 580-21114-16	DRO	Detected at similar concentration in method blank	Results <LOQ, UB Results ≥LOQ, B	High
10NC32SB01 10NC32SB05 10NC32SB08 10NC32SB09 10NC32SB10 10NC32SB11 10NC32SB12 10NC32SB13 10NC32SB14 10NC32SB16	580-21114-1 580-21114-5 580-21114-8 580-21114-9 580-21114-10 580-21114-11 580-21114-12 580-21114-13 580-21114-14 580-21114-16	RRO	Detected at similar concentration in method blank	Results <LOQ, UB Results ≥LOQ, B	High
10NC32SB13 10NC32SB14	580-21114-13 580-21114-14	DRO	Field duplicate imprecision	J	Unknown

Table 2-16 Sample Qualifiers (continued)

Field Sample Identification	Laboratory Sample Number	Compounds Affected	Reason	Flag	Bias
MOC Groundwater					
10NC20WA01	580-20883-4	Toluene	Detected at similar concentration in trip blank	Results <LOQ, UB	High
10NC19WA01 10NC20WA01	580-20883-3 580-20883-4	Total Xylene	Detected at similar concentration in method blank	Results <LOQ, UB	High
10NC22WA01 10NC10WA01 10NC27WA03 10NC19WA02 10NC26WA01	580-21052-1 580-21052-2 580-21052-3 580-21052-4 580-21052-5	Methane	Low MS recovery	M	Low
10NC27WA01 10NC27WA02 10NC19WA01 10NC20WA01 10NC17WA01 10NC22WA01 10NC10WA01 10NC27WA03 10NC19WA02 10NC26WA01	580-20883-1 580-20883-2 580-20883-3 580-20883-4 580-20883-5 580-21052-1 580-21052-2 580-21052-3 580-21052-4 580-21052-5	Indeno(1,2,3-cd)pyrene	Detected at similar concentration in method blank	Results <LOQ, UB	High
10NC27WA01 10NC27WA02	580-20883-1 580-20883-2	Acenaphthylene Benzo(a)anthracene	High LCS or LCSD recovery	QH	High
10NC27WA01 10NC27WA02	580-20883-1 580-20883-2	Acenaphthylene Benzo(a)anthracene 2-Methylnaphthalene	High MS/MSD recovery	M	High
10NC19WA01 10NC20WA01 10NC17WA01	580-20883-3 580-20883-4 580-20883-5	GRO	Detected at similar concentration in method blank	Results <LOQ, UB Results ≥LOQ, B	High
10NC27WA01 10NC27WA02 10NC19WA01 10NC20WA01	580-20883-1 580-20883-2 580-20883-3 580-20883-4	RRO	High MS/MSD recovery	M	High
10NC27WA01 10NC27WA02	580-20883-1 580-20883-2	Arsenic, dissolved	Detected at similar concentration in method blank	Results ≥LOQ, B	High

Table 2-16 Sample Qualifiers (continued)

Field Sample Identification	Laboratory Sample Number	Compounds Affected	Reason	Flag	Bias
MOC Groundwater					
10NC27WA02	580-20883-2	Arsenic, total	Detected at similar concentration in method blank	Results ≥LOQ, B	High
10NC22WA01 10NC10WA01 10NC27WA03 10NC19WA02 10NC26WA01	580-21052-1 580-21052-2 580-21052-3 580-21052-4 580-21052-5	Chromium, total Chromium, dissolved	Detected at similar concentration in method blank	Results ≥LOQ, B	High
10NC27WA01 10NC27WA02 10NC19WA01 10NC20WA01 10NC17WA01	580-20883-1 580-20883-2 580-20883-3 580-20883-4 580-20883-5	Total and dissolved: Arsenic Barium Cadmium Chromium Selenium	ICP-MS ICSA standard impurities	J: detects QL: Nondetects	Detects: Unknown Nondetects: low
10NC22WA01 10NC10WA01 10NC27WA03 10NC19WA02 10NC26WA01	580-21052-1 580-21052-2 580-21052-3 580-21052-4 580-21052-5	Barium Cadmium Chromium Selenium	ICP-MS ICSA standard impurities	J: detects QL: Nondetects	Detects: Unknown Nondetects: low

Notes:

µg/kg	=	micrograms per kilogram
µg/L	=	micrograms per liter
B	=	also detected in the blank at a concentration <10x the sample concentration
DRO	=	diesel range organics
GRO	=	gasoline range organics
ICP-MS	=	inductively coupled plasma mass spectroscopy
ICSA	=	Interference Check Solution A
ID	=	identification
J	=	The analyte was positively identified; the quantitation is an estimation
LCS	=	laboratory control sample
LCSD	=	laboratory control sample duplicate
LOQ	=	limit of quantitation
mg/L	=	milligrams per liter
M	=	matrix effect was present
mg/kg	=	milligrams per kilogram
MS	=	matrix spike
MSD	=	matrix spike duplicate
PCBs	=	polychlorinated biphenyls
QH	=	estimated with a high bias
QL	=	estimated with a low bias
R	=	data unsuitable due to inability to analyze the sample and meet quality control criteria
RRO	=	residual range organics
TCLP	=	Toxicity Characterization Leaching Procedure
UB	=	not detected at the LOQ and associated with blank contamination
VOCs	=	volatile organic compounds

(Intentionally blank)

3.0 SUMMARY

This Report evaluates the analytical data generated during the NE Cape Remedial Actions conducted during July through September 2010. This assessment evaluated whether program objectives and data quality goals were met. The assessment reviewed sample receipt conditions, extraction and analytical procedures, sampling procedures, and correspondence to method criteria and project DQOs. The following conclusions were drawn based on this assessment of the analytical data:

- Sample receipt conditions were acceptable based on temperatures upon receipt and CoC correspondence to submitted sample set.
- Holding times were met with the exception that five samples from Site 9 were analyzed for the entire VOC list outside of holding time and results were qualified as rejected, R. BTEX results were analyzed separately for these samples and were within hold time requirements. Holding times for DRO with silica gel cleanup and RRO with silica gel cleanup were also exceeded in one sample from Site 8 by one day and results were qualified as estimated, J.
- Extraction and analytical procedures were acceptable based on MBs, LCS/LCSDs, MS/MSDs, and surrogates except as noted below.
  - Analytes detected in method blanks were toluene, m&p-xylene, GRO, DRO, RRO, chrysene, indeno(1,2,3-cd)pyrene, pyrene, arsenic, chromium, and selenium. Associated results with sample concentrations <10x the blank concentration were B qualified. Associated detections at concentrations less than the LOQ were also qualified as not detected, UB, at the LOQ.
  - High surrogate recoveries were observed for RRO (6), RRO with silica gel cleanup (1), and PCBs (2). Associated detected results were QH qualified to indicate the potential for high bias.
  - Low MS or MSD recoveries were observed for DRO/RRO and DRO/RRO with silica gel cleanup, fluorene, methane, and barium. All associated results were M qualified to indicate a potential matrix effect.
  - High MS or MSD recoveries were observed for DRO/RRO and DRO/RRO with silica gel cleanup, acenaphthylene, benzo(a)anthracene, fluoranthene, naphthalene, 2-methylnaphthalene, 1-methylnaphthalene, PCB-1260, barium, and cadmium. Associated detected results were M qualified to indicate a potential matrix effect.
  - High LCS or LCSD recoveries were observed for RRO, acenaphthylene, and benzo(a)anthracene. Associated detected results were QH qualified to indicate the potential for high bias.
  - The laboratory narratives indicated the presence of standard impurities in the ICSA standards for arsenic, barium, cadmium, chromium, lead, and selenium.

Associated positive results were qualified as estimated and non-detected results were QL qualified to indicate the potential for low bias.

- Laboratory duplicates were outside control criteria for arsenic, chromium, and silver. Associated results were qualified as estimated, J.

- Imprecision was observed in FD samples for DRO/RRO and DRO/RRO with silica gel cleanup, RRO with silica gel cleanup, acenaphthylene, anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, dibenz(a,h)anthracene, methane, PCB-1260, PCB-1254, and TCLP chromium. Target analyte results were reviewed on a site by site basis. If the majority of duplicate sample result RPDs were in control (≥50%), only the duplicate pair was qualified as estimated. If the majority of duplicate samples were outside acceptance criteria, all results were qualified as estimated.

Based on this review, the analytical data generated during the NE Cape Remedial Action are complete, correct, consistent, and compliant with method procedures and QC requirements, and are usable as qualified, with the exception of VOC results for five samples from Site 9. For these samples, acceptable BTEX results are available.

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF SPILL PREVENTION AND RESPONSE
CONTAMINATED SITES REMEDIATION PROGRAM

Technical Memorandum - 06-001 **Date** May 18, 2006

Biogenic Interference and Silica Gel Cleanup

PURPOSE:

The Alaska Department of Environmental Conservation (DEC) has developed state specific laboratory methods for the analysis of petroleum hydrocarbons in soil and water matrices, AK101 for Gasoline Range Organics (GRO), AK102 for Diesel Range Organics (DRO) and AK103 for Residual Range Organics (RRO). The methods are located in Appendix D of the Underground Storage Tank (UST) Procedures Manual, November 7, 2002. Additionally, they are adopted by reference in regulation, both in 18 AAC 75 Oil and Other Hazardous Substances Pollution Control, {18 AAC 75.355 (d)}, and in 18 AAC 78 Underground Storage Tanks, (18 AAC 78.007). This technical memorandum addresses the issue of “naturally occurring organic material” (NOM) and/or “biogenic interference” specifically in relation to methods AK102 and AK103. It also provides the laboratory and reporting requirements for utilizing a silica gel cleanup procedure as a method for evaluating the presence of biogenics and thier contribution to the AK102/AK103 sample results.

BACKGROUND:

It is well established that the currently promulgated AK102 and AK103 methods for petroleum range organic analysis are complicated by biogenic interference. NOM or biogenics are present in many soils and especially prevalent in certain Alaskan soils, e.g. tundra peat. As a result, biogenic interference is the term that is used to describe the NOM that is quantified and reported as DRO and/or RRO in accordance with the AK102 and AK103 methods. Biogenic interference concentrations may occur at levels well above regulatory cleanup levels.

Likewise, silica gel cleanup is a well established analytical procedure utilized to separate analytes from interfering compounds of different polarity. The majority of “fresh” or non-biodegraded petroleum hydrocarbons are considered non-polar compounds. Depending on the soil makeup, the majority of the biogenic compounds may be polar or semi-polar in nature. The silica gel cleanup procedure will preferentially remove polar and semi-polar compound.

In order to ensure consistent data when evaluating the presence and degree of biogenic interference at a contaminated site, the department provides the following laboratory procedure and data reporting requirements.

I. Laboratory Procedure for Silica Gel Cleanup

1. Objective

Alaskan samples containing organic plant material are especially susceptible to background biogenic interference and may result in false positive results for DRO or RRO defined petroleum hydrocarbon ranges. Interpretation of the sample chromatogram MUST be done by an experienced analyst for qualitative match of the chromatograph pattern to known sources of fuel product and/or biogenic interference. Once biogenic interference has been determined, this procedure may be used as an analytical tool to evaluate the contribution of biogenic interference to the original sample results.

2. Method Summary

2.1 A sample extract that has been prepared **and analyzed** utilizing the standard AK102/AK103 methodology**,** is flushed through a silica gel column using methylene chloride.

Note: The extract must not be acidified. An acid cleanup step is not allowed.

2.2 This silica gel cleanup MUST also be performed on all QC samples in the analytical batch associated with the field sample. At a minimum, this must include the Method Blank (MB), Laboratory Control Sample(s) (LCS) and LCS Duplicate(s) (LCSD). All QC results must be reported with the results of the field samples, before and after cleanup. See QC section of this appendix for required control limits.

3. Apparatus and Materials

3.1 Drying oven: an oven capable of maintaining 150^{o}C is used for drying of sodium sulfate and activation/storage of silica gel.

3.2 Glassware

3.2.1 Turbo Vap tubes

3.2.2 10mL graduated disposable pipettes or equivalent

3.3 Reagents

3.3.1 Methylene chloride - analytical grade or better, must be demonstrated to be below method detection limits for diesel and residual range contaminants.

3.3.2 Ottawa sand – cleaned/baked sand used for soil method blanks.

3.3.3 Silica gel - Anhydrous, 60 - 100 mesh. Commercially available prepacked extraction cartridges may be used provided they meet all quality control performance criteria listed in this appendix.

IMPORTANT: silica gel must be activated by placing in a 150^{o}C oven prior to use. Additionally, prolonged exposure to moist air may result in reduced or deficient method performance. Activated silica gel should be stored in a manner as to prevent moisture exposure. It is recommended that the silica gel be stored in the oven continually prior to use.

3.3.4 Glass wool - Pesticide grade or better.

4. Procedure

4.1 Preparing the column

4.1.1 Cut the top off a 10mL disposable volumetric Pasteur pipette using a triangular file.

4.1.2 Place a small plug of glass wool into the pipette and slide it down into the taper.

4.1.3 Add a few grams of Ottawa sand to cover the glass wool and provide a flat bed for the silica gel.

4.1.4 Add silica gel to the pipette, with occasional shaking to ensure uniform packing, up to the 3mL mark. Alternatively, the silica gel may be added as a "slurry" with methylene chloride to minimize channeling.

4.1.5 Add another few grams of Ottawa sand to provide some protection to the silica gel bed.

4.1.6 Pre-elute the column with at least 1 volume of methylene chloride.

Note: Overloading of the silica gel column capacity may occur with extracts containing elevated concentrations of biogenics. Dilution or adjustment of the sample extract volume prior to clean up may be necessary to avoid unwanted breakthrough.

4.2 Extract Preparation

4.2.1 Fill the column to the ~1.5 ml mark with methylene chloride. Allow methylene chloride to drain down to the sand and discard.

4.2.2 Pipette an aliquot of sample from the vial into the column.

4.2.3 Immediately fill the column with methylene chloride up to the –1.5 ml mark.

4.2.4 When the methylene chloride reaches the 0 ml mark, begin collection of the sample into a 15 ml centrifuge tube.

4.2.5 When the methylene chloride reaches the sand, refill the column to the –1.5 ml mark and continue collecting the sample. Repeat this step twice and allow methylene chloride to drain finish dripping from column.

4.2.6 Using an appropriate concentration device, concentrate extract to the required volume.

5. Quality Control

5.1 Calibration requirements and limits are the same as specified in AK102 and AK103.

5.2 QC Results that are outside of the following control limits must be flagged.

5.3 The analysis of a matrix spike and matrix spike duplicate is highly recommended when this procedure is used.

Table 2

Acceptance Criteria for QC Samples
After Silica Gel Cleanup

	Control Limits	
DRO Recovery:	**% Recovery**	**Relative % Difference**
Lab Control Samples & Duplicates	70-125	20
Surrogate Recovery:		
Quality Control Sample	70-125	
Field Sample	50-150	

II. Data Reporting Requirements

The department requires the following data to be submitted for the evaluation of biogenic interference in AK102 DRO and AK103 RRO sample results.

1. Comparison samples.
    a. In general, three to five comparison samples must be collected from similar depth and soil strata. The exact number of comparison samples will be determined by the project data quality objectives. The samples will be analyzed for Total Organic Carbon (TOC) and AK102/AK103, before and after silica gel cleanup. The sample results will be utilized for chromatographic interpretation only, to establish the presence of biogenic interference at the site, the general biogenic chromatographic fingerprint and the effectiveness of the silica gel cleanup procedure. The results will not be used to establish a "background concentration" or "average concentration."

2. Analytical Data
    a. The samples must be extracted only once, per methods AK102/AK103
    b. Standard AK102/AK103 sample analysis must be performed and reported
    c. Silica gel column cleanup procedure must performed on the same extract *Note – A silica gel "slurry" or "swirl" is not acceptable
    d. The silica gel cleanup procedure must be performed and reported for all associated quality control (QC) samples
        i. Minimum required – Method Blank, LCS and LCS Duplicate
    e. QC and Surrogate results must be within method specified limits for both analyses (before and after silica gel cleanup).
    f. All sample results and chromatograms and a narrative report must be submitted to the department for evaluation.

3. Evaluation
    a. Results of samples analyzed using the silica gel cleanup procedure will not be accepted as representative of a site without completion of the comparison process described above.
    b. The presence of biogenic interference must be clearly demonstrated in the background samples. The site samples should contain chromatographically similar biogenic fingerprints. The department will not accept silica gel cleanup results for samples that do not exhibit biogenics and/or only chromatographically exhibit petroleum hydrocarbon contamination.
    c. If the weight of evidence supports the presence of biogenic interference in the AK102 and AK103 sample results, the department may agree to utilize the silica gel cleanup results for site decision purposes.