



# US Army Corps of Engineers Alaska District

Formerly Used Defense Sites Program

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## Contamination Delineation at Pre-WWII Tank Farm Amaknak Island F10AK0841

Unalaska, Alaska

**Final**

February 2006



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**Appendix A – Site Photos**

**Appendix B – ROST/LIF Probe Logs**

**Appendix C – Laboratory Data Packages**

## ACRONYM LIST

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Alaska District	U.S. Army Corps of Engineers – Alaska District
ANCSA	Alaska Native Claims Settlement Act
AST	above ground storage tank
bgs	below ground surface
BTEX	benzene, toluene, ethylene, and xylenes
CANOL	Canadian Oil
COCs	contaminants of concern
CRREL	USACE Cold Regions Research and Engineering Laboratory
CY	cubic yard
DTI	Dakota Technologies, Inc.
DRO	diesel range organics
FUDS	Formerly Used Defense Site
ft	feet
FVD	Fluorescence vs. Depth
GRO	gasoline range organics
LIF	laser induced fluorescence
mg/kg	milligrams per kilogram
MW	monitoring well
NACC	North American Commercial Company
NCA	North Creak Analytical labs
NOB	Naval Operating Base
PAH	polynuclear aromatic hydrocarbons
PDT	Project delivery team
POL	petroleum, oil, and lubricants
ppm	parts per million
ROST	Rapid Optical Screening Tool
RRO	residual range organics
USACE	U.S. Army Corps of Engineers
UV	ultraviolet

## EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers Alaska District conducted an investigation to identify and delineate known petroleum (POL) contamination at the Former Pre-WWII Tank Farm Formerly Used Defense Site (F10AK0841) located in Unalaska, Alaska.

The principal data acquisition method utilized was the Rapid Optical Screening Tool (ROST) and its laser-induced fluorescence (LIF) probe. The scope of work called for the Alaska District to utilize the ROST to investigate the vertical and horizontal extent of POL contamination at the site and acquire real-time data. A total of 100 LIF probe pushes were completed at the site.

The Corps of Engineers was not granted Rights of Entry for tracks 17A, 17B, L15, L16 and L19. No investigations were conducted in those tracks.

POL contamination was prevalent throughout the site. The ROST results showed contamination at various depths from the surface to 18 feet below ground surface at a few locations.

The former Tank Farm area has two distinct types of contamination; the heavier petroleum, bunker C, and a lighter petroleum type, which is consistent with diesel. Zones where the two fuel types have mixed are also present. In the former Tank Farm excavation area, the only remaining contamination is that within the saturated zones to the bedrock interface. The ROST identified the subsurface zones where diesel and bunker C are located, including the areas where they were mixed.

The ROST LIF results correlated very well with the lab analytical data for the light-end petroleum (Diesel Range Organics) contamination present at the site. The ROST LIF probe was also very effective at identifying bunker C contamination. However, due to the refractive nature of bunker C at the LIF probe laser wavelength, no statistical correlation of LIF percent vs. bunker C concentration was found.

Several source areas with different types of product were identified based on the initial ROST results. A separate and independent source area also appears to be associated with the contamination immediately south of Building 551, in front of the current truck loading dock. This area may be the potential source for free phase-product appearing in the crawl space of Building 551. The heavy-end petroleum contamination around the concrete pad near the powerhouse appears to be part of the same plume that underlies the majority of the Pre-WWII Fuel Farm Area and is present at the groundwater interface.

Only three of the 17 soil confirmation samples exceeded the residual range organics (RRO) negotiated cleanup level of 8,300 mg/kg. All 17 samples were below the RRO inhalation and ten times the migration to groundwater pathway cleanup levels. However, 8 of the 17 samples were above the diesel range organics (DRO) negotiated cleanup level of 2,300 mg/kg. The bunker C appears to have a high fraction of the diesel range organics carbon chains (C<sub>10</sub> - C<sub>25</sub>). With respect to cleanup levels, the DRO component may be of greater concern at this site.

## 1.0 INTRODUCTION/OVERVIEW

This report presents the results of a limited site investigation/contamination delineation conducted by the U.S. Army Corps of Engineers - Alaska District (USACE). The report presents the findings of the investigation at the Pre-WWII Tank Farm Formerly Used Defense Site (FUDS) (F10AK0841) located in Unalaska, AK.

The purpose of the investigation was to estimate the vertical and horizontal extent of possible petroleum contaminated soil. The primary investigative tool was the Rapid Optical Screening Tool (ROST) and its laser-induced fluorescence (LIF) probe. The ROST utilizes a track-mounted percussion drill system to drive the LIF probe into the subsurface. The ROST portion of the investigation was carried out on May 12-23, 2005 and the soil sampling was performed on May 21-24, 2005.

### 1.1 Site Location

The Pre-WWII Tank Farm is located on the northeast end of Amaknak Island, adjacent to Dutch Harbor, at Iliuliuk Bay (Figure 1). Amaknak is a small island to the east of the larger Unalaska Island. A single bridge connects the islands. Both islands are mountainous and most flat areas are used for commercial fishing related activities, such as crab pot storage or net mending. The site includes the former tank farm and the current Delta Western Fuel Dock area. The site is located on the southwest side of the intersection of Biorka Drive and East Point Road. Amaknak Island is approximately 800 air miles from Anchorage, AK. The island is only accessible by air or sea.

### 1.2 Background

Prior to the construction of military facilities on Amaknak Island, the Northern Commercial Company (Northern) and the North American Commercial Company (NACC) owned property there. These two companies were engaged in a variety of ship support operations including selling petroleum products, wharfage, and fresh water to ocean vessels. Much of the land owned by Northern and NACC was condemned in a declaration of taking, which gave the U.S. Government control of the land.

The U.S. Government's interest in Dutch Harbor dates back to 1902, when a presidential executive order set aside 23 acres for use as a coaling station, which was never constructed. In 1911, the Navy established a radio communication station on the island. The Navy acquired 127 acres comprising the site property from Northern by condemnation in 1941, and 1,930 acres of public land comprising the bulk of Amaknak Island were withdrawn from public domain in June 1941. Prior to acquiring the property, the Siems Drake-Puget Sound Company (Siems Drake), the U.S. Government's contractor, began construction in 1940. The Dutch Harbor Naval Operating Base (NOB) and Naval Air Station were established in 1941. In 1942, military facilities on Amaknak Island were attacked by the Japanese.

The former Pre-WWII Tank Farm originally consisted of 10 above ground storage tanks (ASTs), which included five wood stave ASTs ranging in capacity from 1,180 to 9,500 barrels and five steel tanks ranging from 500 to 5,000 barrels. Six of the tanks were constructed in the early 1920s, and the other four were constructed in the mid-1930s. Five of the ten tanks were demolished in 1941. The other five storage tanks were emptied and removed between 1942 and 1943, after the Japanese bombing raids on Dutch Harbor on June 3-4, 1942. The ASTs were

reported to hold fuel oil, potentially bunker C or diesel fuel. After demolition of the tank farm in 1943, about 4 feet of clean fill was placed over the entire area.

Several parties operated from the site between 1947 and 1975, when the U.S. Government officially disposed of the site property. The party with the longest tenure and most extensive operation had been the Standard Oil Company of California, Inc., which operated a petroleum storage and distribution operation on certain parcels of Amaknak Island from early 1940 to 1986.

In September 1975, the U.S. Government, in compliance with the Alaska Native Claims Settlement Act (ANCSA), transferred the island, including the site property, to both the Aleut Regional Corporation and the Ounalashka Corporation.

The general ownership of the buildings of interest at the former Dutch Harbor NOB is currently divided among the City of Unalaska, Delta Western and the Ounalashka Corporation. In general the Ounalashka Corporation or one of its subsidiaries owns the land for this site, with the exception that the City of Unalaska owns Building 400, the laundry building, and owns and operates the power plant (Building 409, a.k.a the Power House). The former mess hall, Building 551, is currently owned by Delta Western, Inc.

### 1.3 Geology

Amaknak Island is underlain by the Unalaska Formation. This geological formation consists of thick sequences of sedimentary and pyroclastic rocks intermixed with volcanic flows of dacite, andesite, and basalt. Thin surficial deposits range from a few feet to over 15 feet in thickness of unconsolidated material over bedrock.

The unconsolidated deposits in the vicinity of the Pre-WWII Tank Farm are typically either shot-rock fill material or naturally occurring beach gravel. In general, locations previously investigated through excavation east of Eastpoint Loop Road consisted of shot-rock, while excavations west of Eastpoint Loop Road consisted of beach gravel and silt deposits. Three to four feet of surficial fill material was present at most locations west of Eastpoint Loop Road. The top four feet of surficial fill material consists of approximately 60 percent shot-rock fill and 40 percent silt with sand at the Pre-WWII Tank Farm.

The shot-rock fill material was mostly angular gravel, rock and or cobbles with lesser, but in some cases significant, amounts of sand, silt, and clay. In the past, the shot-rock material was presumably placed over natural deposits to extend the usable area.

Bedrock is present at shallow depths throughout the Pre-WWII Tank Farm area. During the 1989 investigation, bedrock was described as either volcanic rock or shale and, where encountered, was present between 9 and 10 feet below ground surface (bgs). During April 1998 fieldwork, bedrock was encountered in three of the excavation pits at 13 to 14 feet bgs. Bedrock consisting of highly fractured and weathered volcanics was encountered north of the tank farm along Biorka Drive and near the old laundry facility. Bedrock was also encountered east of the intersection of Biorka Drive and Eastpoint Loop Road and north of the site near the intersection of East Point Loop Road and Airport Way.

### 1.4 Hydrology

Surface water on Amaknak Island occurs as lakes, ponds, wetlands, streams, and seasonal drainages. Abundant precipitation in this region is the primary factor influencing the amount and

availability of surface water on the island. Intermittent drainages are abundant to accommodate large amounts of precipitation.

There are no intermittent or perennial surface water bodies in the Pre-WWII Tank Farm area; however, one small surface water outfall was observed discharging into Iliuliuk Bay about 350 feet southeast of the Delta Western fuel dock. Tidal influences are very strong in monitoring wells near the shoreline and significant on the far side of the tank farm site at MW-8.

## **2.0 SUMMARY OF PAST SITE INVESTIGATIONS AND REMEDIAL ACTIONS**

This section summarizes the nature and extent of contamination at the Pre-WWII Tank Farm area prior to completing this ROST investigation.

ADEC has determined that groundwater in the area is not a current or reasonably expected future source of drinking water. Also, the City of Unalaska has an ordinance that requires the use of city water supply in this area.

Contaminants of Concern (COCs) in subsurface inland soil at the Pre-WWII Tank Farm include two petroleum hydrocarbons: diesel-range organics (DRO) and residual-range organics (RRO). Interim removal actions (IRA) were conducted in 1998 and 1999, and from 2000 to 2002. The removal actions involved the excavation, thermal treatment, and backfill of approximately 24,000 cubic yards (CY) of bunker C contaminated soil. However, contaminated soil still remains in bedrock fissures, at the soil/groundwater interface, beneath local roads (Biorka Drive, East Point Road) and under buildings (Buildings 551, 549, and 547).

In addition to the subsurface soil contamination, approximately 1 to 3 inches of free phase product is present in the crawl space of Building 551, which is located south of the site. The exact source of the free phase product has not been determined. Building 551 is approximately 15,000 square feet and has a dirt floor that is about 4 feet below the surrounding ground surface. The height of the crawl space is about 4 to 5 feet from the floor to the bottom of the main level. Based on observations in 1996 and 2003, the product appears to cover approximately 2,000 square feet with varying thickness. A local company now occupies the building and stores filters, rags, drums of petroleum product, and other supplies.

### **2.1 Groundwater and Light Non-Aqueous Phase Liquid Contamination**

Groundwater sampling and monitoring activities have been conducted since 1996 at the Pre-WWII Tank Farm. COCs in groundwater include DRO, RRO, benzene, toluene, ethylbenzene, and xylene (BTEX) compounds; and polynuclear aromatic hydrocarbons (PAH). Samples were collected from test pits, temporary well points, and monitoring wells located onsite as well as to the east, west, north and south of the site. Several wells (MW-2, MW-8, MW-11, and MW-13) contain measurable amounts of bunker C fuel oil/or diesel fuel oil. MW-2 and MW-13 are not located within the Pre-WWII Tank Farm boundary. The data indicates that groundwater associated with the Pre-WWII Tank Farm is contaminated with bunker C fuel. The contamination consists of mobile contamination on the groundwater surface, generally referred to as free product, and immobile droplets that are trapped above and beneath the water table as residual saturation. The bunker C oil naturally attenuates as it moves with the groundwater. A flow model developed for the Pre-WWII Tank Farm indicates that bunker C fuel oil has been discharging into Iliukiuk Bay for decades but not at a rate or concentration that exceeds water

quality standards. Eventually, degradation of the bunker C fuel oil will overtake the discharge rate until the oil is no longer discharging into Iliukiuk Bay, although some oil will remain in the subsurface.

Although volatile organic compounds (VOC) were detected in one well (MW-14) in 2000 and 2001, VOC's concentrations are below regulatory criteria.

### **3.0 LIF/ROST™ TECHNOLOGY**

Fluorescence is a property of some compounds whereby absorbed ultraviolet (UV) light stimulates the release of photons (light) of a longer 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 methods for decades. However, this technology has only recently been taken to the field, with the availability of high-powered light sources and optical fibers.

The system developed by Dakota Technologies, Inc. (DTI) sends UV light through optical fibers that are strung through Geoprobe™ rods. The light exits the probe through a sapphire window on the side of the probe tip. As the probe is advanced, soil sliding past the window is exposed to UV light, if fluorescent compounds exist and are struck by the UV light, the compounds will fluoresce. The fluorescence response is transmitted through a fiber and analyzed by an oscilloscope and a computer. The responses are displayed, in real-time, on a graph of fluorescence vs. depth (FVD). The response displayed on the FVD graph is the total response, which is the sum of four wavelengths monitored by the ROST system. Petroleum hydrocarbons will fluoresce at different wavelengths. Viewing fluorescence by wavelength can provide information about the type of petroleum hydrocarbon present in the soil matrix.

ROST/LIF technology is useful for detecting petroleum, oil, or lubricants (POL) products including; gasoline, diesel fuel, kerosene, motor oil, and creosote. Very small amounts of free product can be detected in the vadose and saturated zones. This method cannot detect chlorinated solvents, pesticides or dissolved phase POLs.

Signal intensities are calibrated to a known standard reference solution (M1) before each push of the probe. M1 is a proprietary blend of POLs designed to give a response across the ROST fluorescence spectrum. The horizontal axis represents the signal intensity relative to that standard (i.e. fluorescence % on the probe logs). The concentration of a contaminant is directly related to the signal intensity, but because of soil matrix effects, degradation of fuels and other factors, approximate concentration values part per million (ppm) can only be assigned by comparison to adjacent laboratory soil confirmation sample data (see Section 4.5). The LIF probe detection limit thus varies with soil matrix and contaminant type.

## **4.0 SITE INVESTIGATION**

### **4.1 Planning**

The Work Plan for Contamination Delineation at Pre-WWII Tank Farm, Amaknak Island, May 2005 was used to guide the field activities. The objectives outlined in work plan were:

“...to collect information that will ultimately lead to a remedy in place at the Pre-WWII area. The objective of this investigation is to estimate the boundary between the diesel fuel from the Rocky Point area and the bunker C fuel from the Pre-WWII Tank Farm area using Rapid Optical Screening Tool with Laser Induced Frequency (ROST/LIF). This objective will be accomplished by completing the following:”

- Laterally and vertically delineate bunker C in the Pre-WWII Tank Farm area near the Power House (Area 1). Figure 2 shows the locations of the areas described in the work plan.
- Laterally and vertically delineate bunker C and diesel in Areas 2 and 3. Diesel has been observed in the monitoring wells MW-13 and MW-15. The ROST/LIF system will be used distinguish between bunker C, diesel, and mixtures of the two.
- Delineate the boundary of the bunker C plume by continuing to probe along the western edge of the plume, starting at Area 1 and moving south toward Areas 2 and 3.
- Investigate the continuity between inland soil contamination and contamination found along the beach. Samples will be collected in Area 4 to accomplish this objective.
- Collect soil samples for laboratory analysis to correlate the ROST/LIF results.
- Once the tasks listed above have been completed, remaining time shall be used to probe the area inside the plume to correlate ROST/LIF results with past sampling.

#### 4.2 Fieldwork

The ROST investigation utilizing LIF was performed at the site from May 12-25, 2005. The field team included Mr. Kenneth Andraschko, Mr. Neil Folcik, and Mr. Chris Floyd of the USACE - Alaska District, and Mr. Chris Berini from the USACE - Cold Regions Research and Engineering Laboratory (CRREL).

A total of 100 ROST/LIF probes and 10 beach sample probes were completed at the site (Figure 2). Seventeen confirmation soil samples were collected from the site and analyzed at North Creek Analytical (NCA) laboratory for DRO, RRO and PAHs (Methods AK102, AK103, and 8270 SIMS). Selected samples were also analyzed for GRO and optimized GC using Method 8015M. The relative position of each probe and sampling point was located using a Trimble Pro-XR Differential Global Positioning System (DGPS). The northing and easting coordinates of the points are referenced using the coordinate system: Alaska State Plane, NAD 83, Zone 10 (FIPS 5010), feet. The elevations were referenced locally to a known monitoring well to an accuracy of 0.1 foot.

The Corps of Engineers was not granted rights of entries for tracks 17A, 17B, L15, L16 and L19. No investigation was conducted in these tracks. (See Figure 7 for real estate boundaries.)

Each ROST probe produces a data point (fluorescence vs. depth) approximately every 0.08 feet. Over 20,000 individual data points were collected from the 100 LIF/ROST probes. Generally, probes were pushed to refusal or two feet past contamination into the saturated zone. After the completion of each probe or boring, the holes were back-filled to the surface with granular or chip bentonite.

Additional investigation along the northwest side of Area 1 was limited due to the hillside topography (see photos of Area 1 in Appendix A). Investigation near the southeast side of Area 2 was limited due to an abundance of buried utilities.

The southern extent of Area 2 was not investigated since a right-of-entry could not be obtained before demobilization occurred from the site. Access to Area 3 was restricted by aboveground pipelines and load restrictions on the access road. The drilling rig was positioned in Area 3 via crane on 23 May 2005. Investigation time was limited to the afternoon of 23 May 2005. The aboveground pipelines prevented any further investigation east of East Point Road from the Delta Western Fuel Dock area to just north of MW-15 (see photos of Area 3 in Appendix A).

The proposed line of LIF points planned for Area 4 was not performed. The site conditions at Area 4 consisted of shot-rock and posed very difficult probing that resulted in damaged rods and created a high risk of losing a fiber-wire and/or other equipment on every push (see photo of Area 4 in Appendix A).

The remaining area within the “ROST investigation boundary” was delineated as proposed by the work plan with the following exceptions. The area north of the connection between building 551 and 549 was inaccessible due to enormous amounts of debris, unmovable vehicles, and a building that was not indicated in the work plan. The majority of the area south of the connection between buildings 547 and 549 was inaccessible due to large above ground storage tanks and associated piping. The area south of Area 2 was not investigated, since a right-of-entry could not be obtained by the time the ROST team demobilized from the site.

#### 4.3 ROST/LIF Results

The work plan specified that the objective of this investigation was to estimate the boundary between the diesel fuel from the Rocky Point area and the bunker C fuel from the Pre-WWII Tank Farm using the ROST. The Rocky Point area is southeast of the Pre-WWII Tank Farm area. The southern extent of Area 2 (the area identified in the work plan which lies between the Pre-WWII Tank Farm and the Rocky Point areas) was not investigated since a right-of-entry could not be obtained by the time demobilization occurred from the site. The access to Area 3 was limited due to the aboveground pipelines and load restrictions on the access road.

As expected, POL fluorescence was encountered at most of the probe locations. Figure 3 depicts a plan view contour map of the maximum total fluorescence across of the entire site investigation area. No information was collected to determine the extent of POL contamination south of Delta Way and east of East Point Rd since rights of entry were not granted in this area. This is noted on the figure.

The ROST successfully identified the presence of POL in the soil on a qualitative basis. Furthermore, the ROST results had a strong quantitative correlation between % LIF and DRO concentration (ppm). The ROST gave a good indication of the DRO concentration based on the relative fluorescence, e.g. the higher the fluorescence the greater the concentration. The ROST results did not correlate with the laboratory samples for RRO (e.g. bunker C). The relative fluorescence (%LIF) did not correspond to a specific concentration of RRO. This is common for the very heavy end POLs (e.g. bunker C, coal tar, and creosote). The heavy end POLs create low signal levels. An analysis of the ROST data resulted in an accurate delineation of the boundaries between layers of the diesel fuel and bunker C contamination. Figure 3 provides a good indication of where a POL product was encountered but not necessarily the magnitude of concentration.

The ROST data generated from the investigation at Amaknak was further analyzed by Dakota Technologies and the fluorescence signal was separated (parsed) into diesel, bunker C, and background components. Further details regarding the parsing of the data are provided in Section 4.3.1. From this parsed data set, Figures 4 and 5 were generated to show plan view contour maps of the maximum “Diesel Fluorescence” and “bunker C Fluorescence” respectively across the entire site area.

It should be noted that while it is extremely useful for parsing ROST logs into separate components, the behavior of mixtures of fluorescent compounds is not linear or quantitatively well behaved. For instance, pure bunker C may yield a relatively low signal, for example 10%. Contamination of this bunker C by only 10% diesel may cause the signal to double to 20% – even though it’s obvious that the pure product cannot be doubled. There are numerous nuances to what fluorescent fuels and products do when they co-mingle. Sometimes one dominates the other even when its concentration is minor in comparison. While this did not seem to occur for the Amaknak site, it cannot be guaranteed that some of the quantitative results are skewed by this phenomenon.

The complete ROST™/LIF logs are provided in Appendix B.

#### 4.3.1 Parsing of the Data

The ROST log files produced in the field show a good delineation between the diesel, bunker C, and where the mixing occurs. The ROST files generated in the investigation were sent to Dakota Technologies, Inc (DTI) for further data interpretation. DTI has the capabilities of parsing the signals generated by the ROST and showing how much of the fluorescence signal is due to diesel, bunker C, and background. This is performed by DTI using their proprietary software.

A discussion of how the parsing occurs is provided below.

##### 4.3.1.1 Procedures for Parsing Data

The parsing of the fluorescence is performed by applying a non-negative least square fitting routine to the data to isolate the bunker C from any/all other POLs that may exist.

An initial data set was generated based on the following assumptions:

- a. AMK001 contained bunker C at 13-14 ft.
- b. AMK086 contained Diesel Fuel at 12-13 ft.
- c. AMK069 possibly contained Lube Oil at 1-3 ft.
- d. AMK025 possibly contained Transformer Oil at 9-9.5 ft.

This basis set was applied to the logs starting with AMK001 and working sequentially upwards. The results were promising until AMK013 and higher logs were analyzed. High residuals and/or “background robbing” (the assignment of excessively high contribution of the Background waveform) were encountered. Several issues were identified:

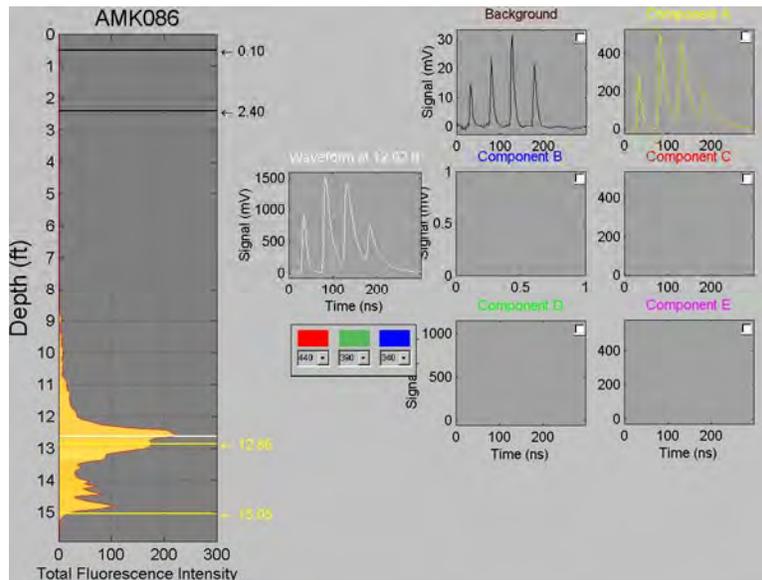
- The background signal (the system-generated contribution to the waveform that results from reflectance/emission of internal mirror, internal window surface, etc.), by coincidence, was a good match for a blend of diesel and bunker C at low concentrations.

- The Unknowns were also relatively good matches for various blends of the Background, Diesel, and bunker C Basis set. This raised the question of whether they really are unique products – or simply unique blends/conditions of mixtures.

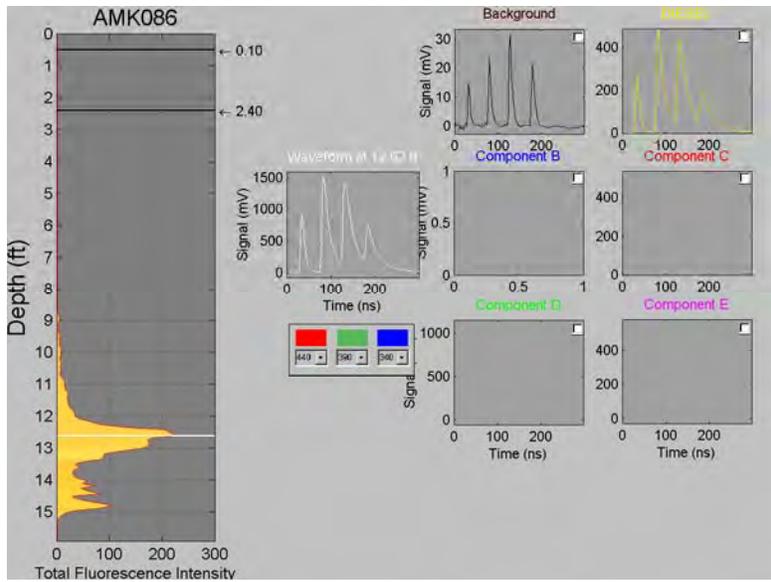
An alternative approach was taken to simplify the analyses – one that simply isolated the bunker C with emphasis on retaining accurate bunker C levels (reduce Background robbing of the relatively low level signals attained on bunker C.) The result would perhaps misappropriate the amount/type of diesel and other contaminants or background, but the main goal of project would be accomplished – that is the accurate isolation of the bunker C contamination into discrete depth vs. % fluorescence logs.

A new basis set of waveforms were chosen which included:

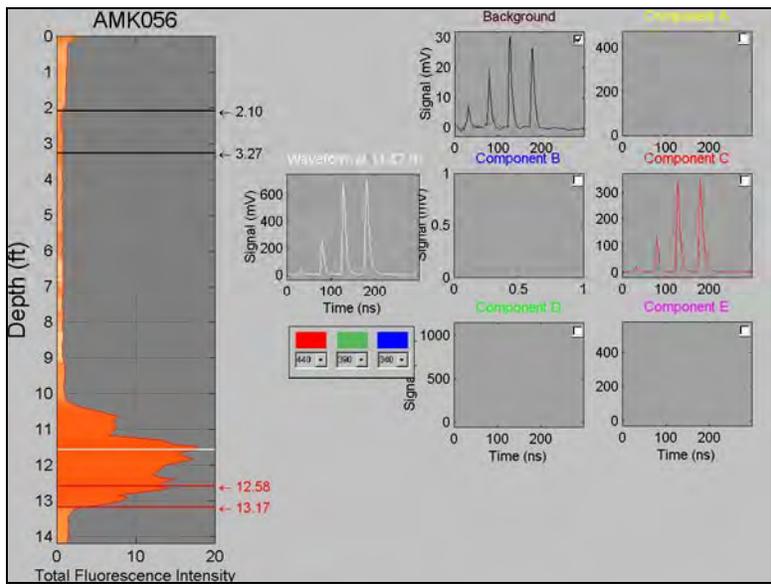
- Diesel from AMK086 - 12.86 ft to 15.05 ft (graphs 1 and 2)
- Bunker C from AMK056 – 12.58 ft to 13.7 ft. (graphs 3 and 4)
- Both basis set waveforms were background corrected (the background from the logs from which they were harvested was subtracted).



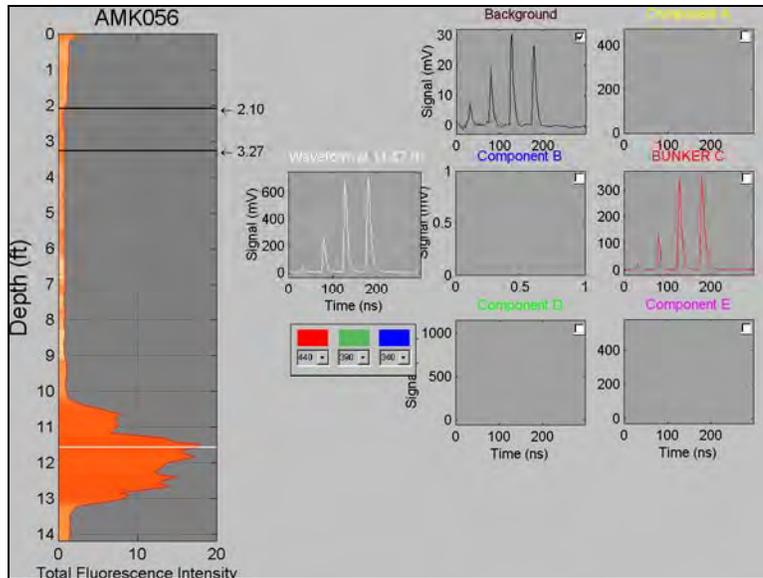
Graph 1. Harvesting Diesel waveform from AMK086.



Graph 2. Diesel waveform background-corrected and saved as DIESEL.



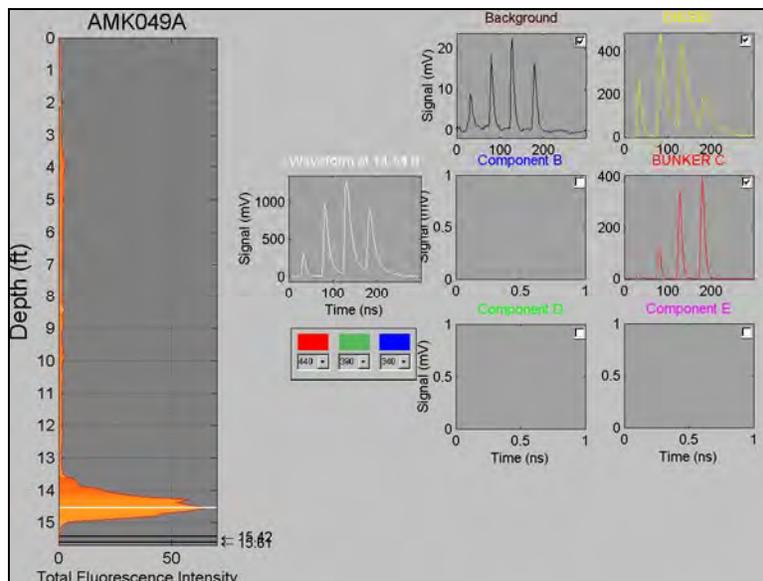
Graph 3. Bunker C waveform harvested from AMK056.



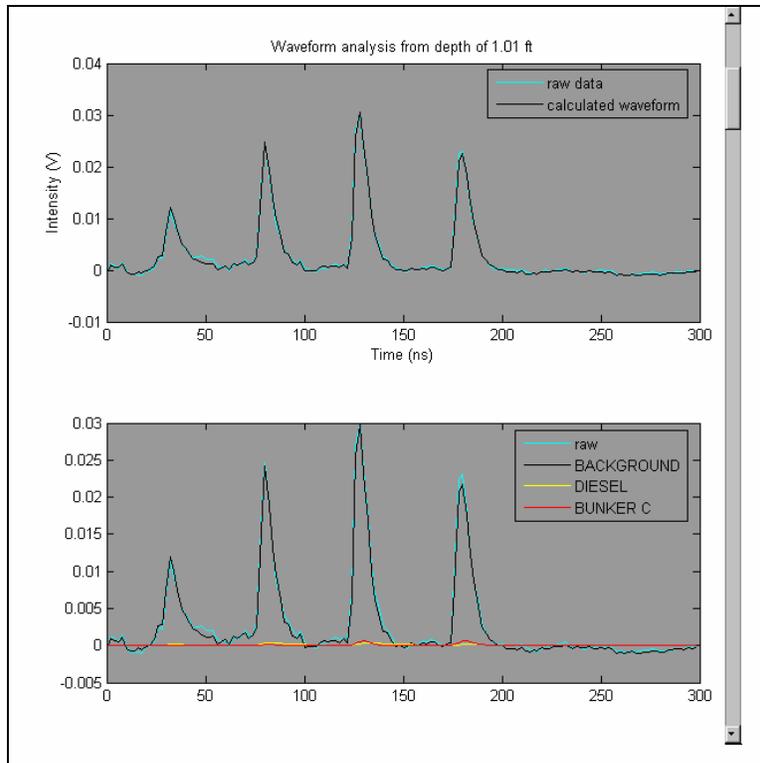
Graph 4. Bunker C waveform background-corrected and saved as BUNKER C.

Once the basis set was developed the analyses actually became straightforward. One at a time, the logs are loaded into the analyses software (written in Matlab). As an example, here is the process followed for a log.

- Basis Set is loaded (in this case DIESEL and BUNKER C) into the analyses software.
- The log is loaded (Graph 5) and a region best representing background (clean soil) is chosen (black cursors).

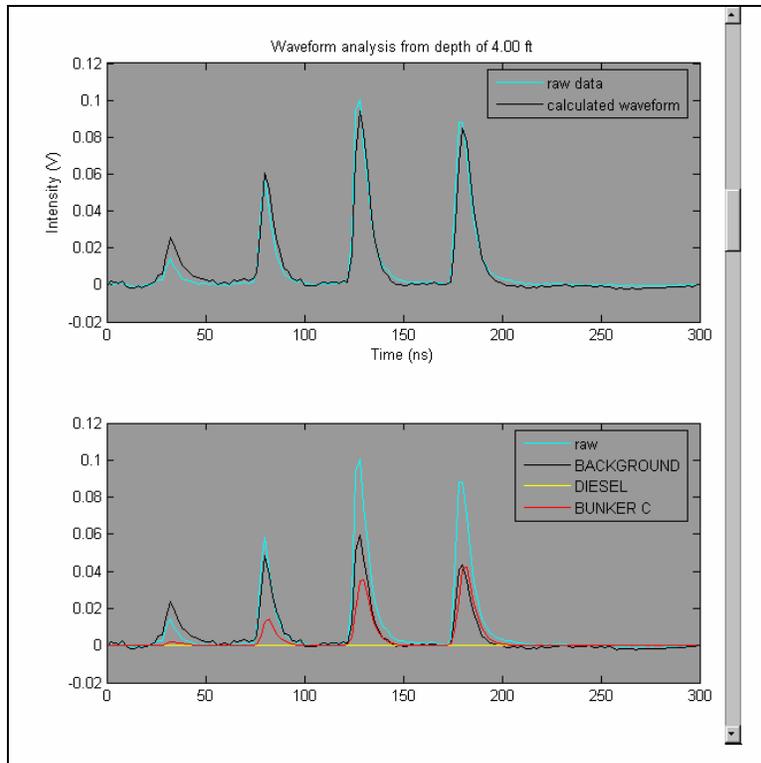


Graph 5. AMK049A loaded and background Basis waveform selected (black cursors).

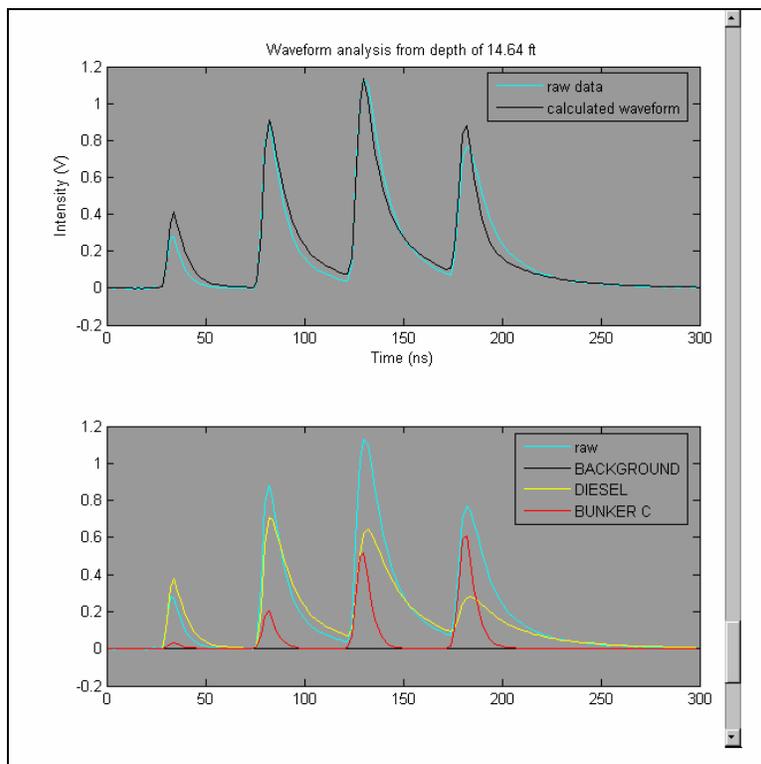


Graph 6. Screenshot of fitting AMK049A - results at 1.01 ft.

- A non-negative least square fit of each raw waveform is done using the Basis Set. As an example, Graph 6 shows the fit performed at 1.01 ft. The lower panel shows the raw waveform, along with the calculated contribution for each Basis waveform needed to provide the best fit to the raw waveform. Here the waveform is almost perfectly fit using only the Background waveform. In the upper panel the calculated waveform is shown along with the raw data waveform. The difference between the two is the Residual (difference between the calculated and the raw).
- Moving down the log to 4.00 ft (Graph 7), there is now a presence of BUNKER C and Background, with the calculated waveform fitting the raw waveform nicely.
- Working down to 14.64 ft (Graph 8), the raw waveform has begun to take on some of the characteristics of both BUNKER C and DIESEL, with little relative contribution by the Background. It indicates that this is where BUNKER C and DIESEL are “mixing”. The calculated waveform, while not a perfect match, clearly does a reasonable job of matching the raw waveform. Residuals at this depth of AMK049A were on the order of 5%, which was actually on the high end of the residuals for the logs analyzed for this site. Most of the Amaknak logs had residuals well below 1%, which is excellent among the many sites DTI has experience with.

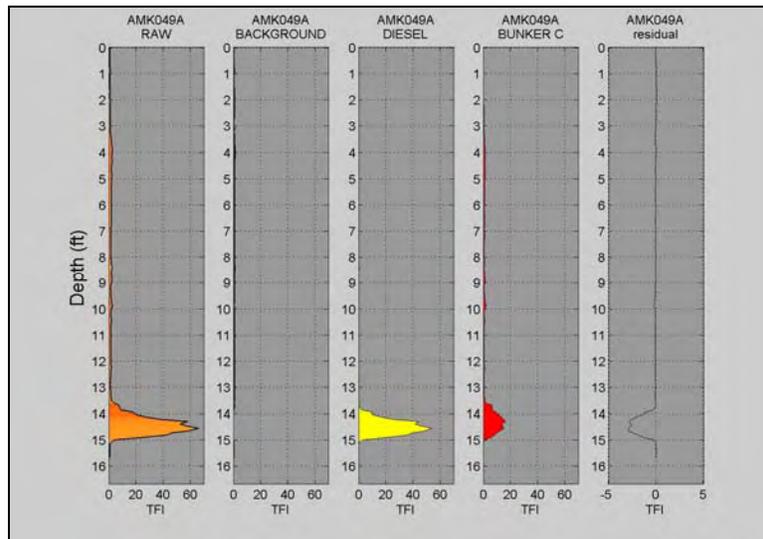


Graph 7. Screenshot of fitting AMK049A - results at 4.00 ft.



Graph 8. Screenshot of fitting AMK049A - results at 14.64 ft.

- Finally, the result for the entire log is graphically presented (Graph 9), JPG images of both the Setup and Result panels are saved to file, and the associated data are saved to ASCII text files that are readily imported into Excel. The raw data, each Basis waveform, and the residual (difference between fit and raw) are shown. The residual indicates the general goodness of fit vs. depth. The residuals is simply a tool for judging overall success in establishing an appropriate Basis Set and identifying the presence of “unknowns” that cannot be explained away as mixtures of Basis Set products. High residuals also occur when the detector is saturated. This occurs when the probe first encounters significant concentrations of product with depth and cannot rescale in time to avoid detector saturation.



Graph 9. Results of fitting AMK049A.

The analysis was successful and the logs show that what is understood to be BUNKER C (in a visual sense) was successfully isolated into the BUNKER C data set with very little loss to the Background set. Also, any “unknowns” or products that did not yield a perfect fit did not contribute significantly to the BUNKER C data set (they were not improperly attributed to BUNKER C).

#### 4.3.2 Power House Area

The work plan addressed the power house area as Area 1. Bunker C was evident in the ROST logs from this area. Figure 5 depicts a discontinuous plume of bunker C in the area near the power house and appears to be primarily along the eastern edge of the concrete pad. The bunker C in the power house area appears to be located within and influenced by the fluctuating groundwater table. The probe points (AMK010 to AMK013) located along Biorka Drive and the hillside were typically free of contamination. These probe points encountered refusal at approximately 6 to 7 ft bgs. Probes AMK014 and AMK019b show bunker C type fluorescence from 11 to 15 ft and 10 to 12 ft bgs, respectively. Probes AMK016, -018, and -029 are relatively free from bunker C fluorescence and refusal was encountered at 18.4 ft, 6.6, and 6.6 ft bgs, respectively. These three probes divide the power house area bunker C plume as depicted in Figure 5. These areas may very well be connected as refusal was encountered prior to reaching the groundwater depth within this disconnected zone. The utility corridor and roadway limited

the investigation in this area. Bunker C may exist in the subsurface within this area and the northern extent of the plume was not fully delineated.

Cross-section A – A' depicts a cross section of a Rockworks™ generated model of the bunker C plume. The cross-section follows a line of probe logs along Biorka Drive and towards the power house. Figure 6 shows the locations of all the cross sections. The cross-section shows the ground surface elevation, probe locations, and a depiction of the bunker C plume model. The bunker C in the power house area appears to be primarily within the groundwater zone.

#### 4.3.3 Buildings 549, 551, and 557

The work addressed the south and southeast side of Building 551 as Area 2. Due to the nature of the contamination, the areas around buildings 549, 551, and 557 were combined. The investigation of the northwest corner of the intersection of Delta Way and East Point Rd was limited to utility easements. No information was collected to determine the extent of POL contamination south of Delta Way and east of East Point Rd since rights of entry were not granted in this area.

Figure 4 depicts the area impacted by diesel type fuel and Figure 5 depicts the area impacted by bunker C. Both Figures 4 and 5 are generated using the parsed ROST data. Near surface bunker and diesel type fluorescence were encountered on the south side of Building 551 and especially in the vicinity of the southeast bay doors. Probes AMK052 through -055, -067, -069, -083, and -084 show bunker C and/or diesel mixtures from the surface or near surface up to 5 feet bgs. This could indicate that this area at one time was a source area for POL contamination being introduced into the subsurface. Cross-sections D-D', E-E', F-F', and G-G' show several different slices of the POL plume model in this area. Sections D-D' and E-E' run parallel with Delta Way and depict the anvil type plume from the near surface.

Cross-Section F-F' depicts the line parallel with East Point Rd and is along the eastern side of Building 551. Cross-Section G-G' depicts the line parallel with East Point Rd and runs through Building 551. Cross-Section H-H' passes along the western side of Building 551. There is a high likelihood that the free-phase petroleum product reported within the crawl space of Building 551 is a result of the source area on the southern side of Building 551 as depicted by cross-sections F and G.

The western and southwestern edge of the bunker C plume was bounded by the ROST as depicted on Figure 5. It appears that the bunker C did not impact the area around Building 547.

Another source area was discovered on the north side of the junction of Buildings 549 and 551 near probe AMK087. Cross sections B-B', C-C', G-G', and H-H' depict this area in further detail. This area appears to be a source for the diesel contamination on the north and west sides of Buildings 549 and 551 as well as underneath Building 551. Figure 4 depicts the plan view of the diesel contamination.

#### 4.3.4 Former Tank Farm Area

The majority of the bunker C contamination delineated with the ROST in the Former Tank Farm Area appears to be either on or near the bedrock interface or within the groundwater/soil interface. This is consistent with the interim removal actions that were conducted in 1998 and 1999, and from 2000 to 2002. ROST probe log AMK001 is a good example of this area. Log AMK001 shows the first 7.5 feet as background fluorescence, from 7.5 ft to 10 ft could be

treated soil with residual bunker C, and from 10 to 15 ft is typical of what remains in the groundwater and/or bedrock interface at the site. Only a small area appears not to have been excavated and is relatively close to the northwestern corner of building 551. Cross-Section H-H' depicts the non-excavated area in detail between probes AMK074 and AMK039. Cross-Sections B-B', C-C', F-F', and G-G' show further details of the Former Tank Farm Area.

#### 4.3.5 Monitoring Well 15 Vicinity (Area 3)

Area 3 was identified in the work plan as consisting of the area within an approximate 60 ft radius of monitoring well MW-15. Access to Area 3 was limited due to aboveground pipelines and load restrictions on the access road. Access to that area was achieved via crane on 23 May 2005. Investigation time was limited to the afternoon of 23 May 2005. The aboveground pipelines prevented any further investigation east of East Point Road from the Delta Western Fuel Dock area to just north of MW-15 (see photos of Area 3 in Appendix A). Probe points AMK097 through AMK100 were completed in this area. Probe AMK097 identified a light-end weathered fuel from 12 to 14.5 ft bgs with a maximum fluorescence of approximately 11%. The analytical results from AMK097 show predominately GRO. AMK098 and AMK099 were consistent with background. Probe AMK100 identified a light-end weathered fuel at 13.4 ft with fluorescence at 3%.

#### 4.3.6 East of East Point Road and Area 4

This area of the investigation consists of the land east of East Point Road and north of the junction with Delta Way. This area is predominately the staging area for crab pots. A total of 11 ROST probes were pushed in this area. Probes AMK089, -090, -095, and -096 were placed east of the power house location. Probes were pushed to refusal between 7.5 and 16 ft bgs. The parsed data shows bunker C and diesel were detected in all 4 probes. A small area of near surface diesel contamination was found at AMK095, most likely a result of a surface spill. The bunker and diesel impacts in this area appear to be significantly less than the powerhouse and Former Tank Farm areas.

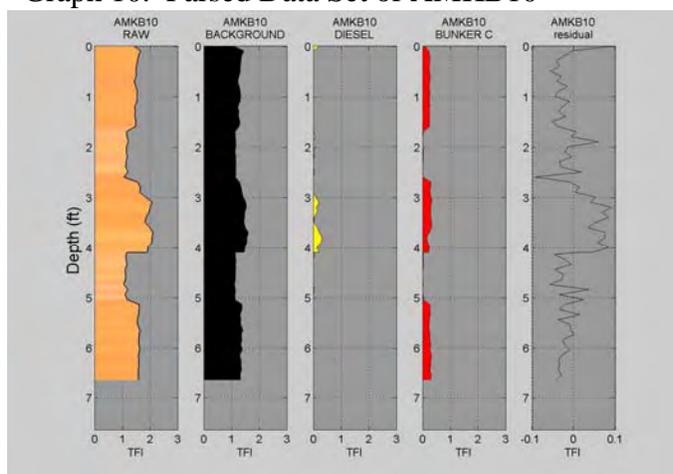
Two probes (AMK030a, and AMK032a) were completed to depths of 21 and 17 ft bgs respectively, across the road from the Former Tank Farm Area, and east of East Point Road. Probe AMK031 could only be driven to a depth of 1.3 ft after numerous attempts. This area along the road is reported to be filled with "shot" rock. No additional probes were attempted in this immediate area due to the potential damage and loss of equipment (see pictures in Appendix A). Bunker C was encountered from 6 to 17 feet in AMAK030a and from 4 to 17 feet in AMK032a. These two probes are included on Cross-Sections B-B' and C-C'. The profiles in probes AMK030a and -032a were typical of the contamination that was encountered across the street at the Former Tank Farm Area.

Four ROST probes (AMK091 through AMK094) were placed northeast of Building 551, on the east side of the East Point Road. AMK091 depicts bunker C contamination from 10 to 14 ft bgs and is included on cross-section E-E'. AMK093 depicts bunker C contamination from 11.5 to 16 ft bgs and is included on Cross-Section D-D'. Both of these probes are consistent with what was encountered on the south and east side of Building 551. AMK092 shows no significant contamination other than bunker C like fluorescence from the surface to 1 ft and from 4 to 5 ft bgs. AMK092 was placed in close proximity to monitoring well MW-12. AMK094 was located approximately 50 ft north of AMK092 and bunker C fluorescence was encountered from 10 to

13 ft bgs. All the contamination in this area (with the exception of AMK092) appears to be within the soil/groundwater interface.

Ten samples were collected along the beach at the high water tide line. Samples were collected from approximately 1 foot bgs. Samples were placed in a zip-loc bag and homogenized. The samples were then placed on the ROST window to obtain a simulated fluorescence reading. This procedure was repeated 3 times for each sample. The ROST logs indicated that the fluorescence is slightly elevated background. However, the parsed beach-screening ROST logs tend to generally show a very low level bunker C response with an occasional diesel component as depicted in the graph below of ROST probe AMKB10. A soil sample from AMKB10 was sent to the lab for analysis which confirmed low levels DRO and RRO at (292 mg/kg and 456 mg/kg respectively). Sampling results are also provided in Section 4.5.

Graph 10. Parsed Data Set of AMKB10



#### 4.4 ROST/LIF Data Qualifications

System errors can occur while pushing the ROST/LIF probe, if so that location is re-probed until a useable dataset is acquired. Exaggerated background readings or loss of signal from the LIF probe are the usual indications that a problem has occurred. Typical problems include: cracked sapphire window, software errors, and/or electronic malfunctions. Table 1 provides a summary of the logs with descriptions of the data acquired, problems that may have occurred, and where background interference was suspected.

Table 1

Log Number	Observations
AMK001	10 - 15 ft: Fuel fluorescence - heavy-end type fuel All remaining fluorescence is background – with no major indication of contamination present. Log terminated at refusal @ 15 ft.

Log Number	Observations
AMK001a	<p>10 - 16 ft: Fuel fluorescence - heavy-end type fuel</p> <p>All remaining fluorescence is background – with no major indication of contamination present.</p> <p>This is a duplicate push point to verify refusal and to show the variation in the soil column.</p> <p>Log terminated at refusal @ 16 ft.</p>
AMK002	<p>10.7 - 11 ft: Fuel fluorescence - light-end type fuel possible diesel</p> <p>11.8 – 15.5 ft: Fuel fluorescence - heavy-end type fuel</p> <p>All remaining fluorescence is background – with no major indication of contamination present.</p> <p>Log terminated at refusal @ 15.5 ft.</p>
AMK003	<p>10 - 11 ft: potential fuel fluorescence - heavy-end type fuel</p> <p>12 – 14 ft: potential fuel fluorescence - heavy-end type fuel</p> <p>All remaining fluorescence is background – with no major indication of contamination present.</p> <p>Log terminated at refusal @ 16.5 ft.</p>
AMK004	<p>8 - 11 ft: fuel fluorescence - heavy-end type fuel</p> <p>13 – 18 ft: potential fuel fluorescence - heavy-end type fuel or elevated background</p> <p>All remaining fluorescence is background – with no major indication of contamination present.</p> <p>Log terminated at refusal 18 ft.</p>
AMK005	<p>11 - 16 ft: fuel fluorescence - heavy-end type fuel</p> <p>All remaining fluorescence is background – with no major indication of contamination present.</p> <p>Log terminated at refusal 16.75 ft.</p>
AMK006	<p>6.5 - 8 ft: potential fuel fluorescence - heavy-end type fuel</p> <p>All remaining fluorescence is background – with no major indication of contamination present.</p> <p>Log terminated at refusal 8.5 ft.</p>
AMK007	<p>11 – 12.75 ft: potential fuel fluorescence - heavy-end type fuel</p> <p>All remaining fluorescence is background – with no major indication of contamination present.</p> <p>Log terminated at refusal 13.5 ft.</p>
AMK008 AMK008a AMK008b	<p>Refusal at 3.5 ft – subsurface obstruction</p> <p>Refusal at 2.6 ft – subsurface obstruction. Laser recharged after AMK008a.</p> <p>Background is off due to debris on window or mirror</p>

Log Number	Observations
AMK008c	<p>3 – 4 ft: potential fuel fluorescence - light-end type fuel</p> <p>10 – 12 ft: potential fuel fluorescence - heavy-end type fuel or elevated background</p> <p>18 – 18 ft: fuel fluorescence - heavy-end type fuel</p> <p>All remaining fluorescence is background – with no major indication of contamination present.</p> <p>Log terminated at refusal 17.5 ft.</p>
AMK009	<p>1 – 2 ft: fuel fluorescence - heavy-end type fuel</p> <p>11 – 15 ft: potential fuel fluorescence - light-end type fuel</p> <p>All remaining fluorescence is background – with no major indication of contamination present.</p> <p>Log terminated at refusal 21 ft.</p>
AMK010	<p>All fluorescence appears to be elevated background – with no major indication of contamination present.</p> <p>Log terminated at refusal 6 ft.</p>
AMK011	<p>All fluorescence appears to be elevated background – with no major indication of contamination present.</p> <p>Log terminated at refusal 5.5 ft.</p>
AMK012	<p>All fluorescence appears to be elevated background – with no major indication of contamination present.</p> <p>Log terminated at refusal 7 ft.</p>
AMK013	<p>All fluorescence appears to be elevated background – with no major indication of contamination present.</p> <p>Log terminated at refusal 6.5 ft.</p>
AMK014	<p>11 – 15 ft: potential fuel fluorescence – heavy-end type fuel</p> <p>All remaining fluorescence is elevated background – with no major indication of contamination present.</p> <p>Log terminated at refusal 15 ft.</p> <p>Background off due to dust on mirror. Replace mirror prior to AMK015</p>
AMK015	<p>3 – 7 ft: potential fuel fluorescence - heavy-end type fuel or elevated background</p> <p>All remaining fluorescence is background – with no major indication of contamination present.</p> <p>Log terminated at refusal 10.5 ft.</p>
AMK016	<p>0 – 1 ft: fuel fluorescence – gasoline – appears to be surface spill</p> <p>All remaining fluorescence appears to be elevated background – with no major indication of contamination present above background.</p> <p>Log terminated at refusal 18.5 ft.</p>

Log Number	Observations
AMAK017c	<p>3 – 4.7 ft: potential fuel fluorescence - heavy-end type fuel or elevated background</p> <p>9.7 – 11.6 ft: fuel fluorescence - heavy-end type fuel</p> <p>All remaining fluorescence is background – with no major indication of contamination present.</p> <p>Log terminated at refusal 14 ft.</p>
AMAK018	<p>All fluorescence is elevated background – with no major indication of contamination present.</p> <p>Log terminated at refusal 6.5 ft.</p>
AMAK019b	<p>4 – 12 ft: fuel fluorescence - heavy-end type fuel or elevated background</p> <p>All remaining fluorescence is background – no major indication of elevated contamination.</p> <p>Log terminated at refusal 14 ft.</p>
AMAK020	<p>8.3 – 9.2 ft: potential fuel fluorescence - heavy-end type fuel or elevated background</p> <p>All remaining fluorescence is background – with no major indication of contamination present.</p> <p>Log terminated at refusal 10 ft.</p>
AMAK021	<p>8.2 – 11.7 ft: fuel fluorescence - heavy-end type fuel</p> <p>All remaining fluorescence is background – with no major indication of contamination present.</p> <p>Log terminated at refusal 12 ft.</p>
AMAK022	<p>7.5 – 11.2 ft: Fuel fluorescence – probable heavy-end type fuel</p> <p>5.8 – 11.0 ft: Fuel fluorescence – probable heavy-end type fuel</p> <p>All remaining fluorescence is background – with no major indication of elevated contamination.</p> <p>Log terminated at refusal 11.75 ft.</p>
AMAK023	<p>7.5 – 11.2 ft: Fuel fluorescence – probable heavy-end type fuel</p> <p>All remaining fluorescence is background – with no major indication of elevated contamination.</p> <p>Log terminated at refusal 11.5 ft.</p>
AMAK024	<p>0.7 – 1.0 ft: Fuel fluorescence – probable light-end type fuel possible surface spill</p> <p>7.3 – 9.5 ft: Fuel fluorescence – probable heavy-end type fuel</p> <p>All remaining fluorescence is background – with no major indication of elevated contamination.</p> <p>Log terminated at refusal 9.5 ft.</p>

Log Number	Observations
AMAK025	7.0 – 8.7 ft: Potential fuel fluorescence – heavy-end type fuel possible 8.7 – 10.0 ft: Fuel fluorescence – heavy-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at refusal 10.25 ft.
AMAK026	6.4 – 7 ft: Potential fuel fluorescence – probable heavy-end type fuel possible All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at refusal 7 ft.
AMAK027	0.6 – 0.8 ft: Potential fuel fluorescence – light-end type fuel possible 4.3 – 4.5 ft: Fuel fluorescence – light-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at refusal 6.5 ft.
AMAK028	2.6 – 4.5 ft: Potential fuel fluorescence – heavy-end type fuel possible All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at refusal 6 ft.
AMAK029	0.6 – 0.95 ft: Potential fuel fluorescence – light-end type fuel possible, possible surface spill 1.5 – 2.5 ft: Fuel fluorescence – heavy-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated to prevent damage to rods. Log terminated at refusal 6.75 ft.
AMAK030a	4.21 ft: Potential fuel fluorescence – light-end type fuel possible 6 – 9 ft: Fuel fluorescence – heavy-end type fuel 10 – 11 ft: Fuel fluorescence – heavy-end type fuel 13 – 19 ft: Fuel fluorescence – heavy-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at refusal 21.5 ft.
AMAK031	Four attempts were made to place a probe at this location. Data could only be collected on the first 1.3 ft.

Log Number	Observations
AMAK032a	<p>4.2 – 7.0 ft: Potential fuel fluorescence – heavy-end type fuel possible</p> <p>9.9 – 10.2 ft: Fuel fluorescence – possible mixture of light &amp; heavy-end type fuels</p> <p>10.6 – 15.2 ft: Fuel fluorescence – heavy-end type fuel</p> <p>15.3 – 16.3 ft: Fuel fluorescence – possible mixture of light &amp; heavy-end type fuels</p> <p>All remaining fluorescence is background – with no major indication of elevated contamination.</p> <p>Log terminated at 17ft – very heavy hammering and below groundwater table.</p>
AMAK033	<p>1.5 – 1.7 ft: Potential fuel fluorescence – light-end type fuel possible</p> <p>6.6 – 9.8 ft: Fuel fluorescence – heavy-end type fuel</p> <p>All remaining fluorescence is background – with no major indication of elevated contamination.</p> <p>Log terminated at 10 ft due to very heavy hammering</p>
AMAK034	<p>1.16 &amp; 1.93 ft: Potential fuel fluorescence – light -end type fuel possible</p> <p>6 – 13.5 ft: Fuel fluorescence – heavy-end type fuel</p> <p>All remaining fluorescence is background – with no major indication of elevated contamination.</p> <p>Log terminated at 13.5 ft</p>
AMAK035	<p>0.7 ft: Potential low fuel fluorescence – light-end type fuel possible</p> <p>4.6 – 4.9 ft: Potential low fuel fluorescence – light-end type fuel possible</p> <p>7 – 13.7 ft: Fuel fluorescence – heavy-end type fuel</p> <p>All remaining fluorescence is background – with no major indication of elevated contamination.</p> <p>Log terminated at 13.7 ft.</p>
AMAK036	<p>5.8 – 13.6 ft: Fuel fluorescence – heavy-end type fuel</p> <p>All remaining fluorescence is background – with no major indication of elevated contamination.</p> <p>Log terminated at 14.3 ft.</p>
AMAK037	<p>6.6 – 12.6 ft: Fuel fluorescence – heavy-end type fuel</p> <p>12.7 – 14 ft: Fuel fluorescence – light-end type fuel</p> <p>All remaining fluorescence is background – with no major indication of elevated contamination.</p> <p>Log terminated at 14 ft.</p>
AMAK038	<p>6 – 13.8 ft: Fuel fluorescence – heavy-end type fuel</p> <p>All remaining fluorescence is background – with no major indication of elevated contamination.</p> <p>Log terminated at 15.5 ft.</p>

Log Number	Observations
AMAK039a	4.5 – 15 ft: Fuel fluorescence – heavy-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 18 ft.
AMAK040	6.8 – 13 ft: Fuel fluorescence – heavy-end type fuel 13 – 14.1 ft: Fuel fluorescence – light-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 15.6 ft.
AMAK041	7.8 – 13.3 ft: Fuel fluorescence – light-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 19.5 ft.
AMAK042	7 – 8 ft: Potential fuel fluorescence – heavy-end type fuel possible 11.8 – 12.7 ft: Fuel fluorescence – light-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 19.4 ft.
AMAK043	8 – 10 ft: Potential fuel fluorescence – heavy-end type fuel possible 10 – 13.2 ft: Fuel fluorescence – light-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 14 ft.
AMAK044	5.8 – 9.3 ft: Potential Fuel fluorescence – heavy-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 18.9 ft.
AMAK045	6.5 – 9.8 ft: Potential fuel fluorescence – heavy-end type fuel possible 11.6 – 14.2 ft: Fuel fluorescence – light-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 15 ft.
AMAK046	1 – 2 ft: Fuel fluorescence – light-end type fuel possible 4 – 5.4 ft: Fuel fluorescence – heavy-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 17.4 ft.

Log Number	Observations
AMAK047	11 – 15.5 ft: Fuel fluorescence – light-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 17.8 ft.
AMAK048b	0.3 – 0.5 ft: Fuel fluorescence – light-end type fuel possible 7 – 10.3 ft: Potential fuel fluorescence – heavy-end type fuel possible 10.3 – 14.7 ft: Fuel fluorescence – light-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 15.4 ft.
AMAK049a	3.4 – 13.5 ft: Potential fuel fluorescence – heavy-end type fuel possible 13.5 – 15.1 ft: Fuel fluorescence – mixture of heavy & light-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 15.7 ft.
AMAK050	0 – 1 ft: Diesel fuel fluorescence – Surface spill 10.5 – 15.2 ft: Fuel fluorescence – heavy-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 17.2 ft.
AMAK051a	10 – 16.4 ft: Fuel fluorescence – heavy-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 17.5 ft.
AMAK052	0 – 6 ft: Fuel fluorescence – heavy-end type fuel 10.2 – 15.8 ft: Fuel fluorescence – heavy-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 17.9 ft.
AMAK053	0 – 1.6 ft: Fuel fluorescence – heavy-end type fuel 9.8 – 15 ft: Fuel fluorescence – heavy-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 17.4 ft.
AMAK054	0 – 6.8 ft: Fuel fluorescence – heavy-end type fuel 9.6 – 15.8 ft: Fuel fluorescence – heavy-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 17.3 ft.

Log Number	Observations
AMAK055	Computer lost power just prior to terminate log. Data may be available.
AMAK055a	0 – 0.3 ft: Fuel fluorescence – heavy-end type fuel 10 – 17 ft: Fuel fluorescence – heavy-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 18.2 ft.
AMAK056	10.3 – 13.3 ft: Fuel fluorescence – heavy-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 14.2 ft.
AMAK057	8.6 – 13.4 ft: Fuel fluorescence – heavy-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 15.9 ft.
AMAK058	10.9 – 12.1 ft: Fuel fluorescence – mixture heavy & light -end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 15.8 ft.
AMAK059	All fluorescence appears to be background – with no major indication of elevated contamination. Log terminated at 17.1 ft.
AMAK060	1.63 ft: Potential fuel fluorescence – light -end type fuel possible surface spill <1% fluorescence. All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 15.8 ft.
AMAK061	All fluorescence appears to be background – with no major indication of elevated contamination. Log terminated at 15.9 ft.
AMAK062	1.59 ft: Potential fuel fluorescence – light -end type fuel possible surface spill = 1% fluorescence. 11.2 – 12 ft: Potential Fuel fluorescence – heavy-end type fuel possible All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 15.6 ft.
AMAK063	All fluorescence appears to be background – with no major indication of elevated contamination. Log terminated at 15.9 ft.

Log Number	Observations
AMAK064	<p>3.2 – 4.3 ft: Fuel fluorescence – light-end type fuel &lt;2% fluorescence  All remaining fluorescence is background – with no major indication of elevated contamination.  Log terminated at 15.3 ft.</p>
AMAK065	<p>9.7 – 12 ft: Fuel fluorescence – mixture of heavy &amp; light-end type fuel  All remaining fluorescence is background – with no major indication of elevated contamination.  Log terminated at 15.7 ft.</p>
AMAK066	<p>1.95 – 2.5 ft: Fuel fluorescence – light-end type fuel &lt;1.1% fluorescence  10 – 12.75 ft: Fuel fluorescence – mixture of heavy &amp; light-end type fuel  All remaining fluorescence is background – with no major indication of elevated contamination.  Log terminated at 14.8 ft.</p>
AMAK067	<p>0 – 2 ft: String pot connection malfunction.  5 ft: Fuel fluorescence – light-end type fuel &lt;1.1% fluorescence  11.3 ft: Fuel fluorescence – light-end type fuel &lt;1.1% fluorescence  11.5 – 16.8 ft: Fuel fluorescence – mixture of heavy &amp; light-end type fuel  All remaining fluorescence is background – with no major indication of elevated contamination.  Log terminated at 18.2 ft.</p>
AMAK068	<p>0.5 – 0.9 ft: Fuel fluorescence – light-end type fuel &lt;1.5% fluorescence possible surface spill  Appears to be a buried concrete as part of the former ramp at this location.  All remaining fluorescence is background – with no major indication of elevated contamination.  Log terminated at 1 ft.</p>
AMAK069	<p>0 – 15 ft: Fuel fluorescence – mixture of heavy &amp; light-end type fuel  All remaining fluorescence is background – with no major indication of elevated contamination.  Log terminated at 16.8 ft.</p>
AMAK070	<p>All fluorescence appears to be background – with no major indication of elevated contamination.  Log terminated at 6.8 ft due to refusal.</p>
AMAK070a	<p>All fluorescence appears to be background – with no major indication of elevated contamination.  Log terminated at 17.4 ft.</p>
AMAK071	<p>All fluorescence appears to be background – with no major indication of elevated contamination.  Log terminated at refusal - 16 ft.</p>

Log Number	Observations
AMAK072	<p>3.1 – 4 ft: Fuel fluorescence – light-end type fuel &lt;1% fluorescence.</p> <p>All remaining fluorescence is background – with no major indication of elevated contamination.</p> <p>Log terminated at 15.9 ft.</p>
AMAK073	<p>All fluorescence appears to be background – with no major indication of elevated contamination.</p> <p>Log terminated at 15.6 ft.</p>
AMAK074	<p>All fluorescence appears to be background – with no major indication of elevated contamination.</p> <p>Log terminated at refusal – 14.1 ft.</p>
AMAK075	<p>Unknown computer error in reading log. Data may be available.</p> <p>From notes on the log:</p> <p>10 – 15 ft: Potential fuel fluorescence – possible heavy-end type fuel, fluorescence 2-4%.</p> <p>All fluorescence appears to be background – with no major indication of elevated contamination.</p> <p>Log terminated at refusal – 16.5 ft.</p>
AMAK076	<p>11.25 – 13.9 ft: Fuel fluorescence – heavy-end type fuel</p> <p>All remaining fluorescence is background – with no major indication of elevated contamination.</p> <p>Log terminated at 15.7 ft.</p>
AMAK077	<p>6.9 – 14.1 ft: Fuel fluorescence – heavy-end type fuel</p> <p>All remaining fluorescence is background – with no major indication of elevated contamination.</p> <p>Log terminated at 16.8 ft.</p>
AMAK078	<p>10.7 – 17 ft: Fuel fluorescence – heavy-end type fuel</p> <p>Indication of light end fuel at 14.2 ft.</p> <p>All remaining fluorescence is background – with no major indication of elevated contamination.</p> <p>Log terminated at 17.1 ft.</p>
AMAK079	<p>11 – 14 ft: Fuel fluorescence – heavy-end type fuel</p> <p>All remaining fluorescence is background – with no major indication of elevated contamination.</p> <p>Log terminated at refusal - 15.7 ft.</p>
AMAK080	<p>11.7 – 15 ft: Fuel fluorescence – heavy-end type fuel</p> <p>All remaining fluorescence is background – with no major indication of elevated contamination.</p> <p>Log terminated at 17.2 ft.</p>

Log Number	Observations
AMAK081	2.75 – 3.2 ft: Fuel fluorescence – light-end type fuel fluorescence <1.5% 5 – 10 ft: Potential Fuel fluorescence – heavy-end type fuel 11 – 17.5 ft: Fuel fluorescence – heavy-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 18.3 ft.
AMAK082	6.5 – 16.2 ft: Fuel fluorescence – heavy-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 18.7 ft.
AMAK083	0 – 0.7 ft: Fuel fluorescence – heavy-end type fuel 10 – 16 ft: Fuel fluorescence – heavy-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 17.2 ft.
AMAK084	0 – 9 ft: Fuel fluorescence – mixture of heavy & light-end type fuel 10 – 16 ft: Fuel fluorescence – heavy-end type fuel, possible mixture All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 18 ft.
AMAK085	11 – 15.3 ft: Fuel fluorescence – light-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 16.1 ft.
AMAK086	8.9 – 15.3 ft: Fuel fluorescence – light-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 15.9 ft.
AMAK087	3.2 – 3.5 ft: Fuel fluorescence – heavy-end type fuel 3.5 – 7.2 ft: Fuel fluorescence – light-end type fuel 7.2 – 10 ft: Fuel fluorescence – mixture of heavy & light-end type fuel 10 – 13.5 ft: Fuel fluorescence – heavy-end type fuel 13.5 – 15 ft: Fuel fluorescence – mixture of heavy & light-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 16 ft.
AMAK088	All fluorescence appears to be background – with no major indication of elevated contamination. Log terminated at refusal – 16.1 ft.

Log Number	Observations
AMAK089	9.7 – 10.1 ft: Potential fuel fluorescence – possible heavy-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at refusal - 11.6 ft.
AMAK090	All fluorescence appears to be background – with no major indication of elevated contamination. Log terminated at refusal – 13.3 ft.
AMAK091	9.5 – 13.8 ft: Fuel fluorescence – mixture of heavy & light-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 16.1 ft.
AMAK092	0 – 1 ft: Fuel fluorescence – heavy-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at refusal - 17 ft.
AMAK093	11.5 – 15.5 ft: Fuel fluorescence – heavy-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at 17 ft.
AMAK094	9.7 – 11.2 ft: Fuel fluorescence – heavy-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Color variations may be due to dust within the SPOC. Log terminated at 15.7 ft.
AMAK095	1 – 1.5 ft: Fuel fluorescence – light-end type fuel, possible surface spill All remaining fluorescence is background – with no major indication of elevated contamination. Color variations may be due to dust within the SPOC. Log terminated at refusal – 7.5 ft.
AMAK096	All fluorescence appears to be background – with no major indication of elevated contamination. Color variations may be due to dust within the SPOC. Log terminated at 15.7 ft.
AMAK097	9.1 – 11.6 ft: Fuel fluorescence – light-end type fuel < 1.5% fluorescence 12.3 – 14.5 ft: Fuel fluorescence – mixture of heavy & light-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at refusal – 15.6 ft.
AMAK098	All fluorescence appears to be background – with no major indication of elevated contamination. Log terminated at 15.2 ft.

<b>Log Number</b>	<b>Observations</b>
AMAK099	All fluorescence appears to be background – with no major indication of elevated contamination. Log terminated at refusal –12.7 ft.
AMAK100	13.3 – 13.5 ft: Fuel fluorescence – mixture of heavy & light-end type fuel All remaining fluorescence is background – with no major indication of elevated contamination. Log terminated at refusal – 14.3 ft.
<b>Beach Sample Location</b>	The following samples were collected along the beach at approximately the high water tide location. Samples were collected from approximately 1 foot bgs. Samples were placed in a zip-loc bag and homogenized. The samples were then placed on the ROST 3-times for a fluorescence reading.
AMKB01	East of power plant.
AMKB02	East of the concrete pad near the power plant.
AMKB03	East of the north-end of the crab-pot staging area.
AMKB04	South of B3 and east of the crab-pot staging area.
AMKB05	South of B3 and east of the crab-pot staging area; location under an abandoned fuel pipeline.
AMKB06	East of the Samson Tug & Barge building.
AMKB07	Under the current fuel loading/distribution center.
AMKB08	East of the southern most building – north corner.
AMKB09	East of the southern most building – south corner.
AMKB10	From the outfall of a discharge pipe.

#### 4.5 Soil Samples

A total of 17 soil samples were collected and analyzed by NCA labs. All of the soil samples were analyzed for diesel and residual range organics (DRO and RRO) by ADEC Methods AK102 and AK103, and PAHs by method 8270 SIMS. During the progression of field work, the USACE Project Delivery Team (PDT) determined to only analyze selected samples for GRO (by ADEC Method AK101) and not every sample as specified by the work plan. The first five samples collected were not analyzed for GRO since these were collected in areas where GRO was not suspected and confirmed with ROST results.

Selected samples were also analyzed for DRO by optimized GC using method 8015B at the Corps of Engineers Laboratory located in Omaha, NE. The chromatograms from these results would assist in comparing the results across the site. The locations for the confirmation samples were then chosen not only in each area of concern throughout the site, but also each unique layer of LIF response (e.g. probe AMK087 showed 4 unique florescent zones). The optimized results are presented in section 4.5.2.

The subsurface soil samples were collected within a foot laterally from the corresponding LIF probe point using a Geoprobe Macroprobe™. Table 2 shows the sampling results for methods AK101, 102 and 103 and the corresponding exsitu LIF readings. Results from method 8015B are reported in section 4.5.2. After collecting the subsurface soil samples, three portions of the homogenized soil were placed on the ROST probe window to obtain a LIF reading from the same soil that would be analyzed by the laboratory. This exsitu average LIF reading is presented in the column labeled LIF Avg. (ex-situ).

**TABLE 2**

Sample ID	LIF Location	Sample Depth	Results	Flag	Results	Flag	Results	Flag	LIF Avg
05AMAK-	AMK-	(ft)	DRO (mg/kg)		RRO (mg/kg)		GRO (mg/kg)		(exsitu)
01SO	001	3-4	164	D-09	948		NA		0.84 %
02SO	001	12-13	9,120	D-15	10,800	D-15	NA		3.36 %
03SO	074	3-4	7.55	D-09	30.3		NA		1.59 %
04SO	017c	10-11	5,410	D-15	6,290	D-15	NA		2.63 %
05SO	041	4-5	3.22	J	7.93	J	NA		1.58 %
06SO	041	12-13	637		112	J	1.01	J	13.50 %
07SO	097	12-14	30.4		10.9	J	415		2.15 %
08SO	069	1-3	1,300		6,820		0.624	J	19.65 %
09SO	069	4-5	2.54	J	7.01	J	0.45	J	1.60 %
10SO	069	11.5-13	16,000		9,790		208	G-02	12.01 %
11SO	069	11.5-13QC	13,800		8,530		133	G-02	13.21 %
12SO	087	3-4	7,600		2,820		95.3	G-02	10.06 %
13SO	087	4.5-6	19,300		1,260	J	1,090	G-02	27.68 %
14SO	087	11-12	8,280		3,120		133	G-02	21.18 %
15SO	087	11-12	10,000		3,950		NA		21.18 %
16SO	087	14-15	280		40.6	J	7.49	G-02	8.17 %
17SO	B10	1	292	D-06	456	D-06	NA		1.11 %

Notes:

mg/kg milligrams per kilogram

NA Not Analyzed

J The quantitation is estimated

D-06 The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

D-09 Results in the diesel organics range are primarily due to overlap from a heavy oil range product.

D-15 Hydrocarbon pattern most closely resembles a Heavy Fuel Oil Range product.

G-02 The chromatogram for this sample does not resemble a typical gasoline pattern. Please refer to the sample chromatogram.

The laboratory report for soil samples analyzed for this investigation is included in Appendix C.

One sample anomaly is worth noting. Sample 05AMK16SO was located at probe point AMK087 at a depth of 14 to 15 ft bgs. The probe fluorescence at AMK087 from 14 to 15 ft bgs ranged from 18 to 55 % with an average of 39 % over that one ft interval. The ex-situ sample had a fluorescence range of 4 – 20 % and an average of approximately 8%. The samples that were sent to both analytical labs were visually stained and had a strong olfactory odor.

#### 4.5.1 Correlation of ROST LIF values versus Laboratory Results

A correlation between LIF readings and POL concentrations is typically accomplished by comparing analytical results of soil samples to insitu LIF readings from the same depth and to exsitu LIF readings taken directly from soil sent to the lab. However, as the concentration of bunker C increases its fluorescence response does not increase. Due to the multiple petroleum products present at this site and the mixing of those compounds in the subsurface the LIF data can not be correlated to the laboratory data in a meaningful way site-wide. It is possible to correlate the diesel impacted soil data by just using the soil samples impacted by only the light-end fuels. These samples include: 05AMAK03SO, 05AMAK05SO, 05AMAK06SO, 05AMAK07SO, 05AMAK14SO, and 05AMAK15SO.

Chart 1 shows the ex-situ percent fluorescence versus the sum of the DRO, GRO and RRO concentrations. The correlation value ( $R^2$ ) of this data is 0.84. This statistical analysis demonstrates that the LIF probe relatively accurately predicts the lighter-end POL contamination levels.

Another critical variable in looking at the correlation of the LIF data to the lab data is in the sampling variability at the lab. The LIF sampling variability is addressed by the field crew taking three LIF readings of each actual sample sent to the lab. Sample AMK041 for example had a fluorescence variance of between 6.3% to 45 after homogenization. Chart 1 uses the average of the fluorescence values collected for sample AMK041 which was 12%. Chart 2 uses the lower value of 6.3%, which assumes that the lab selected a portion of the sample that had the lower range of fluorescence. The correlation value ( $R^2$ ) of this data set is 0.97.

Chart 1. Sample Correlation of Light-End POLs

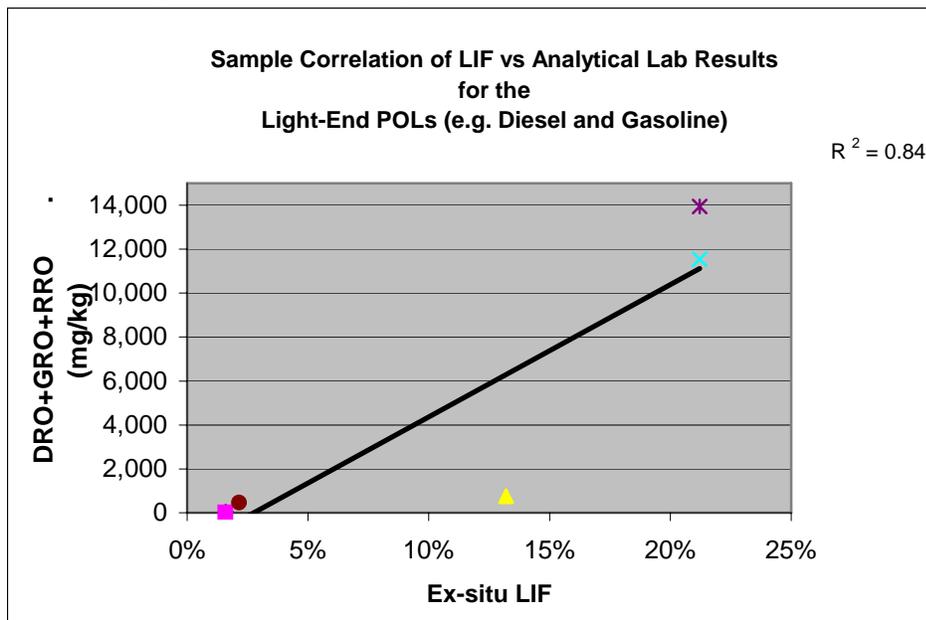
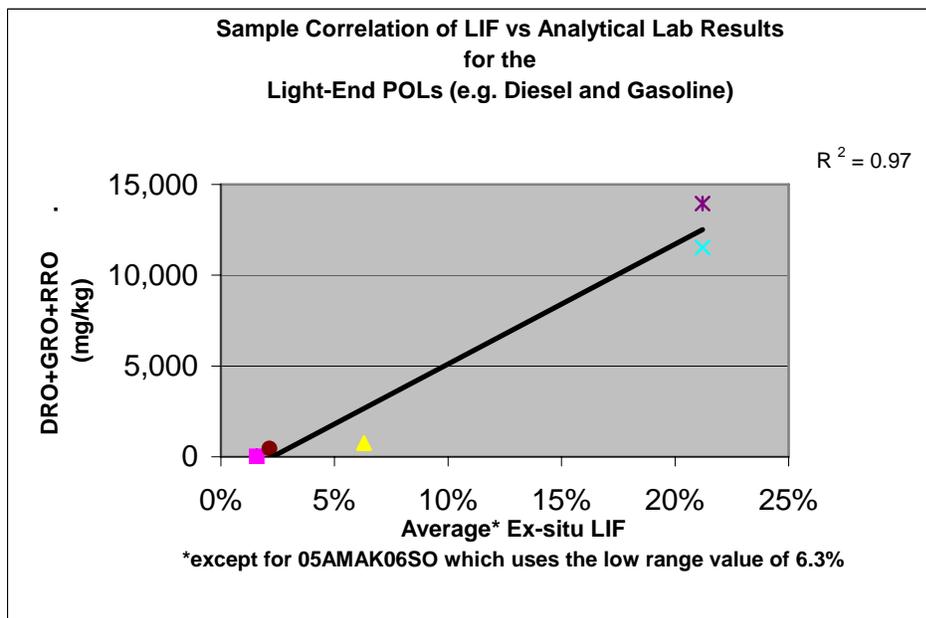


Chart 2. Sample Correlation of Light-End POLs using low value for 05AMAK06SO



#### 4.5.2 Optimized SW846 8015B Method

Selected samples were also analyzed for DRO by optimized GC using method 8015B at the Corps of Engineers Laboratory located in Omaha, NE. The sample's chromatograms were examined for comparability of the contamination throughout the site. The locations for the optimized GC samples were then chosen not only in each area of concern throughout the site, but also each unique layer of LIF response (e.g. probe AMK087 showed 4 unique florescent zones).

Table 3 below reports the results of the selected samples by Method 8015B. Also included in Table 3 are the DRO results from AK102 for comparison purposes.

The USACE Omaha Laboratory provided the following comparability synopsis.

- Samples AMAK02 and AMAK04 appear to indicate the same contamination based on their chromatograms. The extracts were nearly black and the chromatogram was similar to that of No. 6 fuel oil. The absences of straight chain hydrocarbons in both samples indicate degradation of at least 20 years or longer.
- Samples AMAK12 and AMAK13 are similar. Both extracts were amber colored, similar to diesel fuel and the chromatogram was similar to that of diesel. The absences of straight chain hydrocarbons in both samples indicate degradation of at least 20 years or longer.
- Samples AMAK10, AMAK11, AMAK14, and AMAK16 were all similar. The extract on AMAK16 was clear, while the extracts on the other 3 samples were black. The peak on AMAK16s chromatogram ends around 20 minutes, suggesting diesel, while the other three continue to 30 minutes, suggesting No. 6 fuel oil. All four samples are highly weathered with no detectable straight chain hydrocarbons, again indicating a long duration of degradation.

- The chromatogram for sample AMAK08 does not resemble those of any of the other samples. The extract is nearly black, but the chromatogram does not resemble that of No. 6 fuel oil. The peaks from 10 to 18 minutes resemble diesel fuel. But unlike the other samples, there are straight chain hydrocarbons present (C13 - C20), although their relative levels are lower than in fresh diesel fuel. The hump centered at about 21 minutes, trailing past the end of the chromatogram and is characteristic of lubricating oil. The black extract probably indicates a used-waste oil and not a No. 6 fuel oil. Because of the presence of straight chain hydrocarbons in this sample, it is likely that this contamination occurred at a much later date than that of the other samples.

Table 3.

Sample ID	LIF Location	Sample Depth	Results 8015B	Flag	Results AK102	Flag	LIF Avg
05AMAK-	AMK-	(ft)	Diesel (mg/kg)		DRO (mg/kg)		(ex-situ)
02SO	001	12-13	16,000	D	9,120	D-15	3.36 %
04SO	017c	10-11	7,000	D	5,410	D-15	2.63 %
07SO	097		49		30.4		2.15 %
08SO	069	1-3	5,000	D	1,300		19.65 %
09SO	069	4-5	ND	U(27)	2.54	J	1.60 %
10SO	069	11.5-13	14,000	D	16,000		12.01 %
11SO	069	11.5-13QC	18,000	D	13,800		13.21 %
12SO	087	3-4	12,000	D	7,600		10.06 %
13SO	087	4.5-6	22,000	D	19,300		27.68 %
14SO	087	11-12	12,000	D	8,280		21.18 %
16SO	087	14-15	310		280		8.17 %

Notes:

D Result quantitated from a 1:10 dilution

D-15 Hydrocarbon pattern most closely resembles a Heavy Fuel Oil Range product

J The quantitation is estimated

mg/kg milligrams per kilogram

ND Not detected

U Compound was analyzed for but not detected at or above the sample reporting limit. Sample reporting limit in parentheses.

#### 4.5.3 Comparison of Results to Cleanup Levels

Cleanup levels for the bunker C contaminated soil at the Pre-WWII Tank Farm were based on the Alaska Department of Environmental Conservation (ADEC) Method Two and Method Three Cleanup Levels in 2003 (ADEC 2003) and are listed in Table 4. The levels were negotiated with ADEC and are the most stringent of the cleanup levels for ingestion, inhalation, and ten times the migration to groundwater pathway criteria (Jacobs 2004). The levels were contingent on development of enforceable institutional controls prohibiting or limiting future use of groundwater as a drinking water source.

Table 4.

Analyte	ADEC Method Two Cleanup Level <sup>1</sup> (mg/kg)			Negotiated Cleanup Level (mg/kg)
	Ingestion Pathway	Inhalation Pathway	Ten Times the Migration to Groundwater Pathway	
GRO	1,400	1,400	2,600	1,400
DRO	8,250	12,500	2,300	2,300
RRO	8,300	22,000	97,000	8,300

<sup>1</sup>Add footnote

Table 5 below presents a comparison of the soil samples collected versus the negotiated cleanup levels. Only the samples analyzed by NCA labs are included, since that is a single complete data set. Only three samples of the 17 samples were above the RRO negotiated cleanup level of 8,300 mg/kg. All 17 samples were below the inhalation and ten times the migration to groundwater pathway cleanup levels. However, 8 of the 17 samples were above the DRO negotiated cleanup level of 2,300 mg/kg (using the data set presented in Table 2). The bunker C appears to have a high fraction of the diesel range organics carbon chains (C<sub>10</sub> - C<sub>25</sub>) associated with this product.

Table 5.

Contamination Delineation at Pre-WWII Tank Farm Investigation Soil Sample Results (May 2005)						
Analyte	Units	Detection Frequency	Minimum Concentration (above MDL)	Maximum Concentration (above MDL)	Negotiated Cleanup Level (mg/kg)	Detection Frequency Above Cleanup Level
GRO	mg/kg	10/10	0.45	1,090	1,400	0/10
DRO	mg/kg	17/17	2.54	19,300	2,300	8/17
RRO	mg/kg	17/17	7.01	10,800	8,300	3/17

Notes:

MDL method detection limit

mg/kg milligrams per kilogram

## 5.0 OBSERVATIONS AND CONCLUSIONS

Petroleum contamination was identified throughout the site. The ROST investigation successfully delineated several petroleum source areas containing co-mingled fuel products.

The former Tank Farm area has two distinct types of contamination, the heavier petroleum, bunker C, and a lighter petroleum type, which is consistent with diesel (and zones of where the two have mixed). In the excavation area, the only remaining contamination is that within the saturated zones to the bedrock interface.

The heavy-end petroleum contamination around the concrete pad near the powerhouse appears to be a part of the same plume that underlies the Pre-WWII Fuel Farm Area. A separate and

independent source area also appears to be associated with the contamination south of Building 551. This source area may potentially be the source for free phase-product appearing in the crawl-space of Building 551.

There was a strong qualitative correlation between ROST LIF response and presence of POL. There was a strong quantitative correlation between the ROST LIF results and the lab analytical data for the light-end (DRO) petroleum contamination present at the site. The ROST also distinguished subsurface zones where diesel and bunker C were located and/or mixed. There was no quantitative correlation between the ROST LIF results and the lab analytical data for the heavy-end (RRO) petroleum contamination present at the site. Due to the refractive nature of bunker C at the ROST probe laser wavelength, a correlation of LIF percent vs. concentration was not possible. A separate ROST-like technology does exist (TarGost™) that can provide correlation data with the heavy-end POLs for use in future investigations. TarGost™ employs a different frequency of laser. Unfortunately, TarGost™ is unable to detect the lighter-end POLs, which is why the ROST was used at Amaknak FUDS to differentiate the boundaries of bunker C and diesel as well as the mixing zones.

Only three samples of the 17 samples were above the RRO negotiated cleanup level of 8,300 mg/kg. All 17 samples were below the RRO inhalation and ten times the migration to groundwater pathway cleanup levels. However, 8 of the 17 samples were above the DRO negotiated cleanup level of 2,300 mg/kg. The bunker C appears to have a high fraction of the diesel range organics carbon chains (C<sub>10</sub> - C<sub>25</sub>) associated with this product. With respect to cleanup levels, the DRO component appears to be the primary contaminant of concern at this site within the limits of this investigation. The ROST results indicate that any location with a pure bunker C sample fluorescence of near 2 to 3 % is likely to exceed the DRO cleanup value.

The ROCK Works™ program was used to estimate the volume of soil containing fluorescence above 3%. The volume of soil estimated by ROCK Works™ included soil from ground surface to bedrock. Assuming that only soil above the water table would be excavated during a removal action, the model was clipped to show only soil with fluorescence above 3% that was also above the water table. This was accomplished by creating a water table in Surfer™ based on the elevation of the most recent round of groundwater measurements available. Clipping the estimated volume of soil with the water table surface deleted most of the contaminated soil. Two primary areas of soil contamination remained, one north of Building 549 and a second south of 551. The volume of contaminated soil north of Building 549 near the former ASTs is estimated at approximately 1,500 cubic yards. The volume of contaminated soil south of Building 551 is estimated at approximately 3,200 cubic yards. These volumes do not include contamination below the groundwater table or under the buildings.

## **6.0 REFERENCES**

Alaska Department of Environmental Conservation (ADEC). 2004. Oil and Other Hazardous Substances Pollution Control 18 AAC 75, as amended through May 26, 2004. Table B2 Method Two Soil Cleanup Levels, Over 40-inch Zone.

Jacobs Engineering Group Inc (Jacobs) and Radian Corporation. 1999. Final Treatability Study Report, Pre-WWII Tank Farm, Amaknak Island, Alaska.

Jacobs 2003. Islandwide SI/RI/IRA Report; Amaknak/Unalaska Islands, Alaska

Jacobs. 2004. Summary Report, 2000-2002 Soil Treatment Activities, Pre-WWII Tank Farm; Amaknak Island, Alaska. Final August.

Jacobs. 2004. Report, Characterization and Modeling of Groundwater and LNAPL Flow, Pre-WWII Tank Farm.

U.S. Army Corps of Engineers – Alaska District. 2005. Work Plan, Contamination Delineation at Pre-WWII Tank Farm; Amaknak Island, Alaska.

## Figures

Figure 1 – Site Location Map

Figure 2 – ROST/LIF Probe Locations

Figure 3 – Maximum Fluorescence by Location

Figure 4 – Maximum Diesel Fluorescence by Location

Figure 5 – Maximum Bunker C Fluorescence by Location

Figure 6 – Cross Section Locations

Figure 7 – Property Disposal by Ounalashka Corporation After 1975

### Cross – Sections

A – A' Biroka Drive Profile

B – B' Center of Tank Farm

C – C' South Side of Tank Farm

D – D' Adjacent to Building 551

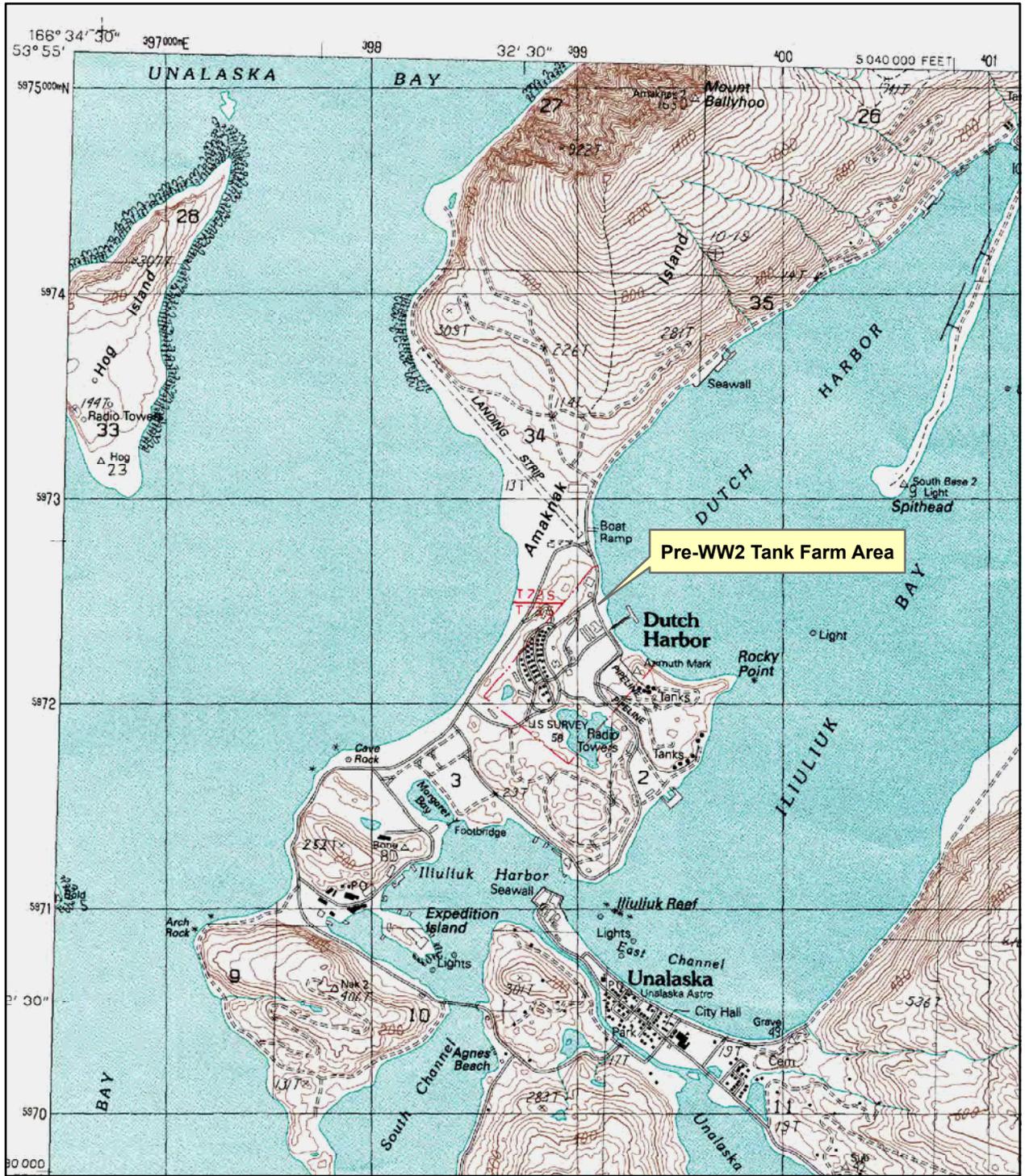
E – E' Adjacent to Delta Way

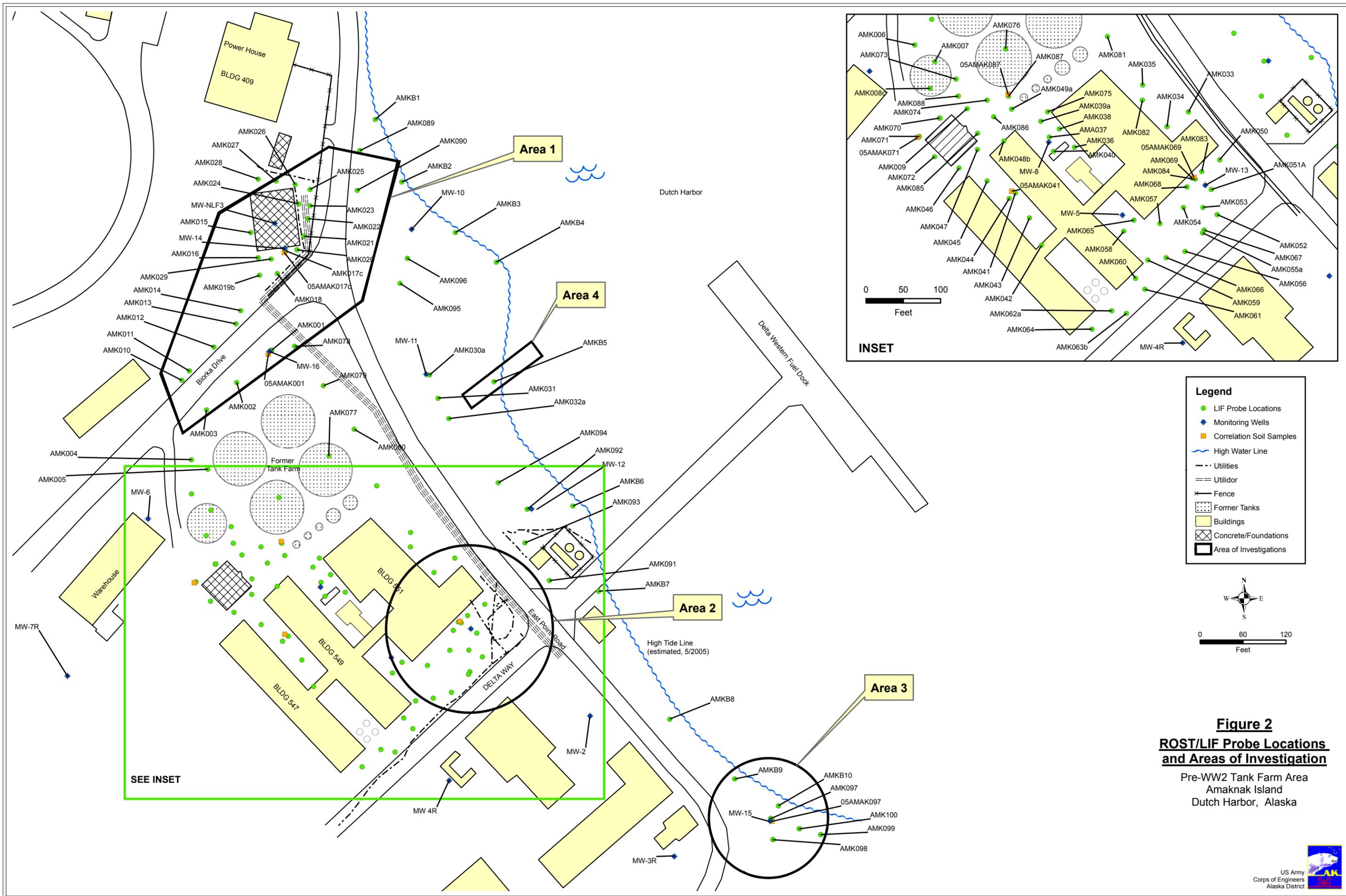
F – F' Adjacent to East Point Road

G – G' Tank Farm to Near Slop Tank

H – H' Along West Side of Site

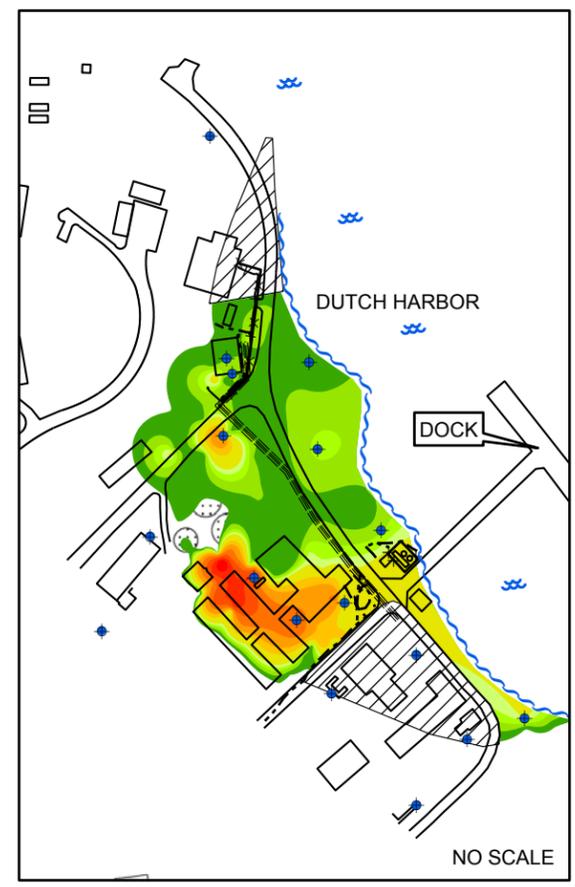
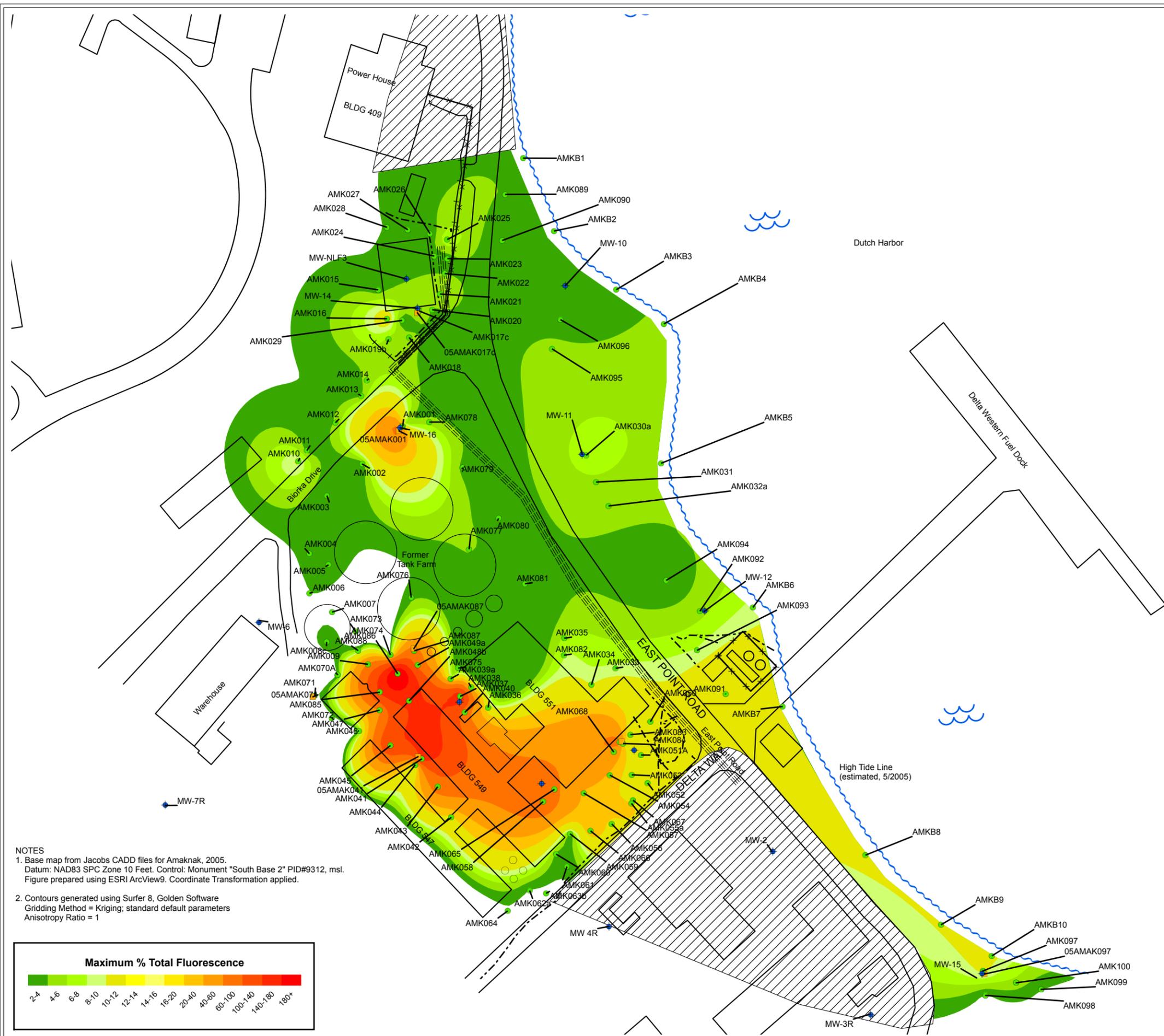
Figure 1 – Site Location Map





**Figure 2**  
**ROST/LIF Probe Locations**  
**and Areas of Investigation**

Pre-WW2 Tank Farm Area  
 Amaknak Island  
 Dutch Harbor, Alaska



**LEGEND**

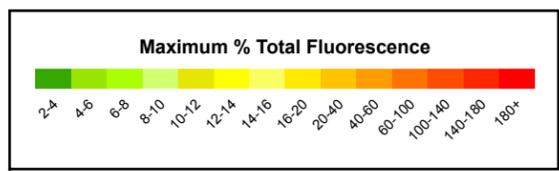
- LIF Probe Locations
- + Monitoring Wells
- Correlation Soil Samples
- ~ High Water Line
- Utilities
- Utilidor
- x Fence
- Former Tanks
- Area Not Investigated

North arrow pointing North (N), South (S), East (E), and West (W).

Scale bar: 0, 60, 120 Feet

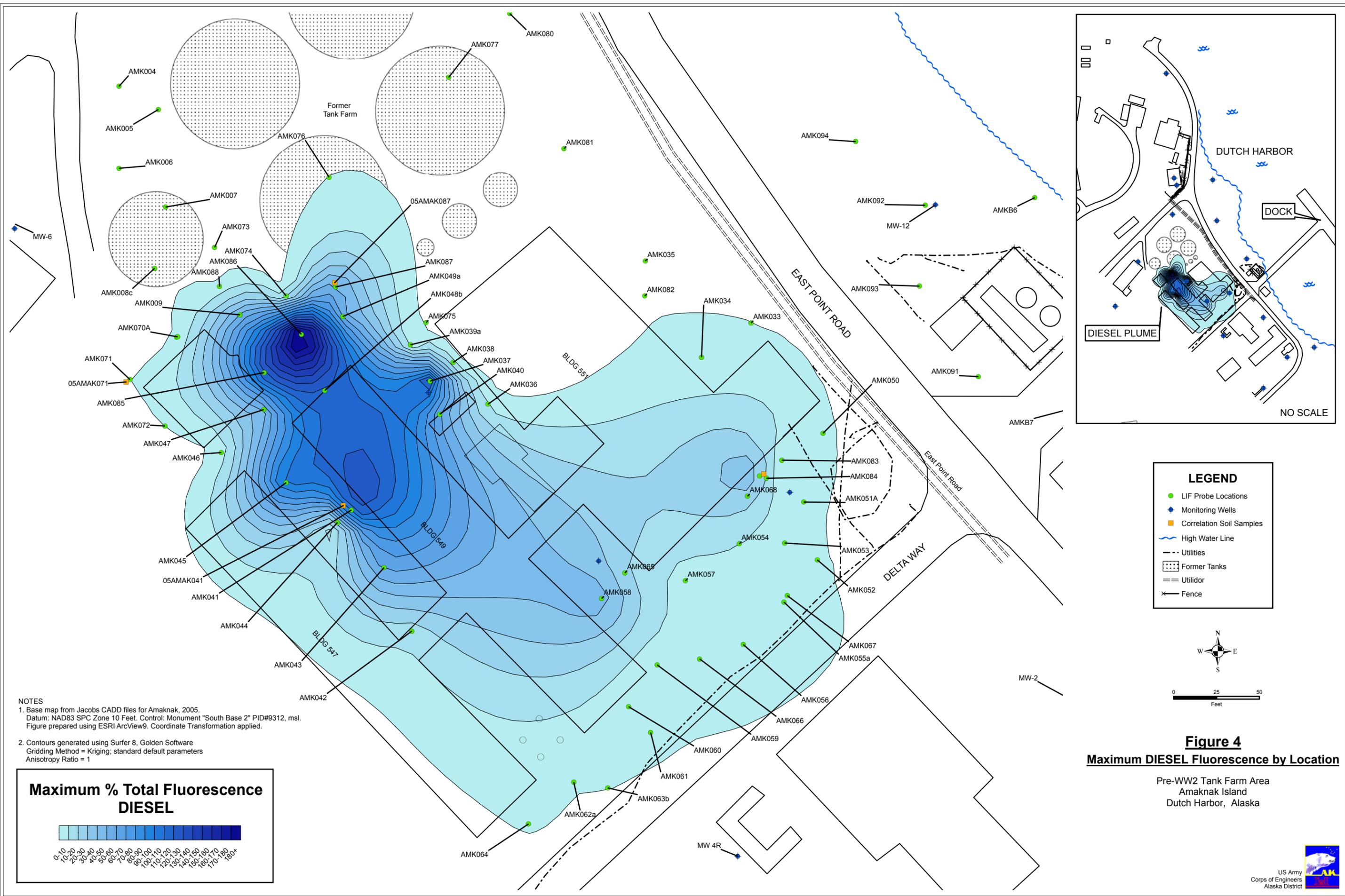
**NOTES**

1. Base map from Jacobs CADD files for Amaknak, 2005.  
Datum: NAD83 SPC Zone 10 Feet. Control: Monument "South Base 2" PID#9312, msl.  
Figure prepared using ESRI ArcView9. Coordinate Transformation applied.
2. Contours generated using Surfer 8, Golden Software  
Gridding Method = Kriging; standard default parameters  
Anisotropy Ratio = 1



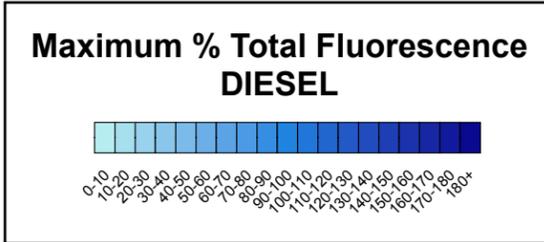
**Figure 3**  
**Maximum Total Fluorescence by Location**

Pre-WW2 Tank Farm Area  
Amaknak Island  
Dutch Harbor, Alaska



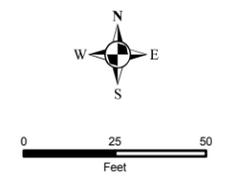
NOTES  
 1. Base map from Jacobs CADD files for Amaknak, 2005.  
 Datum: NAD83 SPC Zone 10 Feet. Control: Monument "South Base 2" PID#9312, msl.  
 Figure prepared using ESRI ArcView9. Coordinate Transformation applied.

2. Contours generated using Surfer 8, Golden Software  
 Gridding Method = Kriging; standard default parameters  
 Anisotropy Ratio = 1



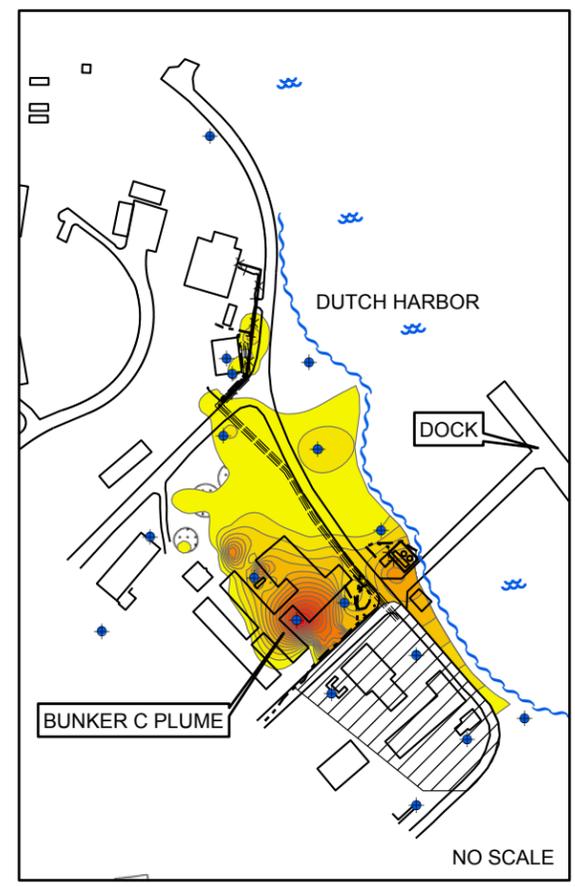
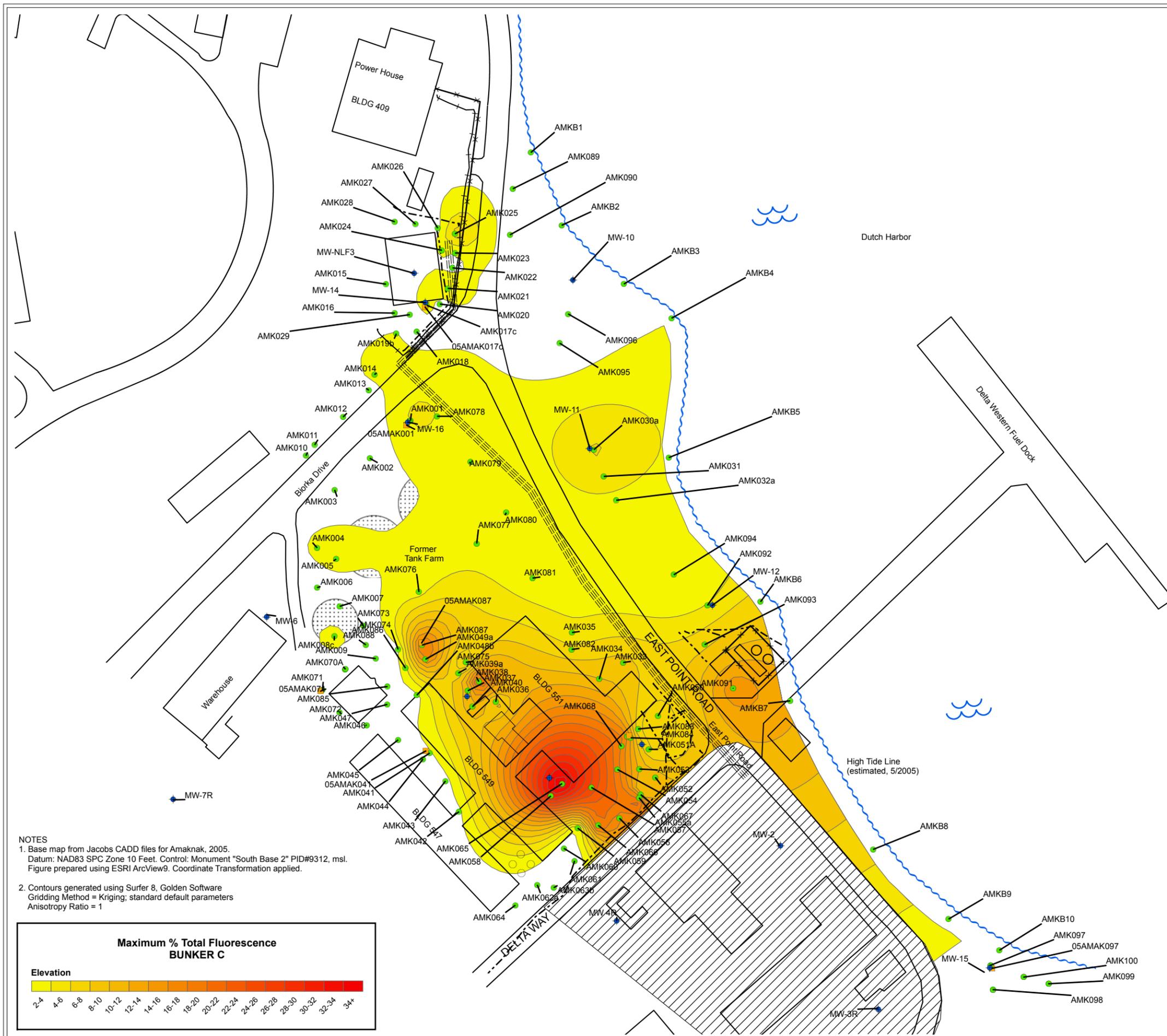
**LEGEND**

- LIF Probe Locations
- ◆ Monitoring Wells
- Correlation Soil Samples
- ~ High Water Line
- Utilities
- Former Tanks
- Utilidor
- Fence



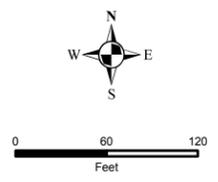
**Figure 4**  
**Maximum DIESEL Fluorescence by Location**

Pre-WW2 Tank Farm Area  
 Amaknak Island  
 Dutch Harbor, Alaska



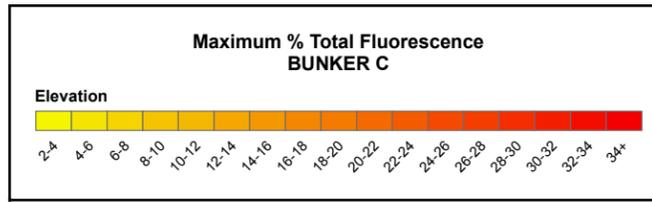
**LEGEND**

- LIF Probe Locations
- Monitoring Wells
- Correlation Soil Samples
- ~ High Water Line
- - - Utilities
- Former Tanks
- Utilidor
- Fence
- Area Not Investigated



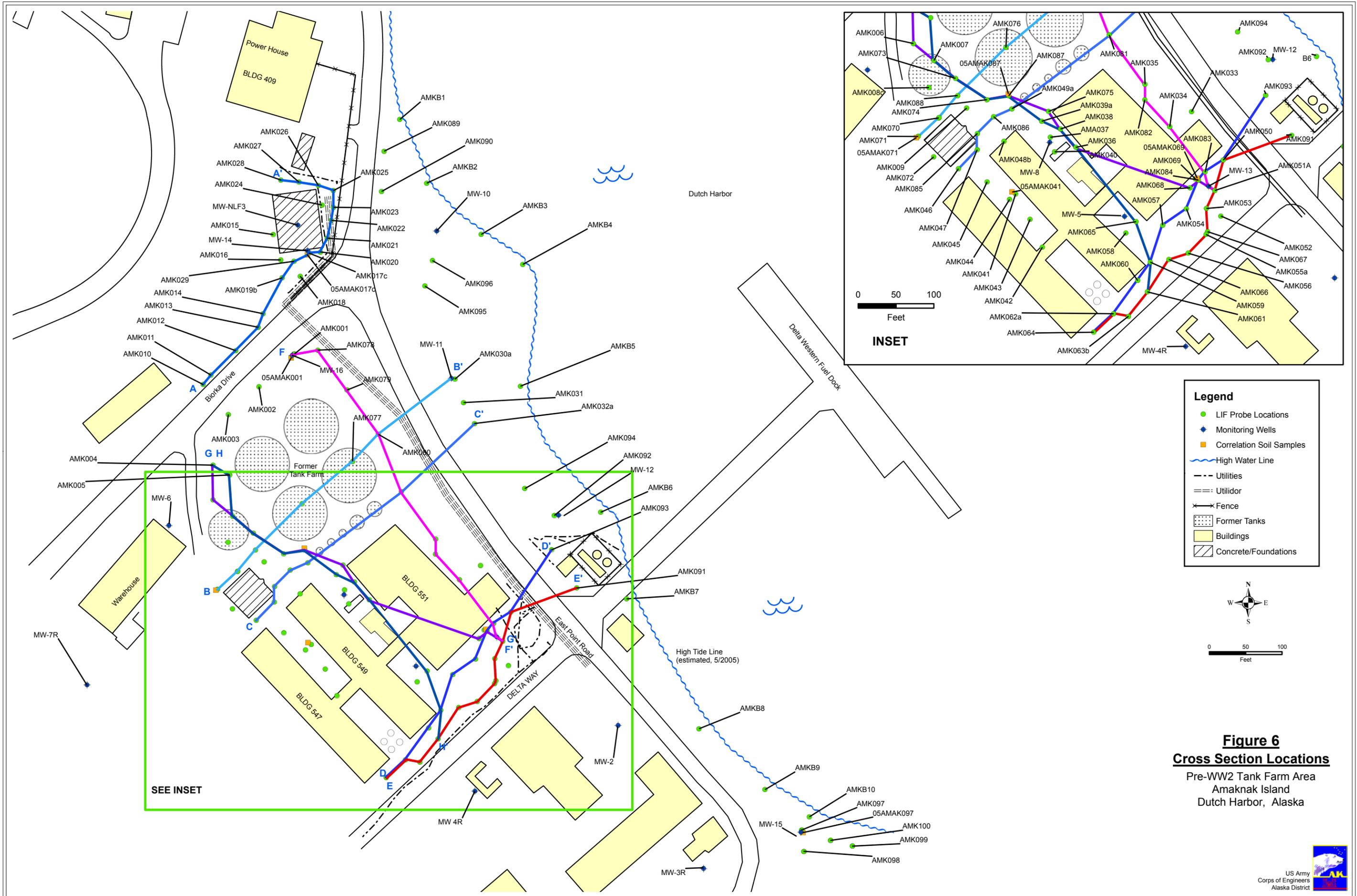
**NOTES**

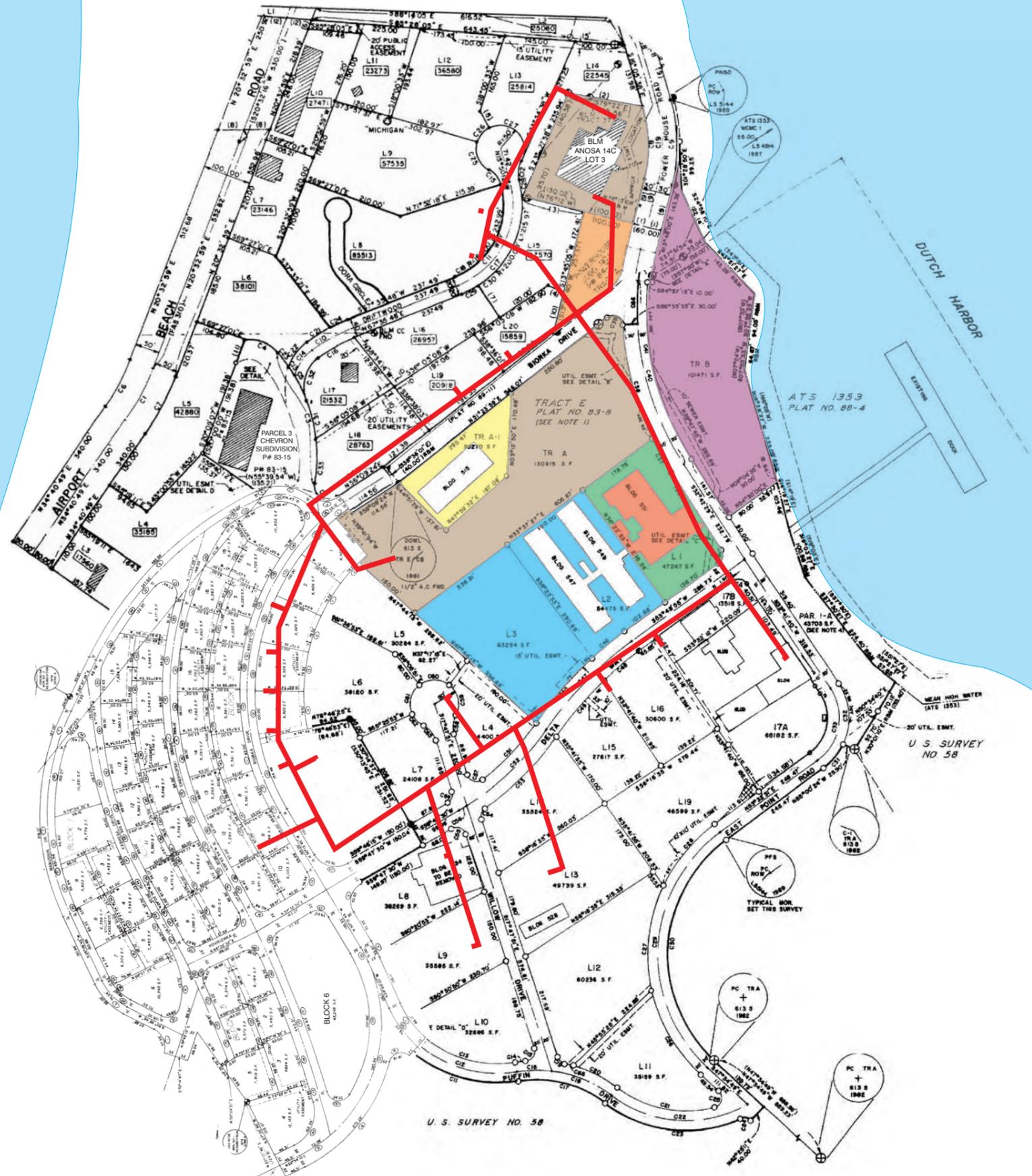
1. Base map from Jacobs CADD files for Amaknak, 2005.  
Datum: NAD83 SPC Zone 10 Feet. Control: Monument "South Base 2" PID#9312, msl.  
Figure prepared using ESRI ArcView9. Coordinate Transformation applied.
2. Contours generated using Surfer 8, Golden Software  
Gridding Method = Kriging; standard default parameters  
Anisotropy Ratio = 1



**Figure 5**  
**Maximum BUNKER C Fluorescence by Location**

Pre-WW2 Tank Farm Area  
Amaknak Island  
Dutch Harbor, Alaska





 Steam and Oil Trenches

**Municipality of Unalaska**

 Building 400

**FDOC, Inc.**

 Land at Building 551 (Lot 1)

 Buildings 547 and 549 (Lots 2 and 3)

 Building 515

 Buildings 502, 507, and 511 (Shore Area)

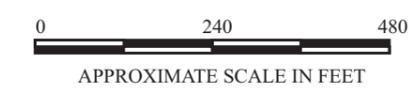
**Delta Western, Inc.**

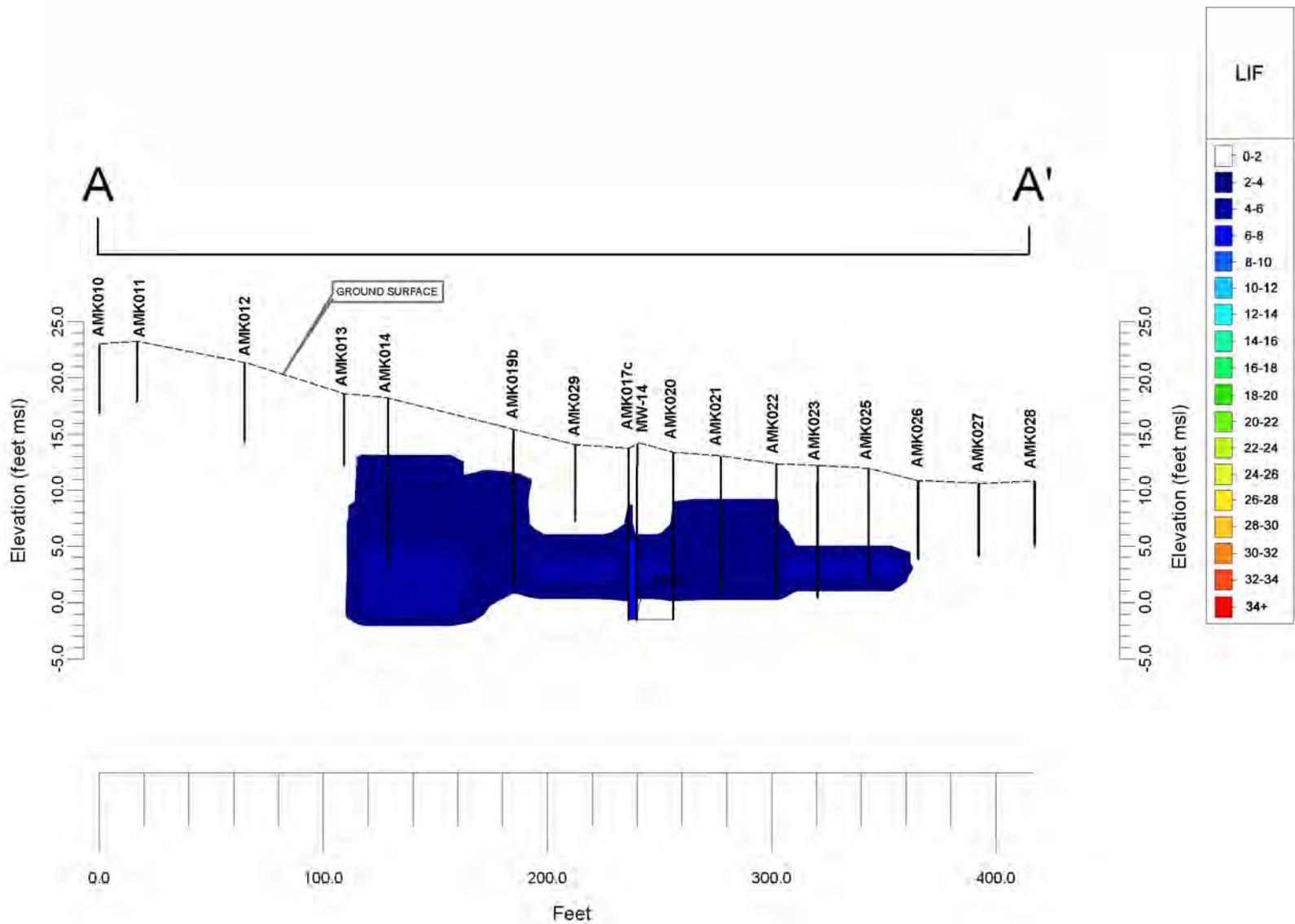
 Building 551

**Retained by Ounalashka Corporation**

 Building 409 and Pre-World War II Tank Farm

**Note:**  
Official documents transferring Building 409 from the Ounalashka Corporation to the municipality of Unalaska have not been located.





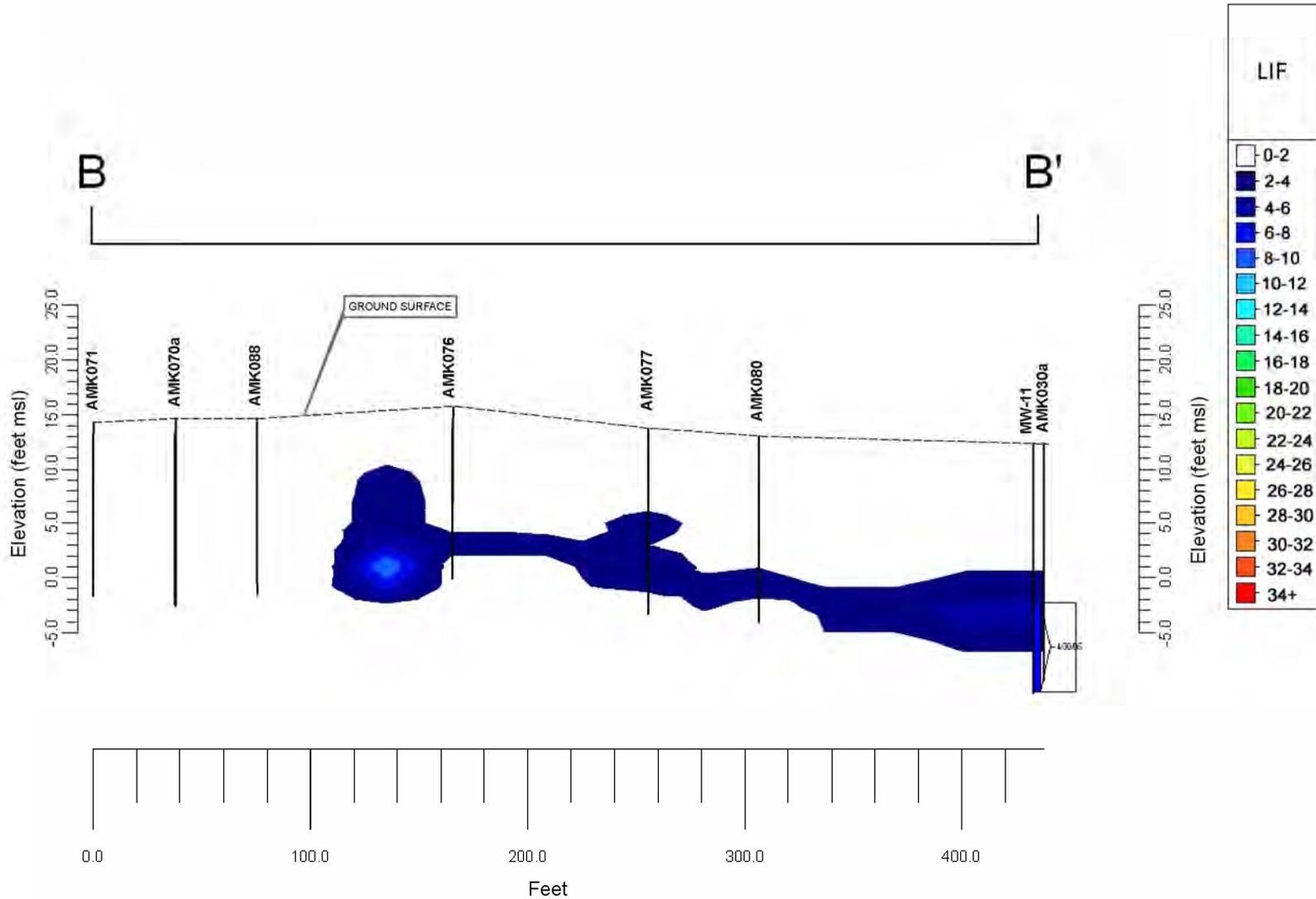
**Cross-Section A - A'**

Biorka Drive Profile  
Amaknak Island  
Dutch Harbor, Alaska

Notes:

1. See Figure 6 for location of cross section.
2. This figure presents a cross section through the model of the site generated using Rockworks Revision 4.11.1





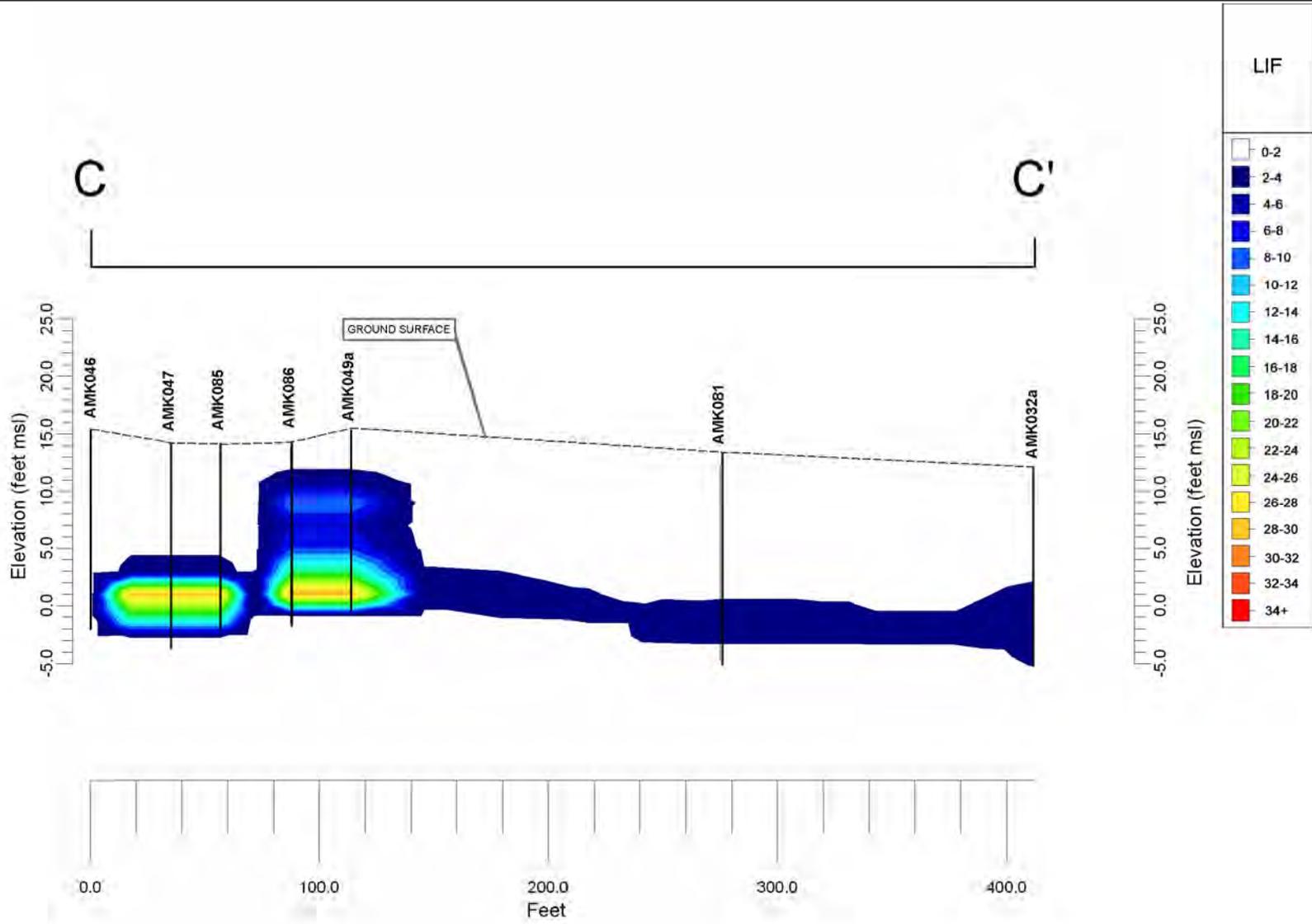
**Cross-Section B - B'**

Center of Tank Farm  
Amaknak Island  
Dutch Harbor, Alaska

Notes:

1. See Figure 6 for location of cross section.
2. This figure presents a cross section through the model of the site generated using Rockworks Revision 4.11.1





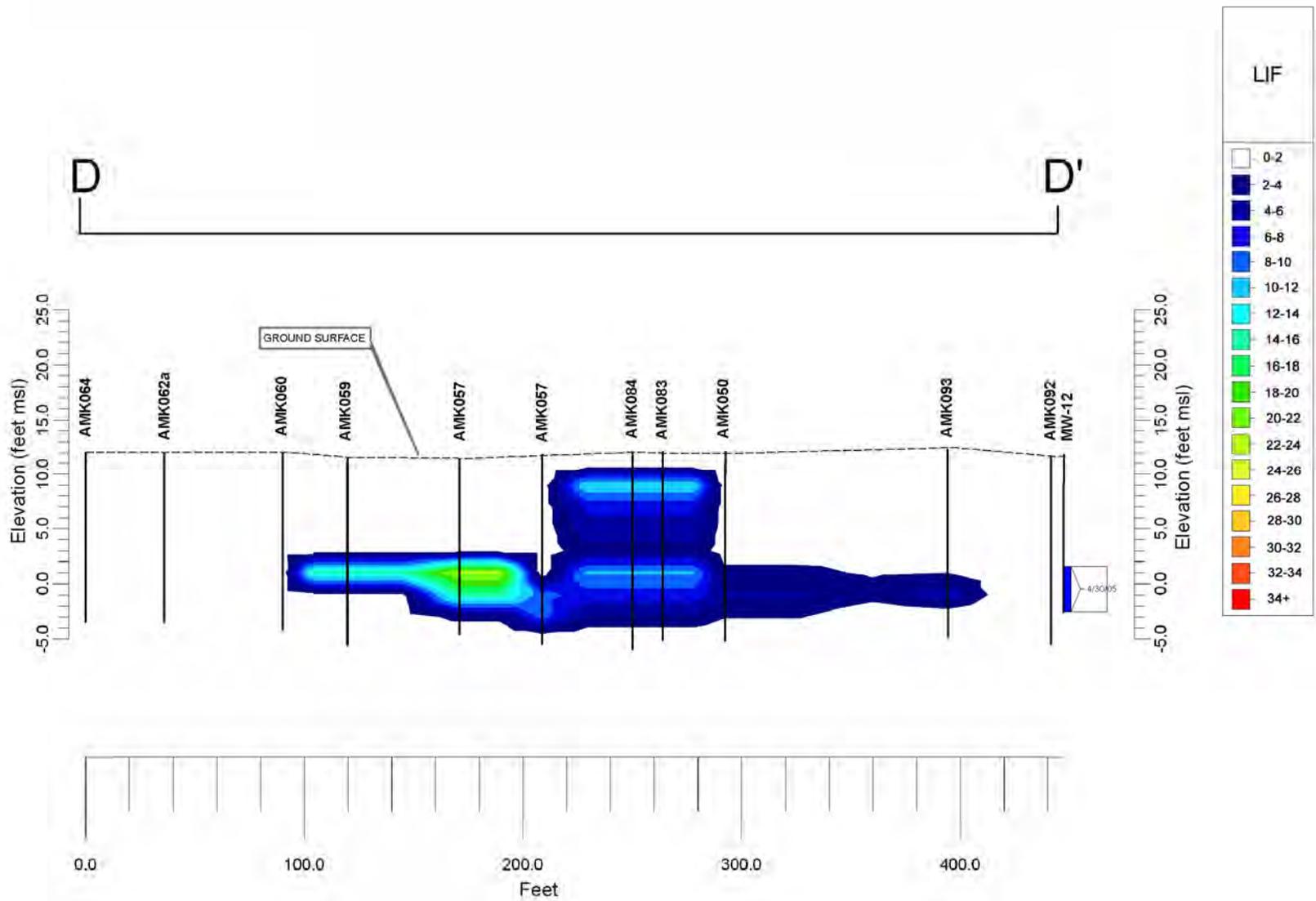
**Cross-Section C - C'**

South Side of Tank Farm  
 Amaknak Island  
 Dutch Harbor, Alaska

Notes:

1. See Figure 6 for location of cross section.
2. This figure presents a cross section through the model of the site generated using Rockworks Revision 4.11.1





**Cross-Section D - D'**

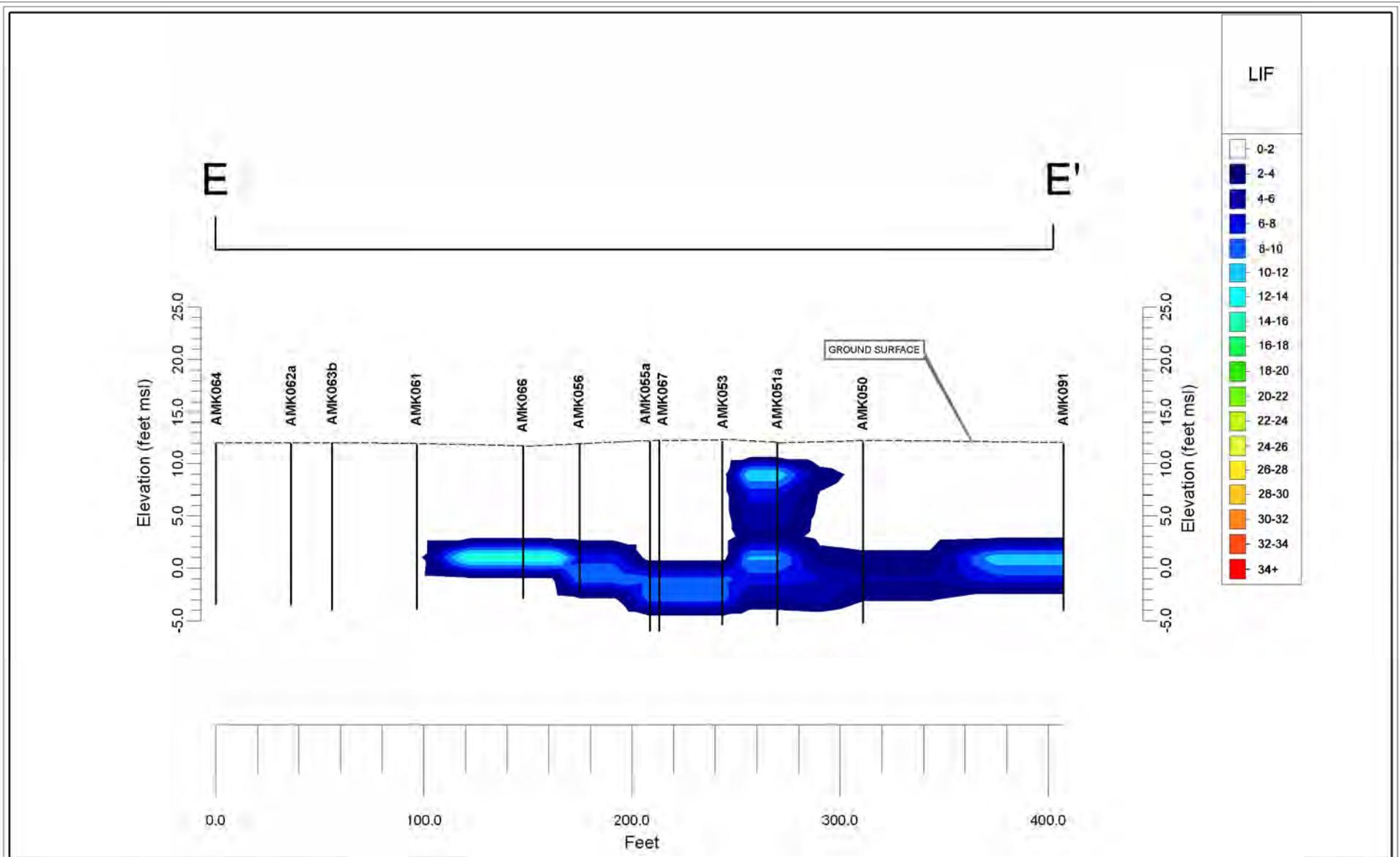
Adjacent to Building 551  
Amaknak Island  
Dutch Harbor, Alaska

Notes:

1. See Figure 6 for location of cross section.
2. This figure presents a cross section through the model of the site generated using Rockworks Revision 4.11.1

U.S. Army  
Corps of Engineers  
Alaska District





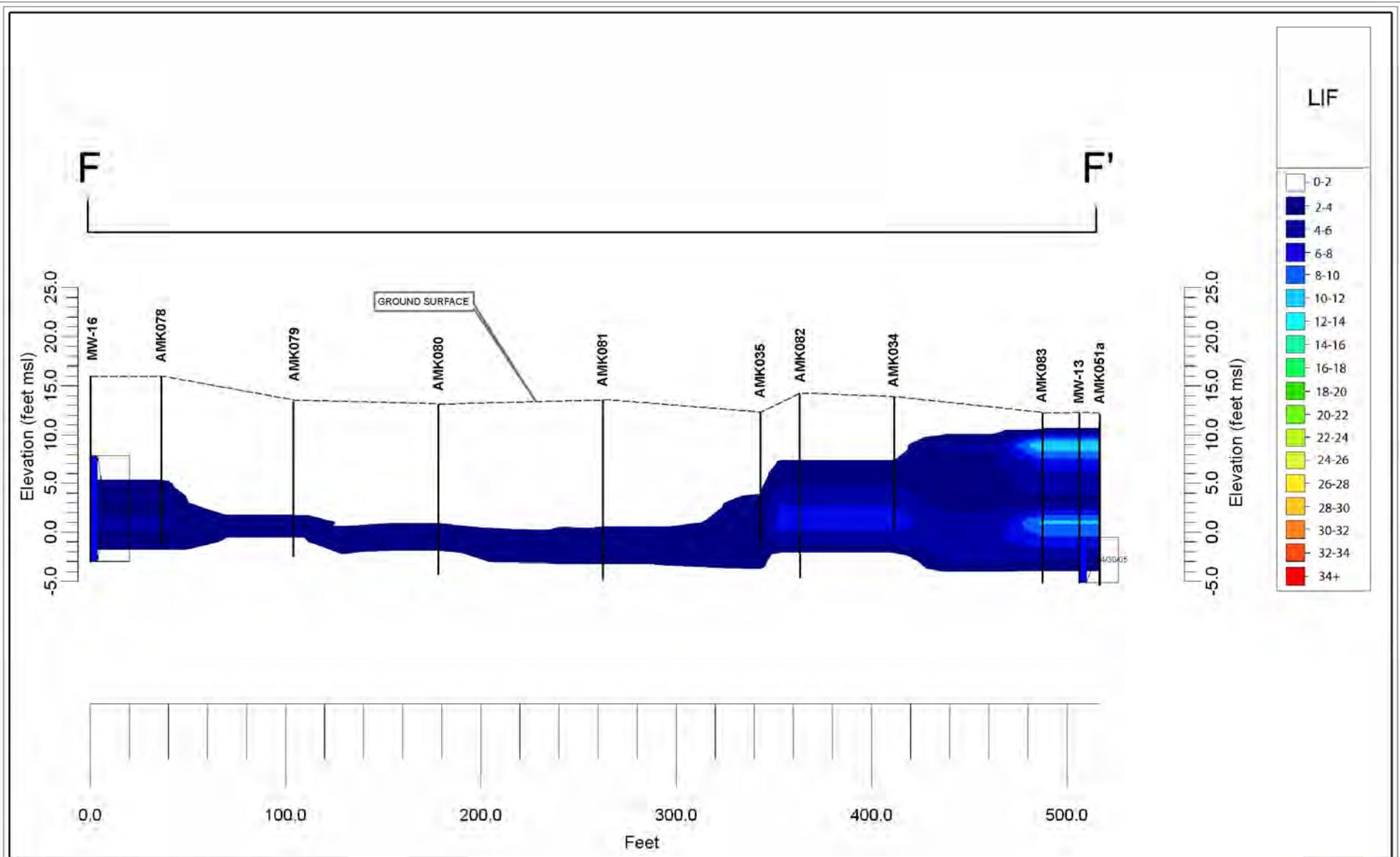
**Cross-Section E - E'**

Adjacent to Delta Way  
Amaknak Island  
Dutch Harbor, Alaska

Notes:

1. See Figure 6 for location of cross section.
2. This figure presents a cross section through the model of the site generated using Rockworks Revision 4.11.1





**Cross-Section F - F'**

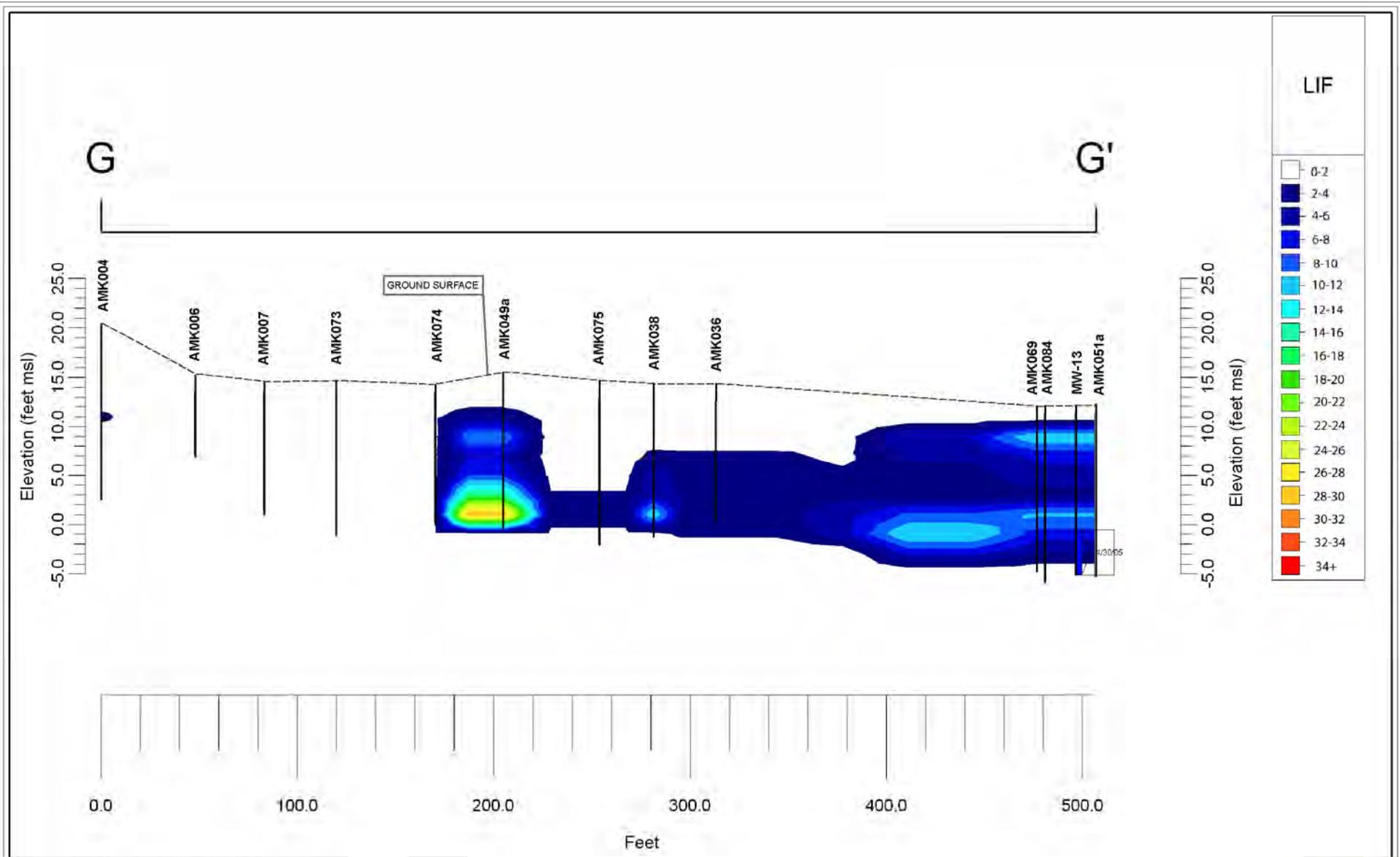
Adjacent to East Point Road  
Amaknak Island  
Dutch Harbor, Alaska

Notes:

1. See Figure 6 for location of cross section.
2. This figure presents a cross section through the model of the site generated using Rockworks Revision 4.11.1

U.S. Army  
Corps of Engineers  
Alaska District





**Cross-Section G - G'**

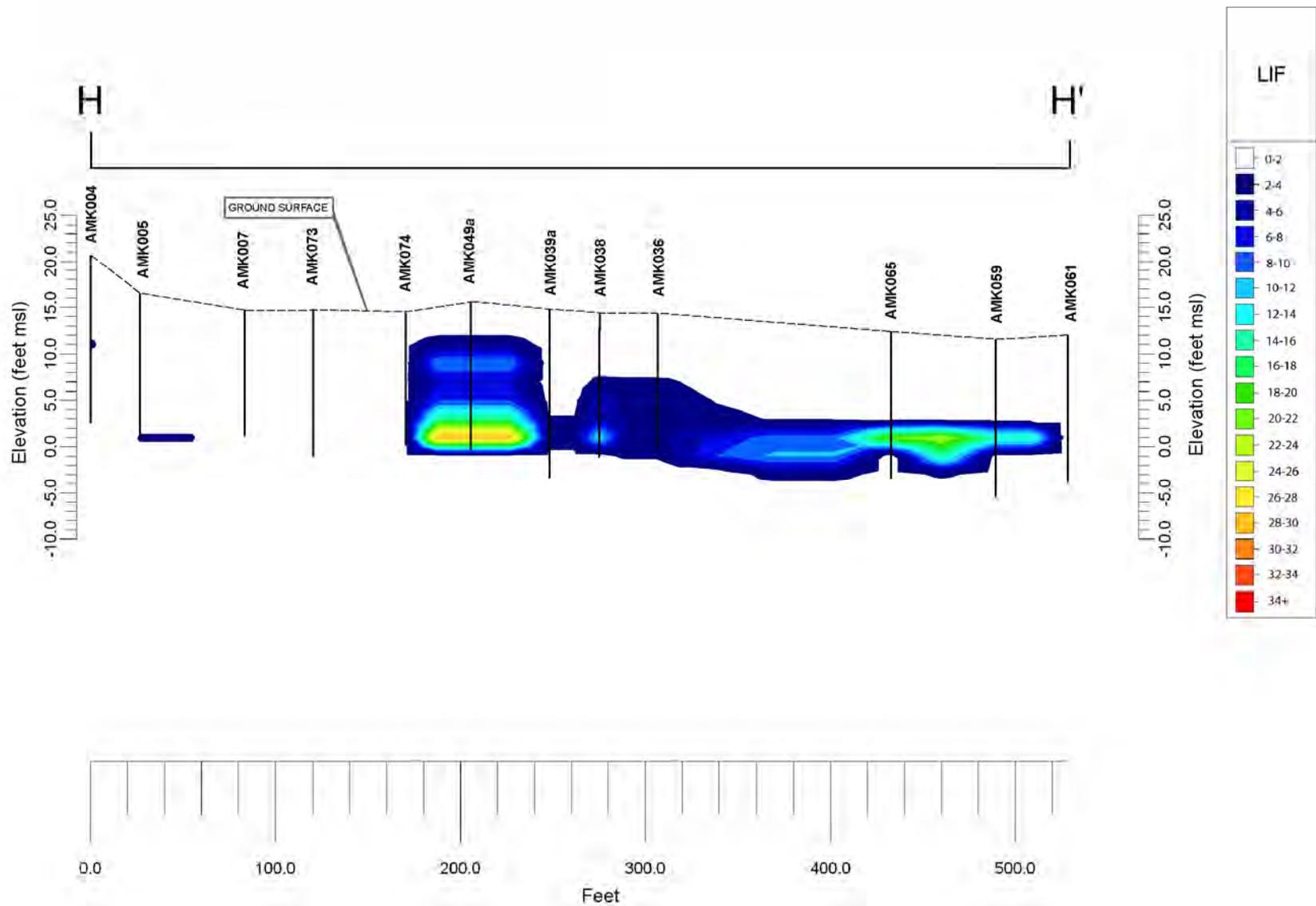
Tank Farm to Near Slop Tank  
Amaknak Island  
Dutch Harbor, Alaska

Notes:

1. See Figure 6 for location of cross section.
2. This figure presents a cross section through the model of the site generated using Rockworks Revision 4.11.1

U.S. Army  
Corps of Engineers  
Alaska District





**Cross-Section H - H'**

NW-SE Along West Side of Site  
Amaknak Island  
Dutch Harbor, Alaska

Notes:

1. See Figure 6 for location of cross section.
2. This figure presents a cross section through the model of the site generated using Rockworks Revision 4.11.1



## **Appendix A – Site Photos**



Amaknak LIF Investigation Staging Area



Area 1 (looking North)



Accessing the West side of Area 1 (LIF point AMK 011)



Performing ROST work at Area 1 (LIF point AMK 017c)



Area 2 (looking West)



Performing ROST work at Area 2 (LIF point AMK 069)



Performing ROST work at Area 2 (LIF point AMK 065)



Area 3 (looking East)



Utilizing a crane to mobilize to Area 3



Area 4 (looking East)



Rods bent while performing ROST work at Area 4 (LIF point AMK 032a)



Collecting grab samples along the shore line



Performing ROST work at suspected bunker C boundary (LIF point AMK 064)



Support vehicle with ROST and generator



Repairing idler wheel and tightening track on drill rig

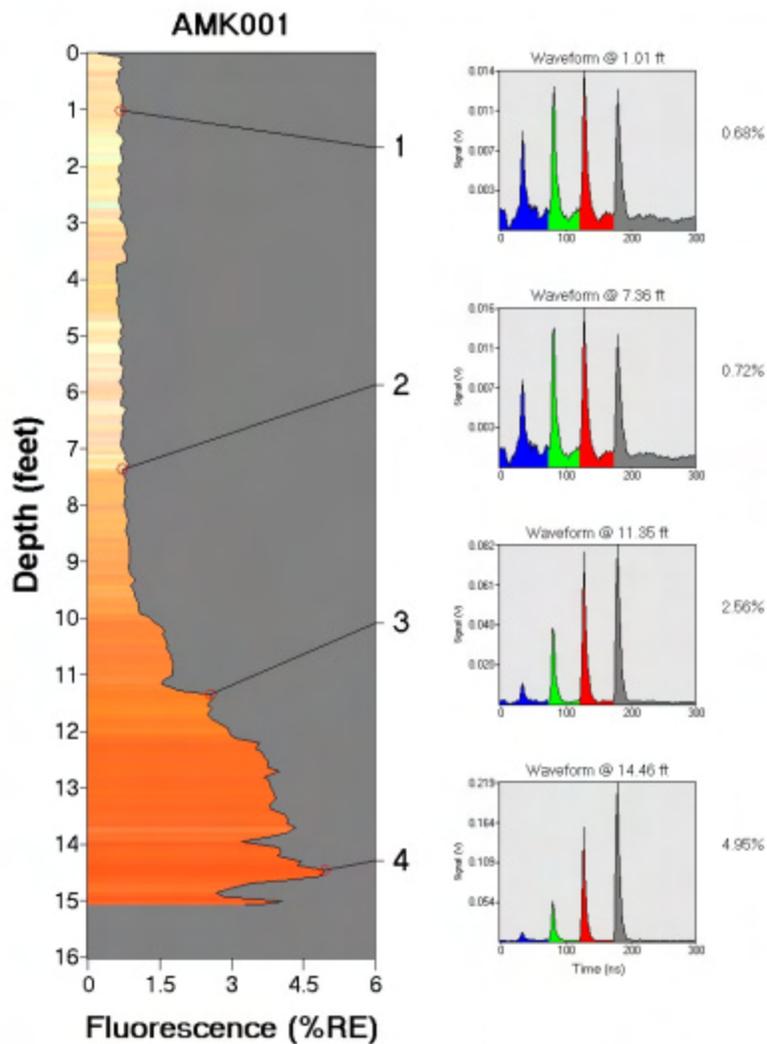


Attempting to repair damaged string pot

## Appendix B – ROST™/LIF Probe Logs

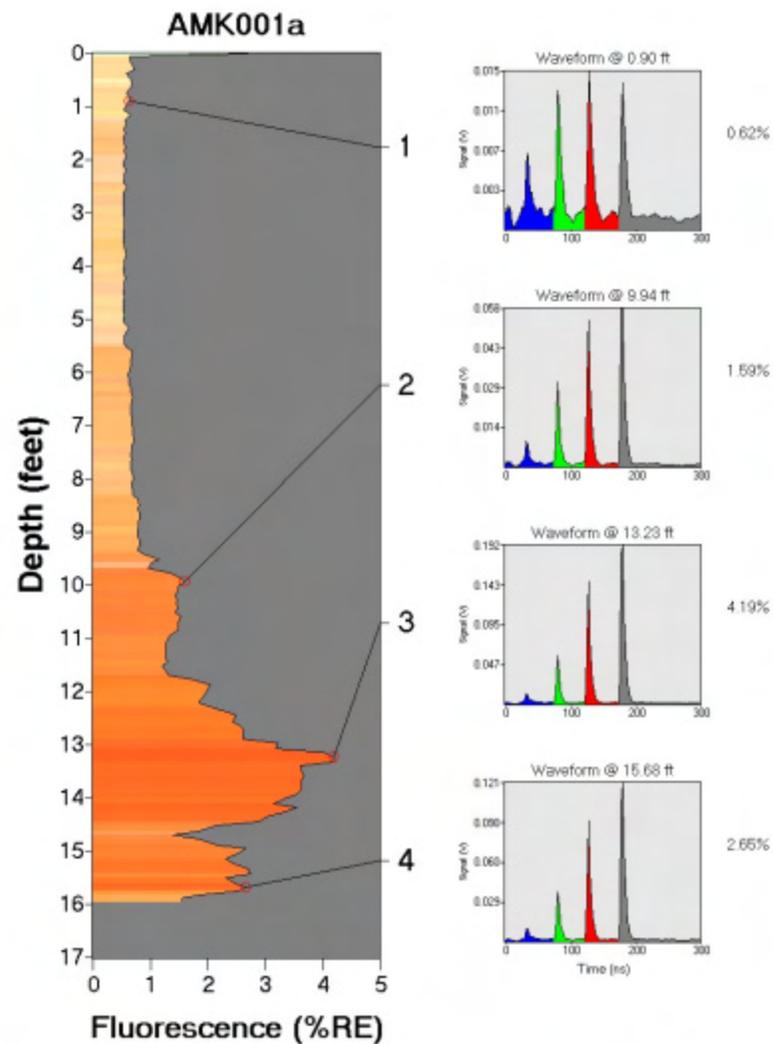
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/12/2005 @ 1:40:24 PM	Max fluorescence: 4.95% @ 14.46 ft
ROST Unit: AK FUDS	Final depth BGS: 15.07 ft
Latitude: Unavailable	Longitude: Unavailable



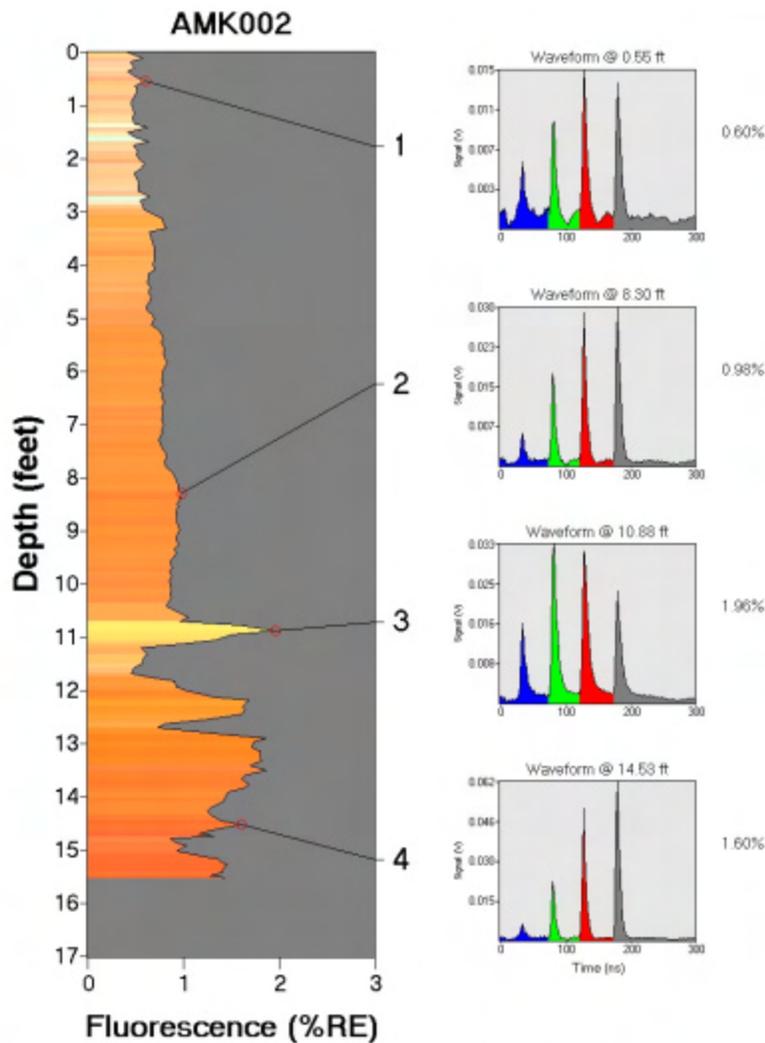
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/12/2005 @ 2:12:12 PM	Max fluorescence: 4.19% @ 13.23 ft
ROST Unit: AK FUDS	Final depth BGS: 15.96 ft
Latitude: Unavailable	Longitude: Unavailable



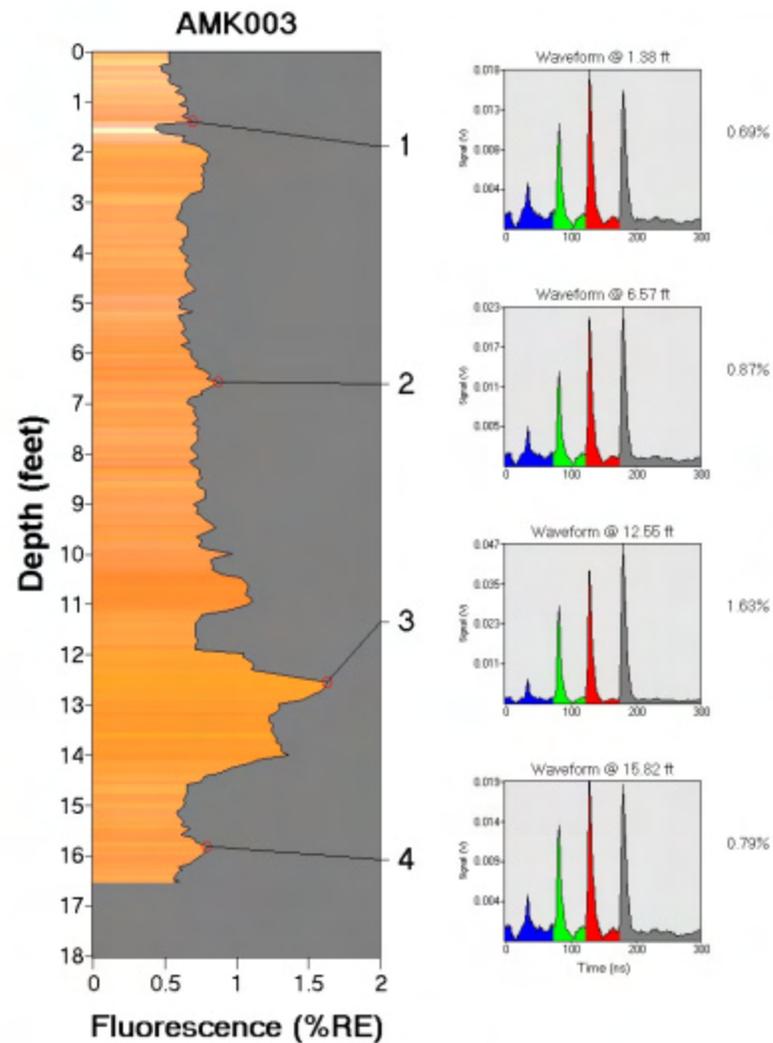
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/12/2005 @ 3:13:51 PM	Max fluorescence: 1.96% @ 10.88 ft
ROST Unit: AK FUDS	Final depth BGS: 15.52 ft
Latitude: Unavailable	Longitude: Unavailable



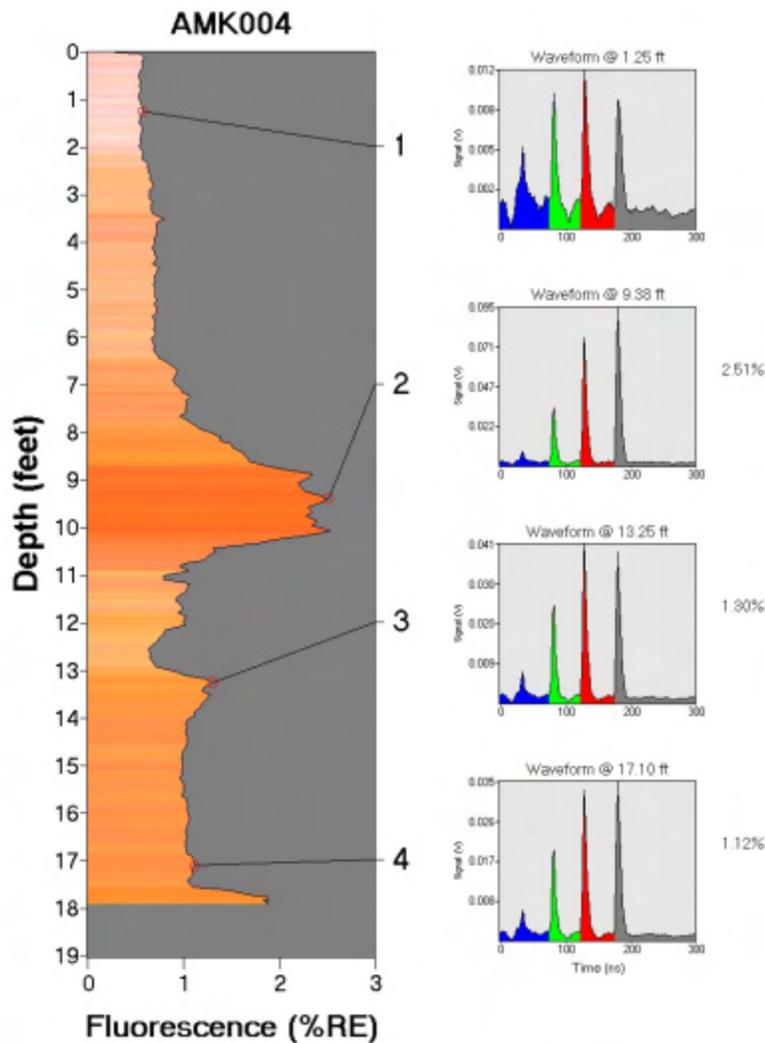
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/12/2005 @ 5:25:13 PM	Max fluorescence: 1.63% @ 12.55 ft
ROST Unit: AK FUDS	Final depth BGS: 16.53 ft
Latitude: Unavailable	Longitude: Unavailable



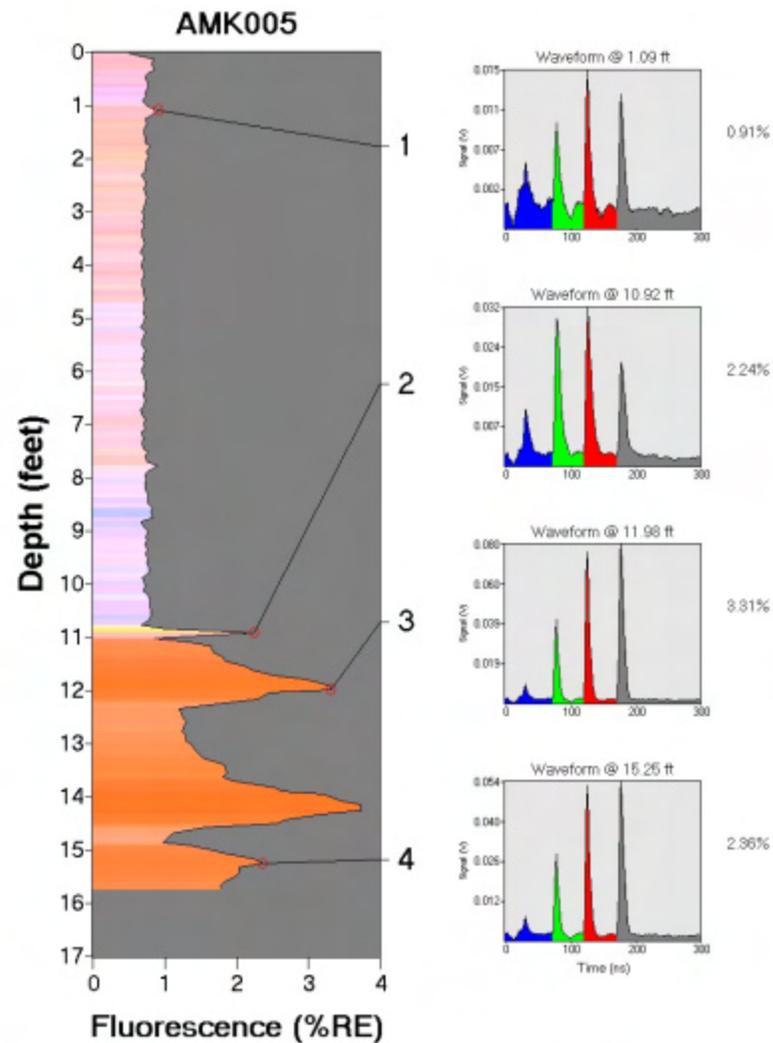
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/12/2005 @ 6:00:40 PM	Max fluorescence: 2.53% @ 10.06 ft
ROST Unit: AK FUDS	Final depth BGS: 17.89 ft
Latitude: Unavailable	Longitude: Unavailable



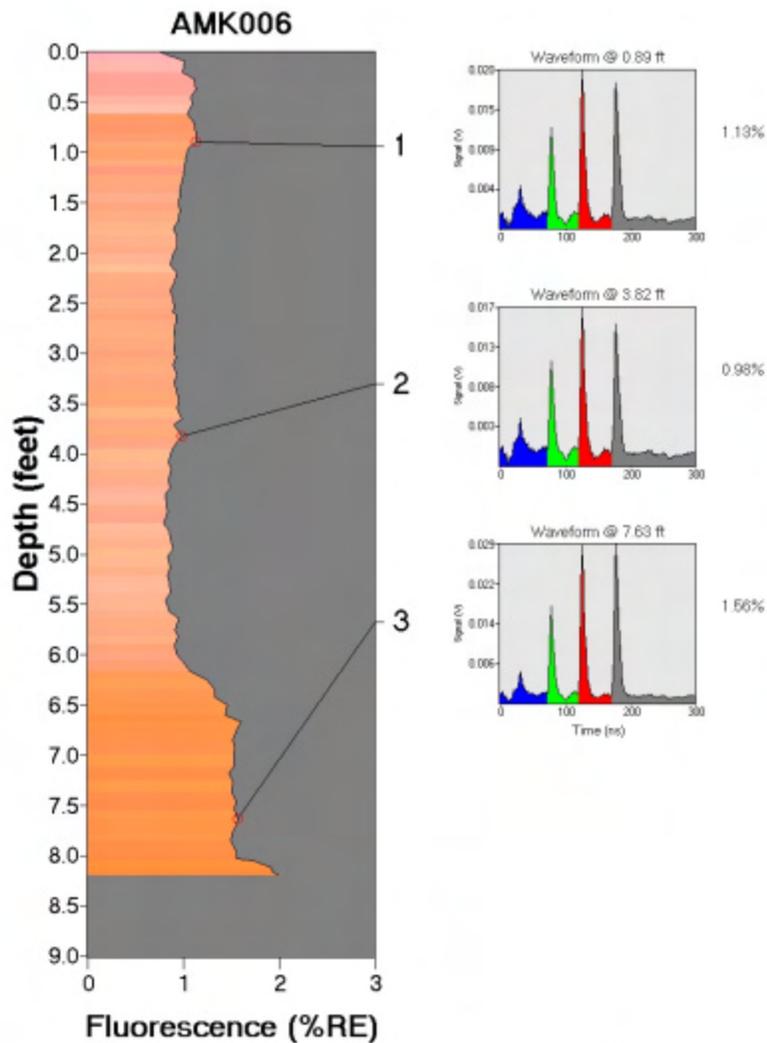
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/12/2005 @ 6:38:14 PM	Max fluorescence: 3.74% @ 14.26 ft
ROST Unit: AK FUDS	Final depth BGS: 15.74 ft
Latitude: Unavailable	Longitude: Unavailable



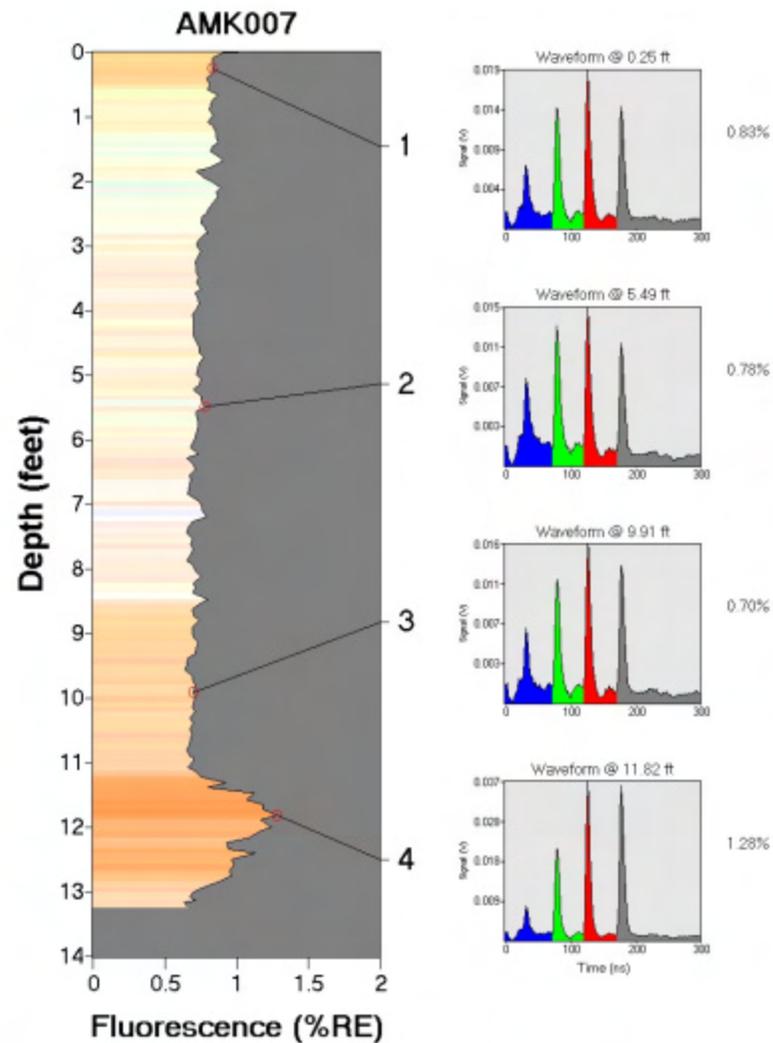
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/12/2005 @ 7:01:18 PM	Max fluorescence: 2.00% @ 8.19 ft
ROST Unit: AK FUDS	Final depth BGS: 8.19 ft
Latitude: Unavailable	Longitude: Unavailable



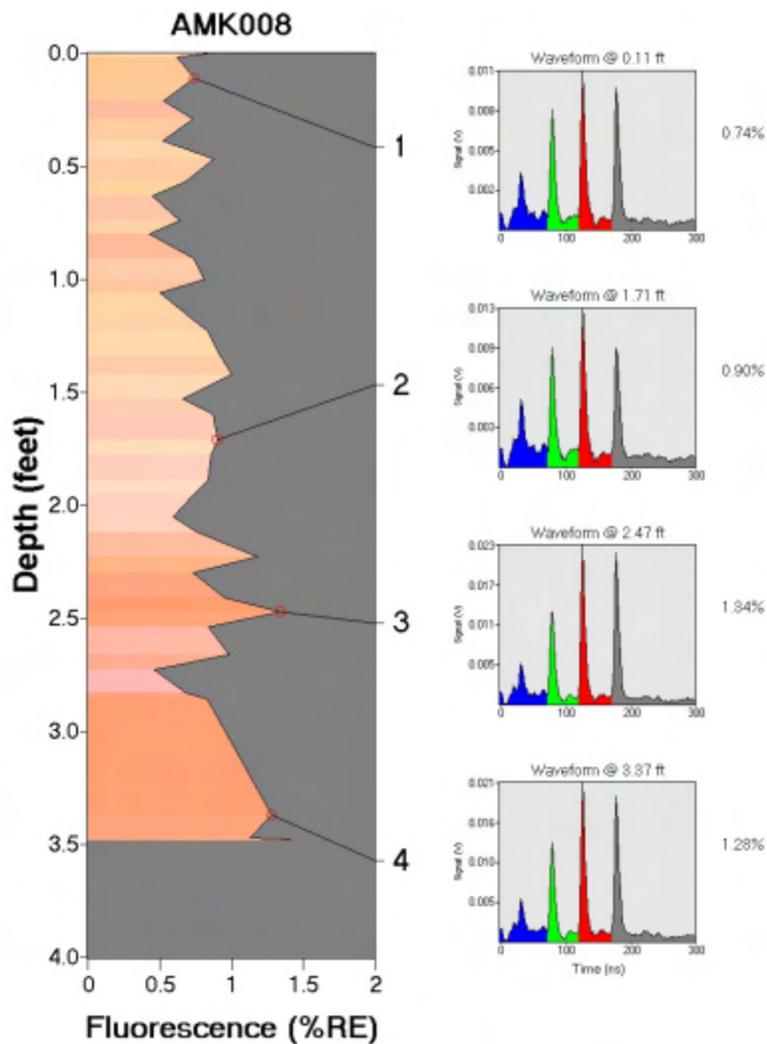
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/13/2005 @ 9:12:43 AM	Max fluorescence: 1.28% @ 11.82 ft
ROST Unit: AK FUDS	Final depth BGS: 13.24 ft
Latitude: Unavailable	Longitude: Unavailable



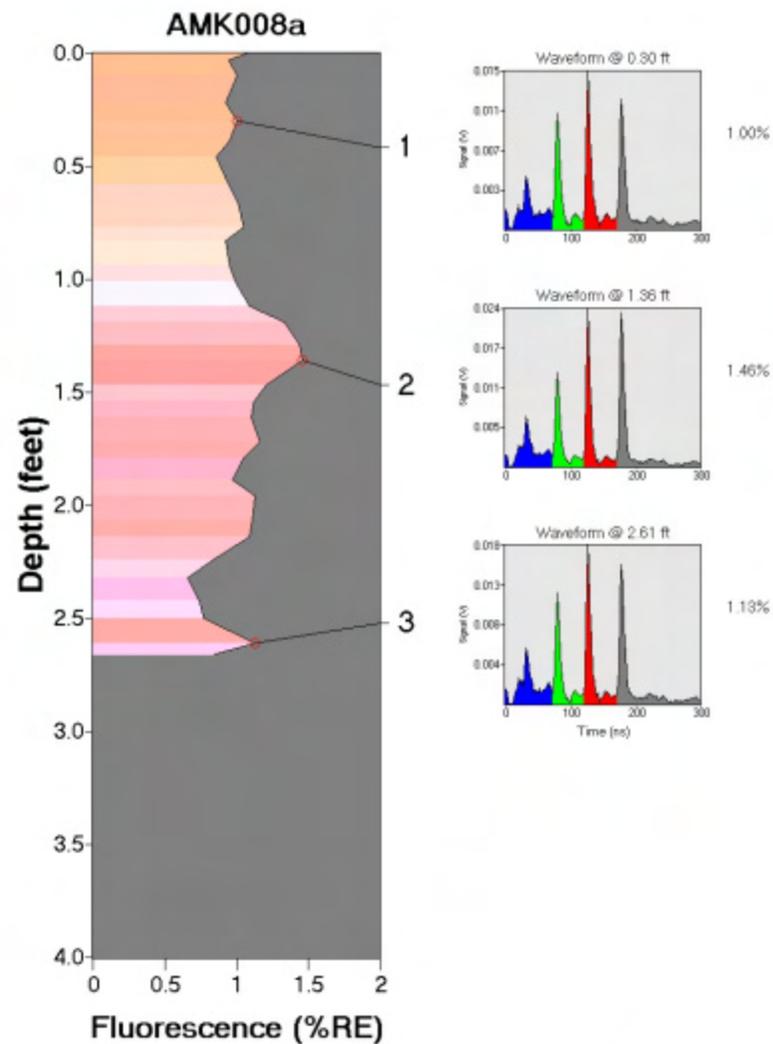
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/13/2005 @ 9:37:08 AM	Max fluorescence: 1.42% @ 3.48 ft
ROST Unit: AK FUDS	Final depth BGS: 3.48 ft
Latitude: Unavailable	Longitude: Unavailable



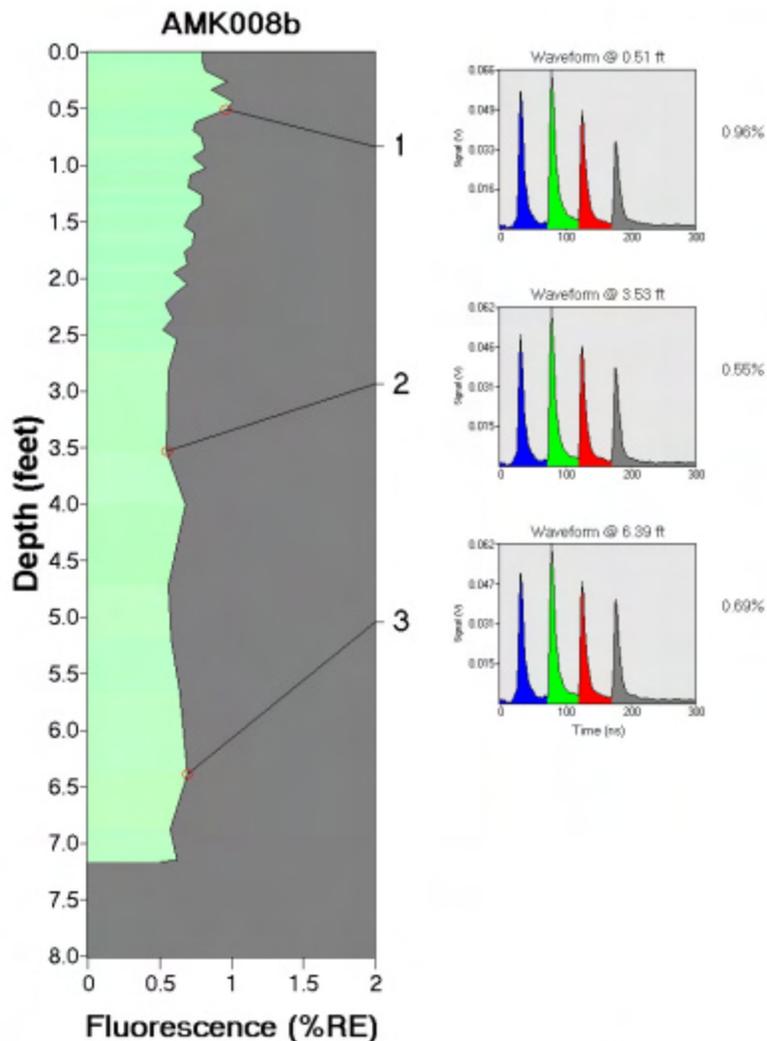
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/13/2005 @ 9:51:08 AM	Max fluorescence: 1.46% @ 1.36 ft
ROST Unit: AK FUDS	Final depth BGS: 2.66 ft
Latitude: Unavailable	Longitude: Unavailable



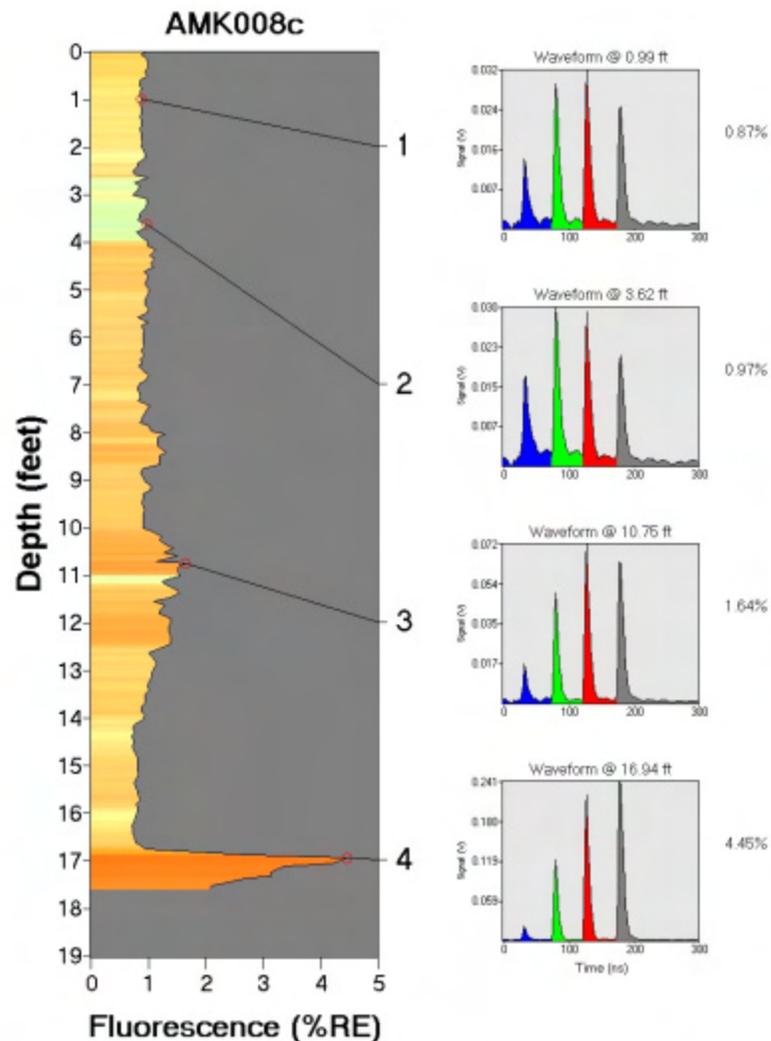
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/13/2005 @ 2:55:50 PM	Max fluorescence: 1.01% @ 0.44 ft
ROST Unit: AK FUDS	Final depth BGS: 7.16 ft
Latitude: Unavailable	Longitude: Unavailable



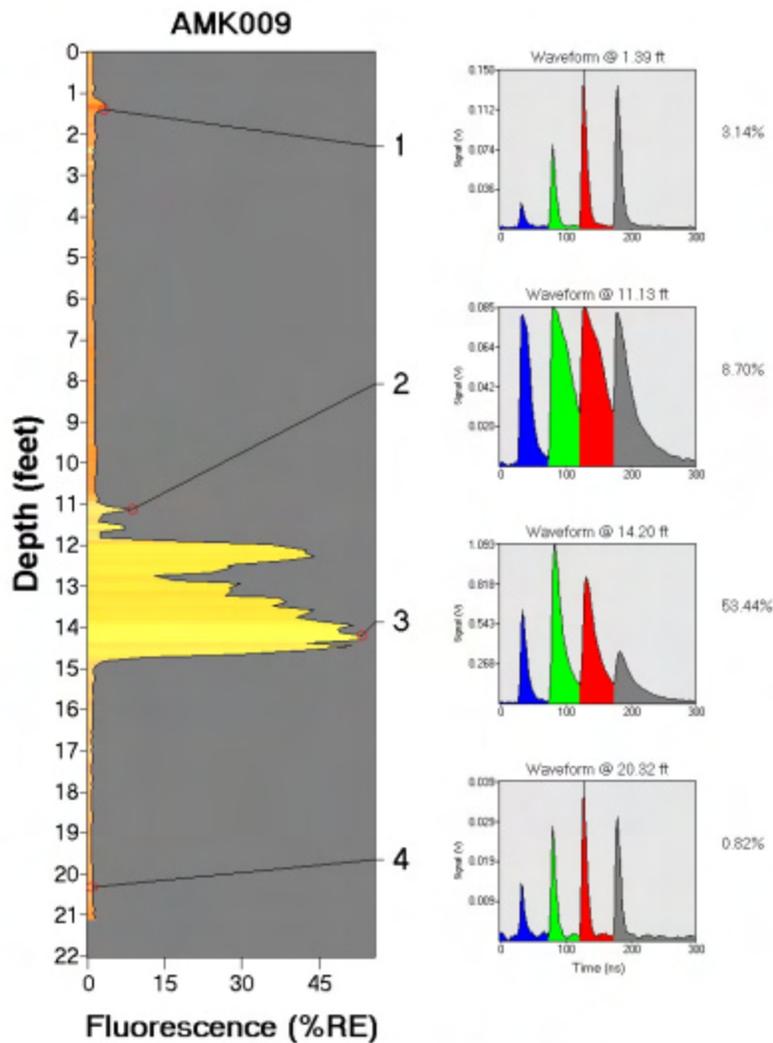
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/13/2005 @ 3:44:10 PM	Max fluorescence: 4.45% @ 16.94 ft
ROST Unit: AK FUDS	Final depth BGS: 17.59 ft
Latitude: Unavailable	Longitude: Unavailable



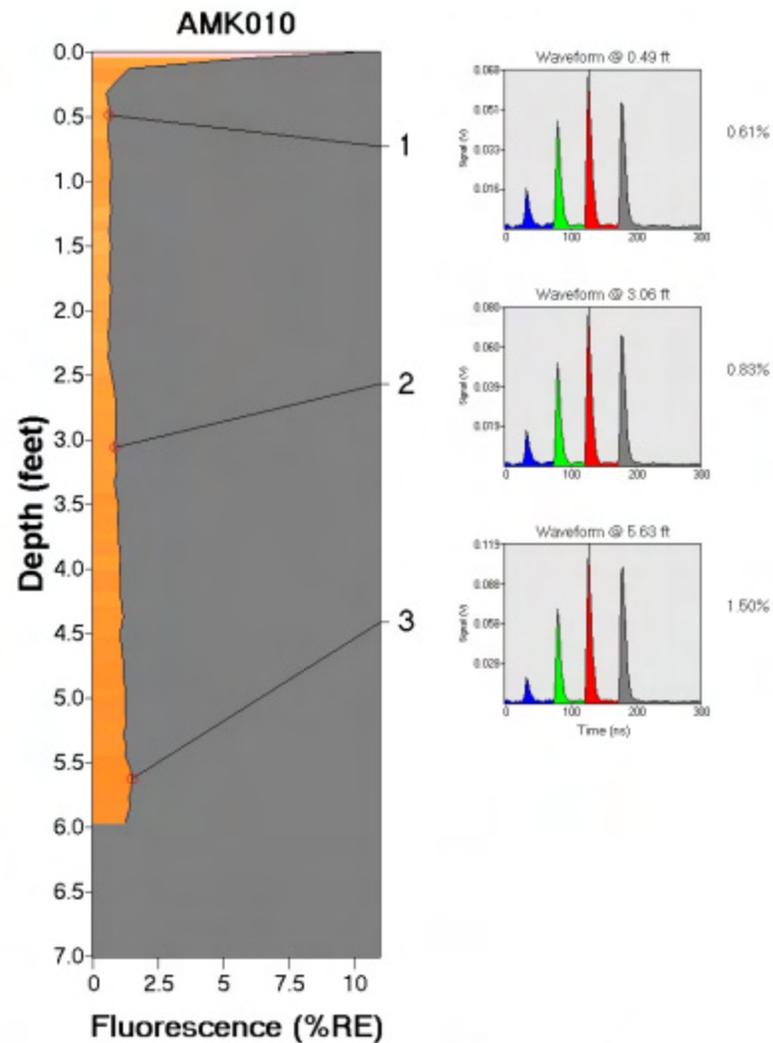
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/13/2005 @ 4:26:01 PM	Max fluorescence: 53.44% @ 14.20 ft
ROST Unit: AK FUDS	Final depth BGS: 21.10 ft
Latitude: Unavailable	Longitude: Unavailable



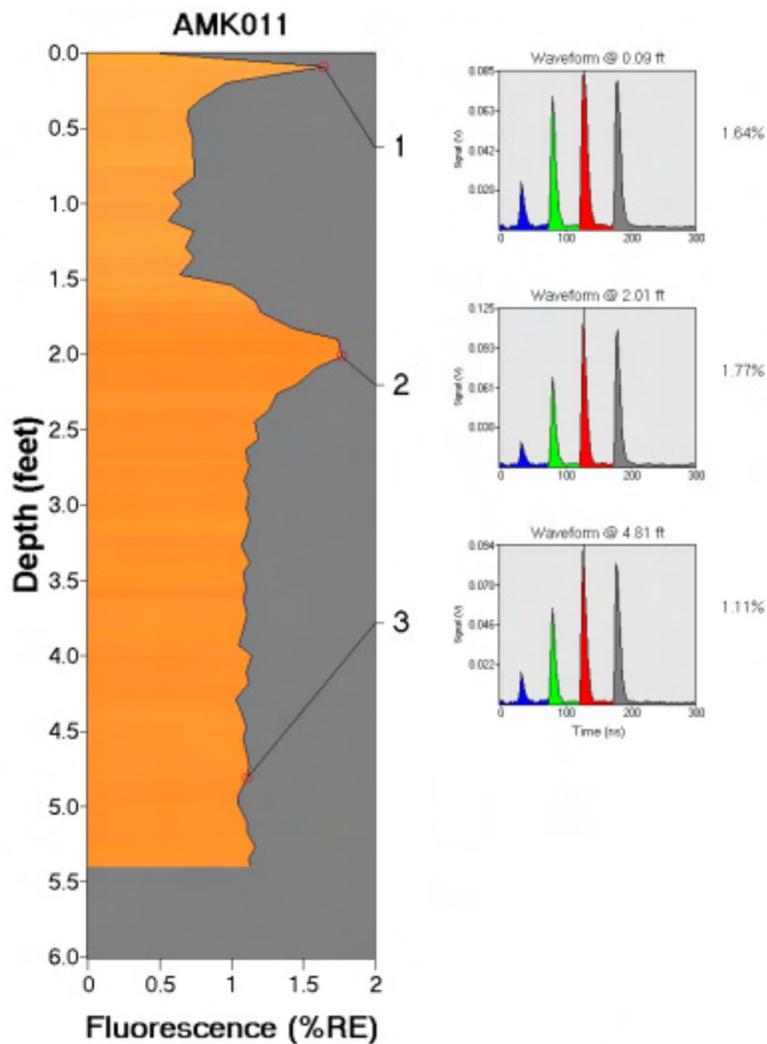
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/13/2005 @ 5:19:30 PM	Max fluorescence: 9.97% @ 0.00 ft
ROST Unit: AK FUDS	Final depth BGS: 5.97 ft
Latitude: Unavailable	Longitude: Unavailable



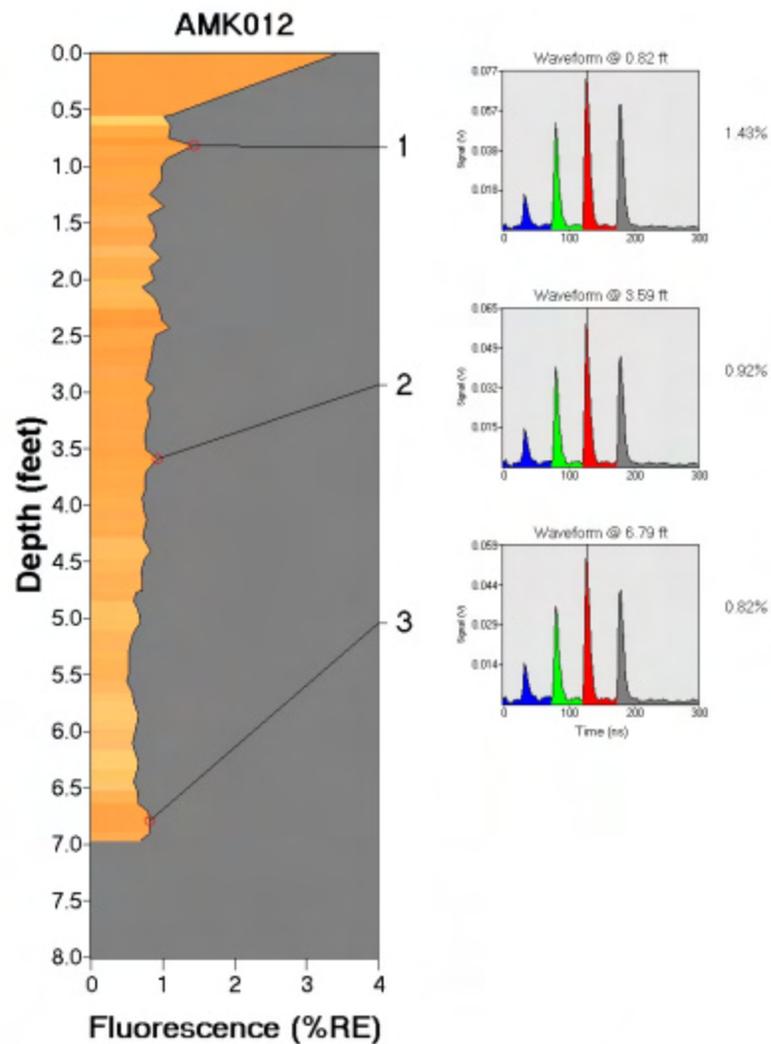
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/13/2005 @ 5:37:42 PM	Max fluorescence: 1.77% @ 2.01 ft
ROST Unit: AK FUDS	Final depth BGS: 5.40 ft
Latitude: Unavailable	Longitude: Unavailable



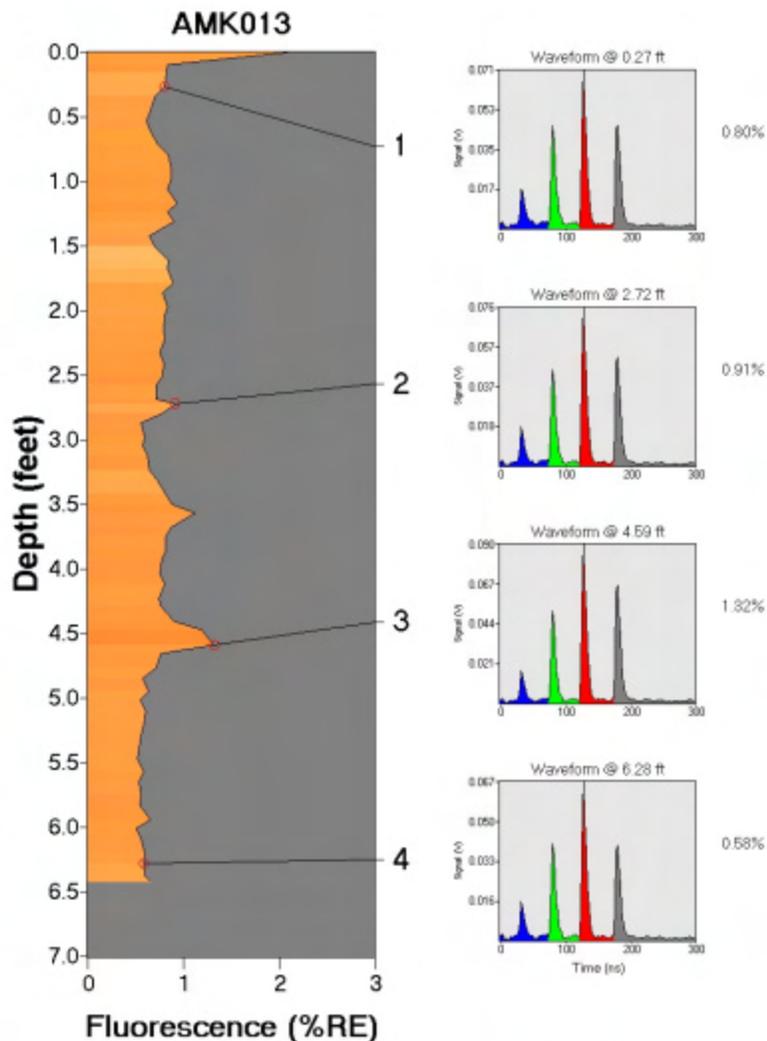
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/13/2005 @ 5:57:42 PM	Max fluorescence: 3.40% @ 0.01 ft
ROST Unit: AK FUDS	Final depth BGS: 6.97 ft
Latitude: Unavailable	Longitude: Unavailable



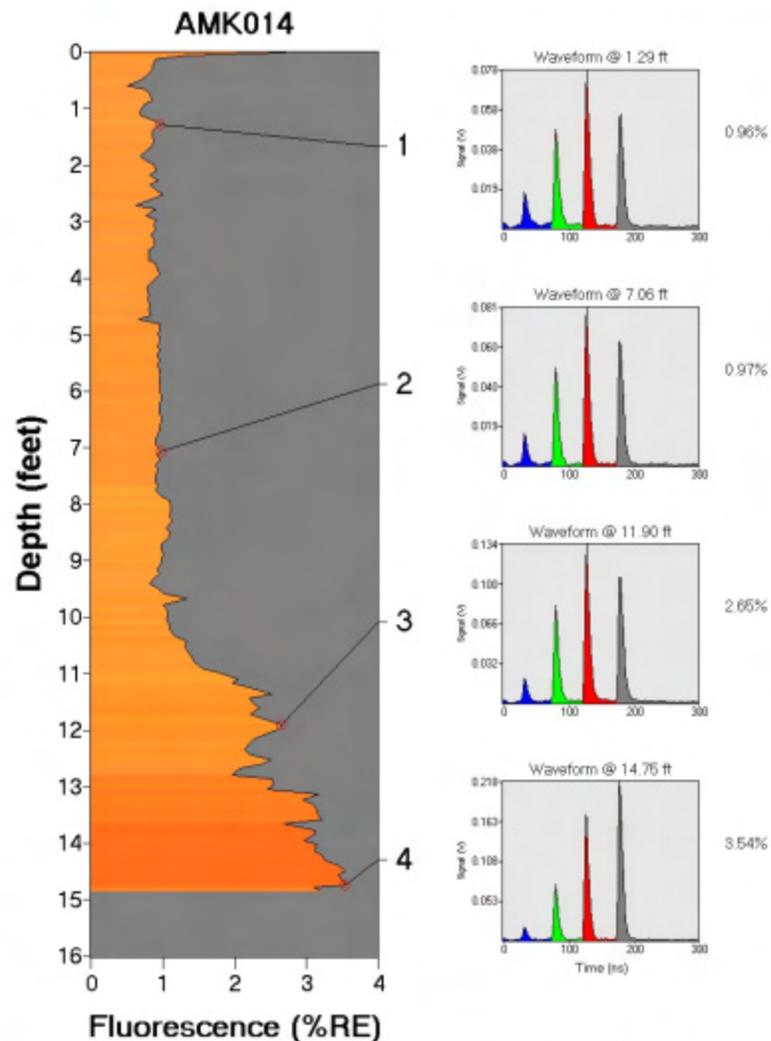
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/13/2005 @ 6:14:20 PM	Max fluorescence: 2.06% @ 0.00 ft
ROST Unit: AK FUDS	Final depth BGS: 6.42 ft
Latitude: Unavailable	Longitude: Unavailable



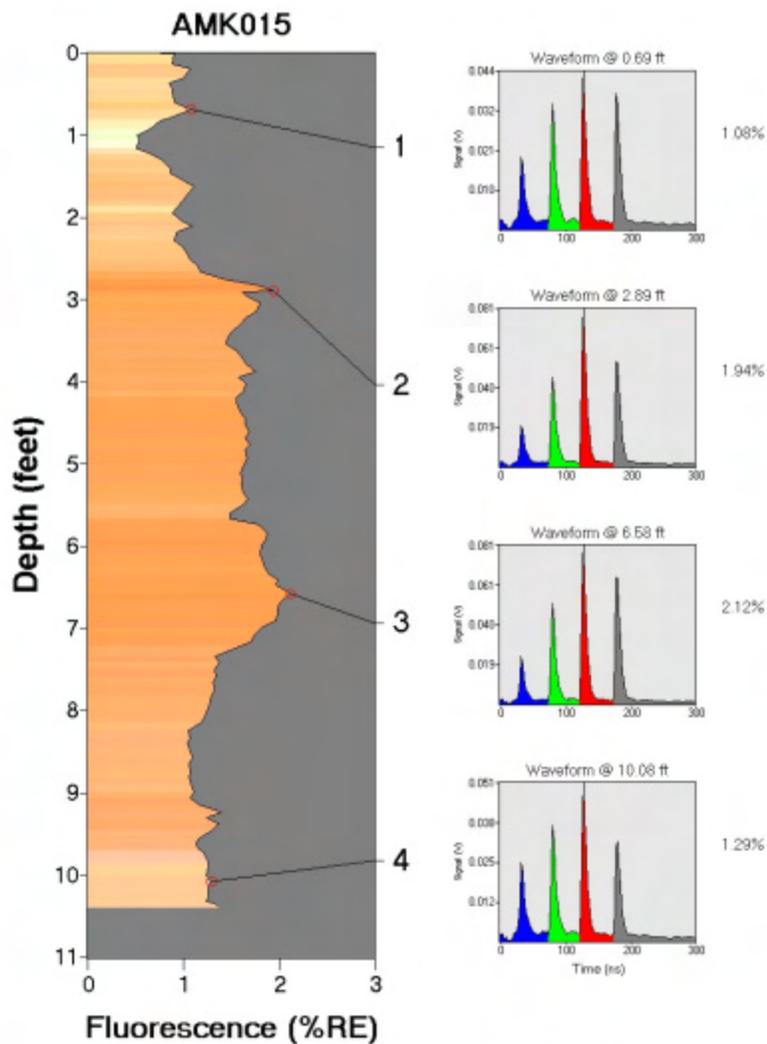
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/13/2005 @ 6:29:49 PM	Max fluorescence: 3.54% @ 14.49 ft
ROST Unit: AK FUDS	Final depth BGS: 14.85 ft
Latitude: Unavailable	Longitude: Unavailable



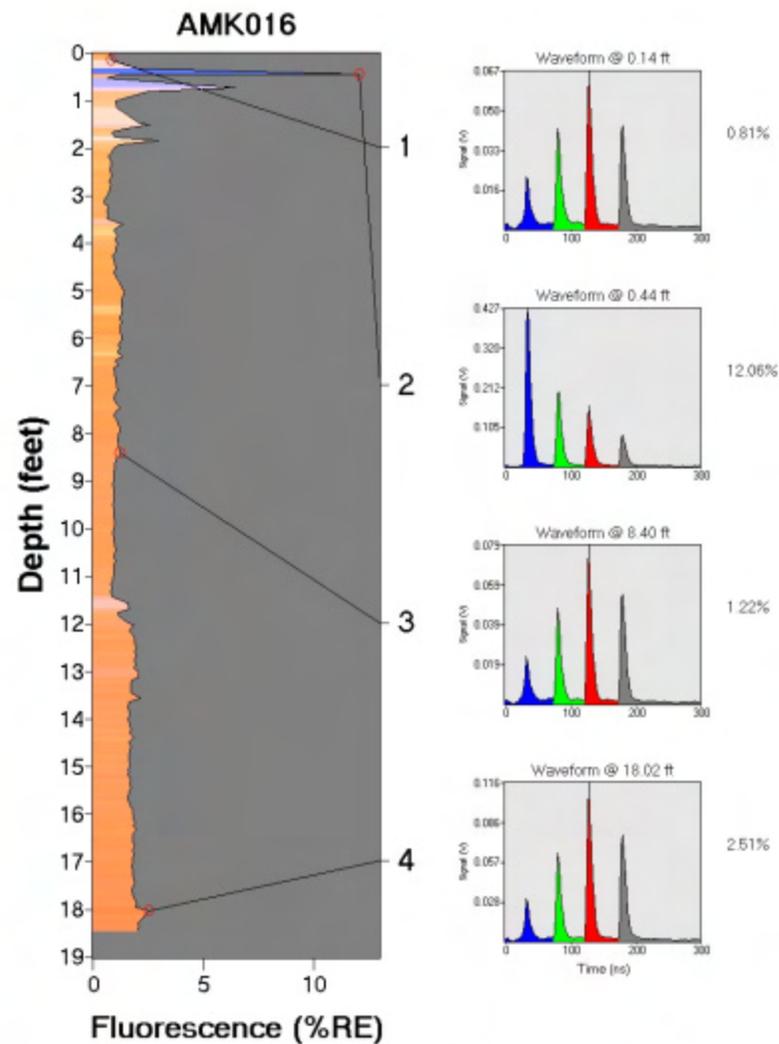
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/14/2005 @ 9:47:45 AM	Max fluorescence: 2.12% @ 6.58 ft
ROST Unit: AK FUDS	Final depth BGS: 10.39 ft
Latitude: Unavailable	Longitude: Unavailable



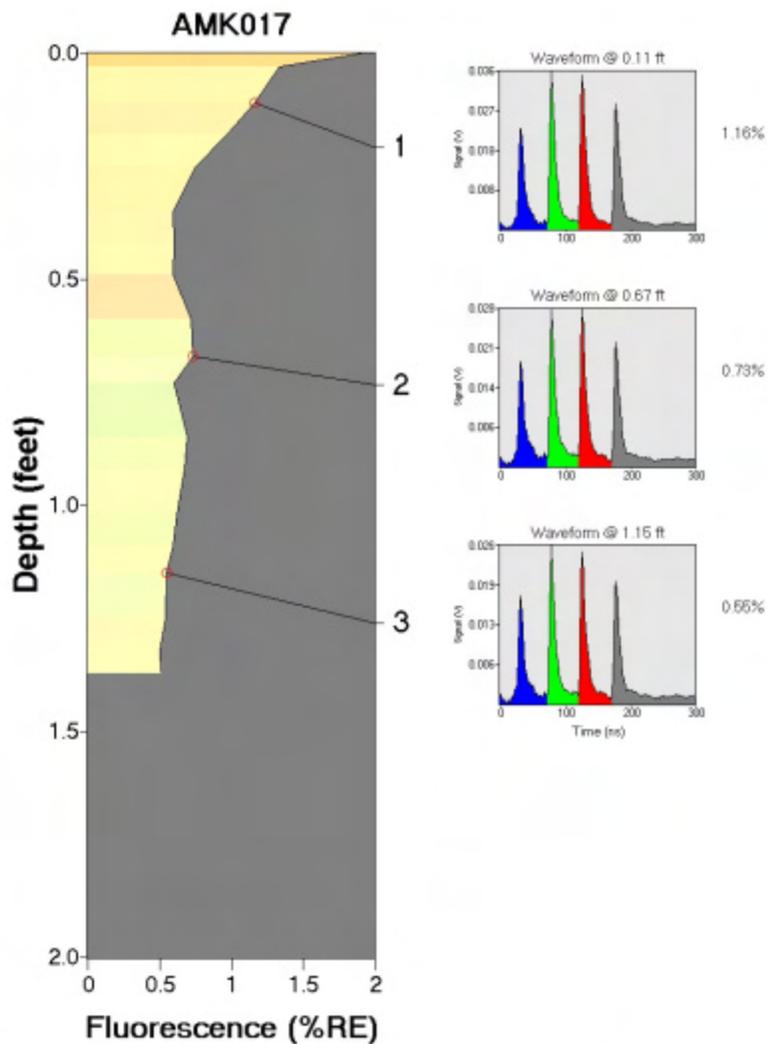
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/14/2005 @ 10:07:29 AM	Max fluorescence: 12.06% @ 0.44 ft
ROST Unit: AK FUDS	Final depth BGS: 18.44 ft
Latitude: Unavailable	Longitude: Unavailable



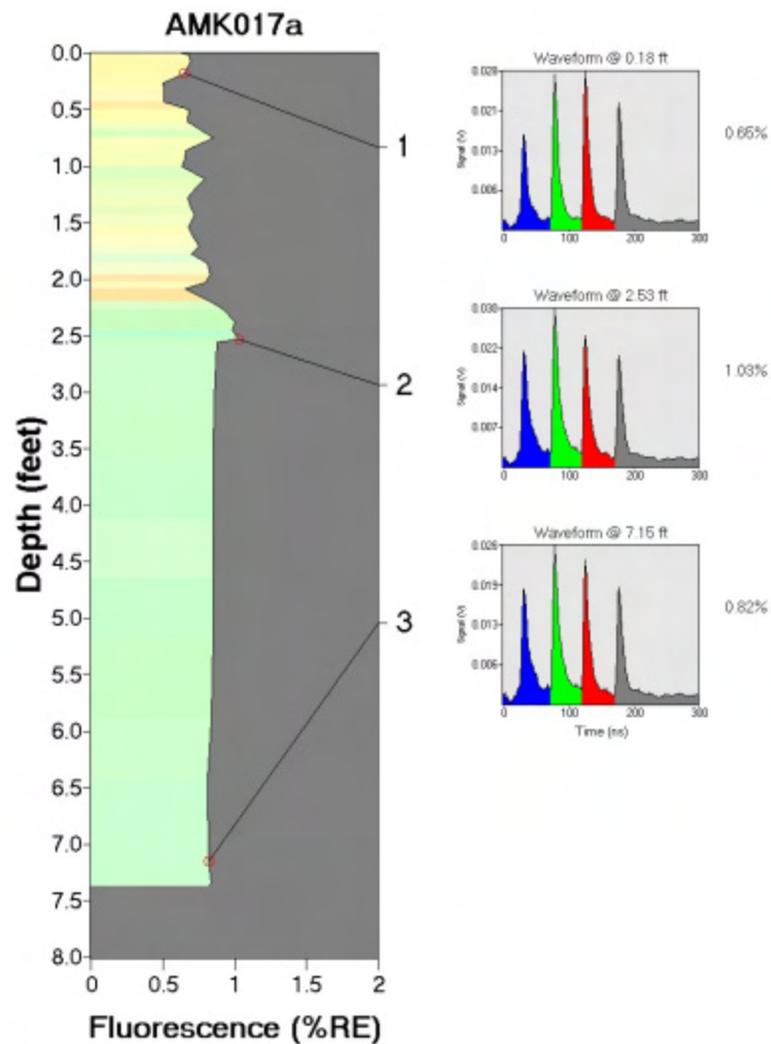
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/14/2005 @ 1:38:12 PM	Max fluorescence: 1.90% @ 0.00 ft
ROST Unit: AK FUDS	Final depth BGS: 1.37 ft
Latitude: Unavailable	Longitude: Unavailable



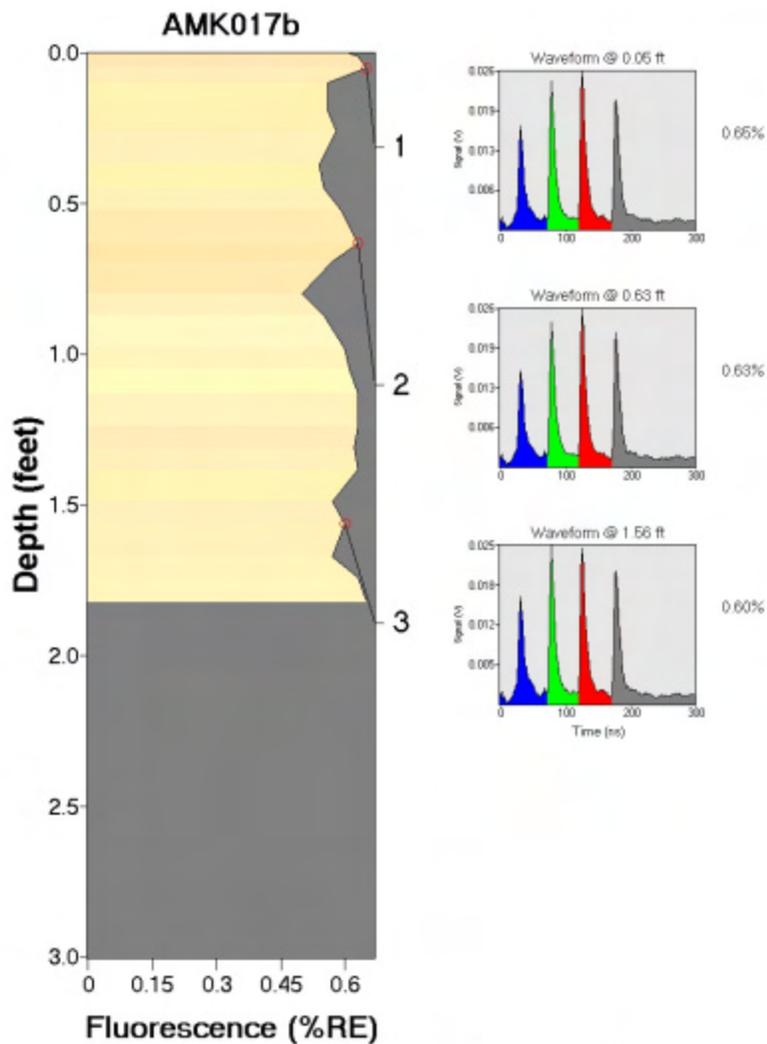
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/14/2005 @ 1:47:03 PM	Max fluorescence: 1.03% @ 2.53 ft
ROST Unit: AK FUDS	Final depth BGS: 7.36 ft
Latitude: Unavailable	Longitude: Unavailable



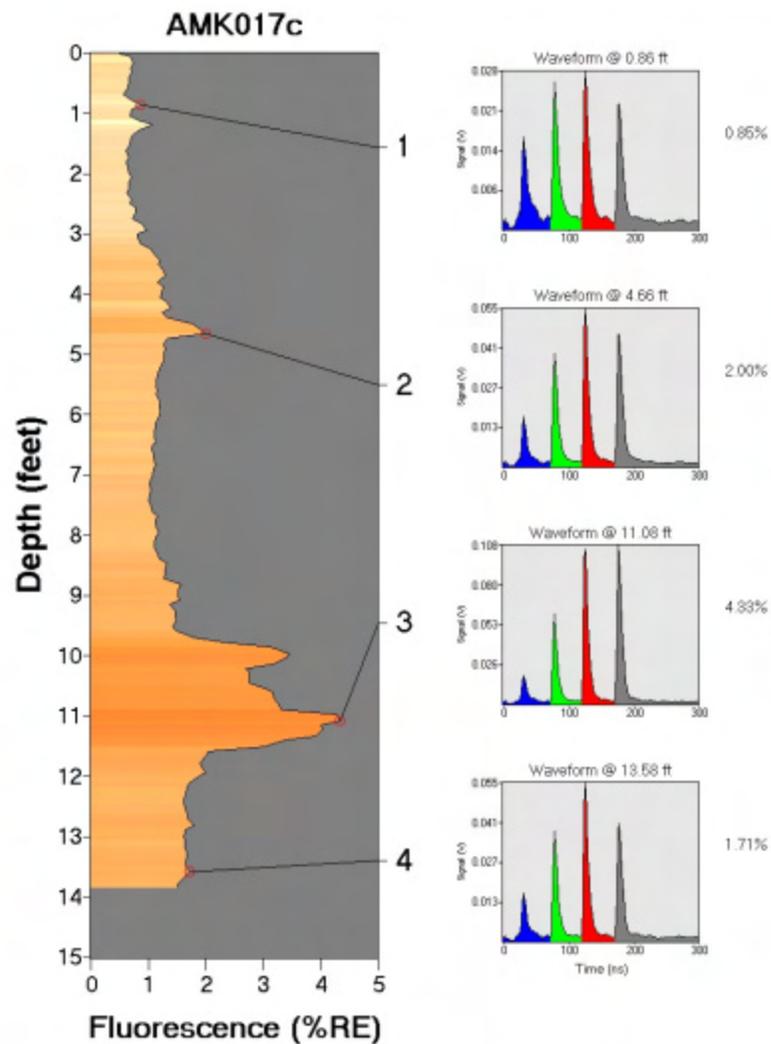
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/14/2005 @ 1:58:01 PM	Max fluorescence: 0.65% @ 0.05 ft
ROST Unit: AK FUDS	Final depth BGS: 1.82 ft
Latitude: Unavailable	Longitude: Unavailable



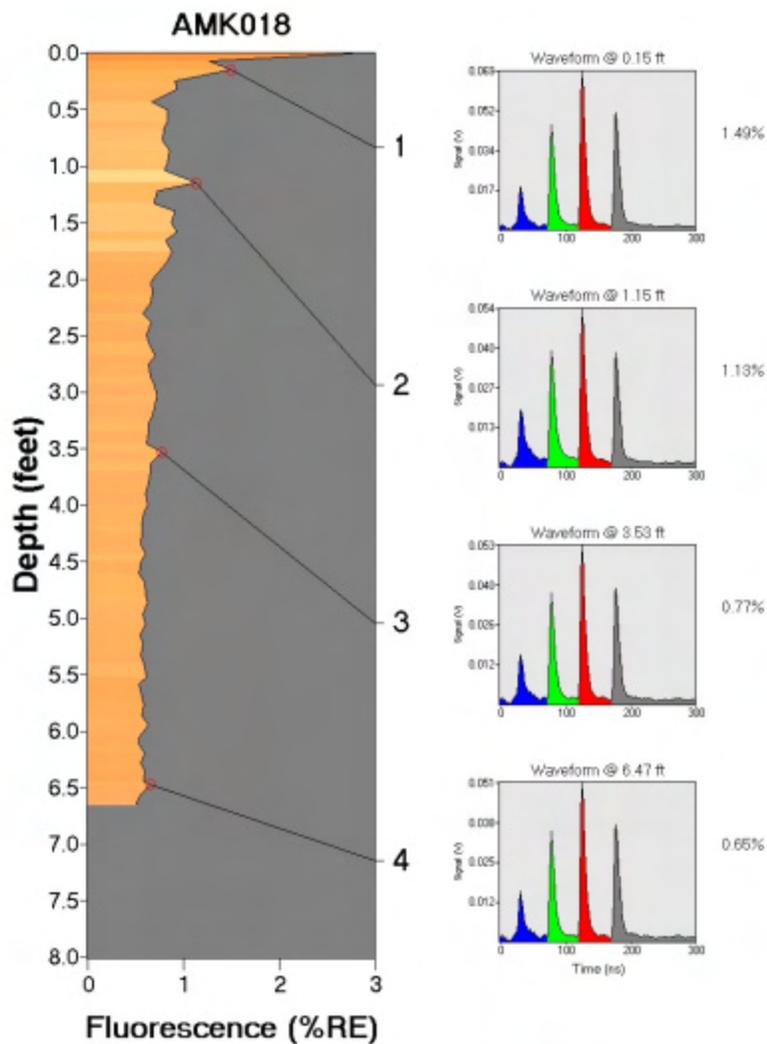
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/14/2005 @ 2:06:31 PM	Max fluorescence: 4.33% @ 11.08 ft
ROST Unit: AK FUDS	Final depth BGS: 13.84 ft
Latitude: Unavailable	Longitude: Unavailable



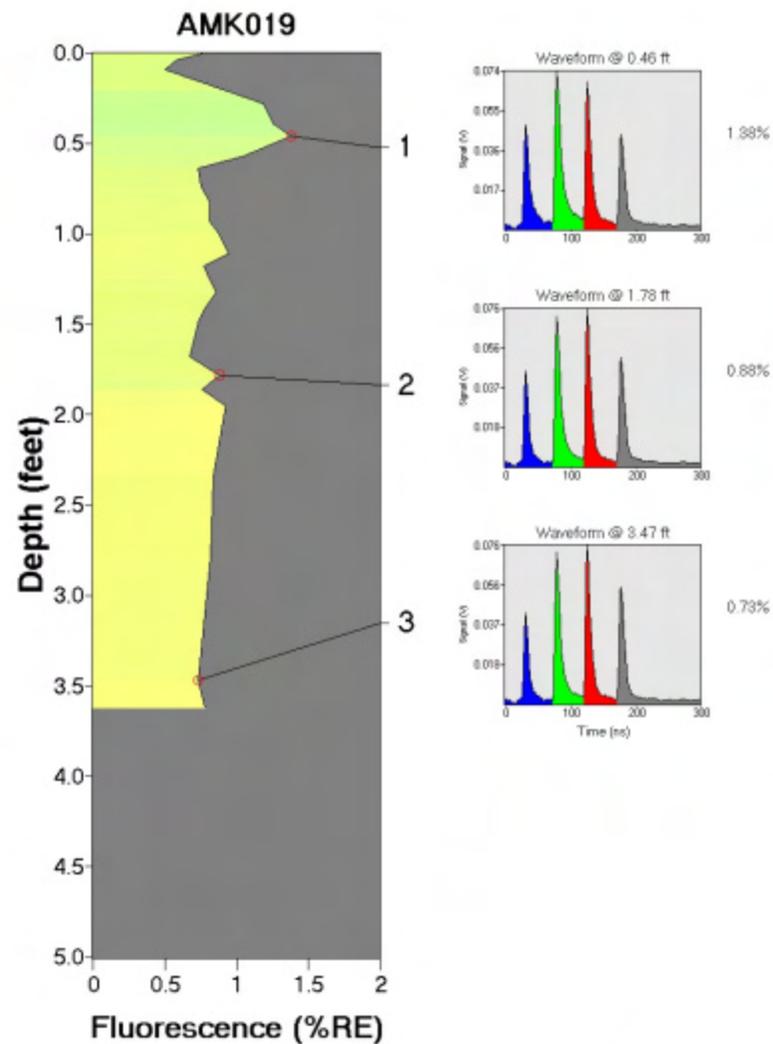
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/14/2005 @ 2:30:34 PM	Max fluorescence: 2.76% @ 0.00 ft
ROST Unit: AK FUDS	Final depth BGS: 6.65 ft
Latitude: Unavailable	Longitude: Unavailable



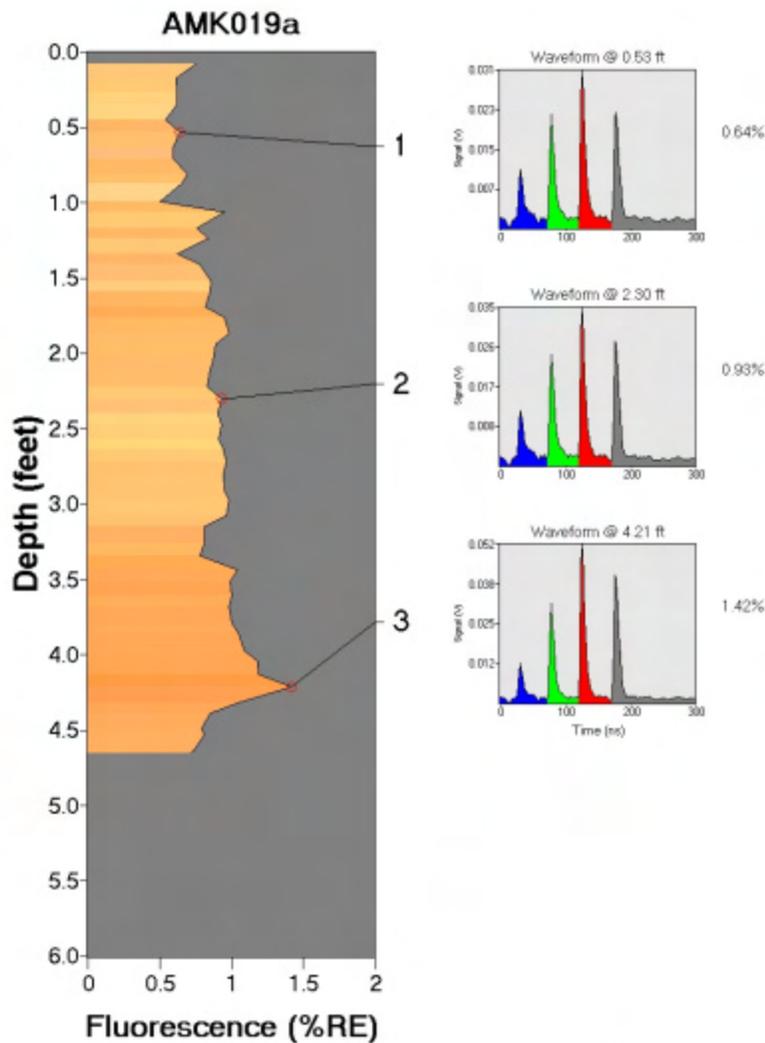
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/14/2005 @ 2:56:37 PM	Max fluorescence: 1.38% @ 0.46 ft
ROST Unit: AK FUDS	Final depth BGS: 3.62 ft
Latitude: Unavailable	Longitude: Unavailable



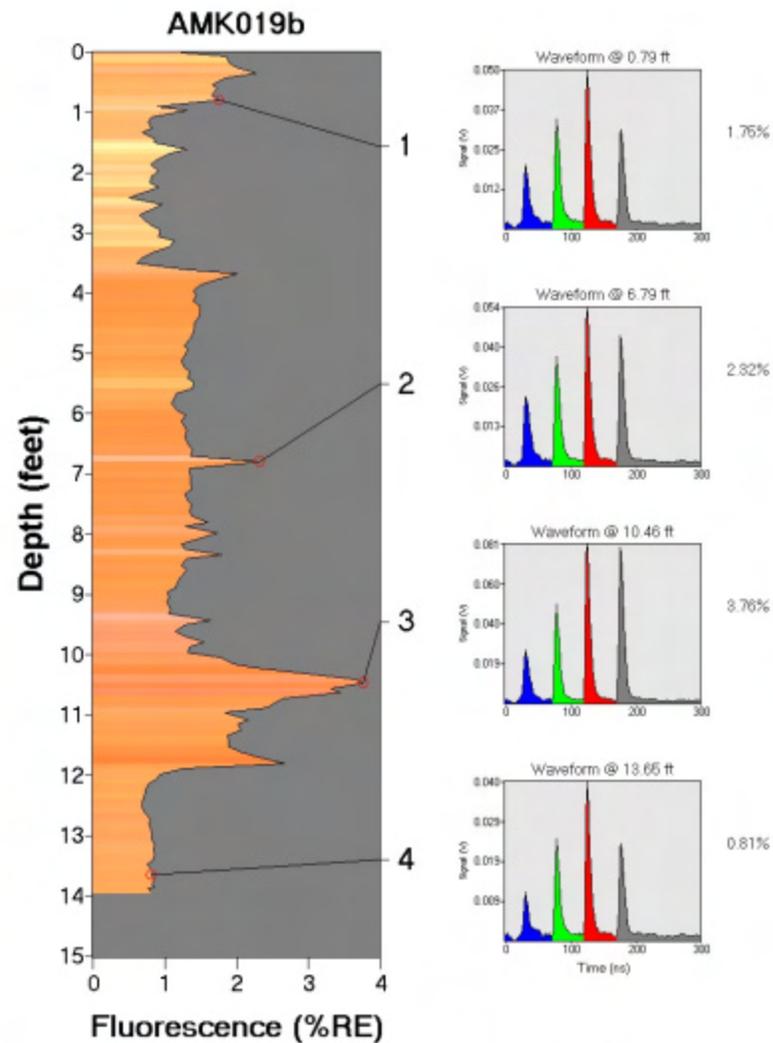
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/14/2005 @ 3:22:41 PM	Max fluorescence: 1.42% @ 4.21 ft
ROST Unit: AK FUDS	Final depth BGS: 4.65 ft
Latitude: Unavailable	Longitude: Unavailable



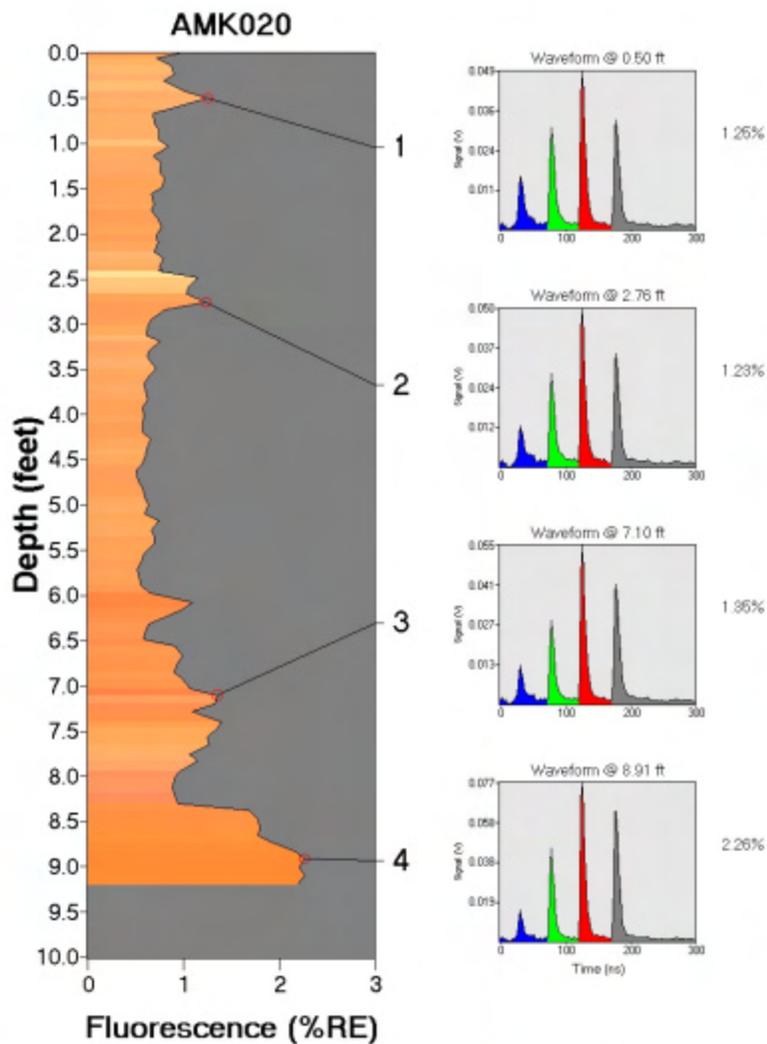
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/14/2005 @ 3:29:14 PM	Max fluorescence: 3.76% @ 10.46 ft
ROST Unit: AK FUDS	Final depth BGS: 13.95 ft
Latitude: Unavailable	Longitude: Unavailable



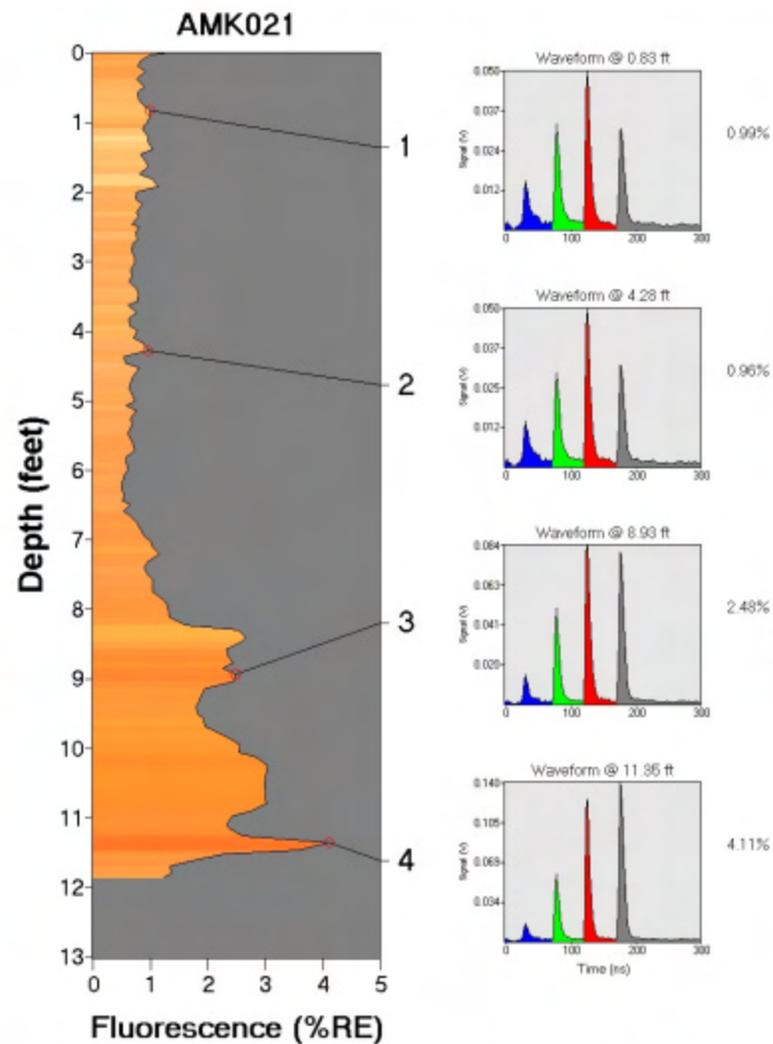
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/14/2005 @ 4:18:33 PM	Max fluorescence: 2.27% @ 9.09 ft
ROST Unit: AK FUDS	Final depth BGS: 9.19 ft
Latitude: Unavailable	Longitude: Unavailable



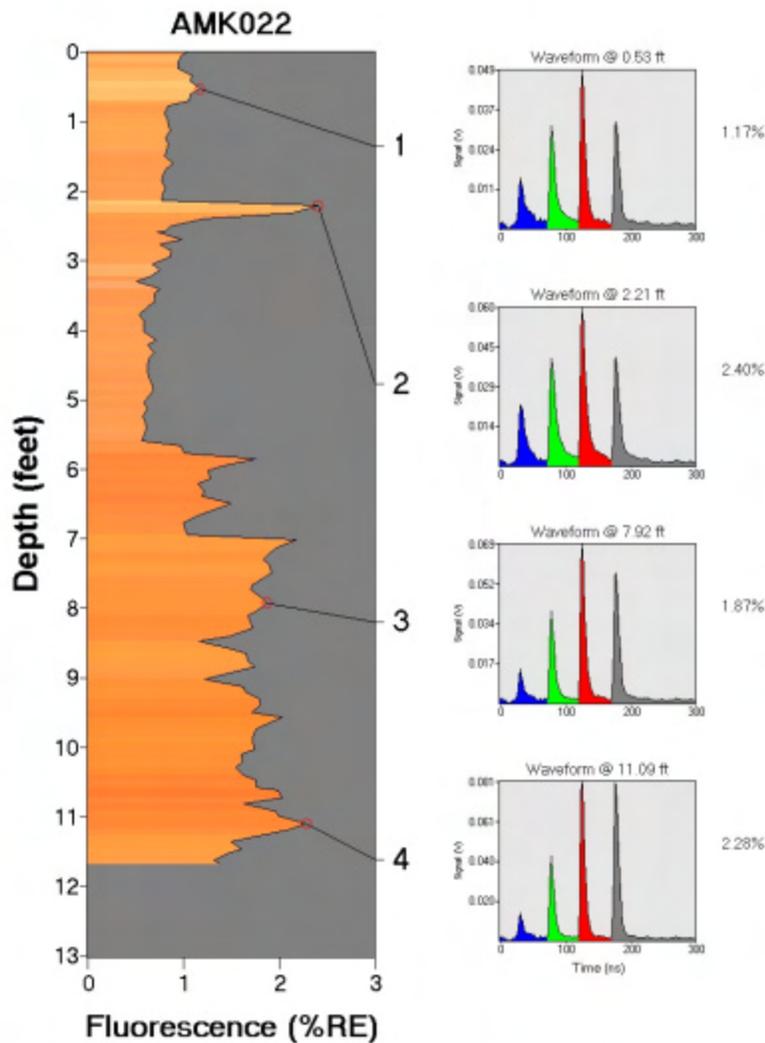
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/14/2005 @ 4:32:51 PM	Max fluorescence: 4.11% @ 11.86 ft
ROST Unit: AK FUDS	Final depth BGS: 11.86 ft
Latitude: Unavailable	Longitude: Unavailable



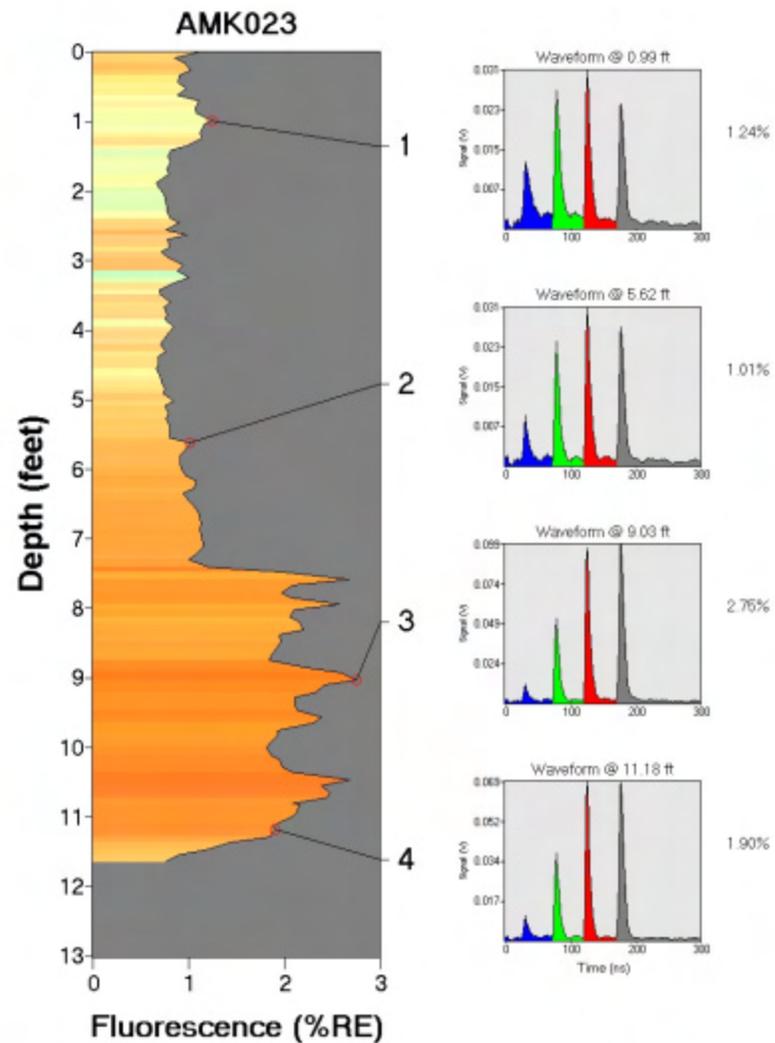
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/14/2005 @ 4:48:28 PM	Max fluorescence: 2.40% @ 2.21 ft
ROST Unit: AK FUDS	Final depth BGS: 11.67 ft
Latitude: Unavailable	Longitude: Unavailable



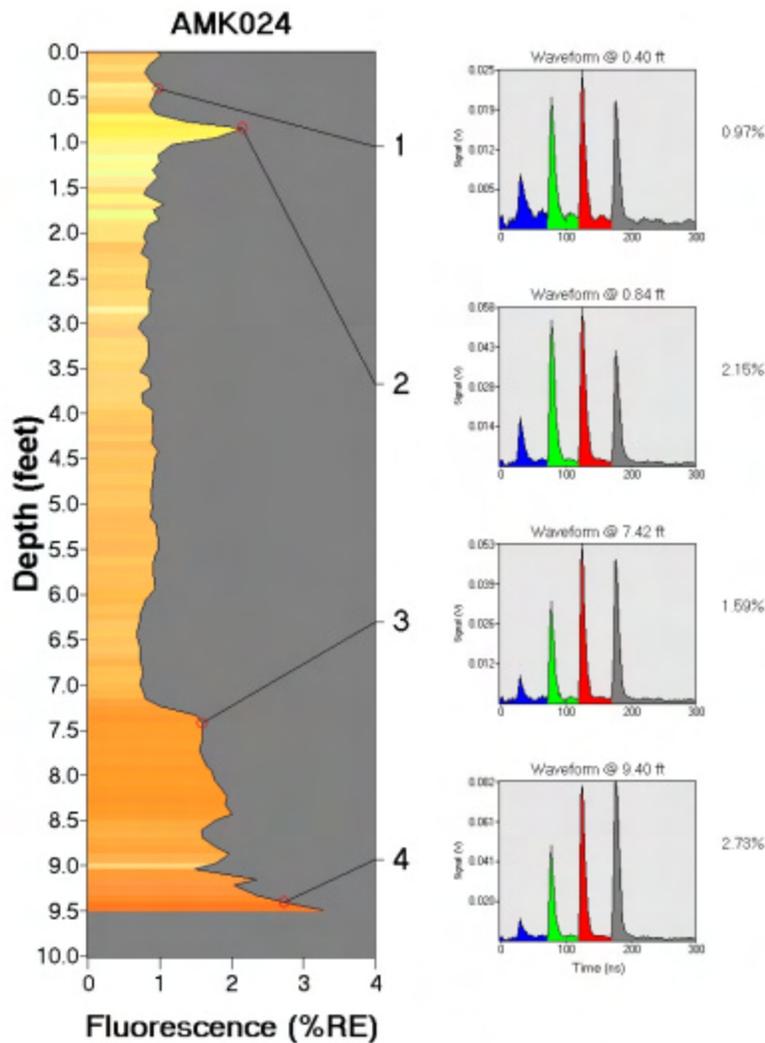
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/14/2005 @ 5:30:19 PM	Max fluorescence: 2.75% @ 9.03 ft
ROST Unit: AK FUDS	Final depth BGS: 11.64 ft
Latitude: Unavailable	Longitude: Unavailable



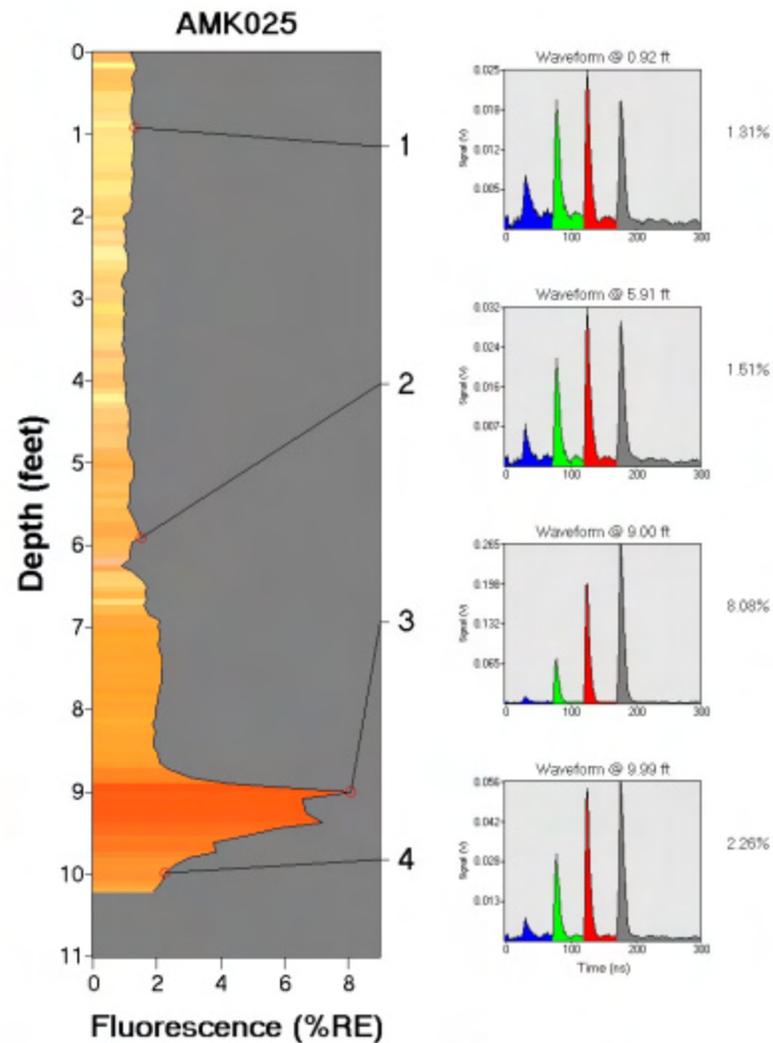
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/14/2005 @ 5:44:30 PM	Max fluorescence: 3.28% @ 9.50 ft
ROST Unit: AK FUDS	Final depth BGS: 9.50 ft
Latitude: Unavailable	Longitude: Unavailable



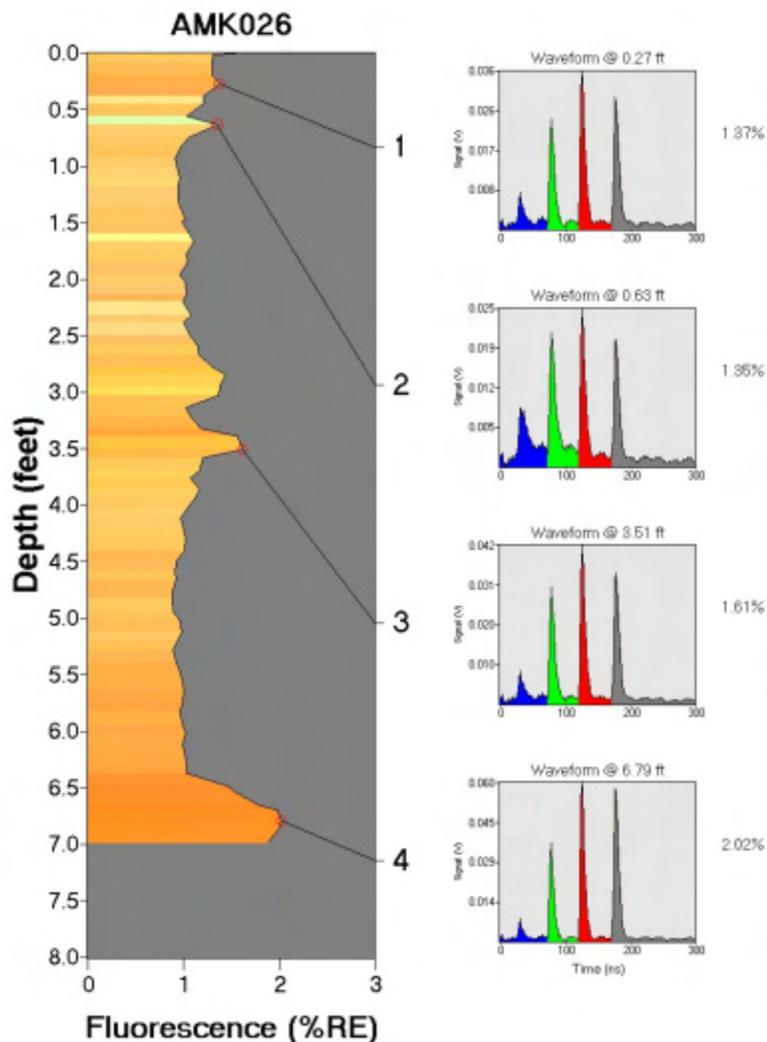
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/14/2005 @ 5:56:20 PM	Max fluorescence: 8.08% @ 9.00 ft
ROST Unit: AK FUDS	Final depth BGS: 10.22 ft
Latitude: Unavailable	Longitude: Unavailable



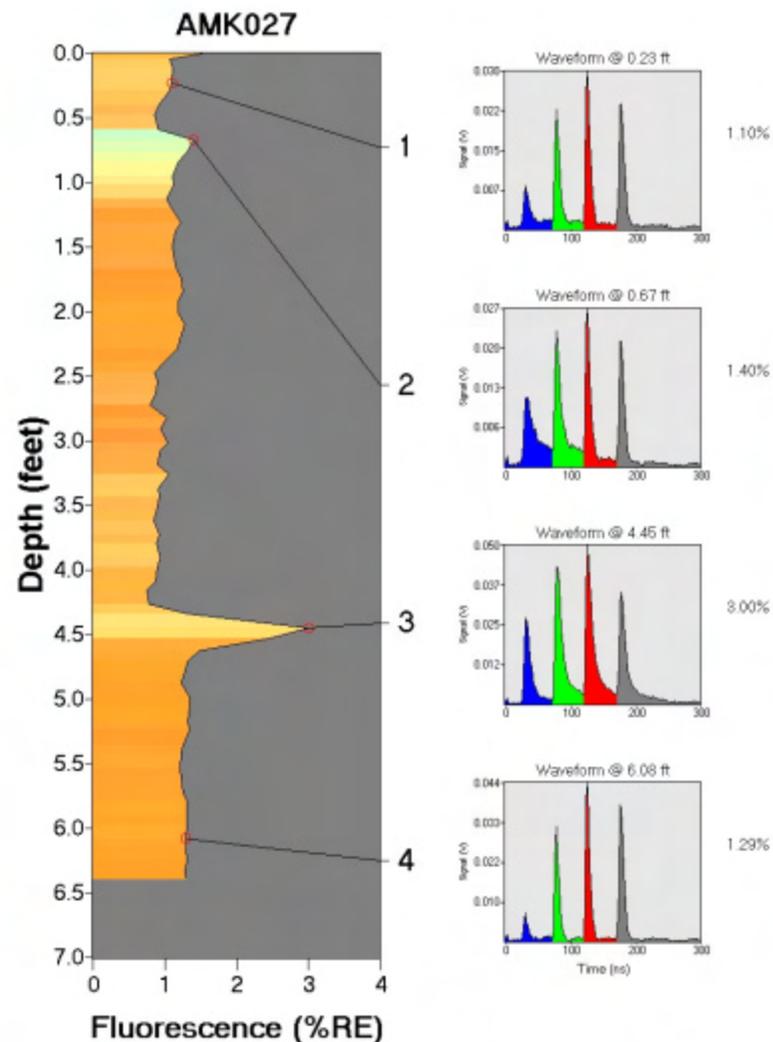
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/14/2005 @ 6:08:46 PM	Max fluorescence: 2.02% @ 6.79 ft
ROST Unit: AK FUDS	Final depth BGS: 6.99 ft
Latitude: Unavailable	Longitude: Unavailable



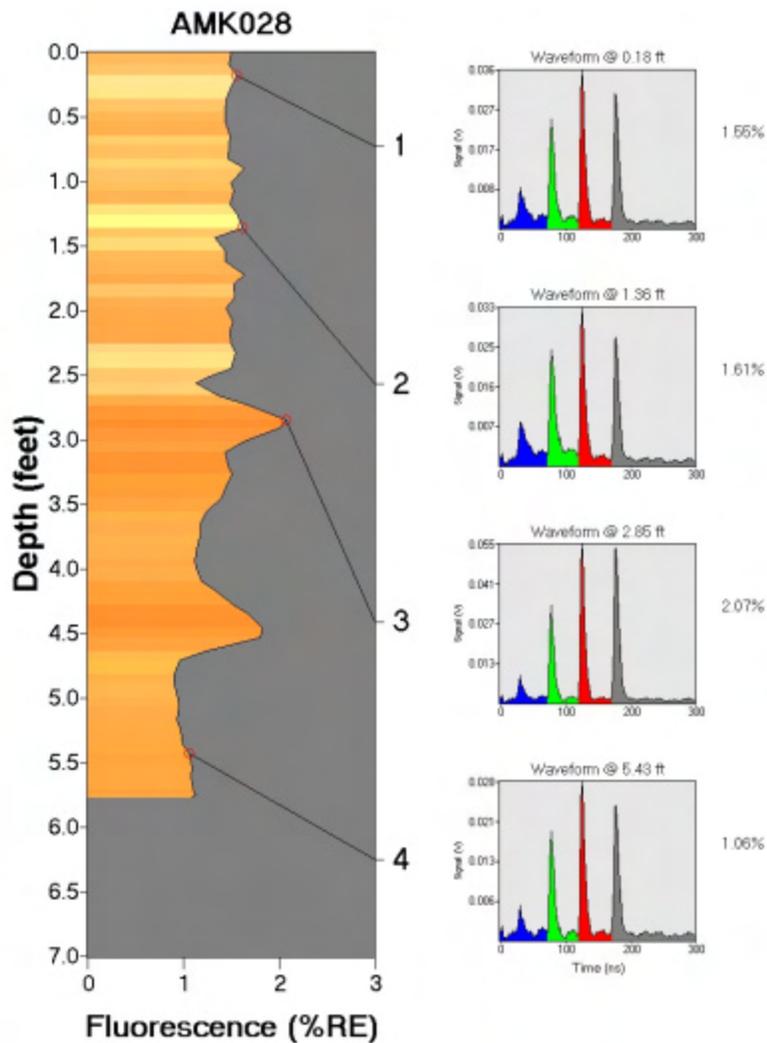
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/14/2005 @ 6:20:38 PM	Max fluorescence: 3.00% @ 4.45 ft
ROST Unit: AK FUDS	Final depth BGS: 6.99 ft
Latitude: Unavailable	Longitude: Unavailable



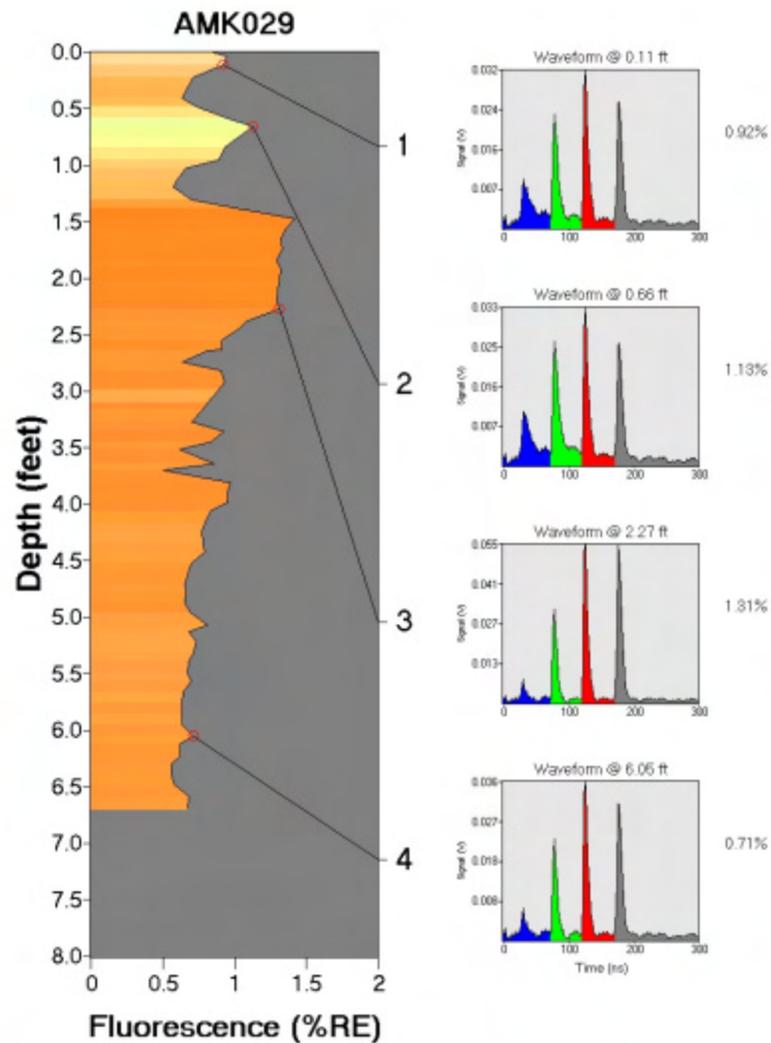
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/14/2005 @ 6:32:09 PM	Max fluorescence: 2.07% @ 2.85 ft
ROST Unit: AK FUDS	Final depth BGS: 5.77 ft
Latitude: Unavailable	Longitude: Unavailable



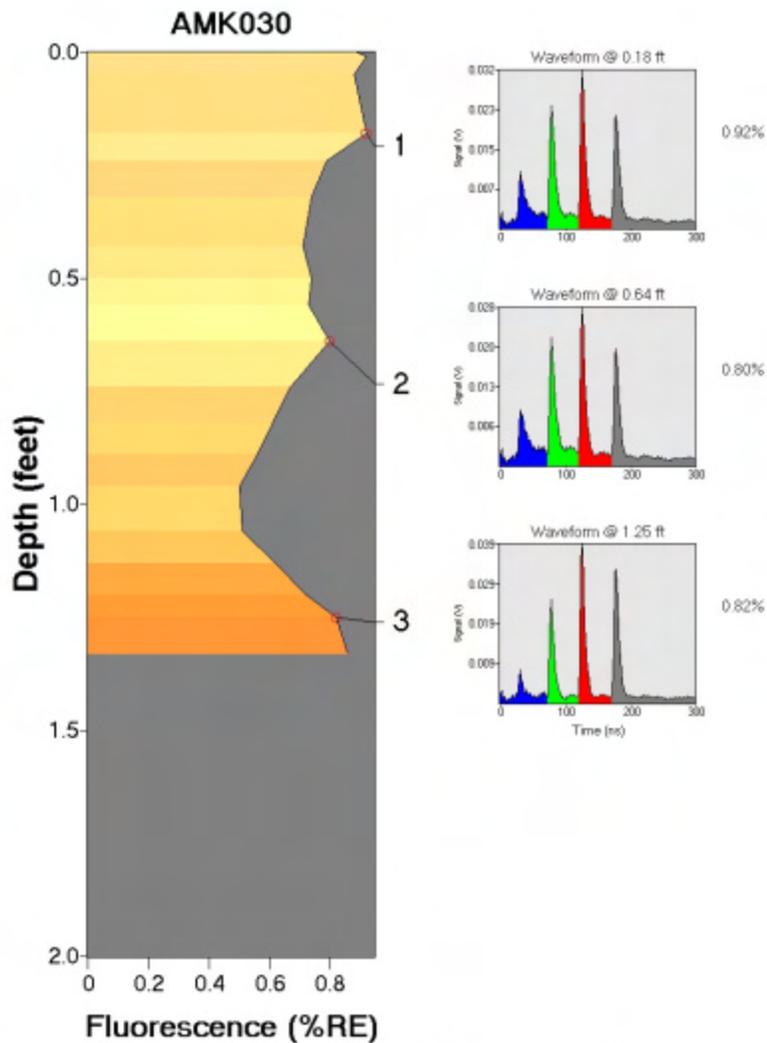
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/14/2005 @ 6:49:02 PM	Max fluorescence: 1.42% @ 1.47 ft
ROST Unit: AK FUDS	Final depth BGS: 6.70 ft
Latitude: Unavailable	Longitude: Unavailable



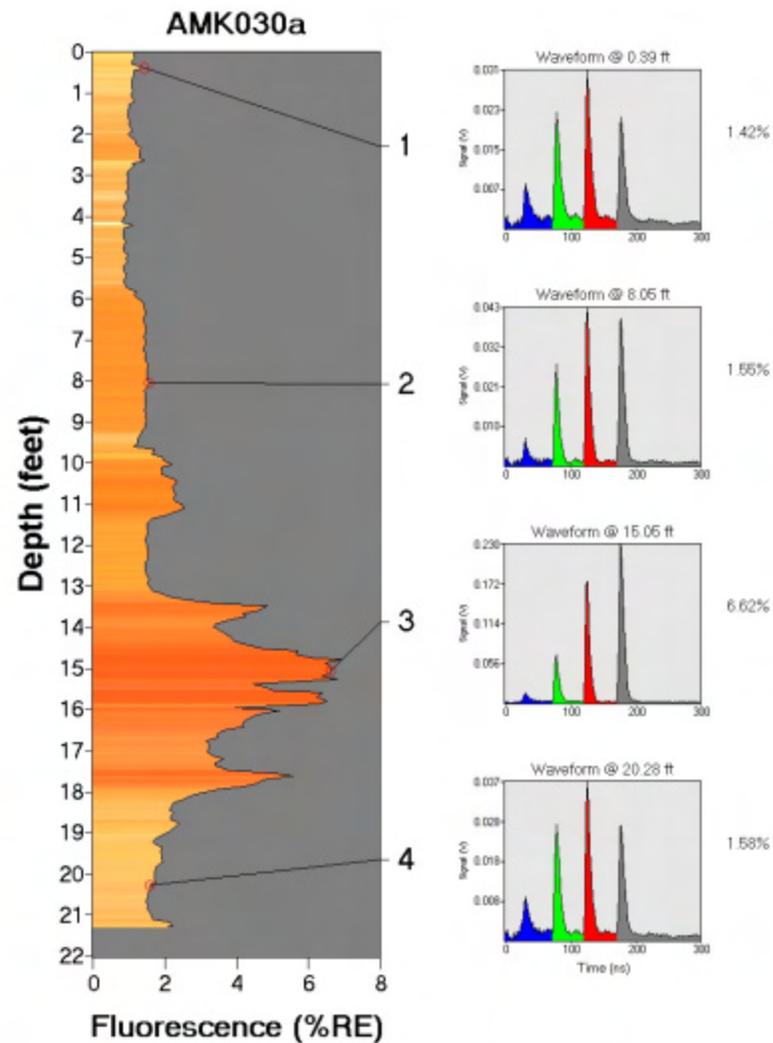
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/15/2005 @ 9:30:47 AM	Max fluorescence: 0.92% @ 0.01 ft
ROST Unit: AK FUDS	Final depth BGS: 1.33 ft
Latitude: Unavailable	Longitude: Unavailable



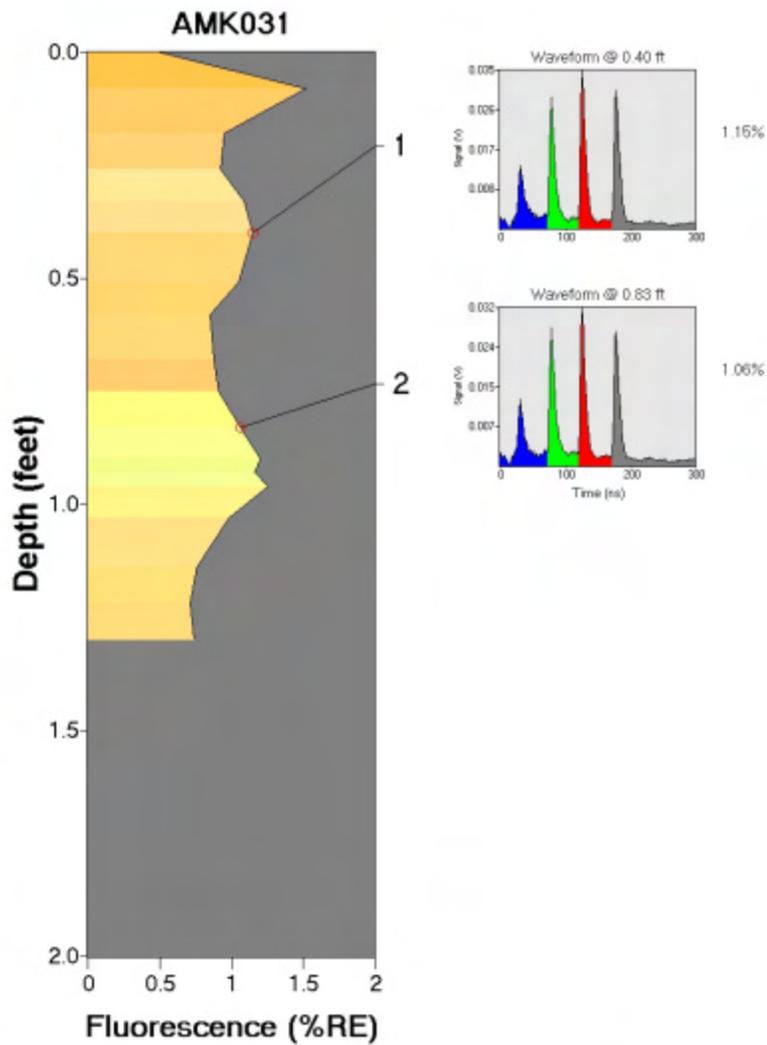
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/15/2005 @ 9:37:02 AM	Max fluorescence: 6.93% @ 14.78 ft
ROST Unit: AK FUDS	Final depth BGS: 21.28 ft
Latitude: Unavailable	Longitude: Unavailable



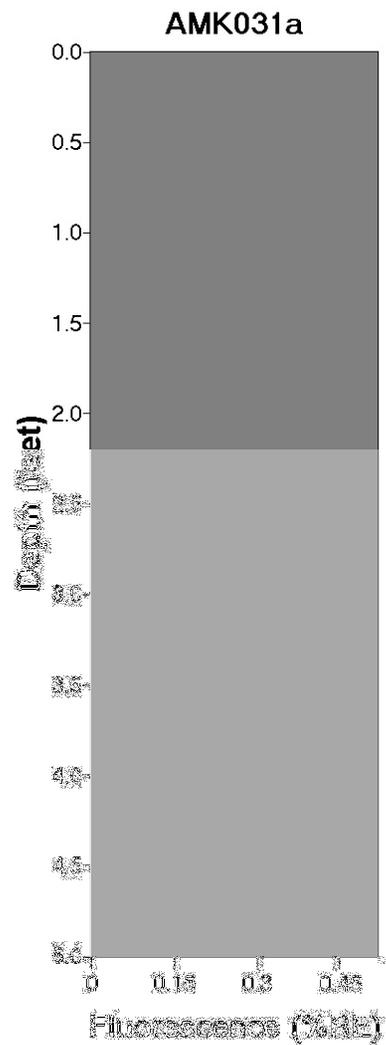
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/15/2005 @ 10:23:51 AM	Max fluorescence: 1.52% @ 0.08 ft
ROST Unit: AK FUDS	Final depth BGS: 1.30 ft
Latitude: Unavailable	Longitude: Unavailable



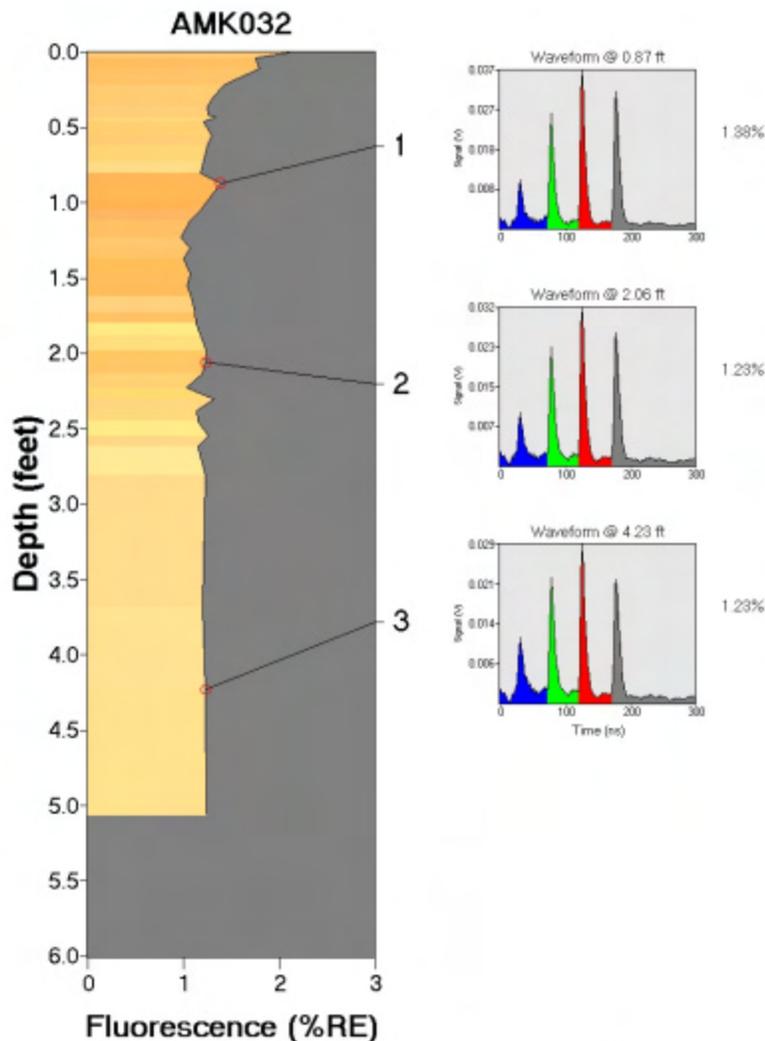
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/15/2005 @ 10:44:49 AM	Max fluorescence: 0.50% @ 3.73 ft
ROST Unit: AK FUDS	Final depth BGS: 3.73 ft
Latitude: Unavailable	Longitude: Unavailable



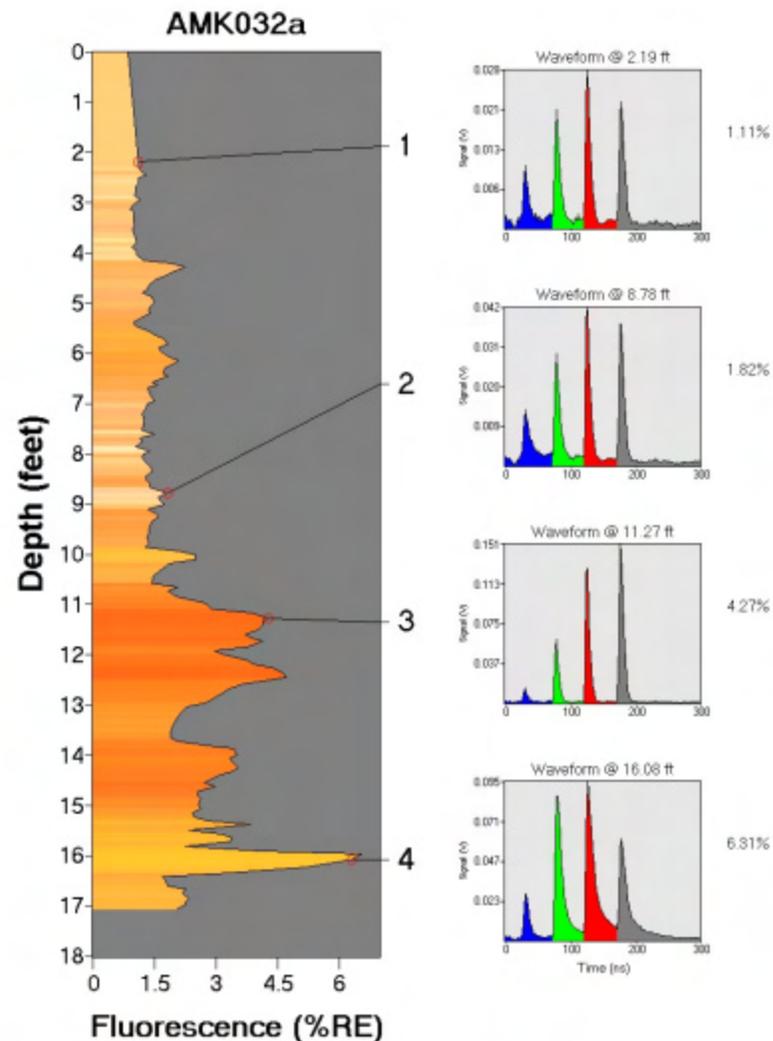
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/15/2005 @ 10:47:26 AM	Max fluorescence: 2.10% @ 0.00 ft
ROST Unit: AK FUDS	Final depth BGS: 5.06 ft
Latitude: Unavailable	Longitude: Unavailable



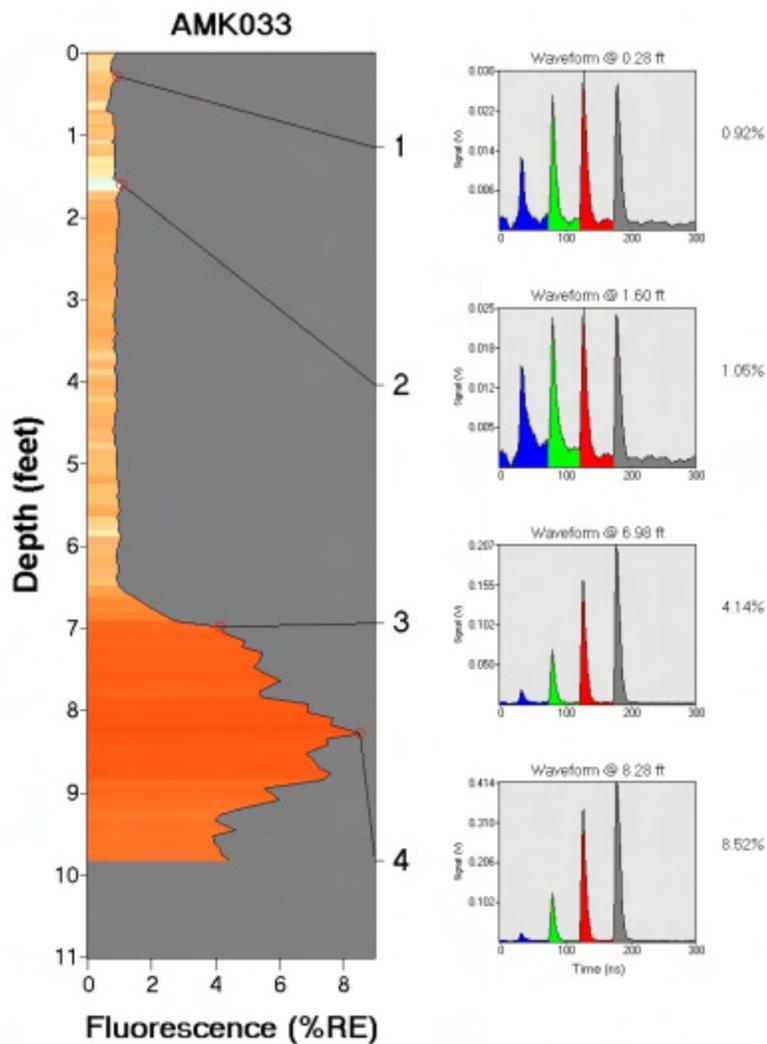
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/15/2005 @ 10:51:35 AM	Max fluorescence: 6.54% @ 15.97 ft
ROST Unit: AK FUDS	Final depth BGS: 17.06 ft
Latitude: Unavailable	Longitude: Unavailable



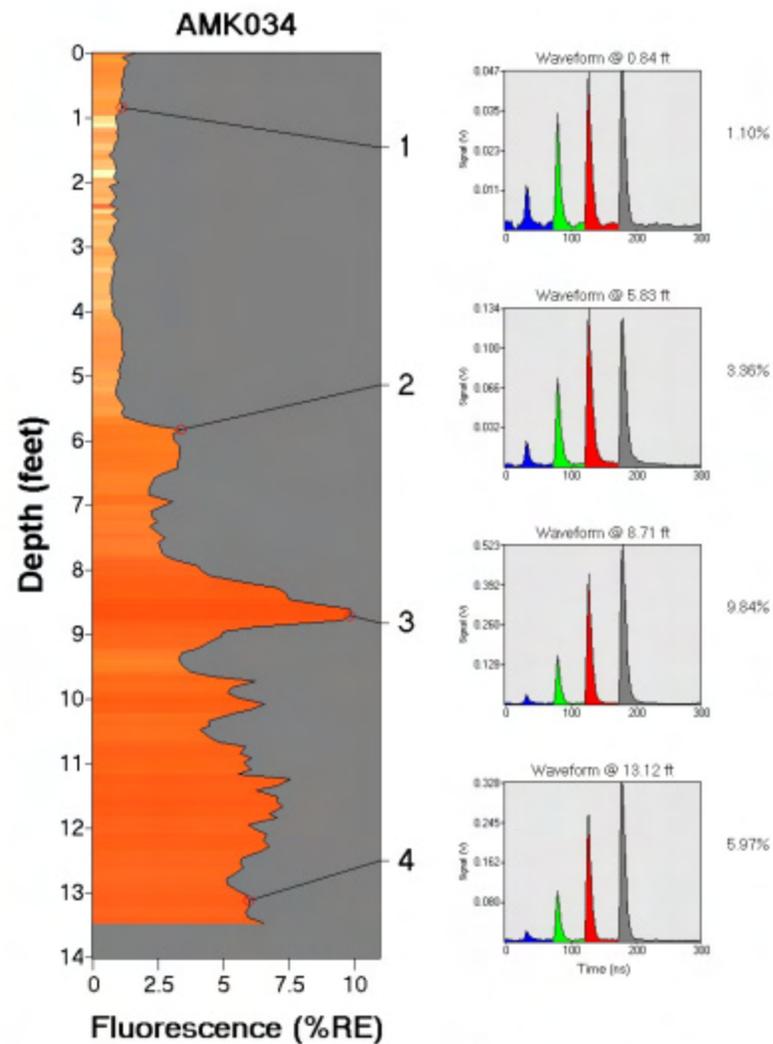
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/15/2005 @ 4:39:45 PM	Max fluorescence: 8.52% @ 8.28 ft
ROST Unit: AK FUDS	Final depth BGS: 9.83 ft
Latitude: Unavailable	Longitude: Unavailable



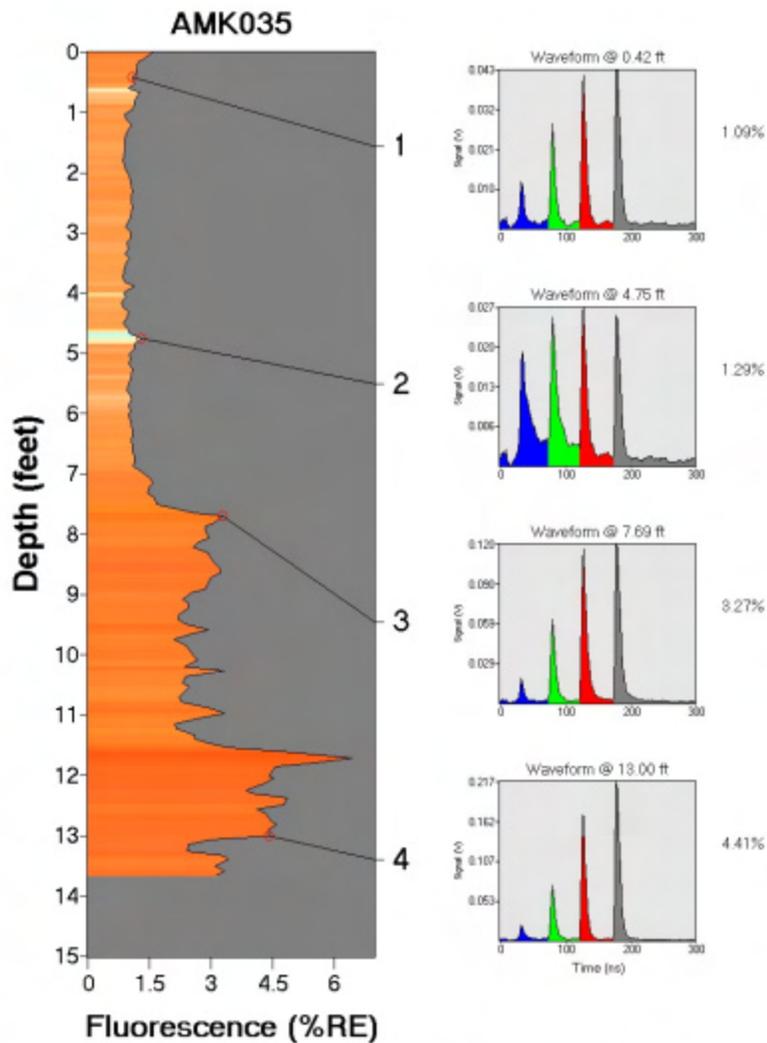
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/15/2005 @ 5:06:22 PM	Max fluorescence: 9.84% @ 8.71 ft
ROST Unit: AK FUDS	Final depth BGS: 13.48 ft
Latitude: Unavailable	Longitude: Unavailable



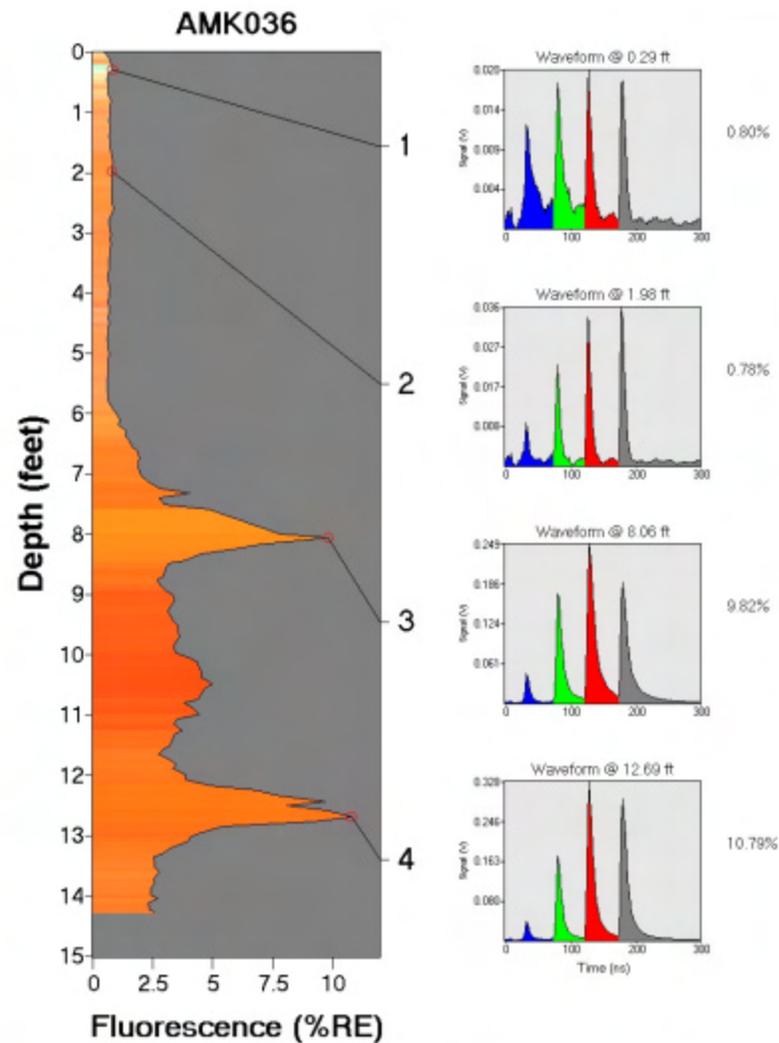
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/15/2005 @ 5:26:50 PM	Max fluorescence: 6.45% @ 11.72 ft
ROST Unit: AK FUDS	Final depth BGS: 13.66 ft
Latitude: Unavailable	Longitude: Unavailable



ROST Fluorescence Response Data

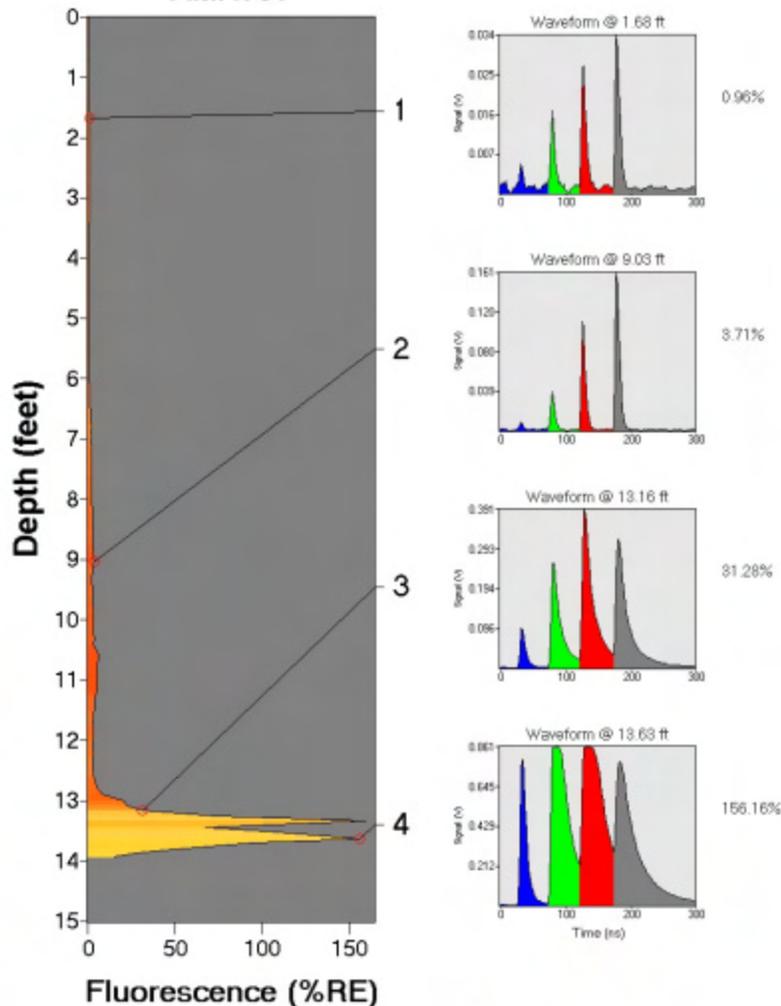
Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/15/2005 @ 5:52:45 PM	Max fluorescence: 10.79% @ 12.69 ft
ROST Unit: AK FUDS	Final depth BGS: 14.28 ft
Latitude: Unavailable	Longitude: Unavailable



ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/15/2005 @ 6:12:04 PM	Max fluorescence: 159.44% @ 13.34 ft
ROST Unit: AK FUDS	Final depth BGS: 13.94 ft
Latitude: Unavailable	Longitude: Unavailable

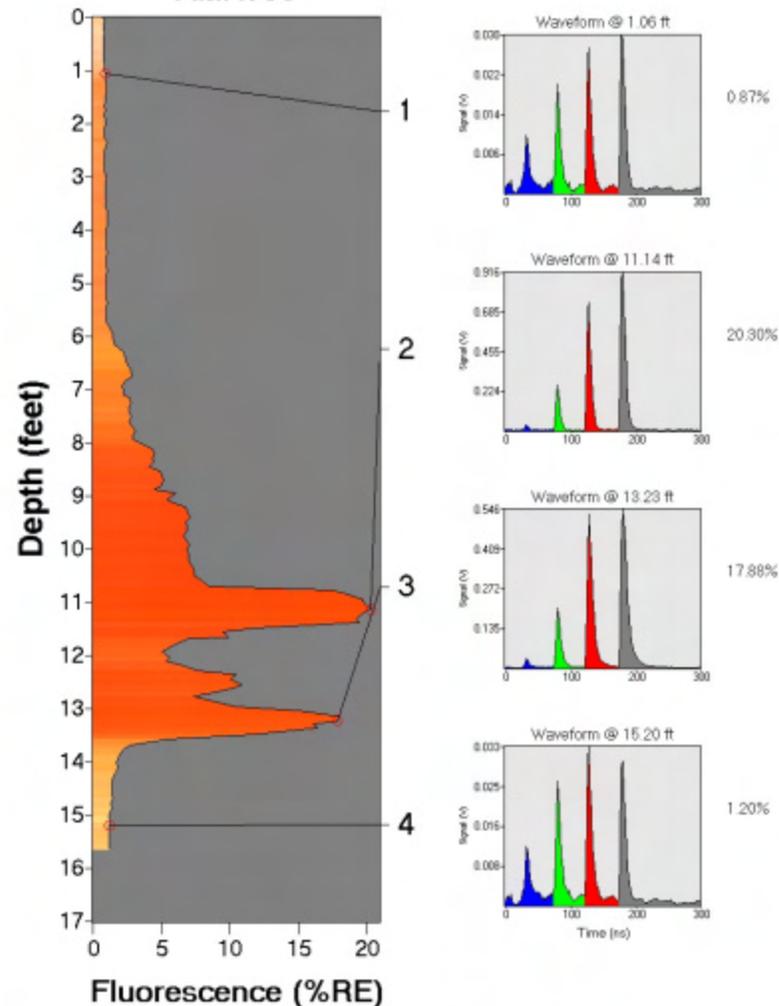
AMK037



ROST Fluorescence Response Data

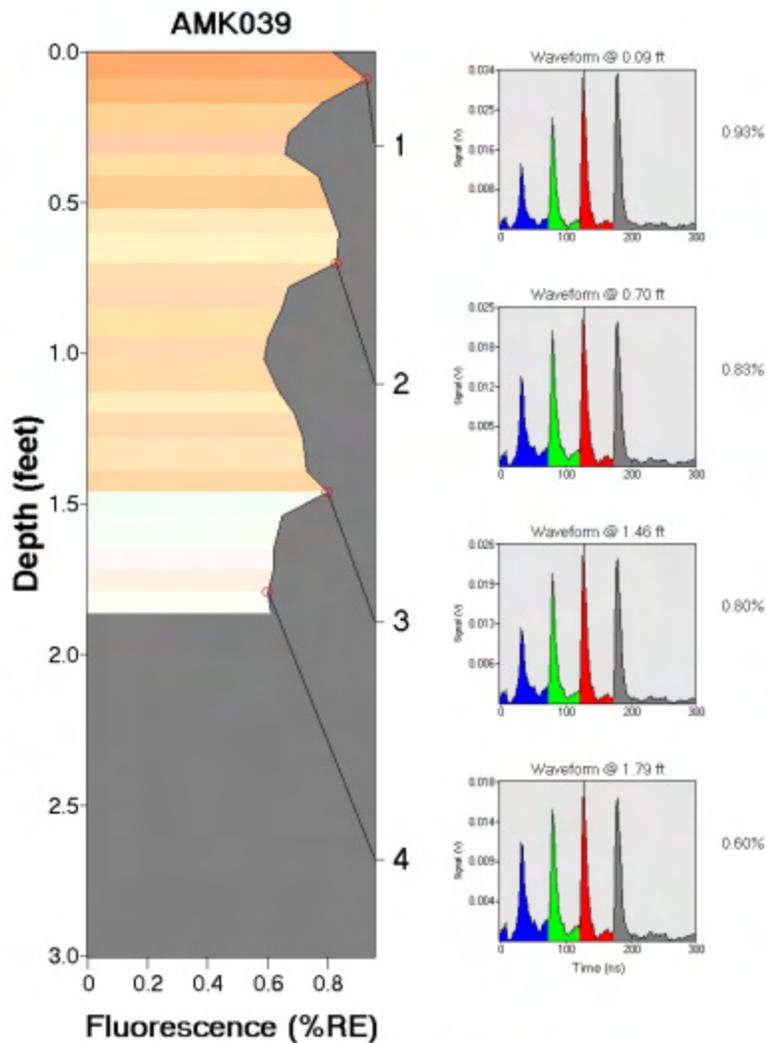
Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/15/2005 @ 6:47:32 PM	Max fluorescence: 20.30% @ 11.14 ft
ROST Unit: AK FUDS	Final depth BGS: 15.65 ft
Latitude: Unavailable	Longitude: Unavailable

AMK038



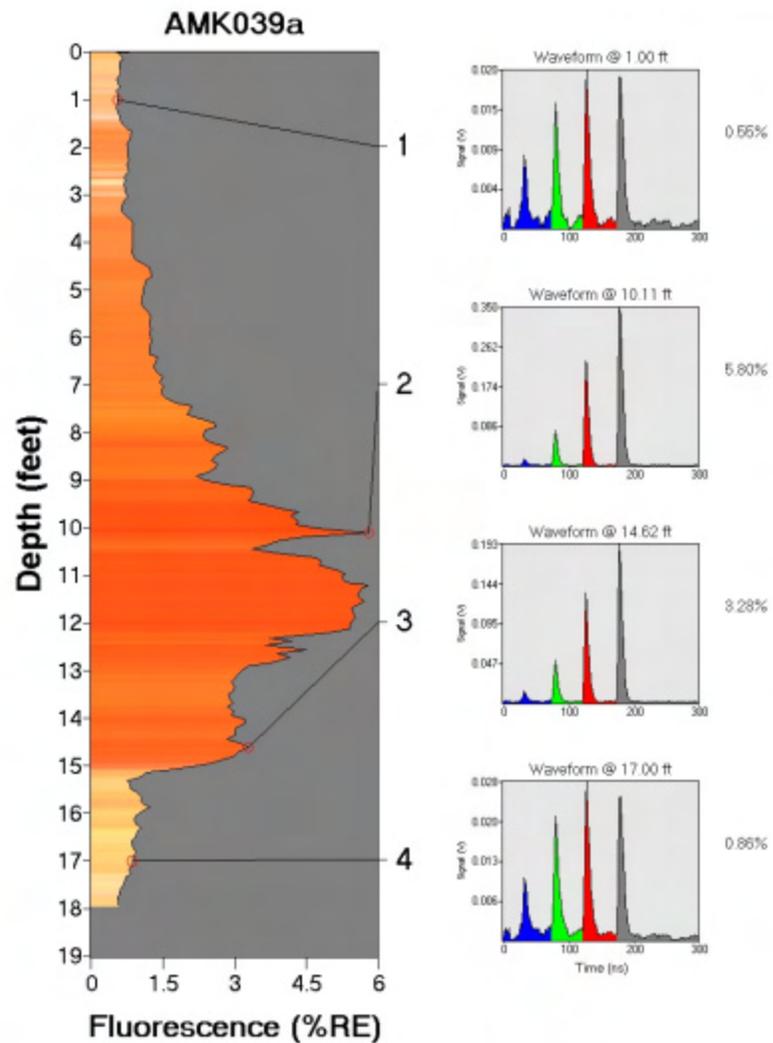
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/15/2005 @ 7:11:33 PM	Max fluorescence: 0.93% @ 0.09 ft
ROST Unit: AK FUDS	Final depth BGS: 1.86 ft
Latitude: Unavailable	Longitude: Unavailable



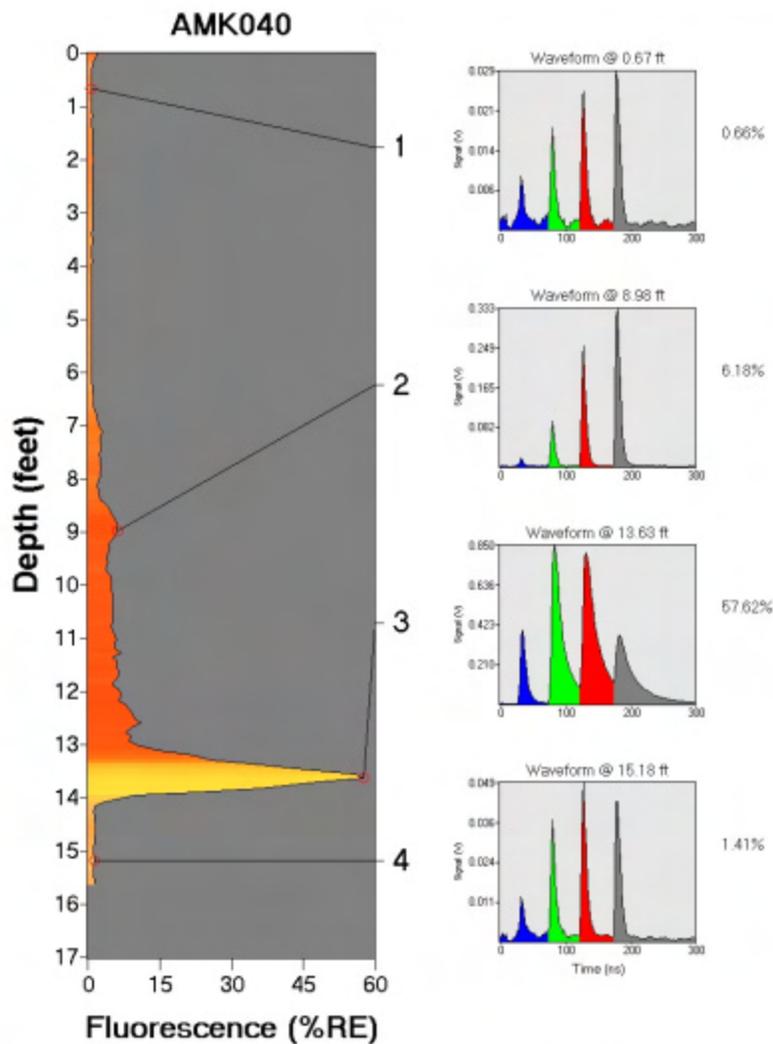
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/15/2005 @ 7:26:54 PM	Max fluorescence: 5.80% @ 10.11 ft
ROST Unit: AK FUDS	Final depth BGS: 17.95 ft
Latitude: Unavailable	Longitude: Unavailable



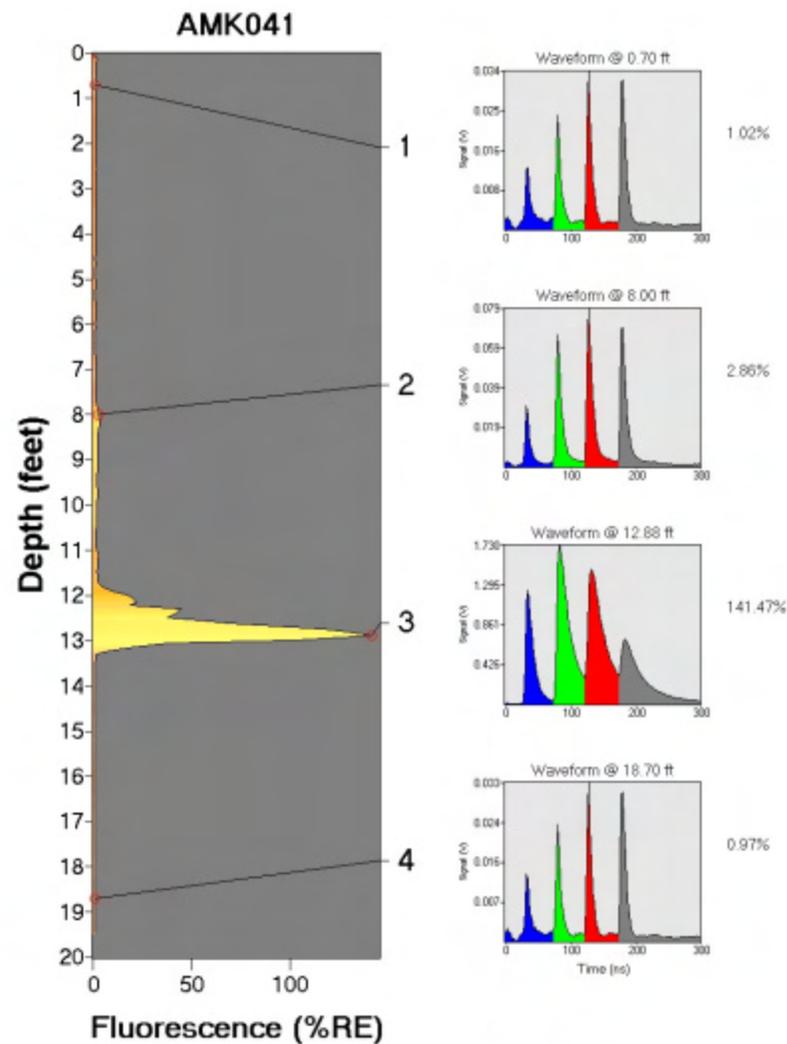
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/16/2005 @ 7:45:01 PM	Max fluorescence: 57.62% @ 13.63 ft
ROST Unit: AK FUDS	Final depth BGS: 15.63 ft
Latitude: Unavailable	Longitude: Unavailable



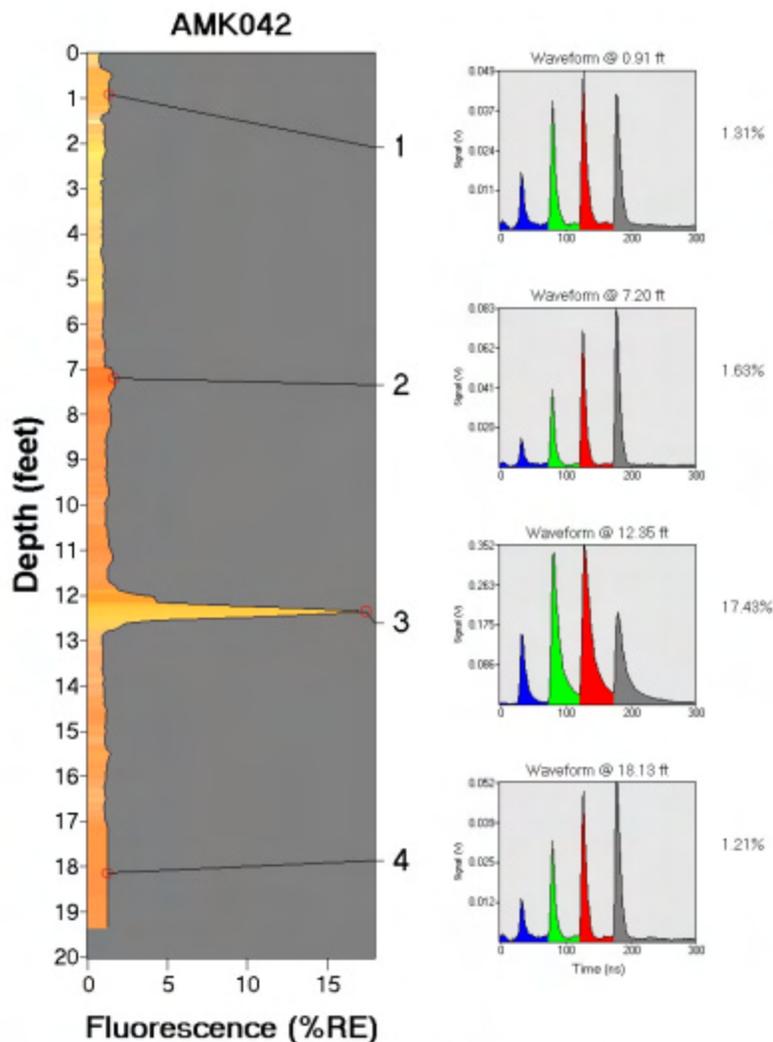
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/16/2005 @ 8:47:35 AM	Max fluorescence: 141.47% @ 12.88 ft
ROST Unit: AK FUDS	Final depth BGS: 19.49 ft
Latitude: Unavailable	Longitude: Unavailable



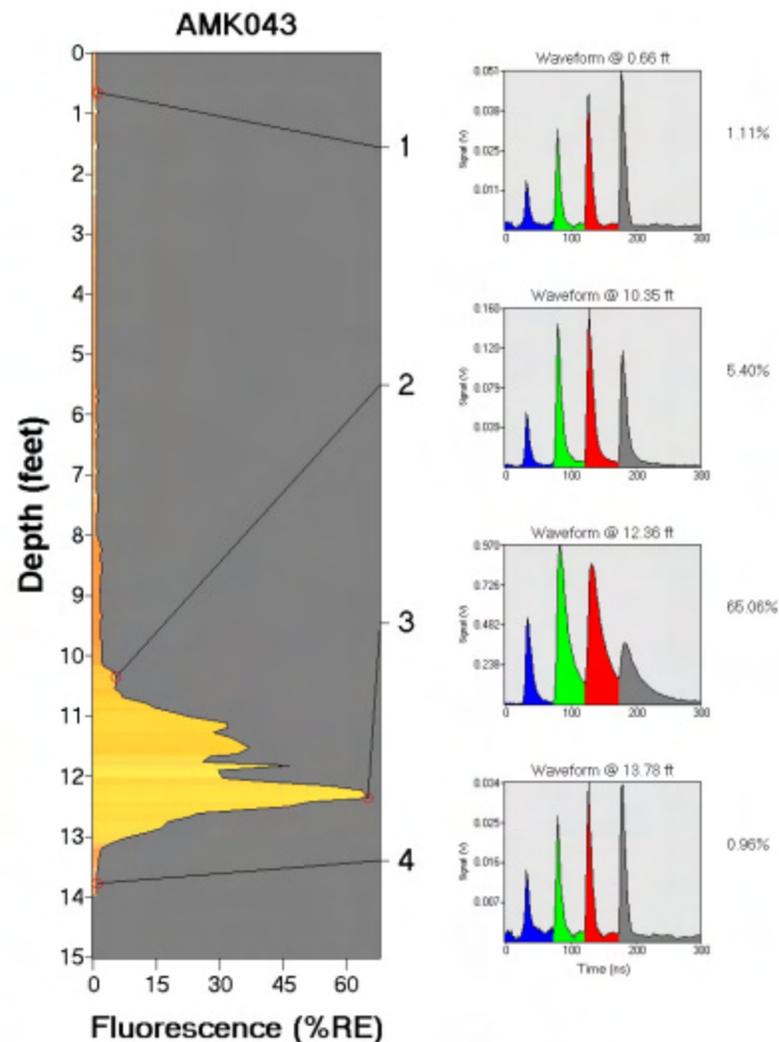
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/16/2005 @ 9:18:50 AM	Max fluorescence: 17.43% @ 12.35 ft
ROST Unit: AK FUDS	Final depth BGS: 19.35 ft
Latitude: Unavailable	Longitude: Unavailable



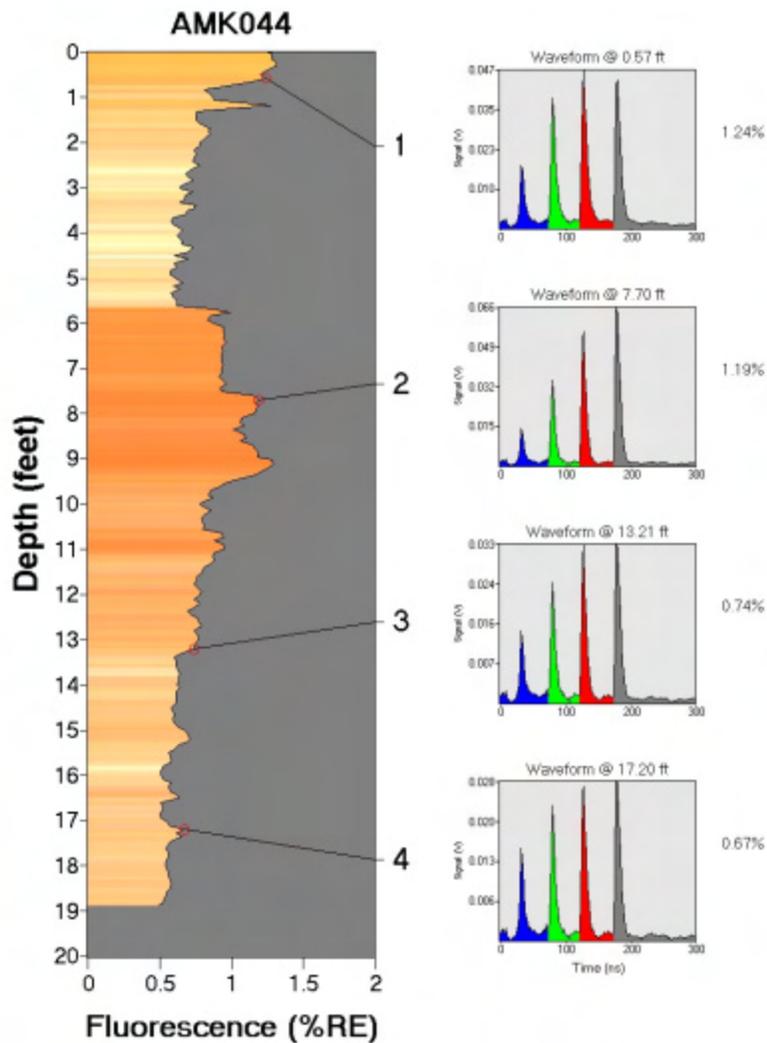
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/16/2005 @ 9:48:14 AM	Max fluorescence: 65.06% @ 12.36 ft
ROST Unit: AK FUDS	Final depth BGS: 13.96 ft
Latitude: Unavailable	Longitude: Unavailable



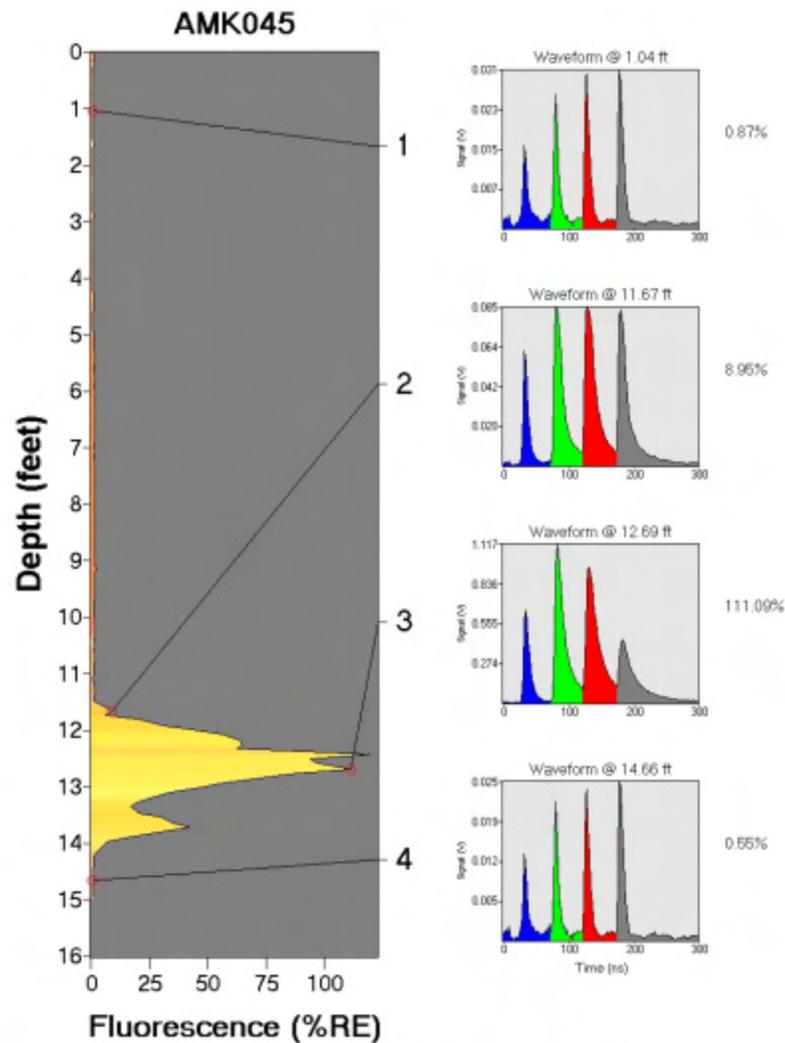
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/16/2005 @ 10:11:01 AM	Max fluorescence: 1.31% @ 0.23 ft
ROST Unit: AK FUDS	Final depth BGS: 18.88 ft
Latitude: Unavailable	Longitude: Unavailable



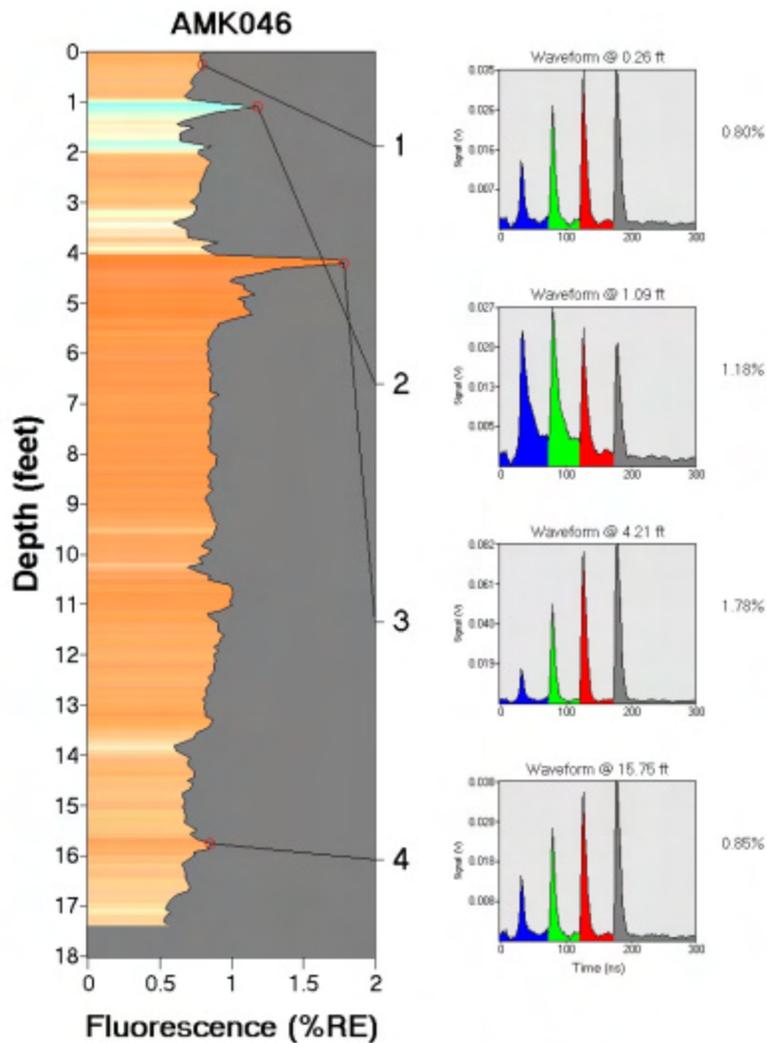
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/16/2005 @ 10:35:24 AM	Max fluorescence: 119.36% @ 12.48 ft
ROST Unit: AK FUDS	Final depth BGS: 14.97 ft
Latitude: Unavailable	Longitude: Unavailable



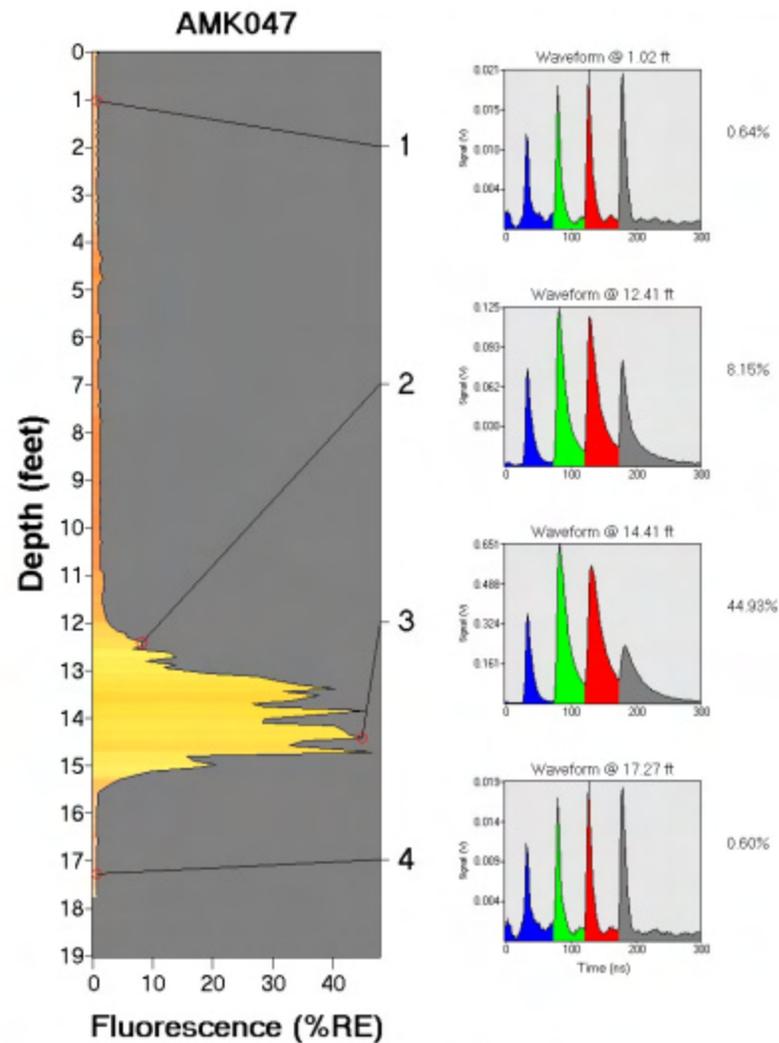
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/16/2005 @ 11:01:39 AM	Max fluorescence: 1.78% @ 4.21 ft
ROST Unit: AK FUDS	Final depth BGS: 17.38 ft
Latitude: Unavailable	Longitude: Unavailable



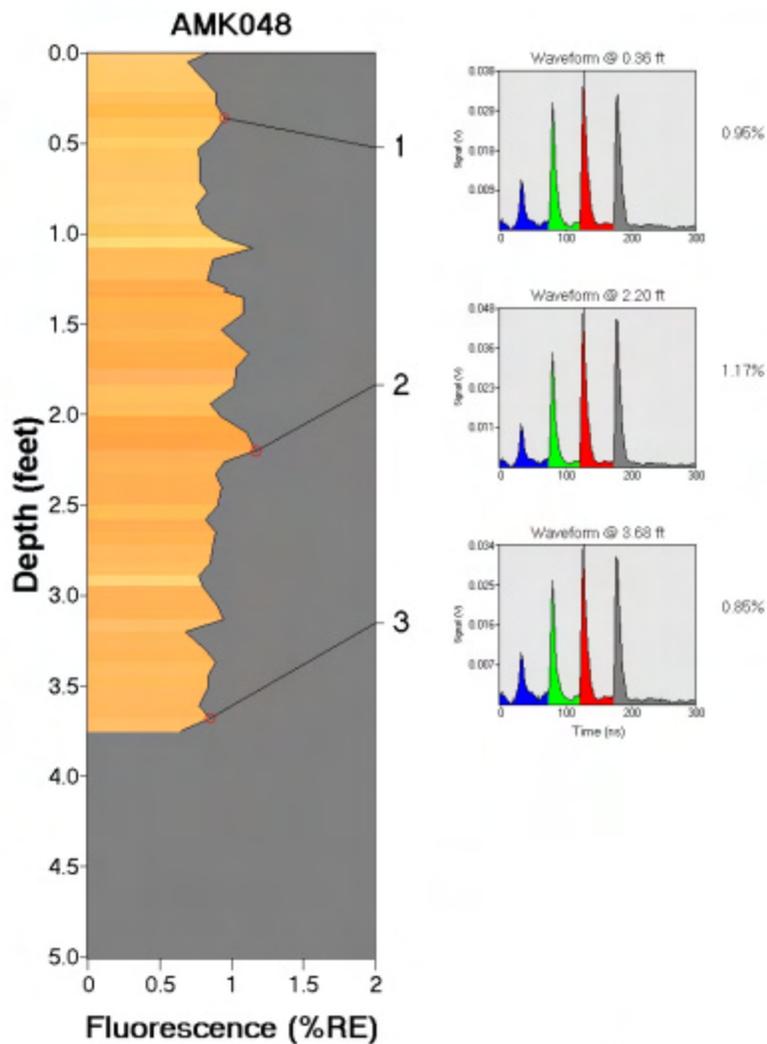
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/16/2005 @ 2:56:27 PM	Max fluorescence: 46.48% @ 14.72 ft
ROST Unit: AK FUDS	Final depth BGS: 17.74 ft
Latitude: Unavailable	Longitude: Unavailable



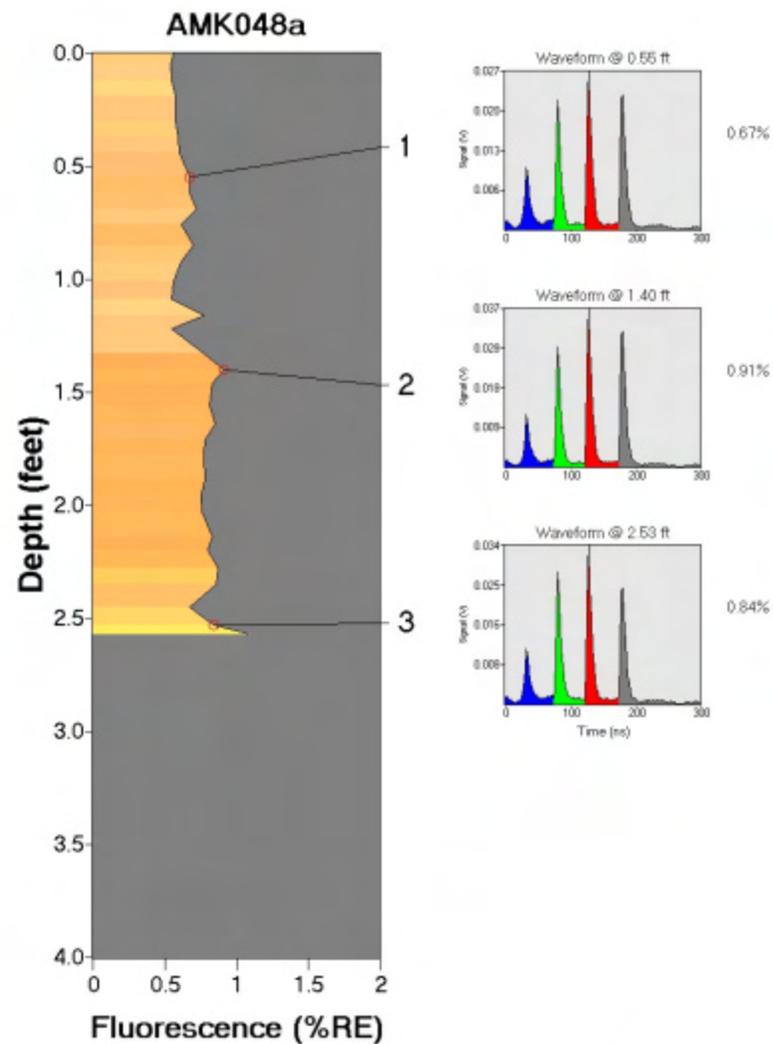
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/16/2005 @ 4:02:04 PM	Max fluorescence: 1.17% @ 2.20 ft
ROST Unit: AK FUDS	Final depth BGS: 3.75 ft
Latitude: Unavailable	Longitude: Unavailable



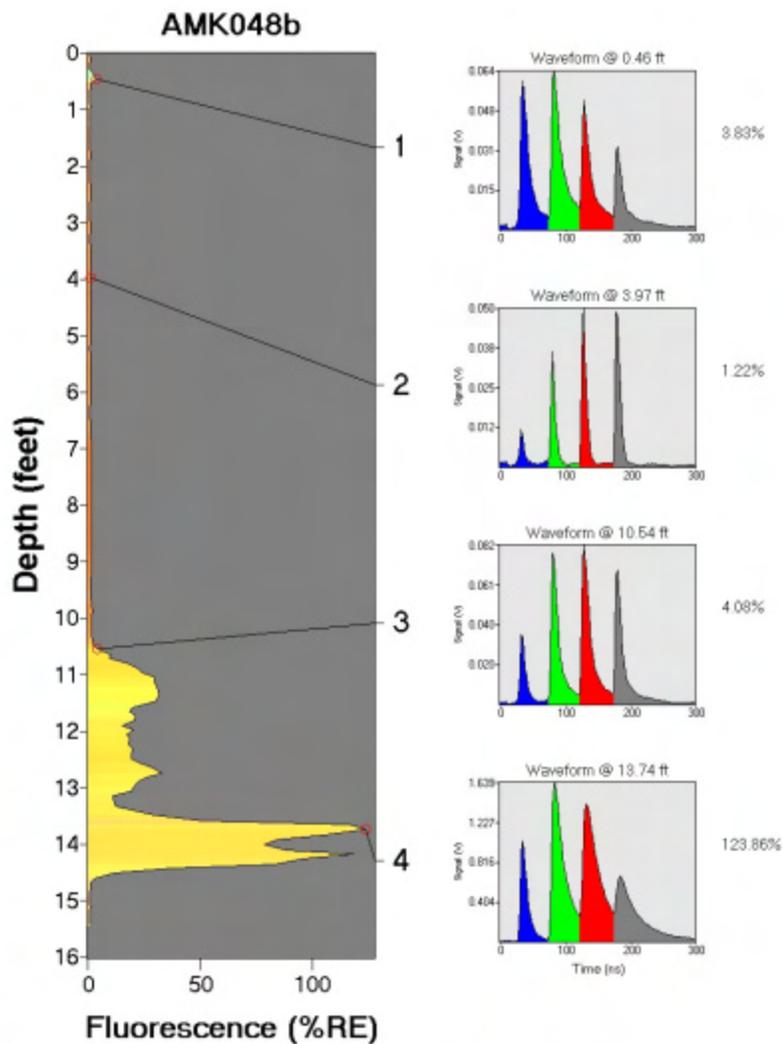
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/16/2005 @ 4:11:18 PM	Max fluorescence: 1.06% @ 2.57 ft
ROST Unit: AK FUDS	Final depth BGS: 2.57 ft
Latitude: Unavailable	Longitude: Unavailable



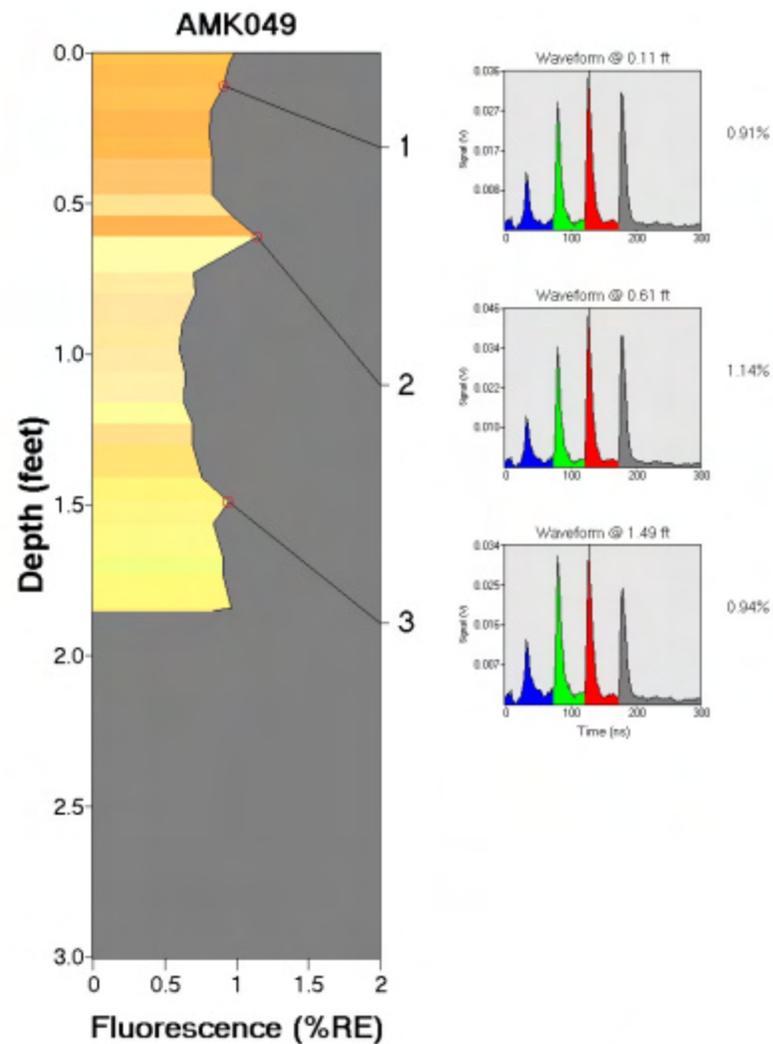
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/16/2005 @ 4:34:38 PM	Max fluorescence: 123.86% @ 13.74 ft
ROST Unit: AK FUDS	Final depth BGS: 15.43 ft
Latitude: Unavailable	Longitude: Unavailable



ROST Fluorescence Response Data

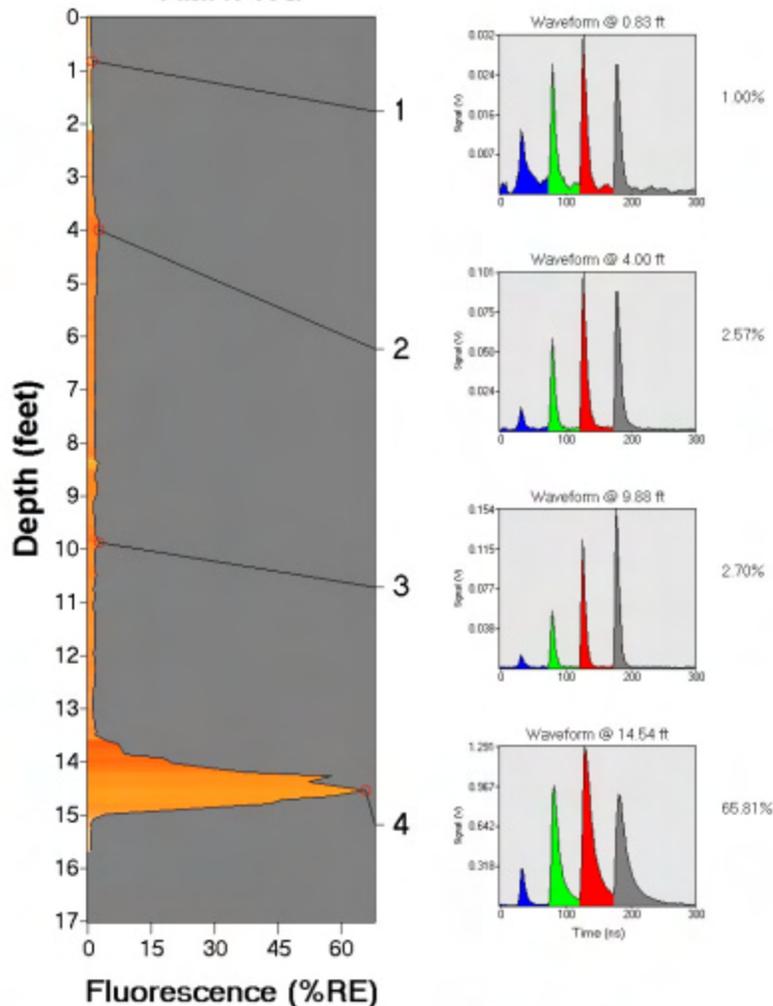
Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/16/2005 @ 4:56:18 PM	Max fluorescence: 1.14% @ 0.61 ft
ROST Unit: AK FUDS	Final depth BGS: 1.85 ft
Latitude: Unavailable	Longitude: Unavailable



ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/16/2005 @ 5:01:31 PM	Max fluorescence: 65.81% @ 14.54 ft
ROST Unit: AK FUDS	Final depth BGS: 15.68 ft
Latitude: Unavailable	Longitude: Unavailable

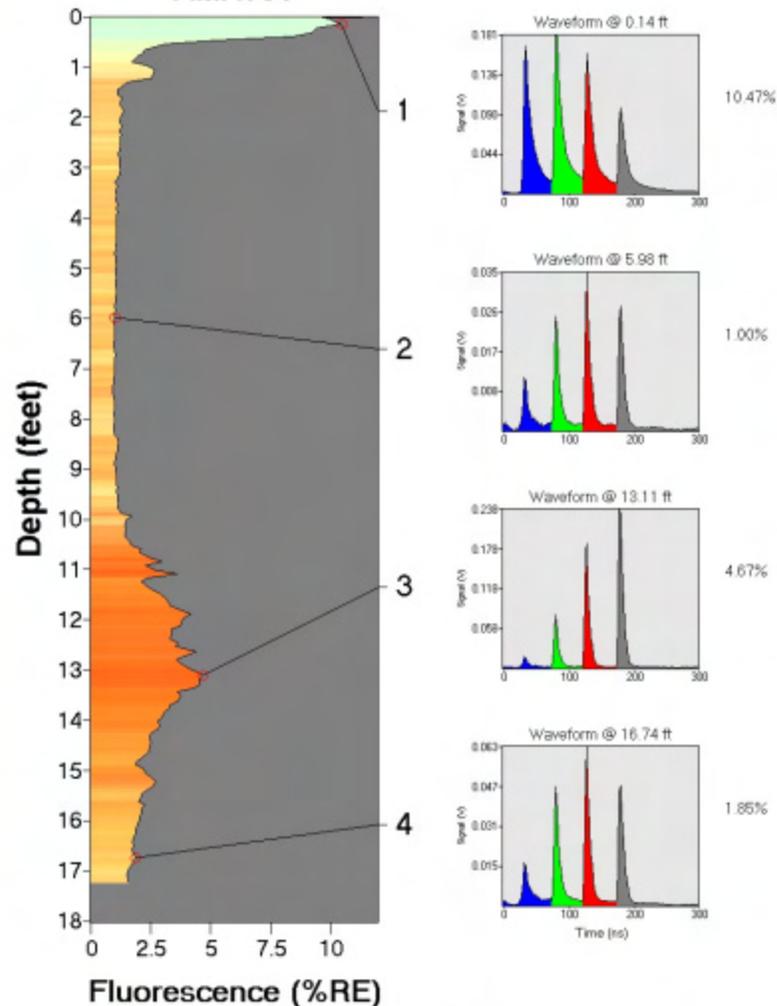
AMK049a



ROST Fluorescence Response Data

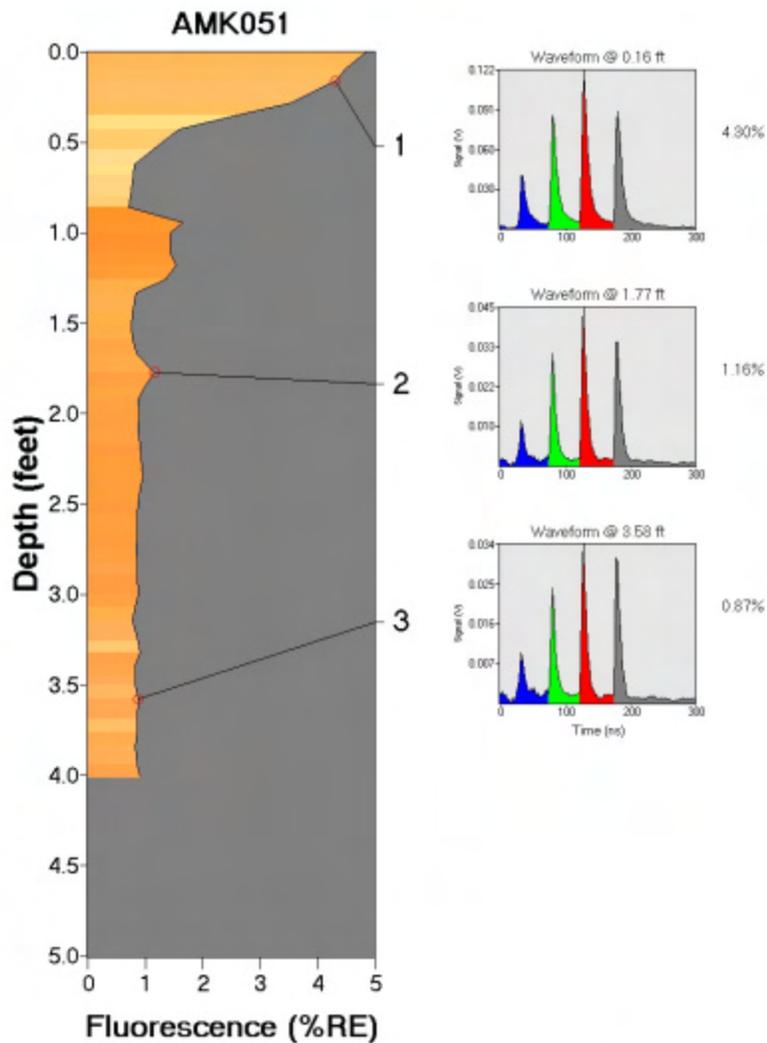
Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/18/2005 @ 9:06:04 AM	Max fluorescence: 11.34% @ 0.00 ft
ROST Unit: AK FUDS	Final depth BGS: 17.23 ft
Latitude: Unavailable	Longitude: Unavailable

AMK050



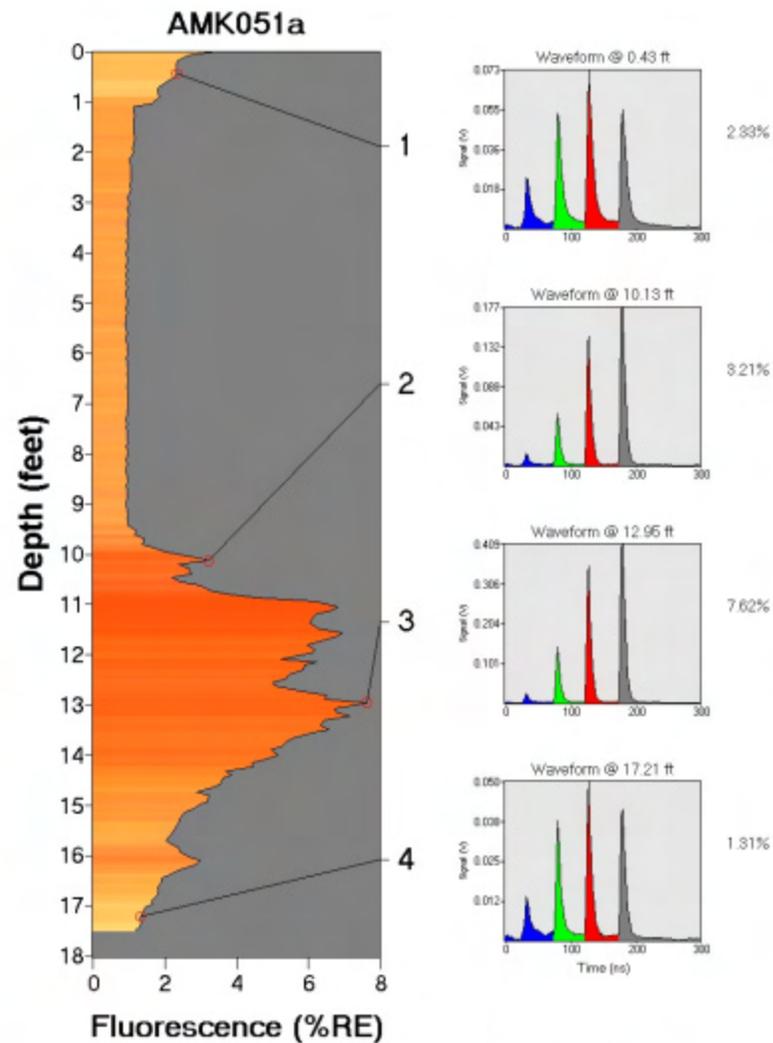
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/18/2005 @ 9:27:47 AM	Max fluorescence: 4.84% @ 0.00 ft
ROST Unit: AK FUDS	Final depth BGS: 4.01 ft
Latitude: Unavailable	Longitude: Unavailable



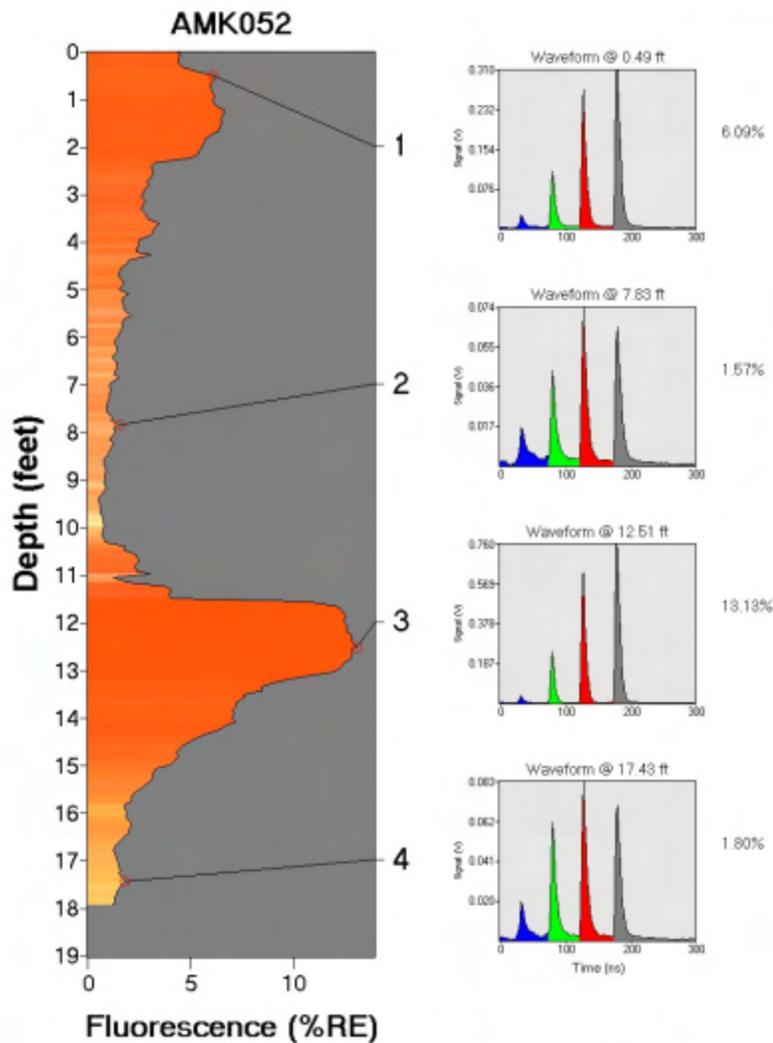
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/18/2005 @ 9:34:18 AM	Max fluorescence: 7.62% @ 12.95 ft
ROST Unit: AK FUDS	Final depth BGS: 17.50 ft
Latitude: Unavailable	Longitude: Unavailable



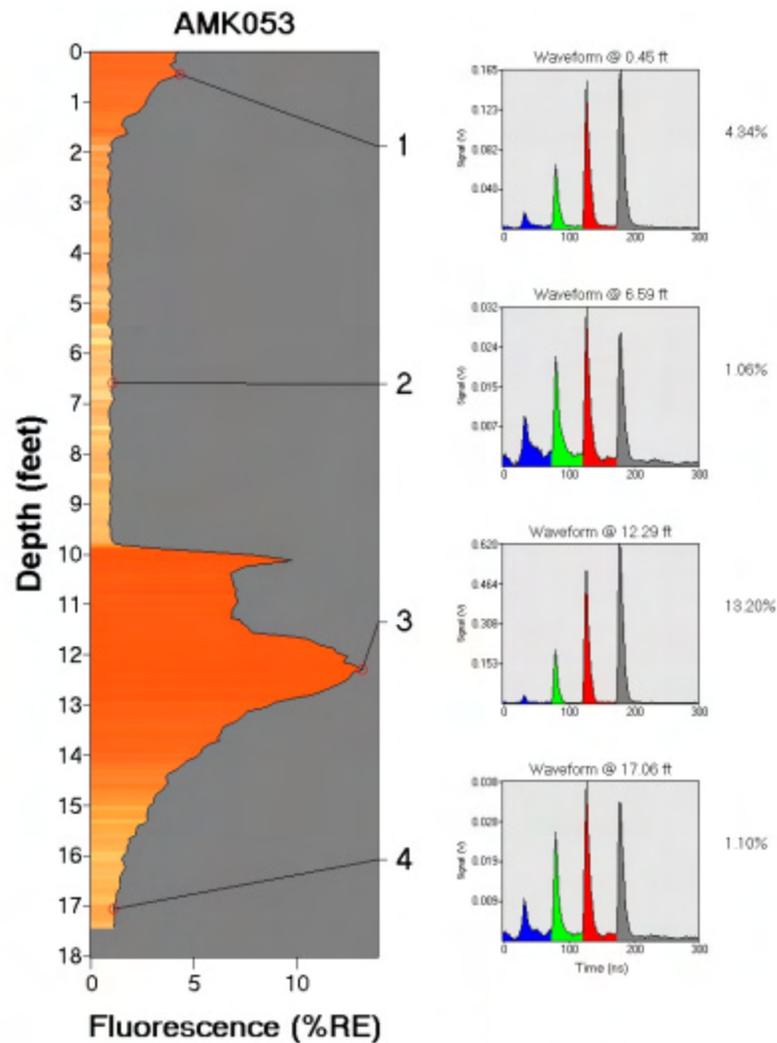
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/18/2005 @ 9:52:11 AM	Max fluorescence: 13.13% @ 12.51 ft
ROST Unit: AK FUDS	Final depth BGS: 17.91 ft
Latitude: Unavailable	Longitude: Unavailable



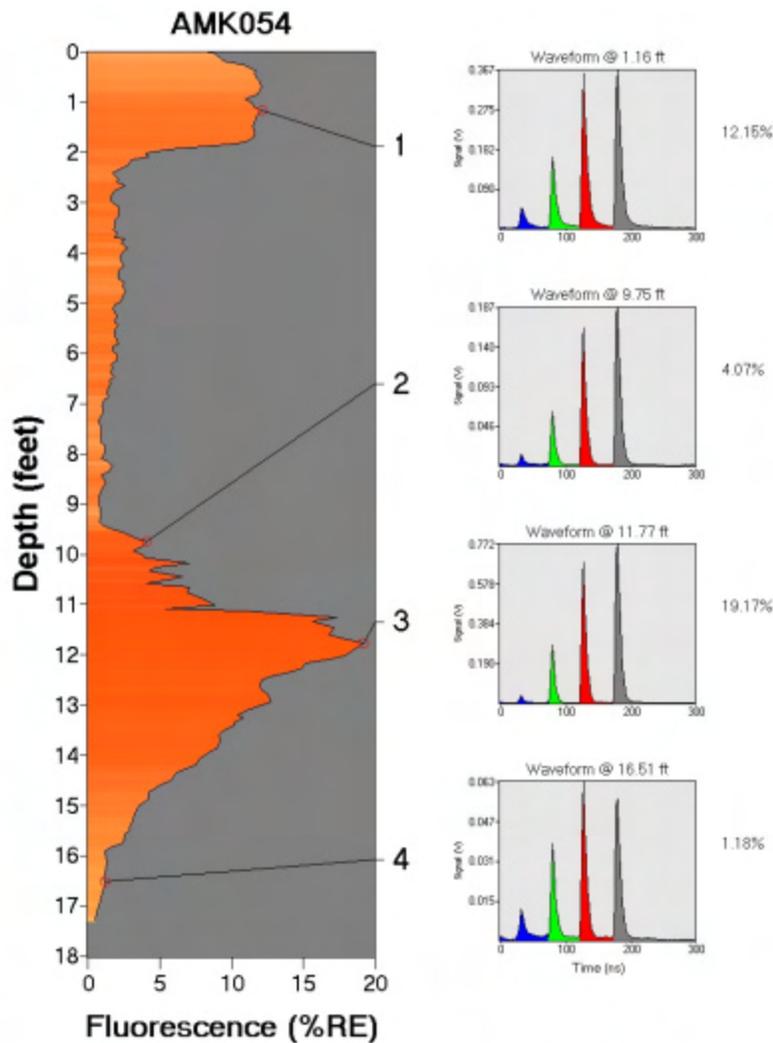
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/18/2005 @ 10:19:02 AM	Max fluorescence: 13.20% @ 12.29 ft
ROST Unit: AK FUDS	Final depth BGS: 17.44 ft
Latitude: Unavailable	Longitude: Unavailable



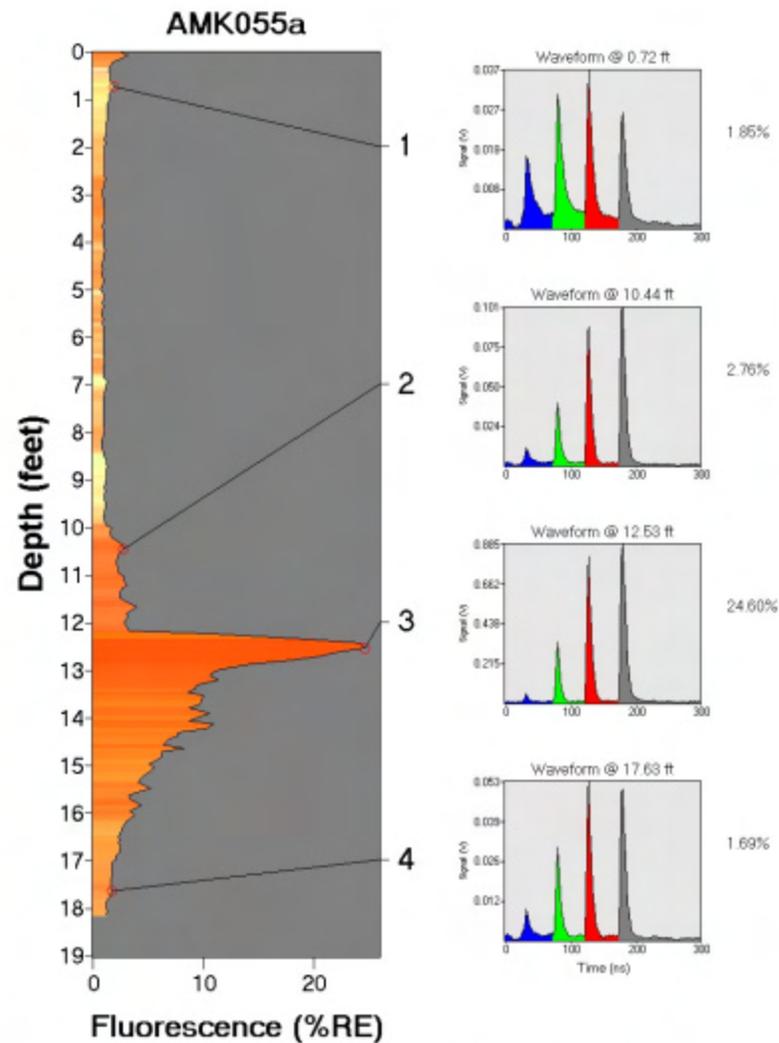
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/18/2005 @ 10:43:13 AM	Max fluorescence: 19.17% @ 11.77 ft
ROST Unit: AK FUDS	Final depth BGS: 17.30 ft
Latitude: Unavailable	Longitude: Unavailable



ROST Fluorescence Response Data

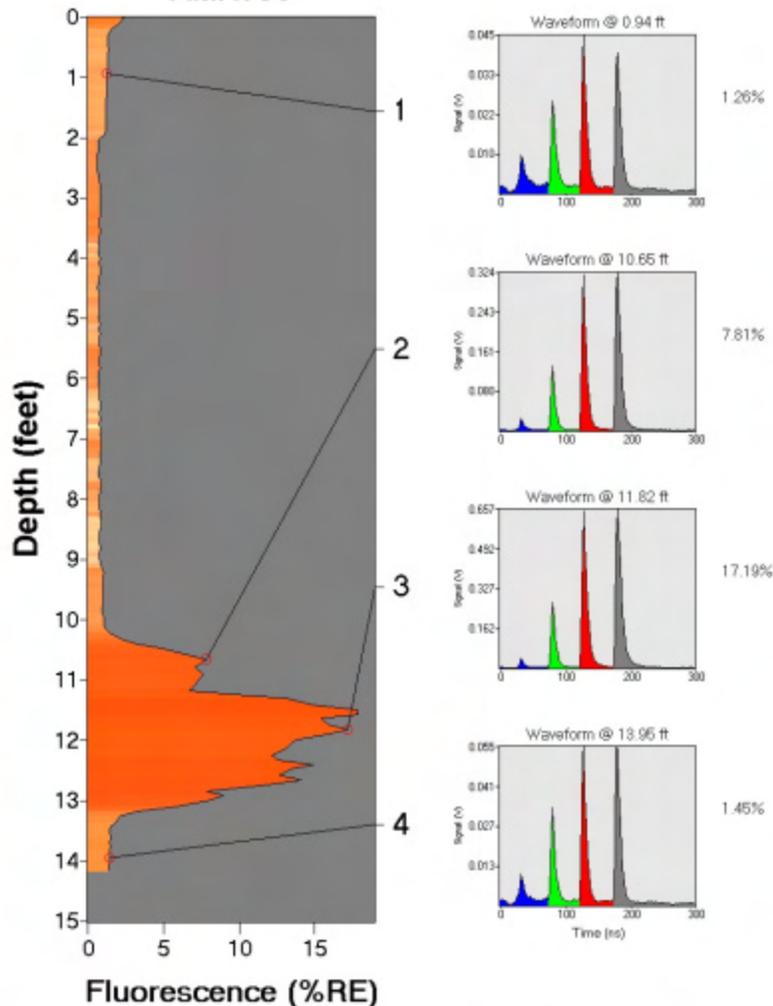
Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/18/2005 @ 11:21:19 AM	Max fluorescence: 24.60% @ 12.53 ft
ROST Unit: AK FUDS	Final depth BGS: 18.15 ft
Latitude: Unavailable	Longitude: Unavailable



ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/18/2005 @ 11:41:17 AM	Max fluorescence: 17.87% @ 11.57 ft
ROST Unit: AK FUDS	Final depth BGS: 14.17 ft
Latitude: Unavailable	Longitude: Unavailable

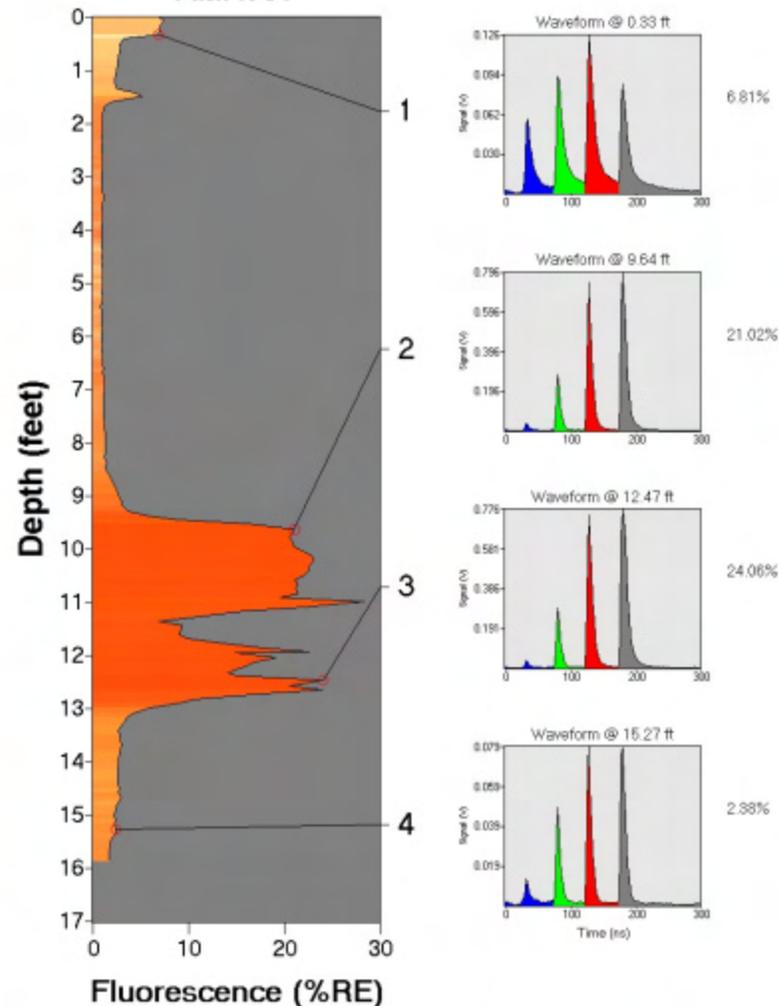
AMK056



ROST Fluorescence Response Data

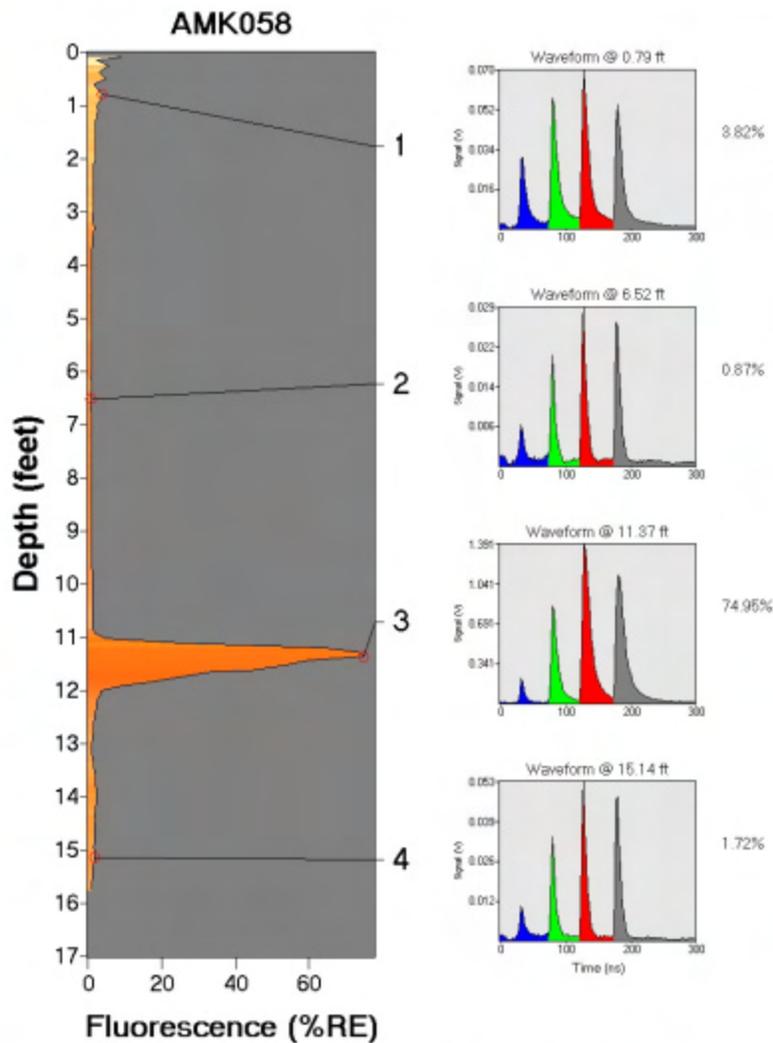
Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/18/2005 @ 12:03:19 PM	Max fluorescence: 28.33% @ 10.99 ft
ROST Unit: AK FUDS	Final depth BGS: 15.86 ft
Latitude: Unavailable	Longitude: Unavailable

AMK057



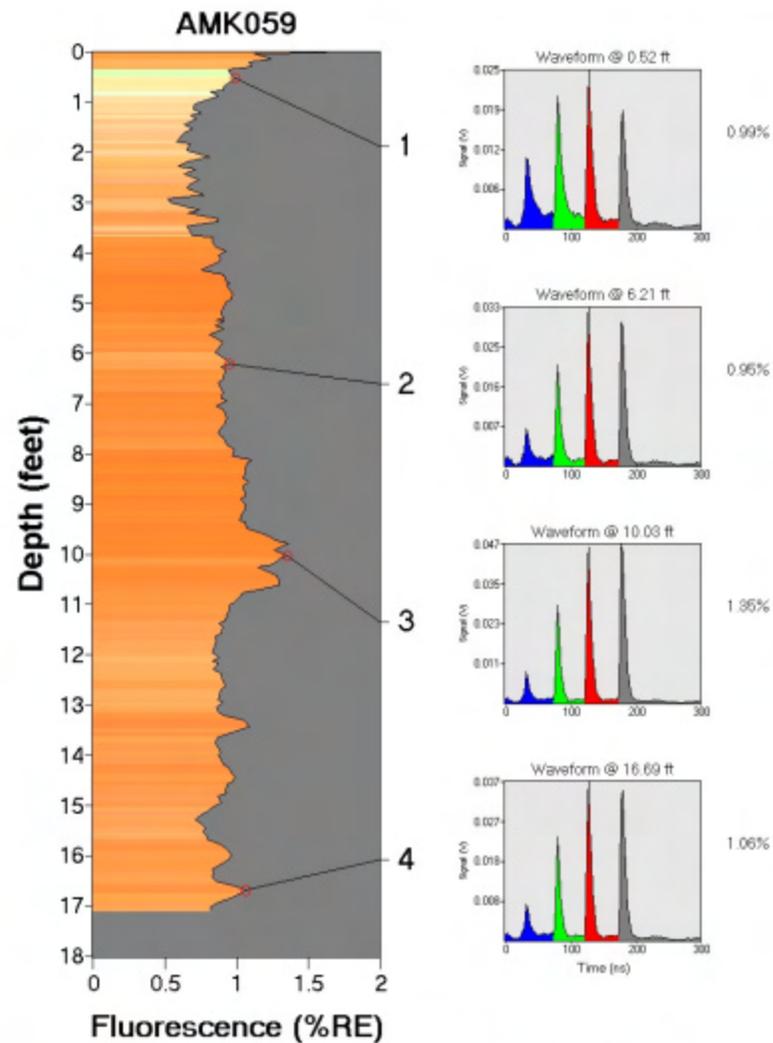
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/18/2005 @ 1:35:07 PM	Max fluorescence: 74.95% @ 11.37 ft
ROST Unit: AK FUDS	Final depth BGS: 15.76 ft
Latitude: Unavailable	Longitude: Unavailable



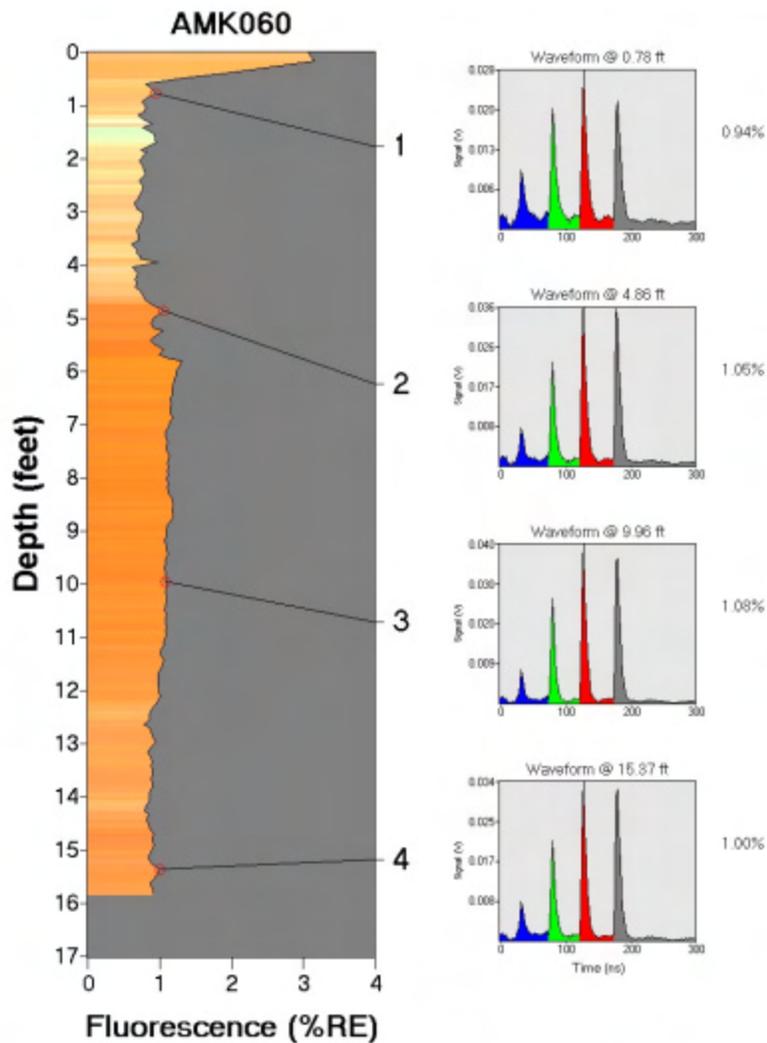
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/18/2005 @ 2:13:15 PM	Max fluorescence: 1.62% @ 0.00 ft
ROST Unit: AK FUDS	Final depth BGS: 17.09 ft
Latitude: Unavailable	Longitude: Unavailable



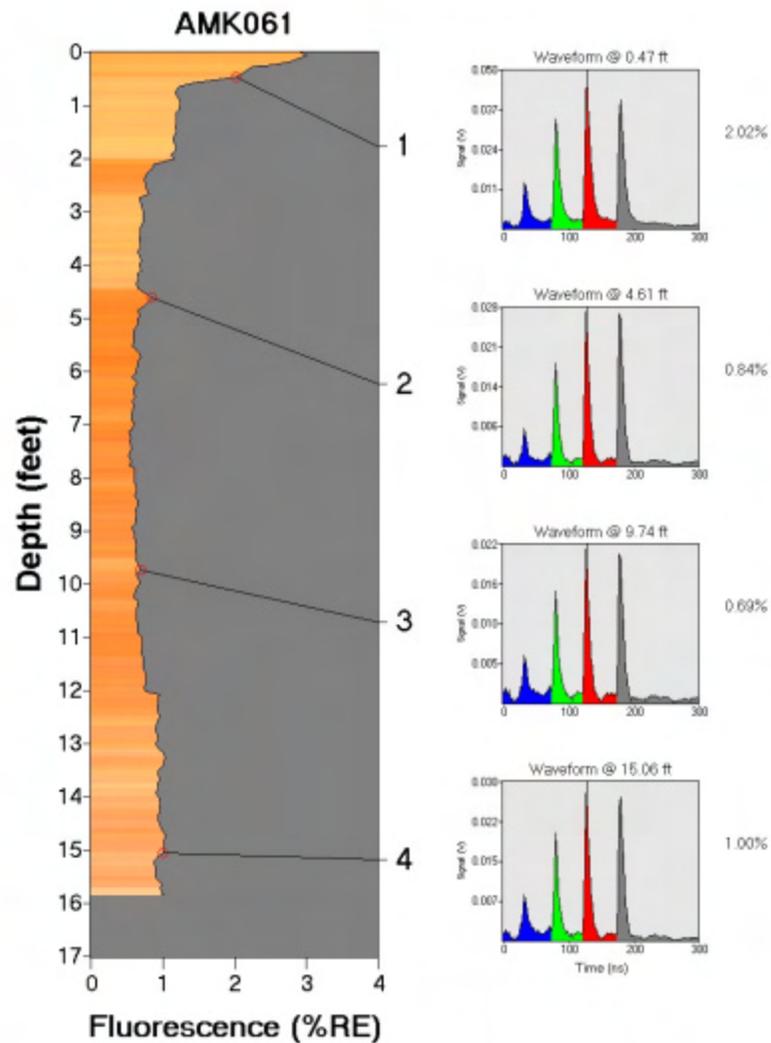
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/18/2005 @ 2:34:44 PM	Max fluorescence: 3.15% @ 0.17 ft
ROST Unit: AK FUDS	Final depth BGS: 15.84 ft
Latitude: Unavailable	Longitude: Unavailable



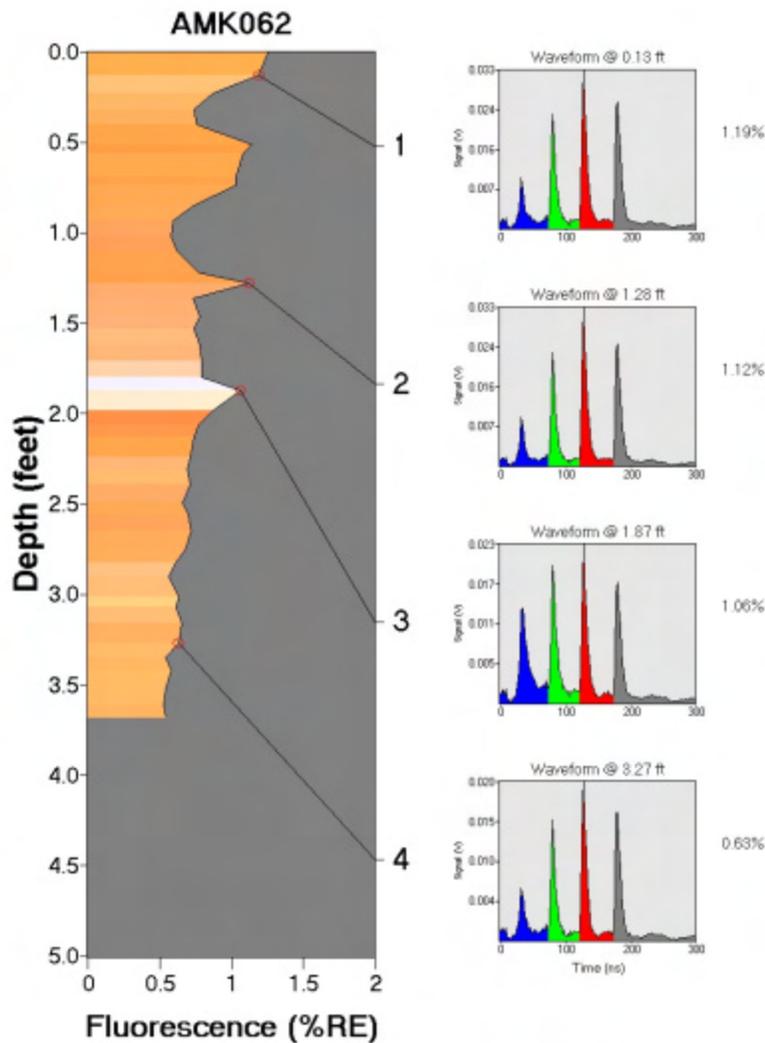
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/18/2005 @ 2:54:13 PM	Max fluorescence: 3.01% @ 0.07 ft
ROST Unit: AK FUDS	Final depth BGS: 15.85 ft
Latitude: Unavailable	Longitude: Unavailable



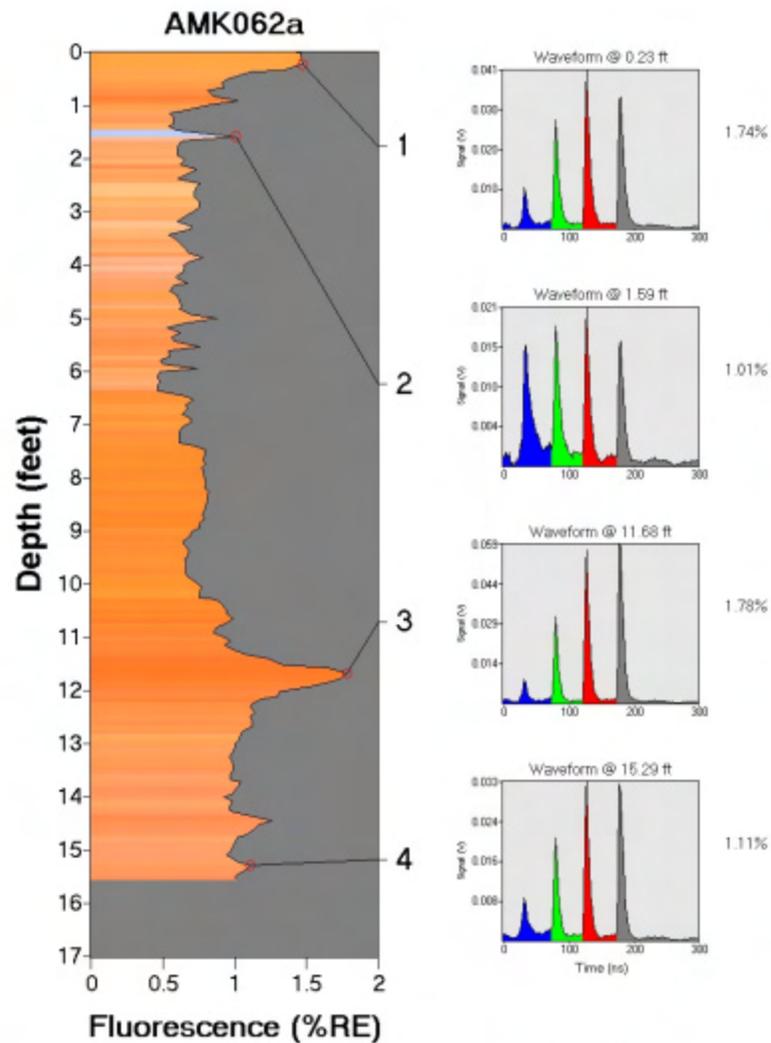
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/18/2005 @ 3:15:49 PM	Max fluorescence: 1.25% @ 0.00 ft
ROST Unit: AK FUDS	Final depth BGS: 3.68 ft
Latitude: Unavailable	Longitude: Unavailable



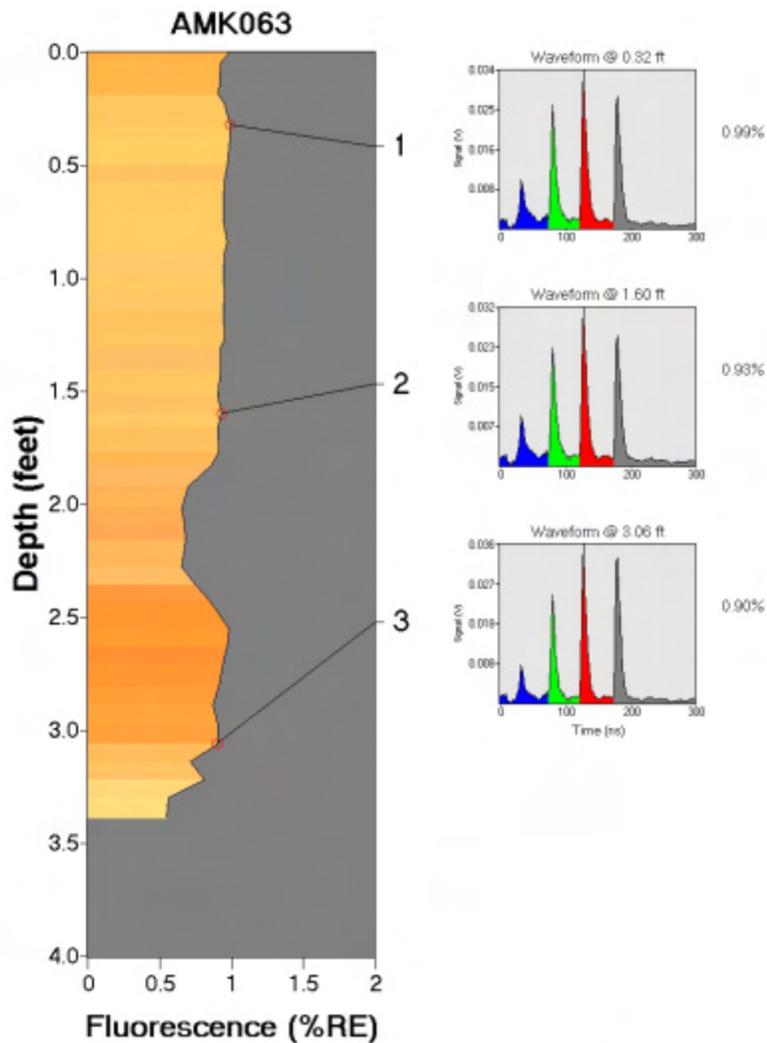
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/18/2005 @ 3:22:30 PM	Max fluorescence: 1.78% @ 11.68 ft
ROST Unit: AK FUDS	Final depth BGS: 15.56 ft
Latitude: Unavailable	Longitude: Unavailable



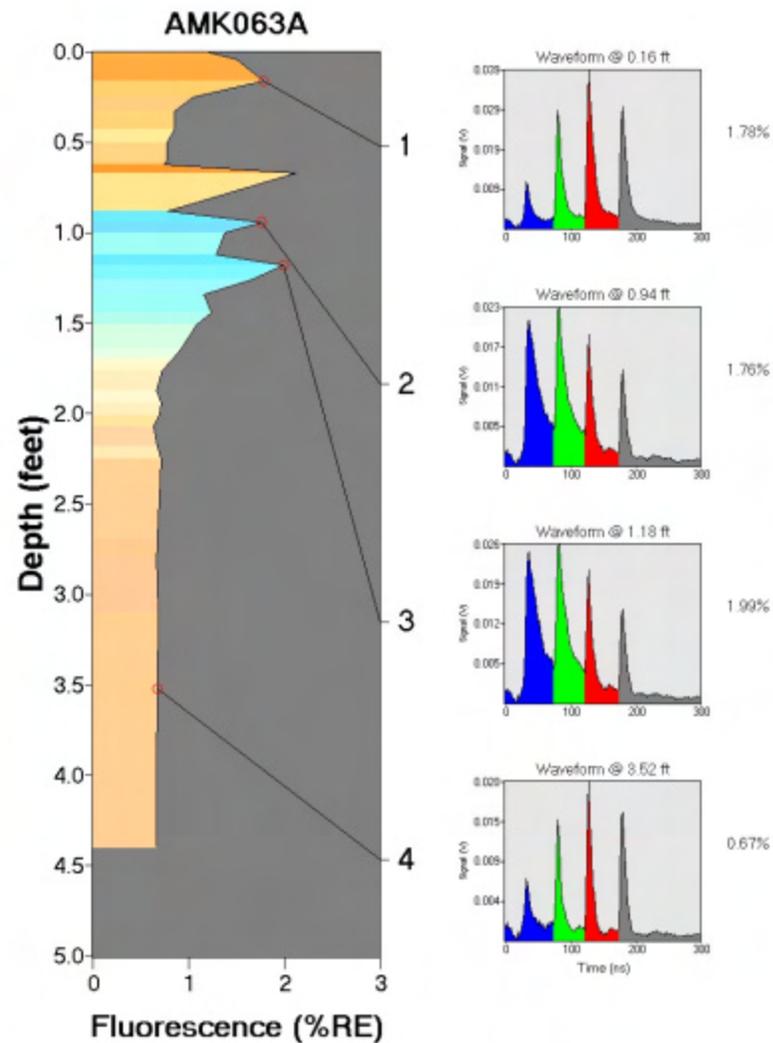
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/18/2005 @ 3:59:09 PM	Max fluorescence: 0.99% @ 0.32 ft
ROST Unit: AK FUDS	Final depth BGS: 3.39 ft
Latitude: Unavailable	Longitude: Unavailable



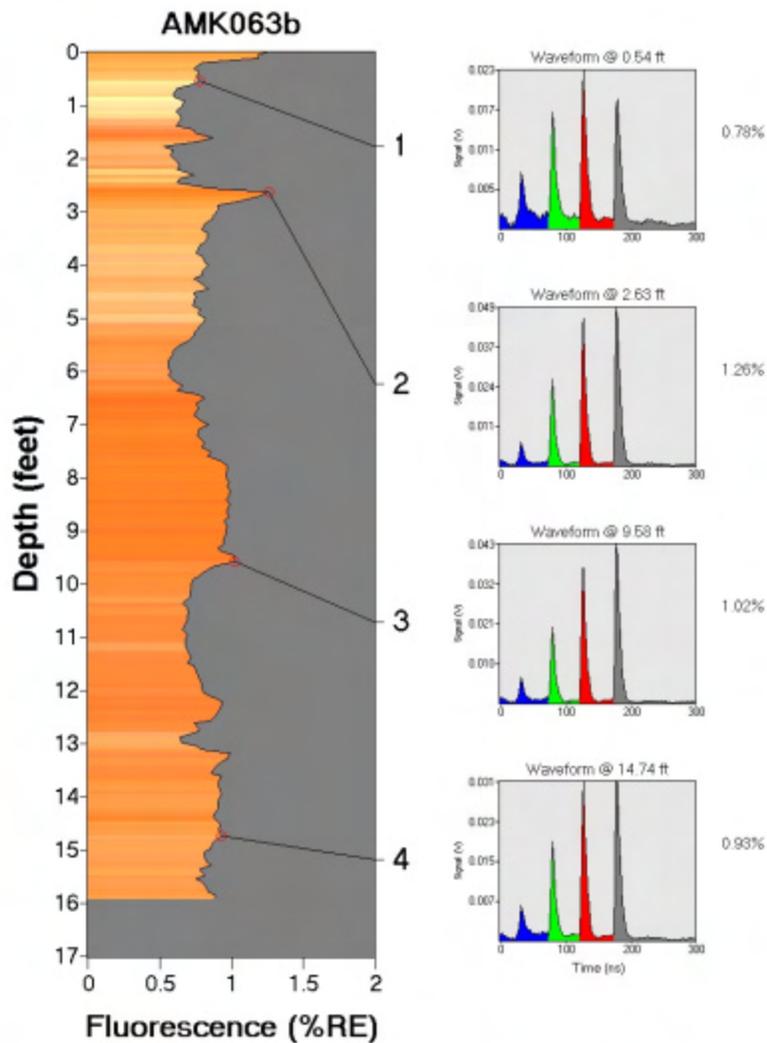
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/18/2005 @ 4:55:34 PM	Max fluorescence: 2.12% @ 0.67 ft
ROST Unit: AK FUDS	Final depth BGS: 4.40 ft
Latitude: Unavailable	Longitude: Unavailable



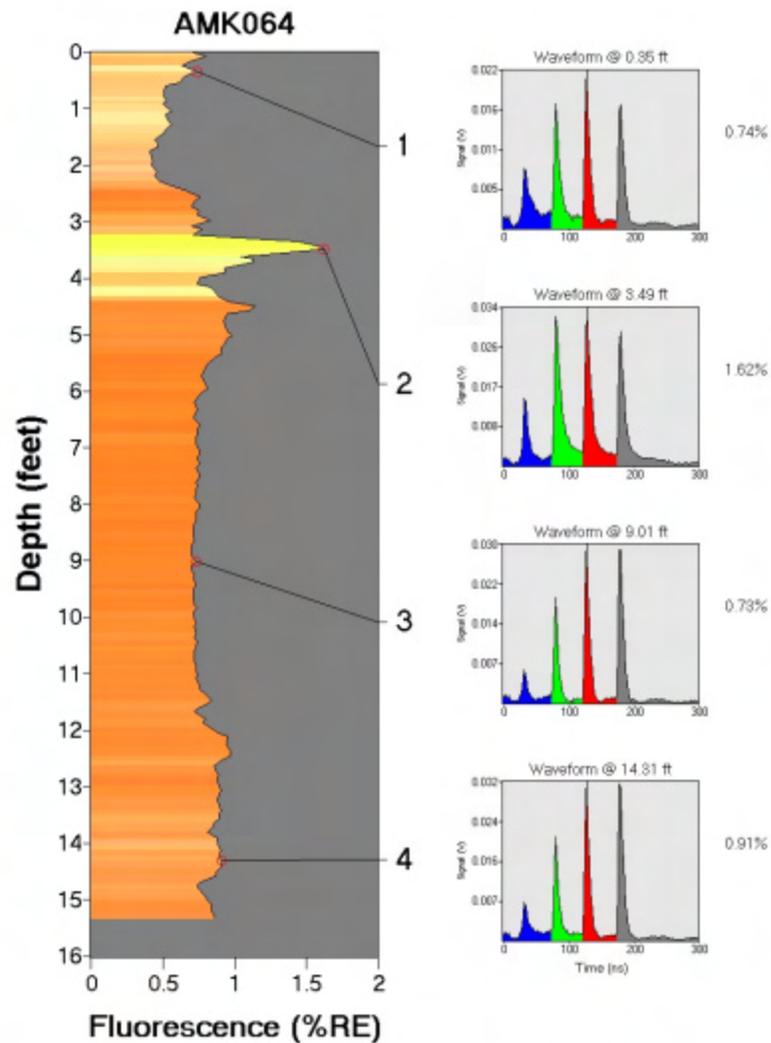
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/18/2005 @ 5:00:59 PM	Max fluorescence: 1.26% @ 2.63 ft
ROST Unit: AK FUDS	Final depth BGS: 15.92 ft
Latitude: Unavailable	Longitude: Unavailable



ROST Fluorescence Response Data

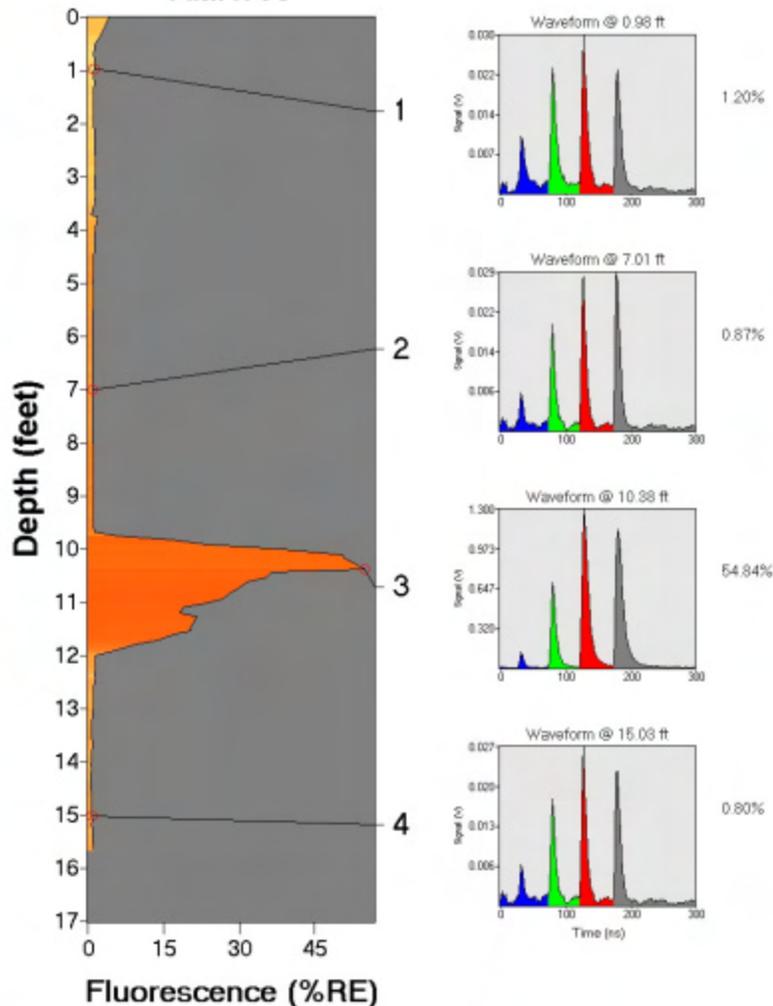
Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/18/2005 @ 5:23:13 PM	Max fluorescence: 1.62% @ 3.49 ft
ROST Unit: AK FUDS	Final depth BGS: 15.34 ft
Latitude: Unavailable	Longitude: Unavailable



ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/18/2005 @ 5:53:19 PM	Max fluorescence: 54.84% @ 10.38 ft
ROST Unit: AK FUDS	Final depth BGS: 15.67 ft
Latitude: Unavailable	Longitude: Unavailable

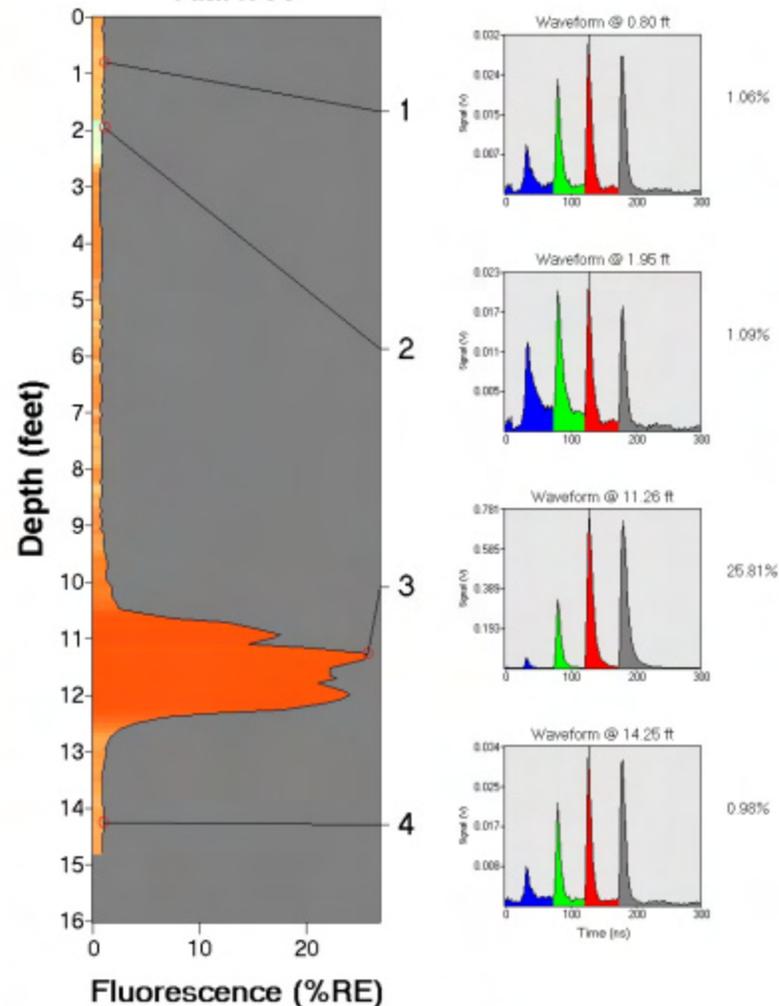
AMK065



ROST Fluorescence Response Data

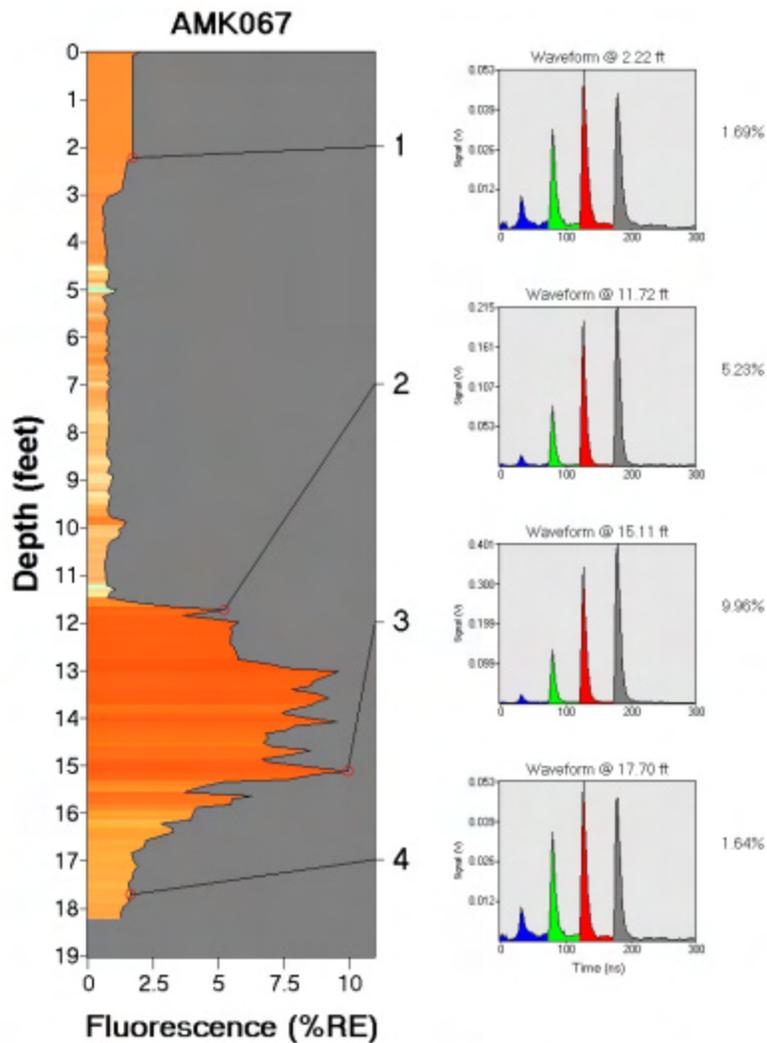
Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/18/2005 @ 6:27:36 PM	Max fluorescence: 25.81% @ 11.26 ft
ROST Unit: AK FUDS	Final depth BGS: 14.82 ft
Latitude: Unavailable	Longitude: Unavailable

AMK066



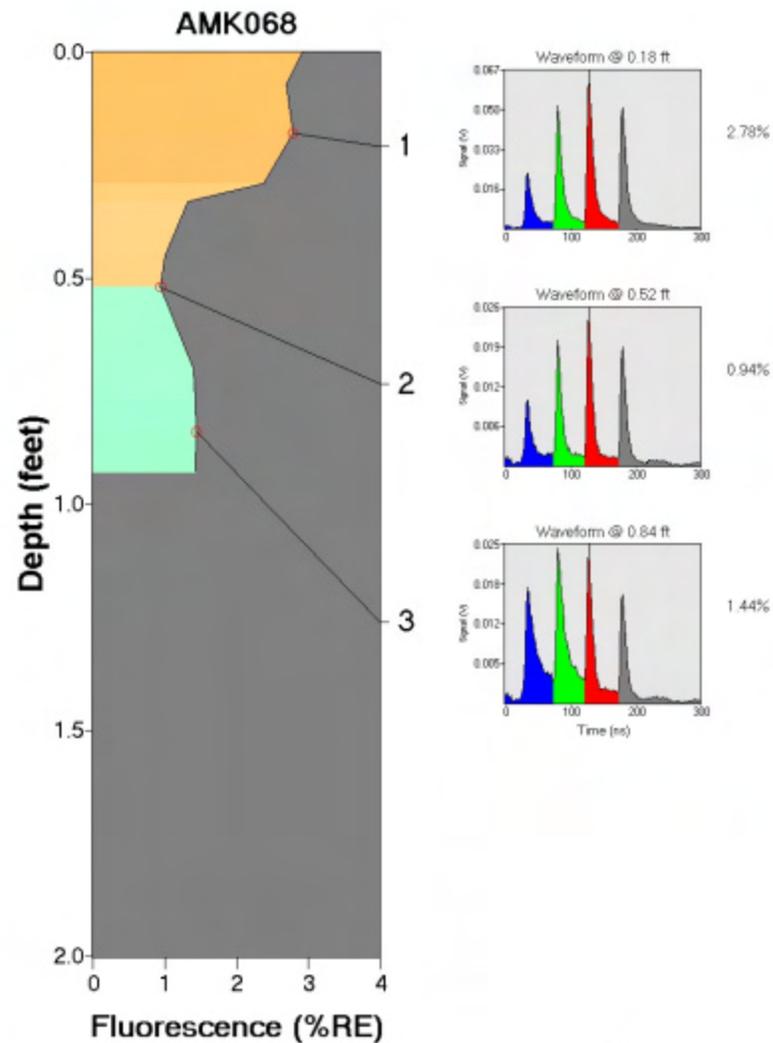
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/18/2005 @ 6:46:34 PM	Max fluorescence: 9.96% @ 15.11 ft
ROST Unit: AK FUDS	Final depth BGS: 18.20 ft
Latitude: Unavailable	Longitude: Unavailable



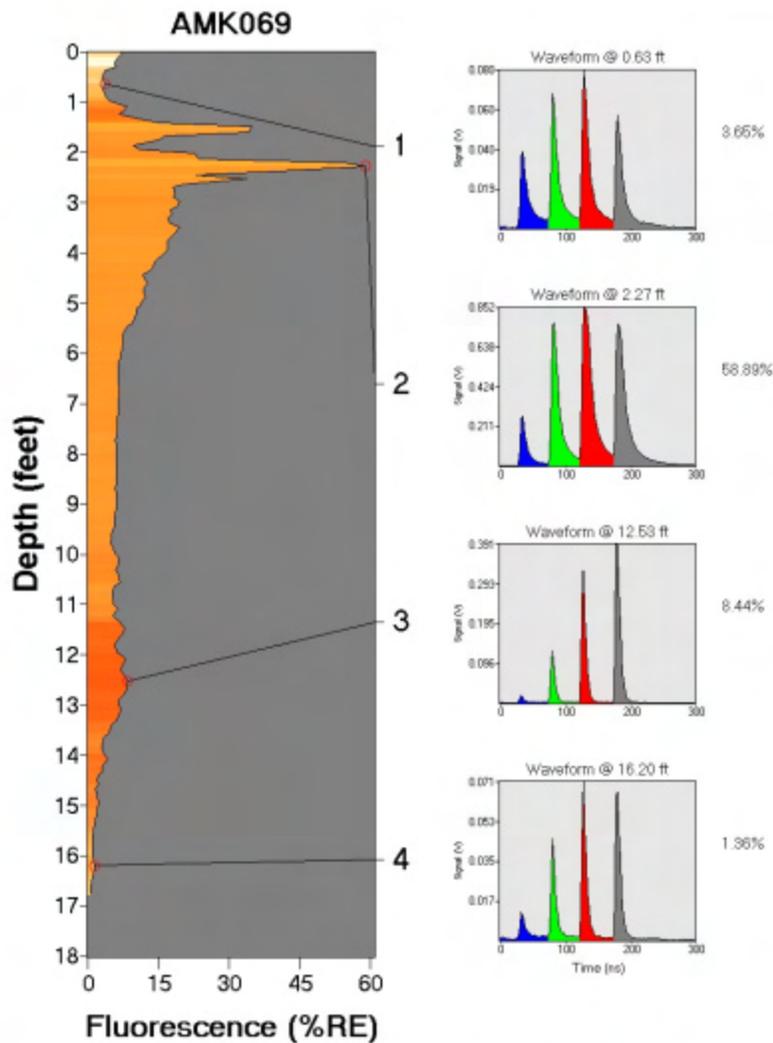
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/18/2005 @ 7:09:17 PM	Max fluorescence: 2.92% @ 0.00 ft
ROST Unit: AK FUDS	Final depth BGS: 0.93 ft
Latitude: Unavailable	Longitude: Unavailable



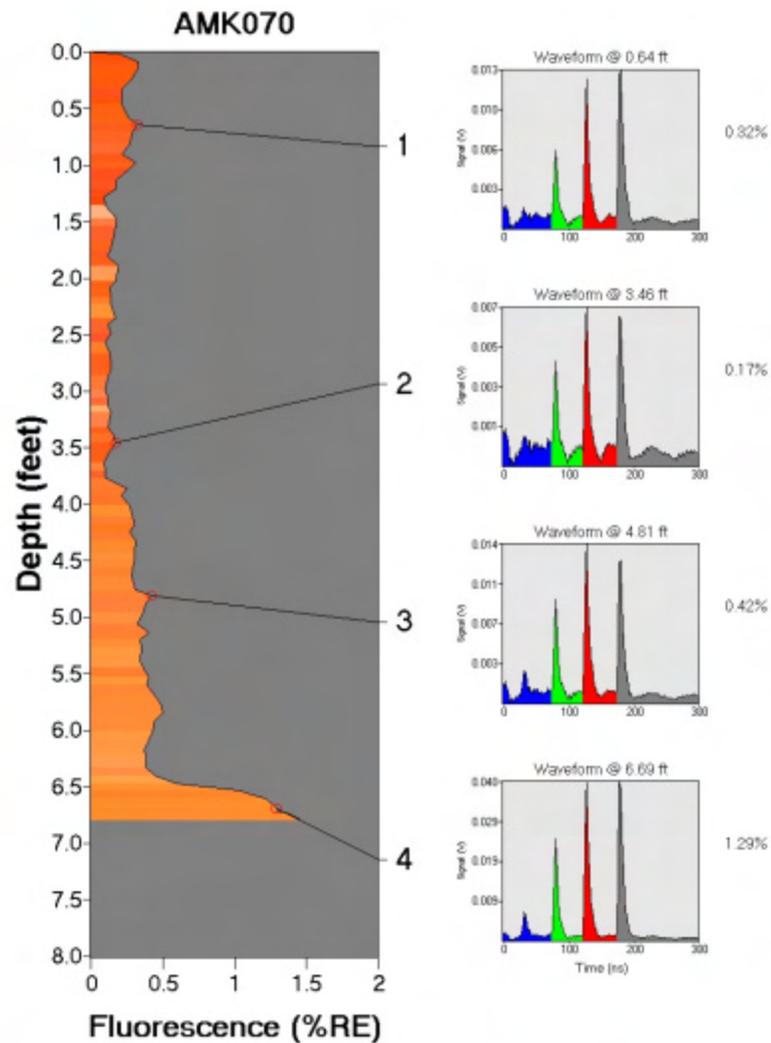
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/18/2005 @ 7:17:52 PM	Max fluorescence: 58.89% @ 2.27 ft
ROST Unit: AK FUDS	Final depth BGS: 16.78 ft
Latitude: Unavailable	Longitude: Unavailable



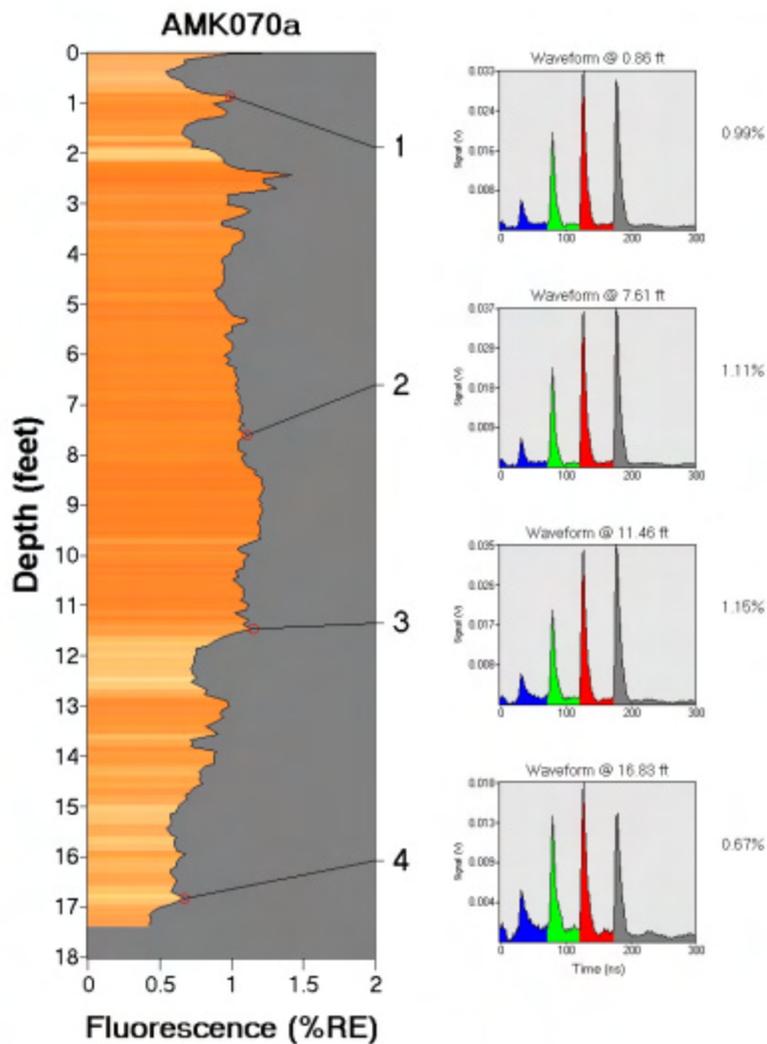
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/19/2005 @ 8:57:07 AM	Max fluorescence: 1.46% @ 6.79 ft
ROST Unit: AK FUDS	Final depth BGS: 6.79 ft
Latitude: Unavailable	Longitude: Unavailable



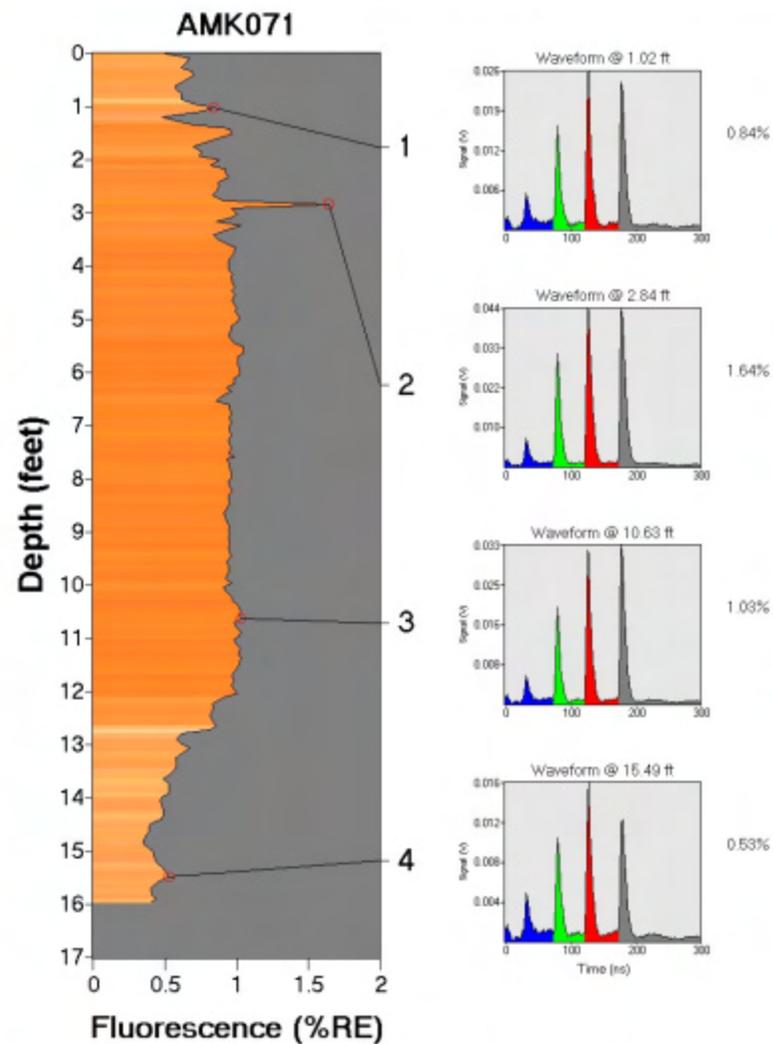
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/19/2005 @ 9:04:37 AM	Max fluorescence: 1.42% @ 2.42 ft
ROST Unit: AK FUDS	Final depth BGS: 17.39 ft
Latitude: Unavailable	Longitude: Unavailable



ROST Fluorescence Response Data

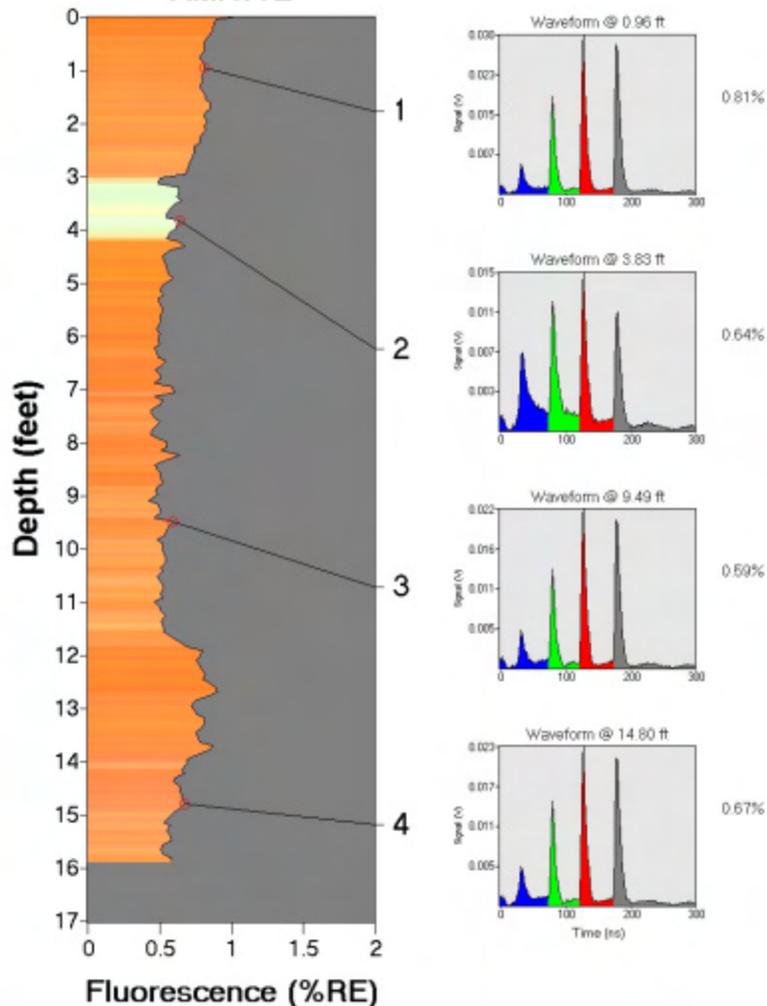
Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/19/2005 @ 9:31:41 AM	Max fluorescence: 1.64% @ 2.84 ft
ROST Unit: AK FUDS	Final depth BGS: 15.97 ft
Latitude: Unavailable	Longitude: Unavailable



ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/19/2005 @ 9:57:54 AM	Max fluorescence: 1.00% @ 0.00 ft
ROST Unit: AK FUDS	Final depth BGS: 15.88 ft
Latitude: Unavailable	Longitude: Unavailable

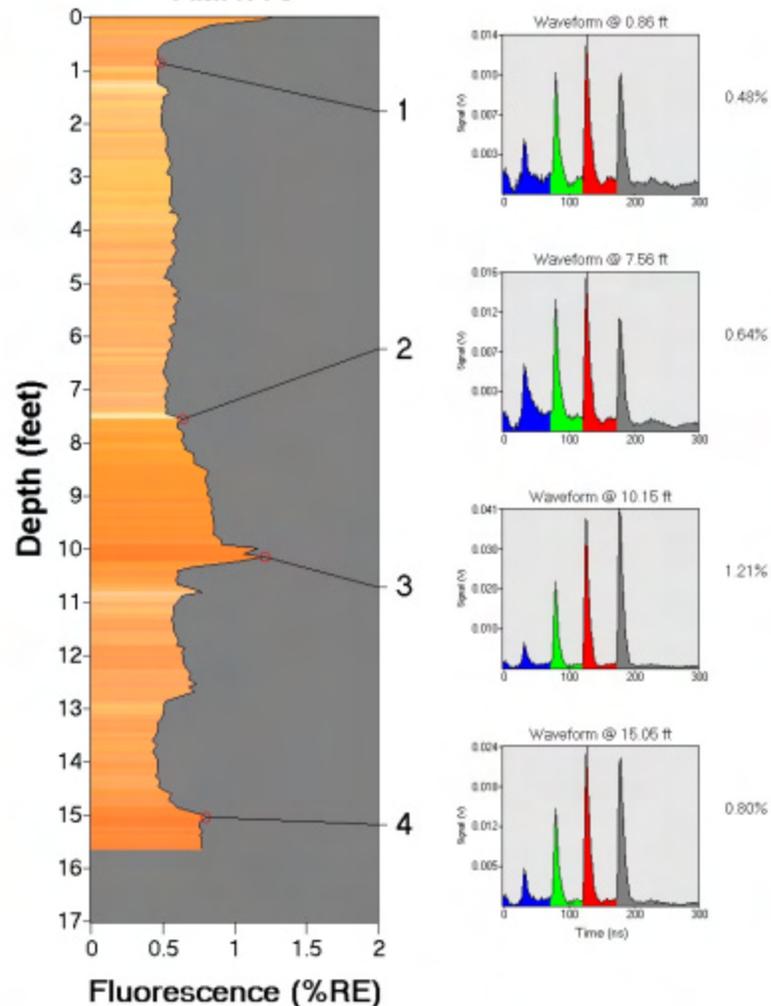
AMK072



ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/19/2005 @ 10:20:51 AM	Max fluorescence: 1.25% @ 0.00 ft
ROST Unit: AK FUDS	Final depth BGS: 15.64 ft
Latitude: Unavailable	Longitude: Unavailable

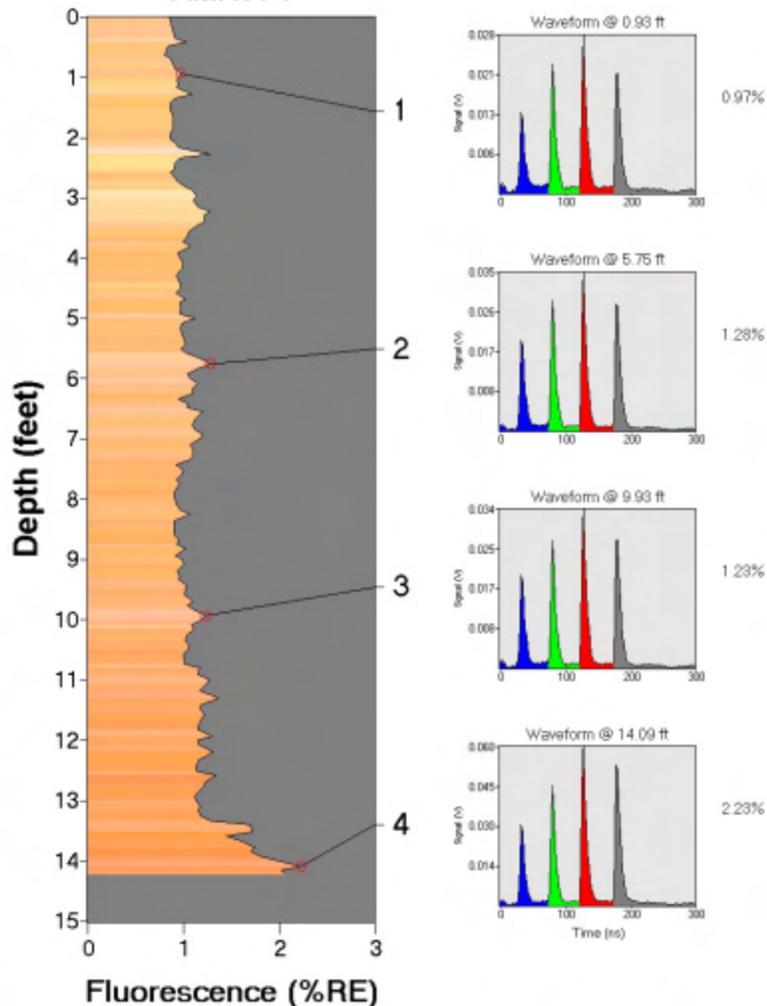
AMK073



ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/19/2005 @ 12:15:38 PM	Max fluorescence: 2.23% @ 14.09 ft
ROST Unit: AK FUDS	Final depth BGS: 14.22 ft
Latitude: Unavailable	Longitude: Unavailable

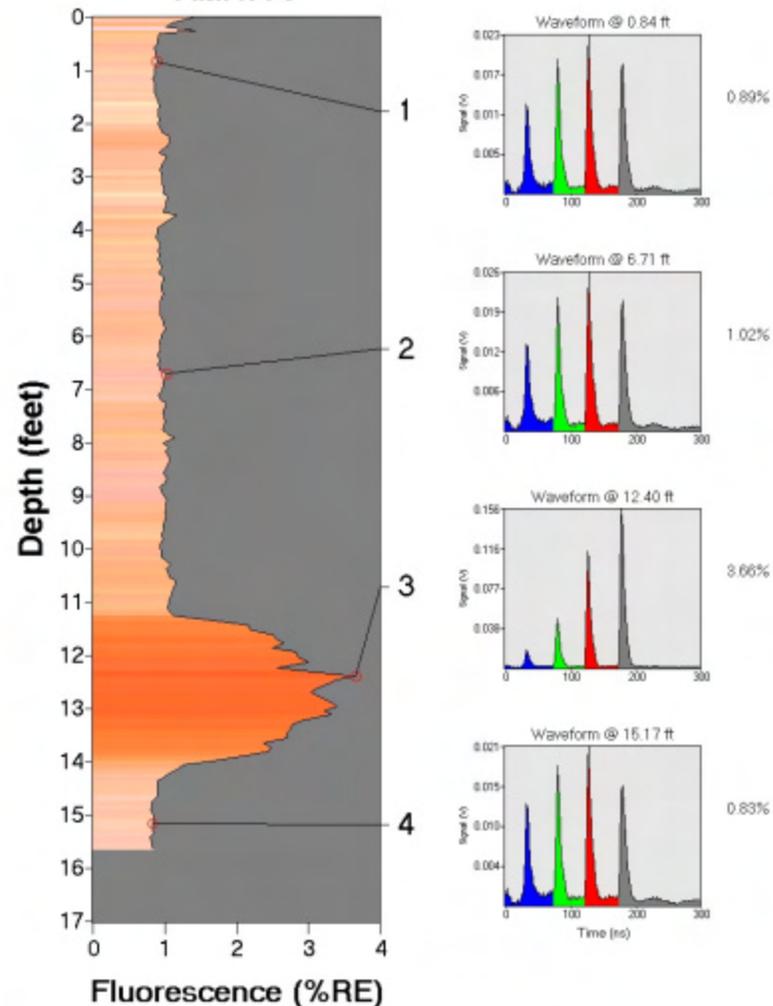
AMK074



ROST Fluorescence Response Data

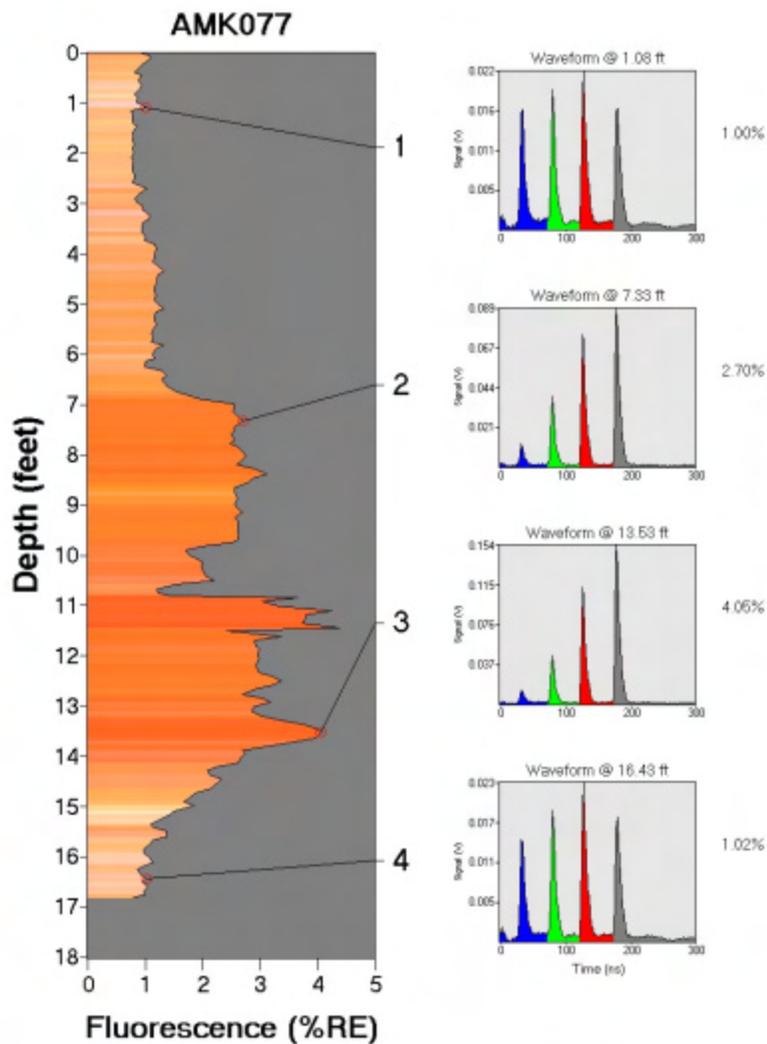
Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/19/2005 @ 1:58:46 PM	Max fluorescence: 3.66% @ 12.40 ft
ROST Unit: AK FUDS	Final depth BGS: 15.65 ft
Latitude: Unavailable	Longitude: Unavailable

AMK076



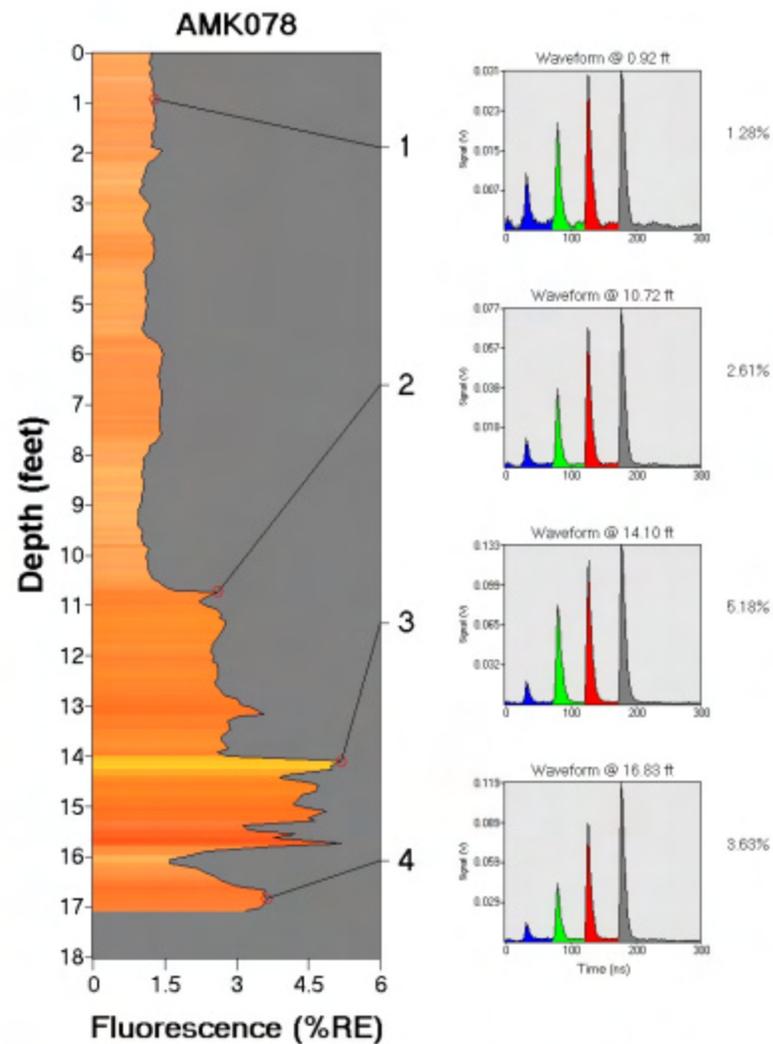
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDES	Job #: Amaknak
Date/Time: 5/19/2005 @ 2:21:11 PM	Max fluorescence: 4.37% @ 11.44 ft
ROST Unit: AK FUDS	Final depth BGS: 16.81 ft
Latitude: Unavailable	Longitude: Unavailable



ROST Fluorescence Response Data

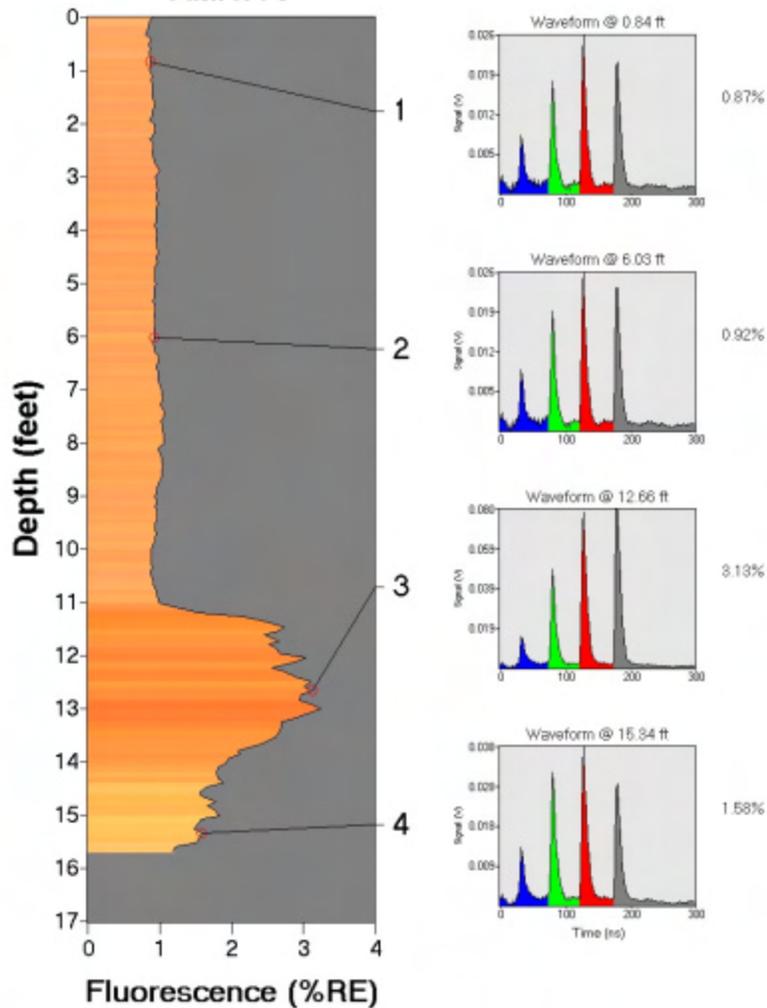
Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDES	Job #: Amaknak
Date/Time: 5/19/2005 @ 2:56:04 PM	Max fluorescence: 5.19% @ 15.73 ft
ROST Unit: AK FUDS	Final depth BGS: 17.08 ft
Latitude: Unavailable	Longitude: Unavailable



ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/19/2005 @ 3:19:39 PM	Max fluorescence: 3.24% @ 13.00 ft
ROST Unit: AK FUDS	Final depth BGS: 15.70 ft
Latitude: Unavailable	Longitude: Unavailable

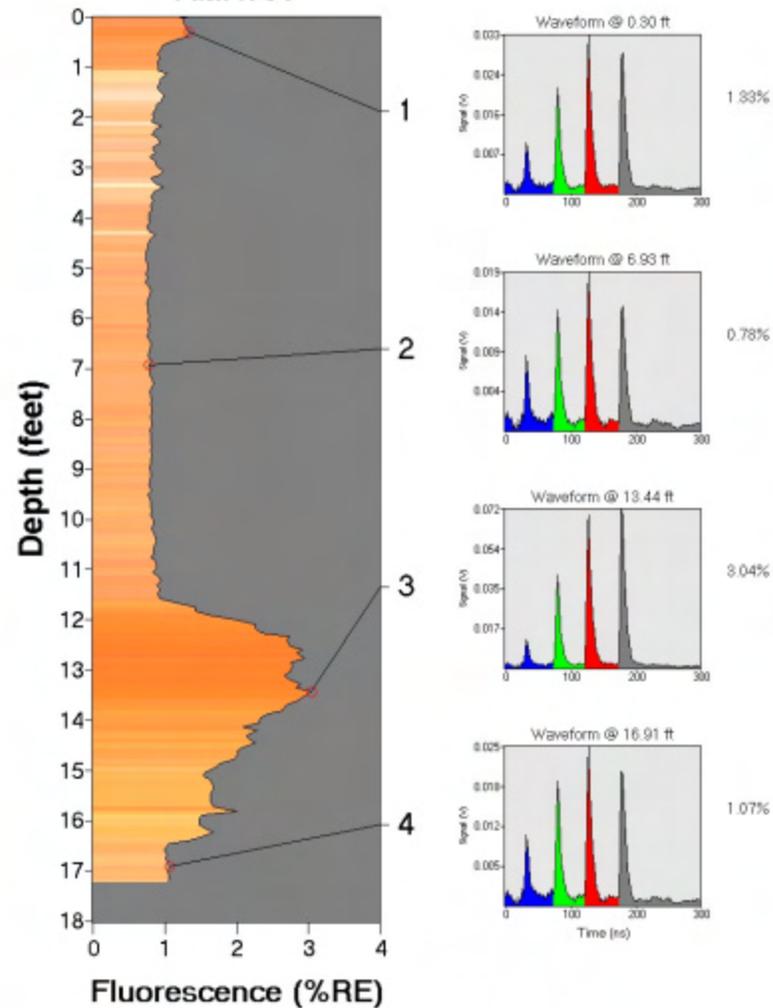
AMK079



ROST Fluorescence Response Data

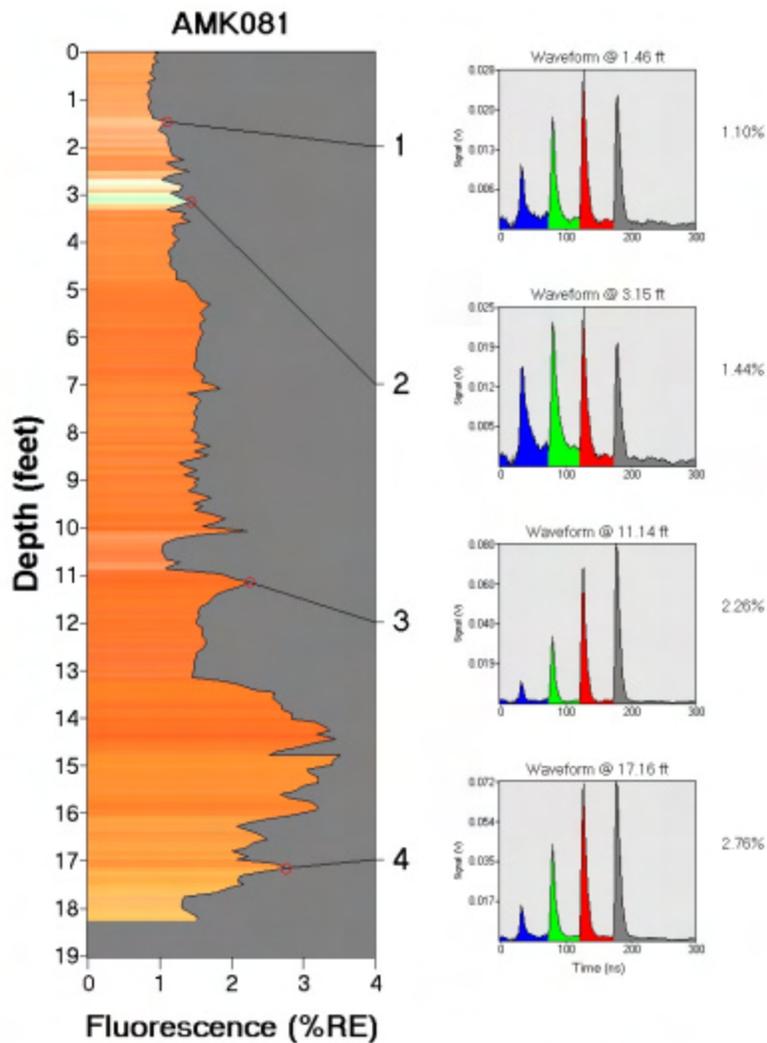
Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/19/2005 @ 3:46:33 PM	Max fluorescence: 3.04% @ 13.44 ft
ROST Unit: AK FUDS	Final depth BGS: 17.21 ft
Latitude: Unavailable	Longitude: Unavailable

AMK080



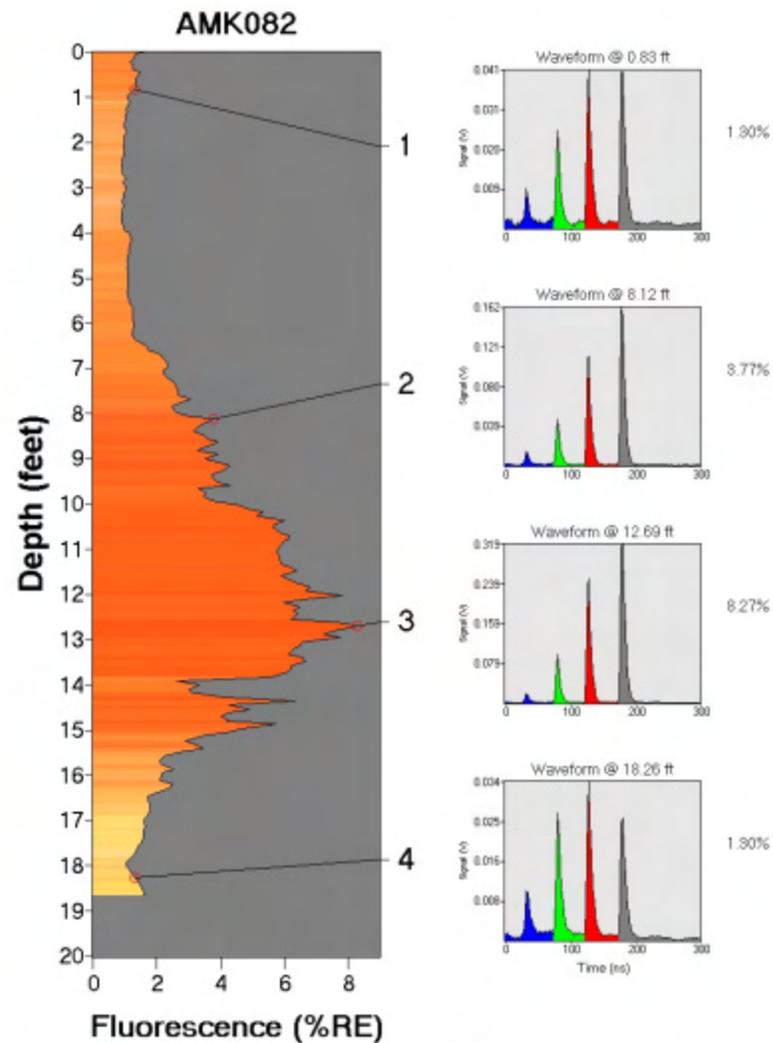
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/19/2005 @ 4:11:52 PM	Max fluorescence: 3.51% @ 14.78 ft
ROST Unit: AK FUDS	Final depth BGS: 18.25 ft
Latitude: Unavailable	Longitude: Unavailable



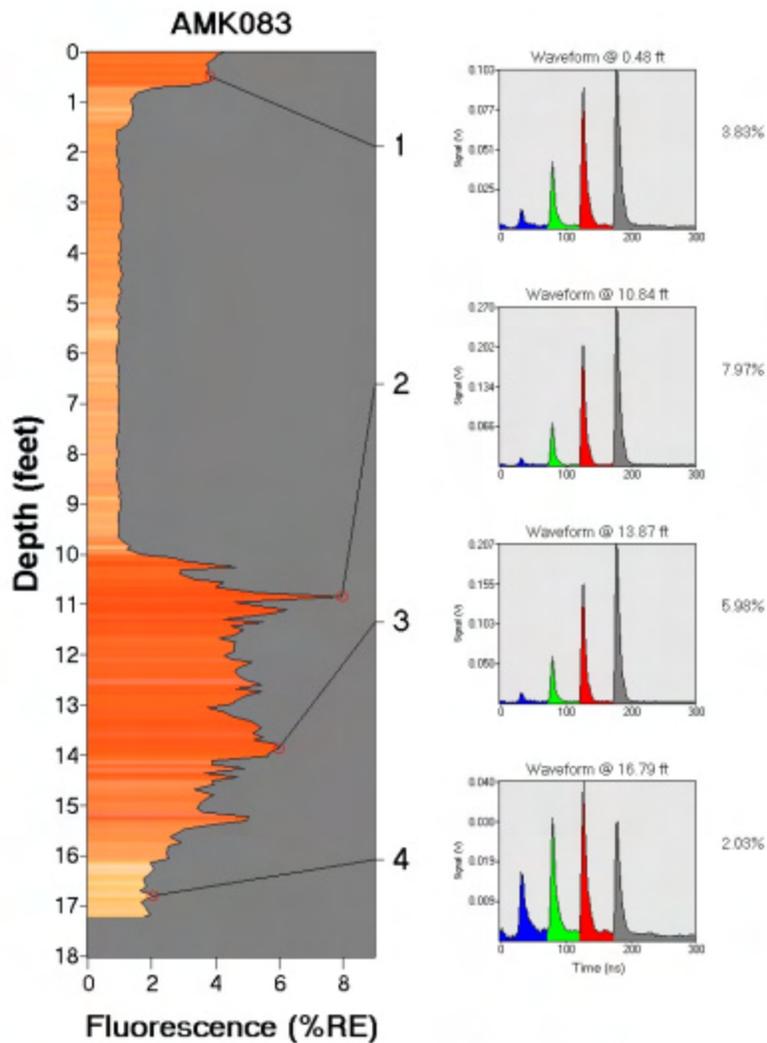
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/19/2005 @ 4:47:20 PM	Max fluorescence: 8.27% @ 12.69 ft
ROST Unit: AK FUDS	Final depth BGS: 18.65 ft
Latitude: Unavailable	Longitude: Unavailable



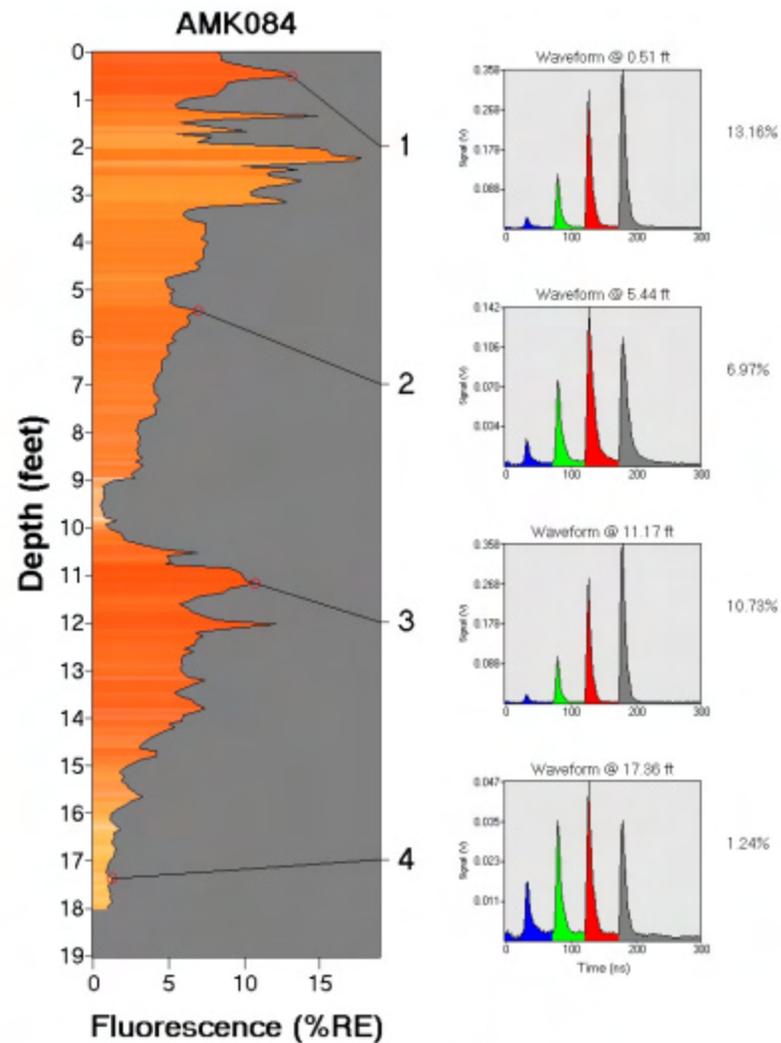
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/19/2005 @ 7:03:52 PM	Max fluorescence: 7.97% @ 10.84 ft
ROST Unit: AK FUDS	Final depth BGS: 17.22 ft
Latitude: Unavailable	Longitude: Unavailable



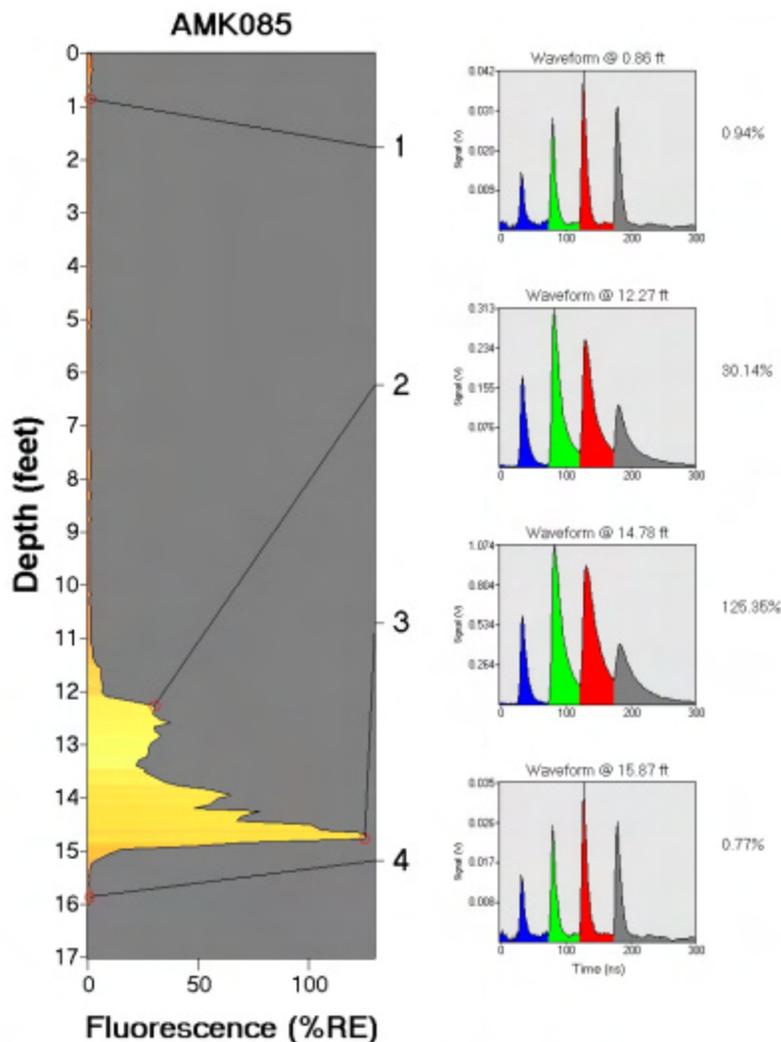
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/19/2005 @ 7:24:53 PM	Max fluorescence: 17.73% @ 2.22 ft
ROST Unit: AK FUDS	Final depth BGS: 18.00 ft
Latitude: Unavailable	Longitude: Unavailable



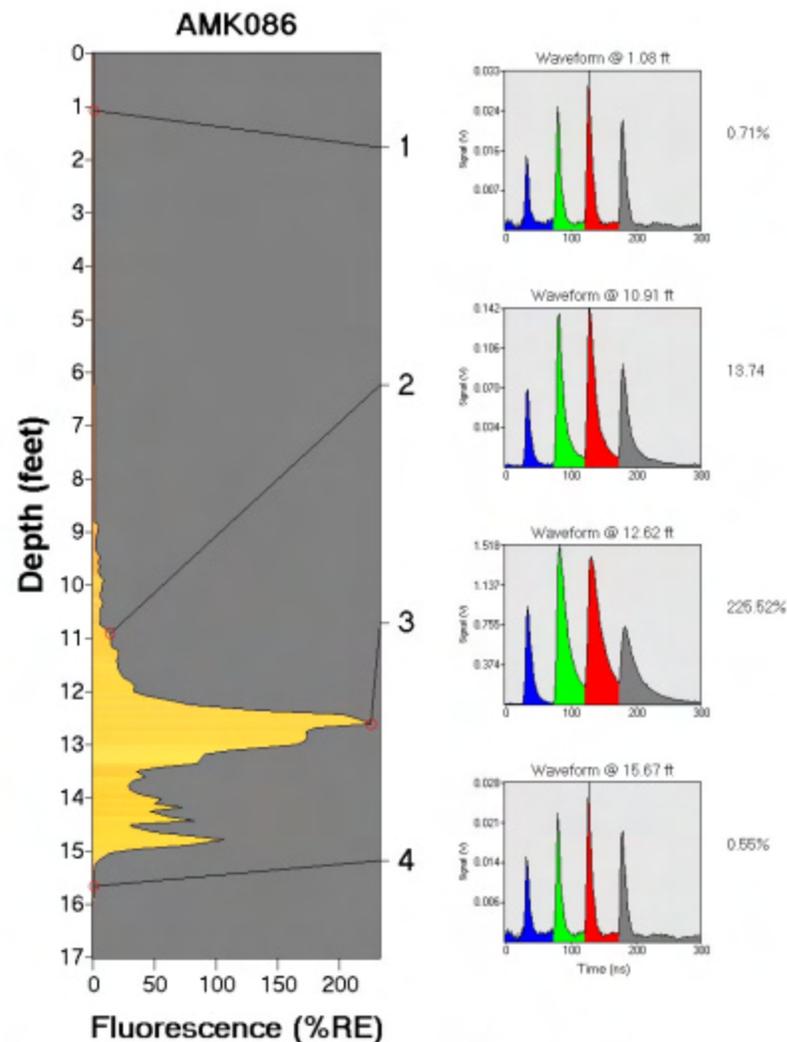
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/20/2005 @ 11:06:46 AM	Max fluorescence: 125.86% @ 14.67 ft
ROST Unit: AK FUDS	Final depth BGS: 16.06 ft
Latitude: Unavailable	Longitude: Unavailable



ROST Fluorescence Response Data

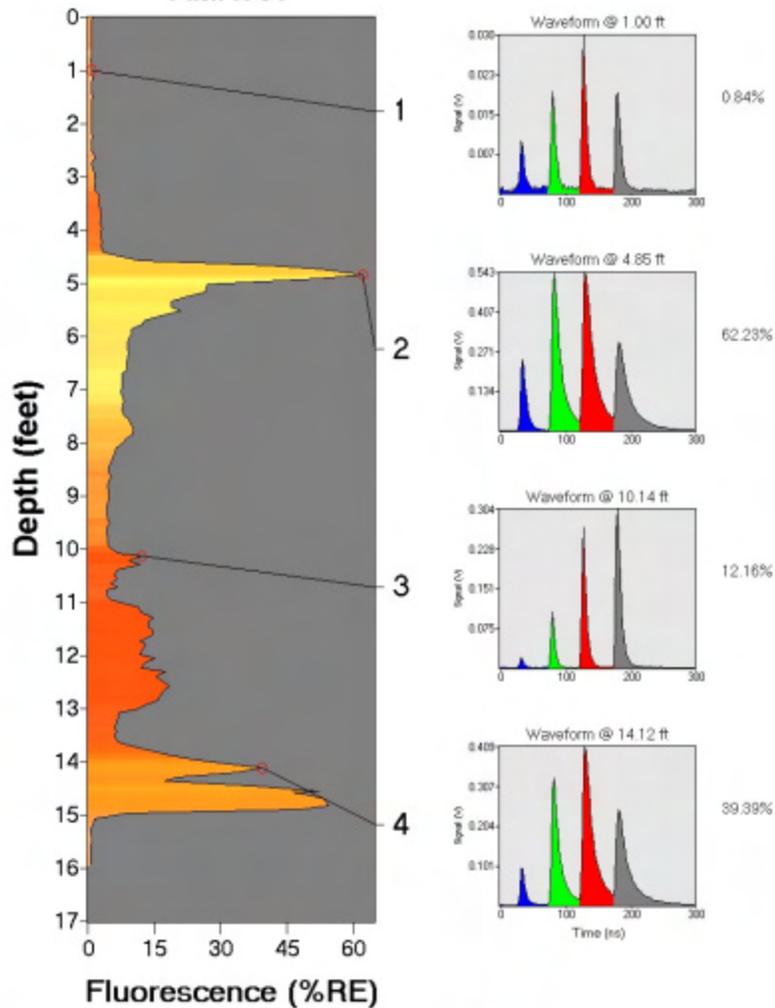
Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/20/2005 @ 12:03:26 PM	Max fluorescence: 225.52% @ 12.62 ft
ROST Unit: AK FUDS	Final depth BGS: 15.90 ft
Latitude: Unavailable	Longitude: Unavailable



ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/20/2005 @ 1:52:39 PM	Max fluorescence: 62.23% @ 4.85 ft
ROST Unit: AK FUDS	Final depth BGS: 15.95 ft
Latitude: Unavailable	Longitude: Unavailable

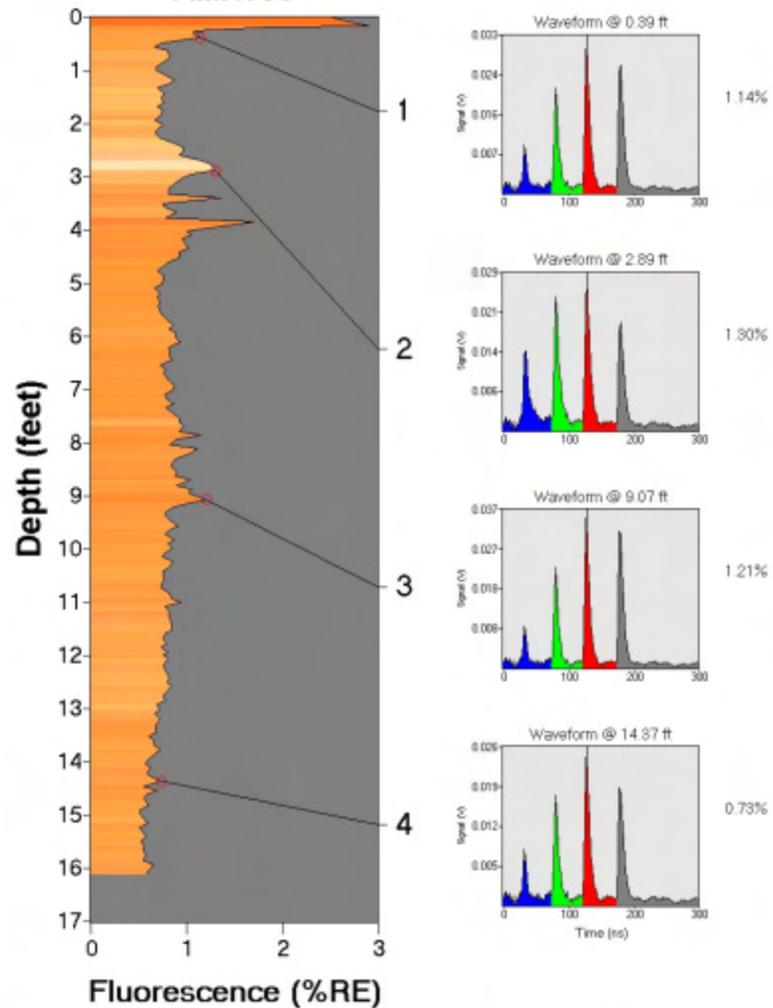
AMK087



ROST Fluorescence Response Data

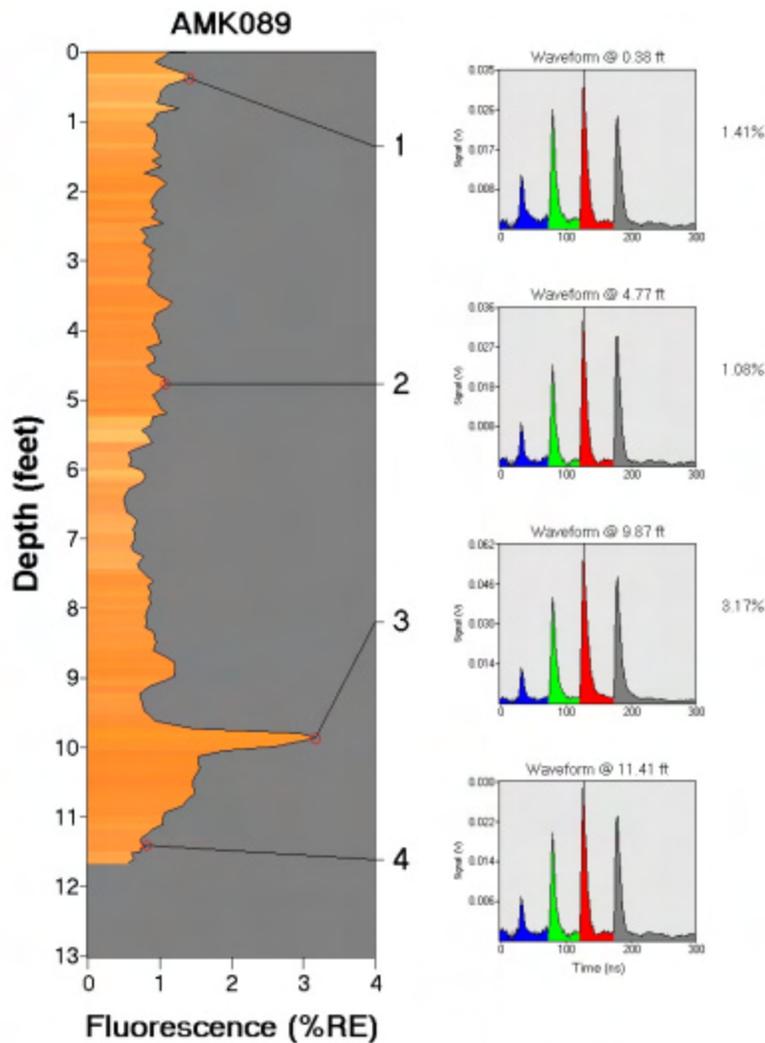
Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/20/2005 @ 2:15:43 PM	Max fluorescence: 2.90% @ 0.16 ft
ROST Unit: AK FUDS	Final depth BGS: 16.12 ft
Latitude: Unavailable	Longitude: Unavailable

AMK088



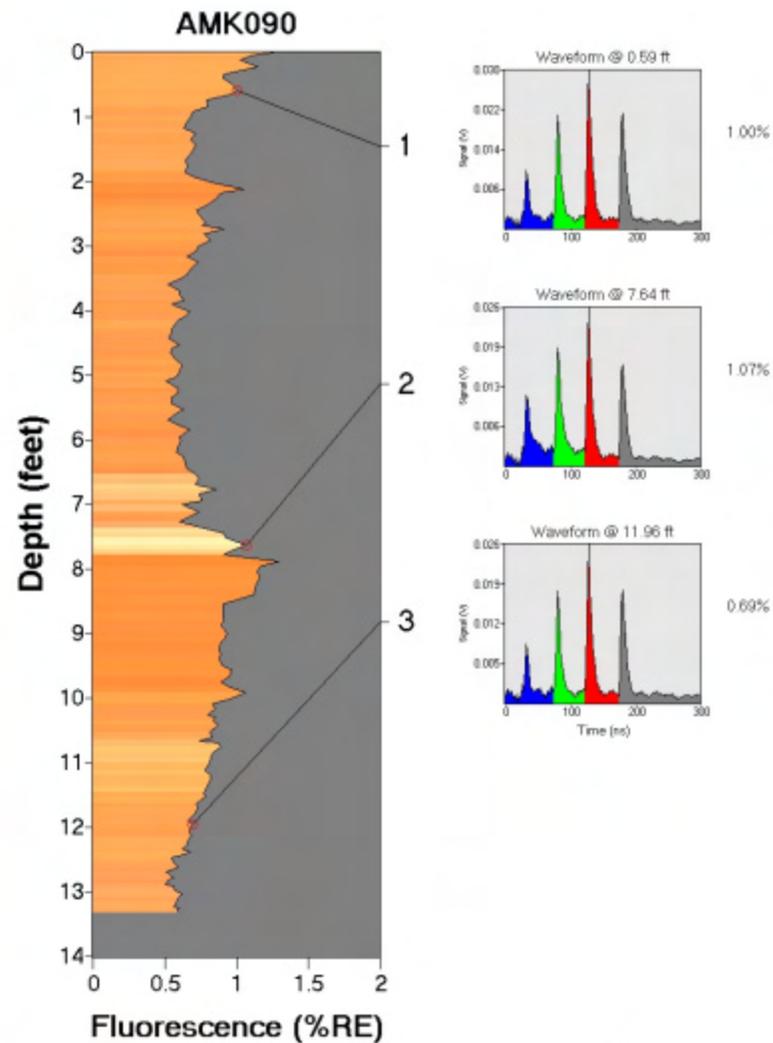
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/20/2005 @ 2:50:13 PM	Max fluorescence: 3.17% @ 9.87 ft
ROST Unit: AK FUDS	Final depth BGS: 11.66 ft
Latitude: Unavailable	Longitude: Unavailable



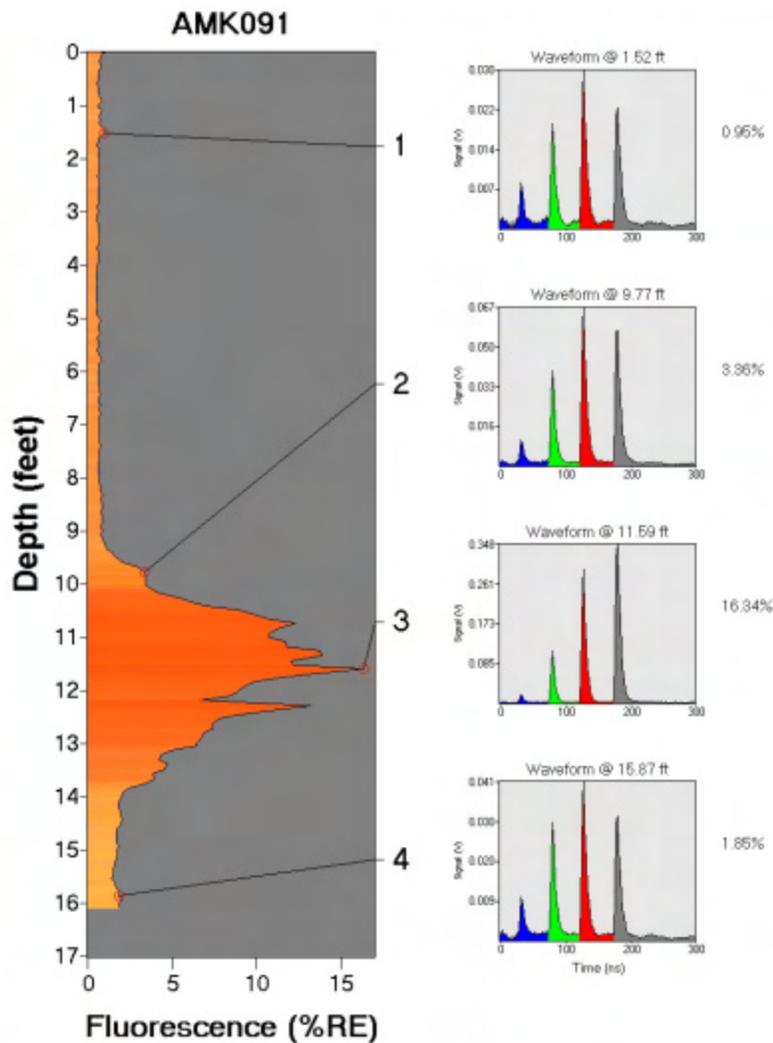
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/20/2005 @ 3:14:34 PM	Max fluorescence: 1.29% @ 7.89 ft
ROST Unit: AK FUDS	Final depth BGS: 13.32 ft
Latitude: Unavailable	Longitude: Unavailable



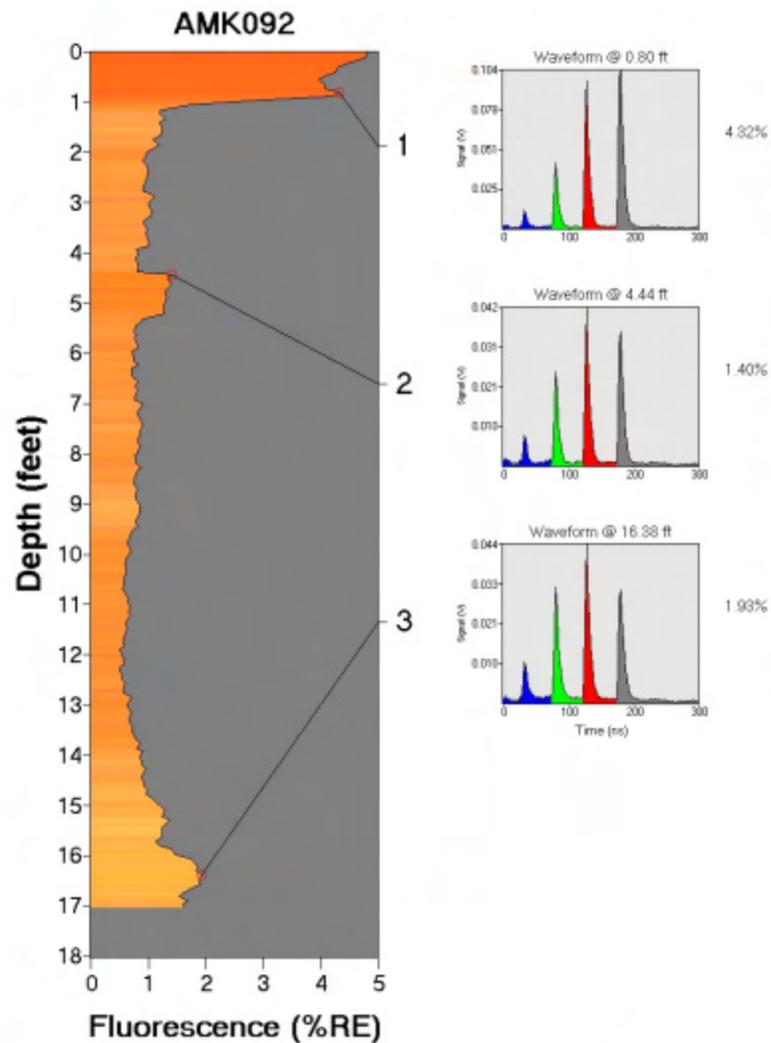
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/20/2005 @ 3:41:30 PM	Max fluorescence: 16.34% @ 11.59 ft
ROST Unit: AK FUDS	Final depth BGS: 16.09 ft
Latitude: Unavailable	Longitude: Unavailable



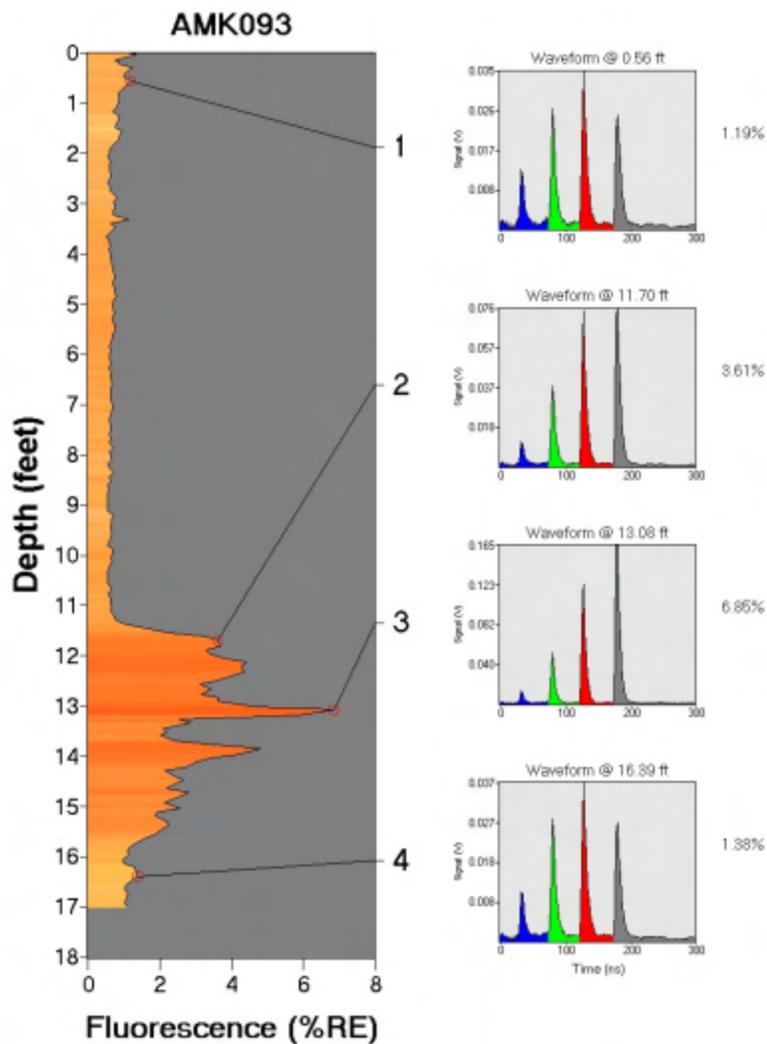
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/20/2005 @ 4:02:48 PM	Max fluorescence: 4.81% @ 0.00 ft
ROST Unit: AK FUDS	Final depth BGS: 17.02 ft
Latitude: Unavailable	Longitude: Unavailable



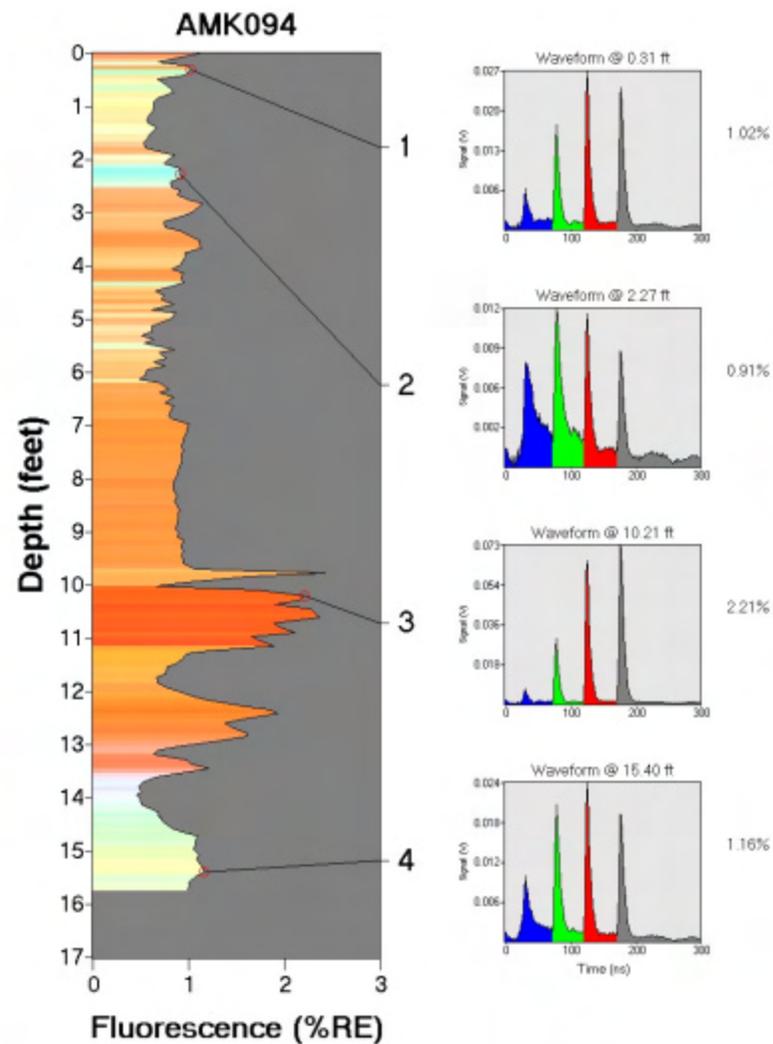
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/20/2005 @ 4:44:36 PM	Max fluorescence: 6.85% @ 13.08 ft
ROST Unit: AK FUDS	Final depth BGS: 17.01 ft
Latitude: Unavailable	Longitude: Unavailable



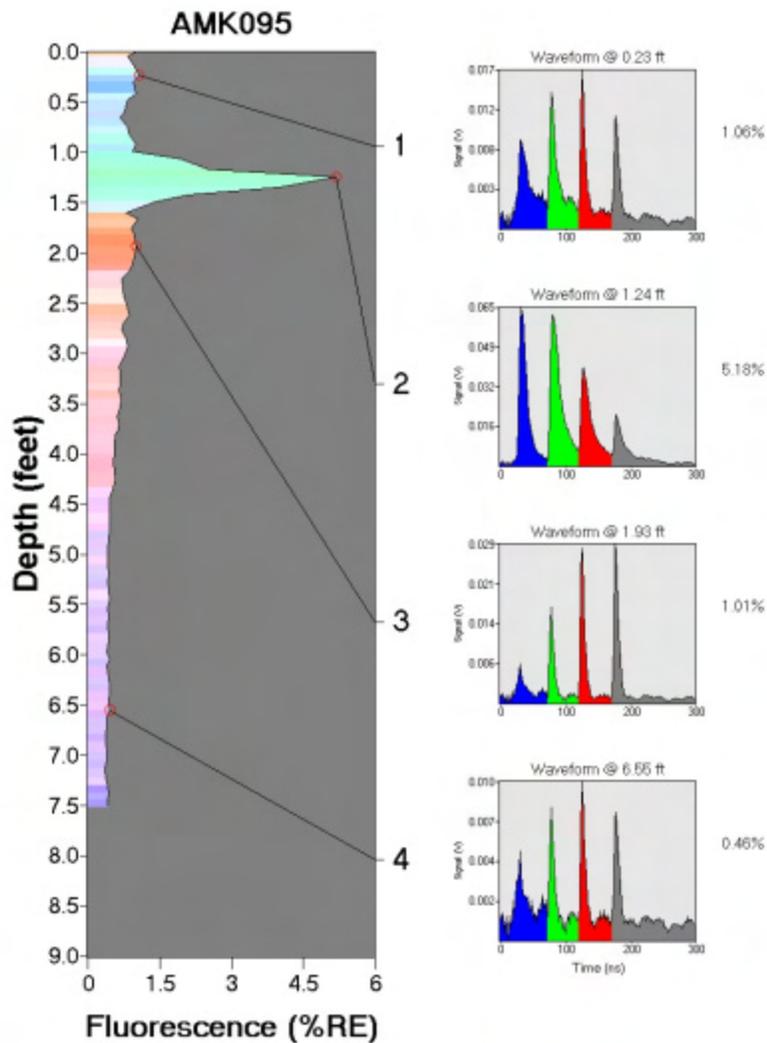
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/20/2005 @ 5:34:21 PM	Max fluorescence: 2.42% @ 9.78 ft
ROST Unit: AK FUDS	Final depth BGS: 15.73 ft
Latitude: Unavailable	Longitude: Unavailable



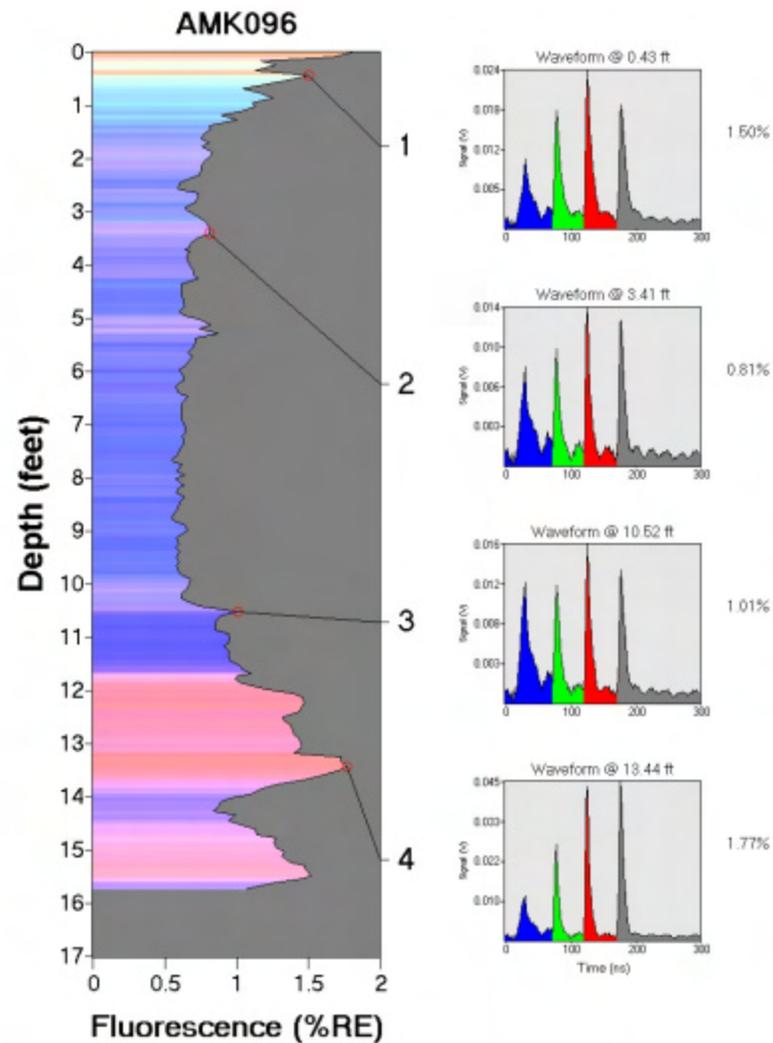
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/20/2005 @ 6:02:44 PM	Max fluorescence: 5.18% @ 1.24 ft
ROST Unit: AK FUDS	Final depth BGS: 7.51 ft
Latitude: Unavailable	Longitude: Unavailable



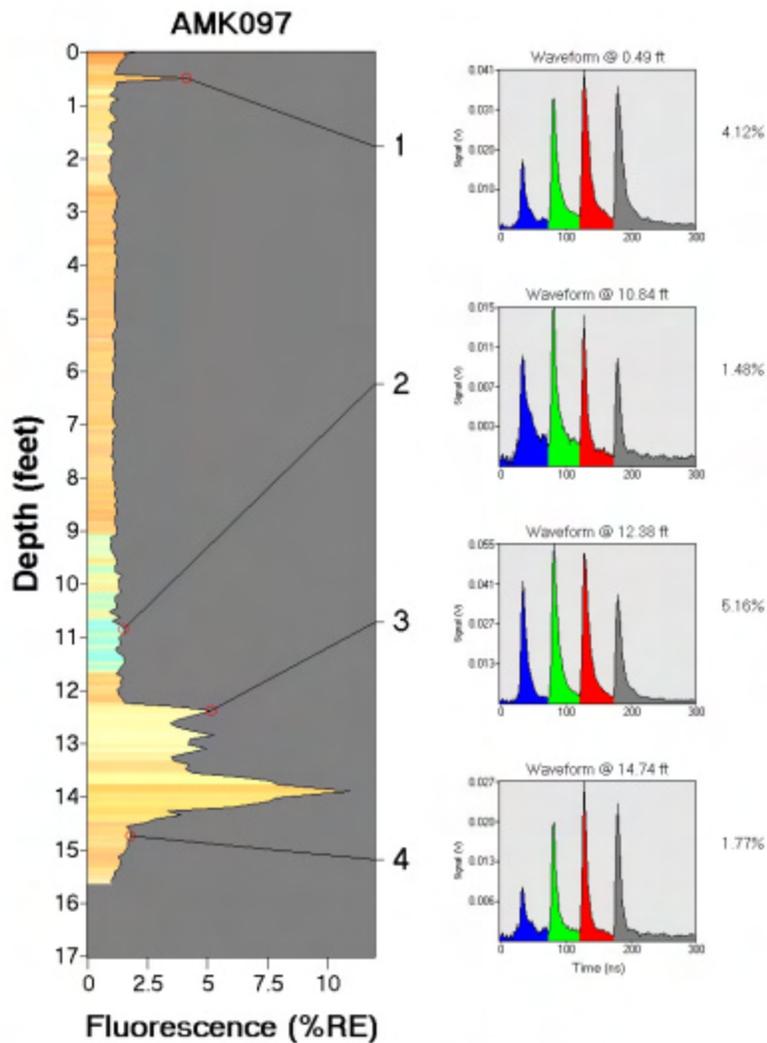
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/20/2005 @ 6:23:21 PM	Max fluorescence: 1.80% @ 0.00 ft
ROST Unit: AK FUDS	Final depth BGS: 15.73 ft
Latitude: Unavailable	Longitude: Unavailable



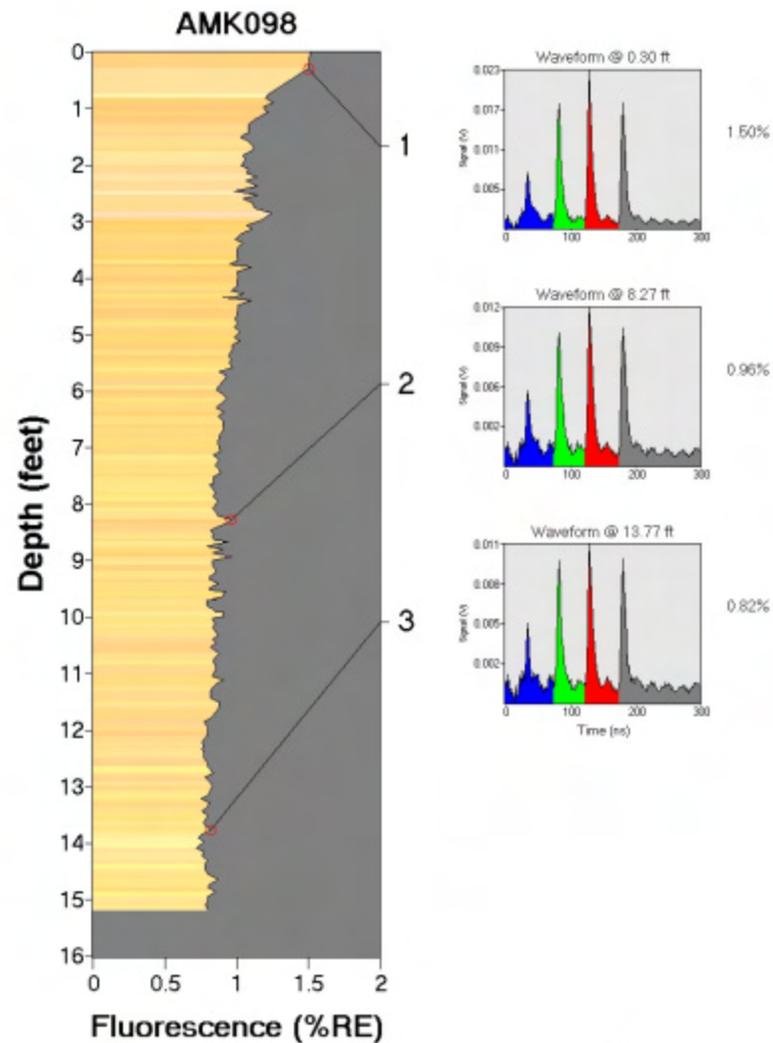
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/23/2005 @ 12:48:16 PM	Max fluorescence: 10.91% @ 13.89 ft
ROST Unit: AK FUDS	Final depth BGS: 15.63 ft
Latitude: Unavailable	Longitude: Unavailable



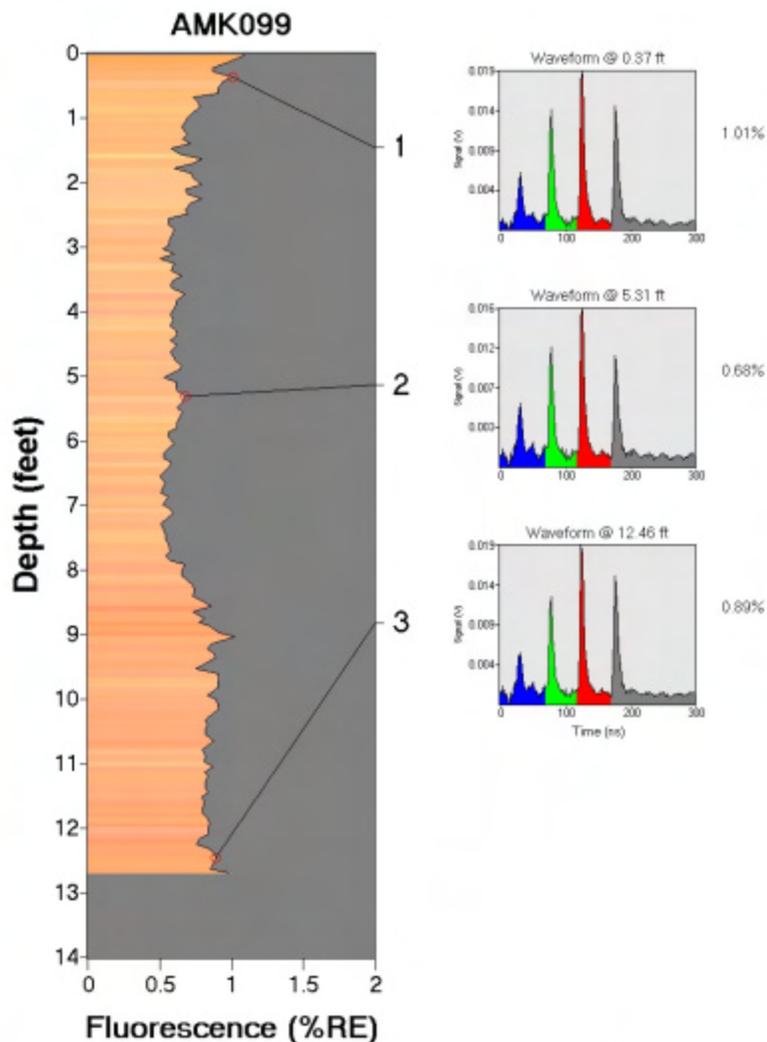
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/23/2005 @ 1:21:37 PM	Max fluorescence: 1.51% @ 0.00 ft
ROST Unit: AK FUDS	Final depth BGS: 15.19 ft
Latitude: Unavailable	Longitude: Unavailable



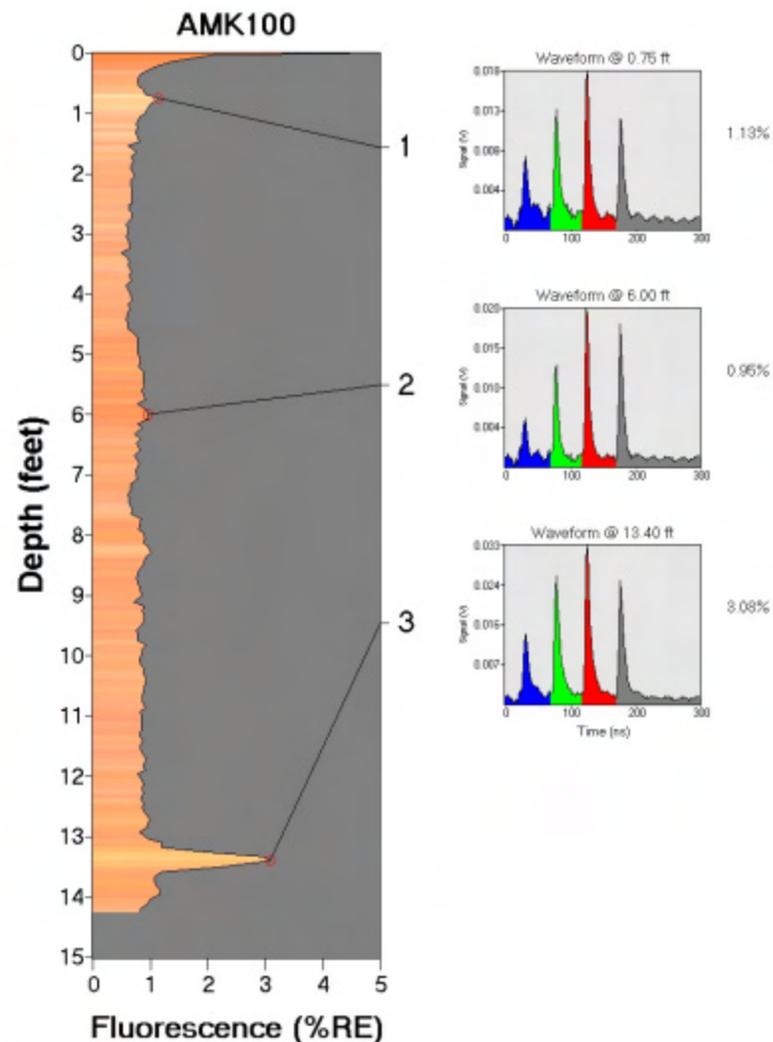
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/23/2005 @ 2:18:44 PM	Max fluorescence: 1.09% @ 0.03 ft
ROST Unit: AK FUDS	Final depth BGS: 12.69 ft
Latitude: Unavailable	Longitude: Unavailable



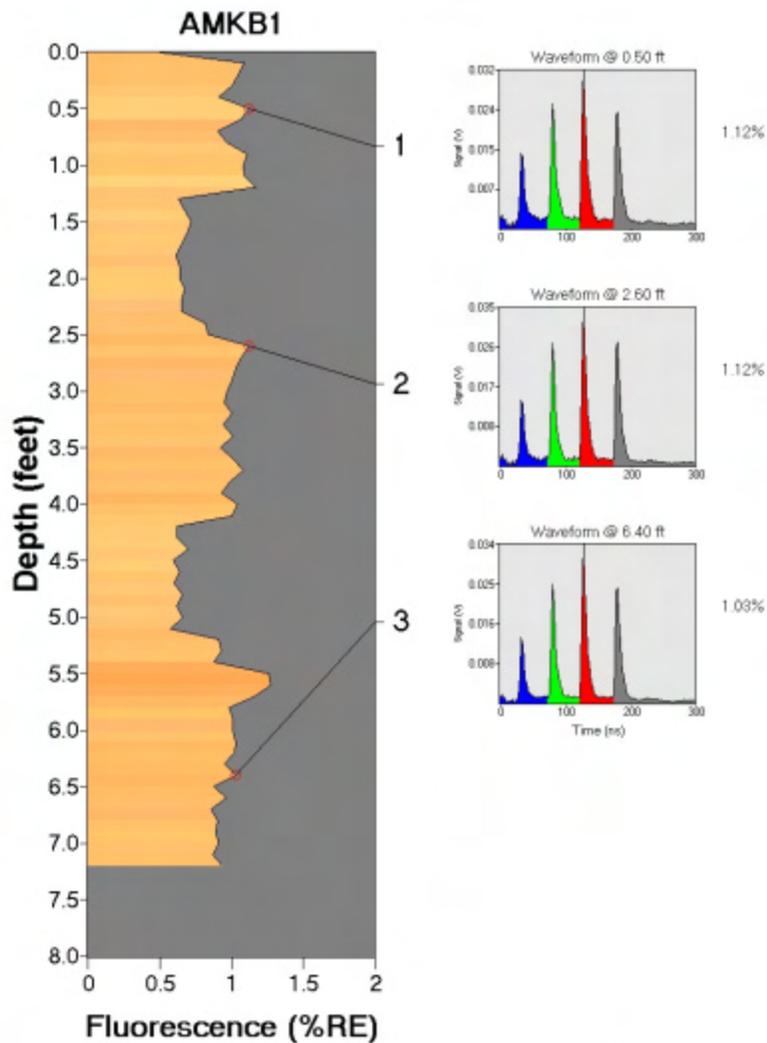
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/23/2005 @ 2:39:14 PM	Max fluorescence: 4.47% @ 0.00 ft
ROST Unit: AK FUDS	Final depth BGS: 14.25 ft
Latitude: Unavailable	Longitude: Unavailable



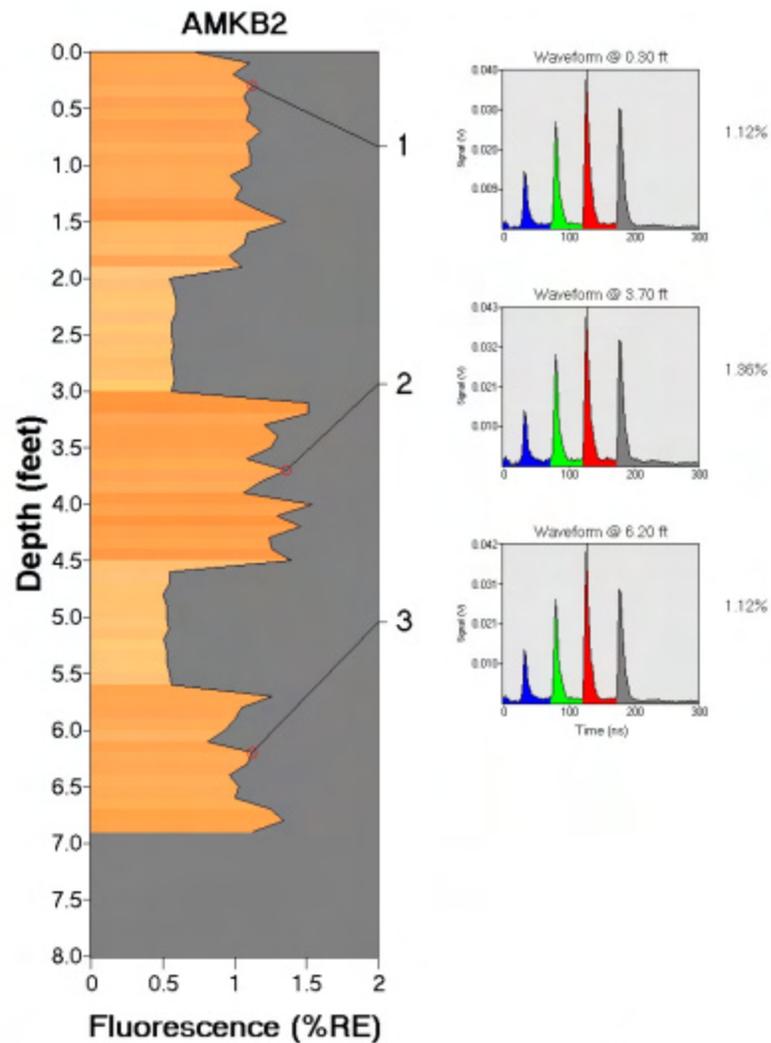
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/20/2005 @ 9:54:54 AM	Max fluorescence: 1.27% @ 5.60 ft
ROST Unit: AK FUDS	Final depth BGS: 7.20 ft
Latitude: Unavailable	Longitude: Unavailable



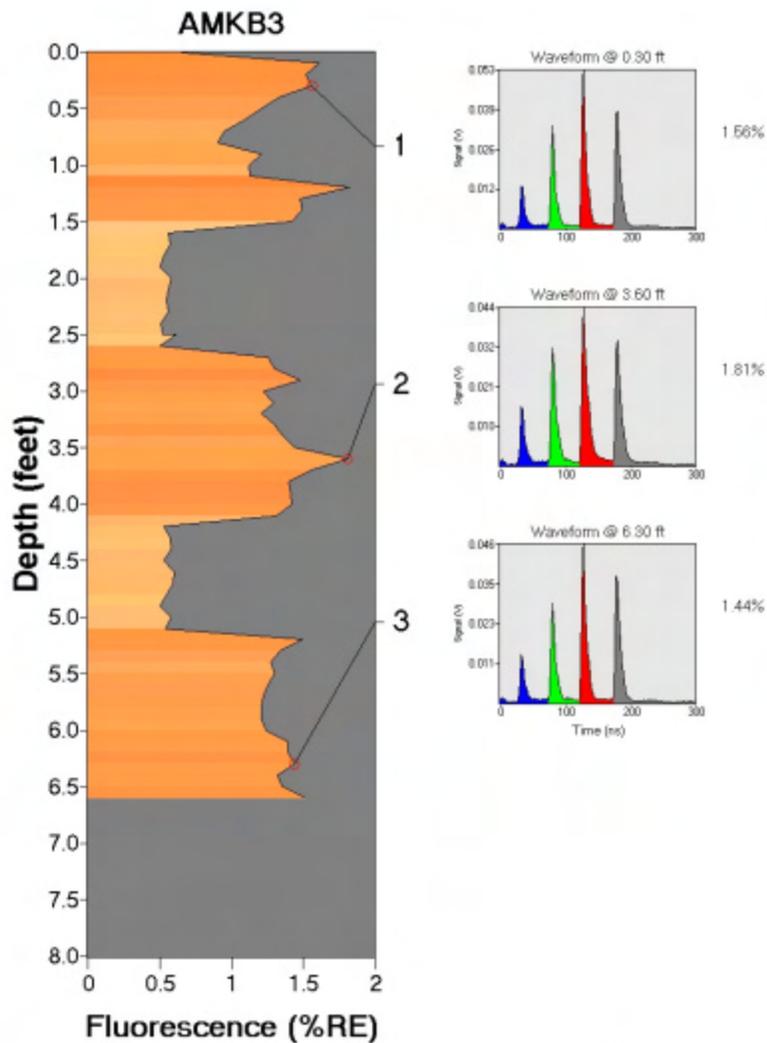
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/20/2005 @ 10:01:03 AM	Max fluorescence: 1.54% @ 4.00 ft
ROST Unit: AK FUDS	Final depth BGS: 6.90 ft
Latitude: Unavailable	Longitude: Unavailable



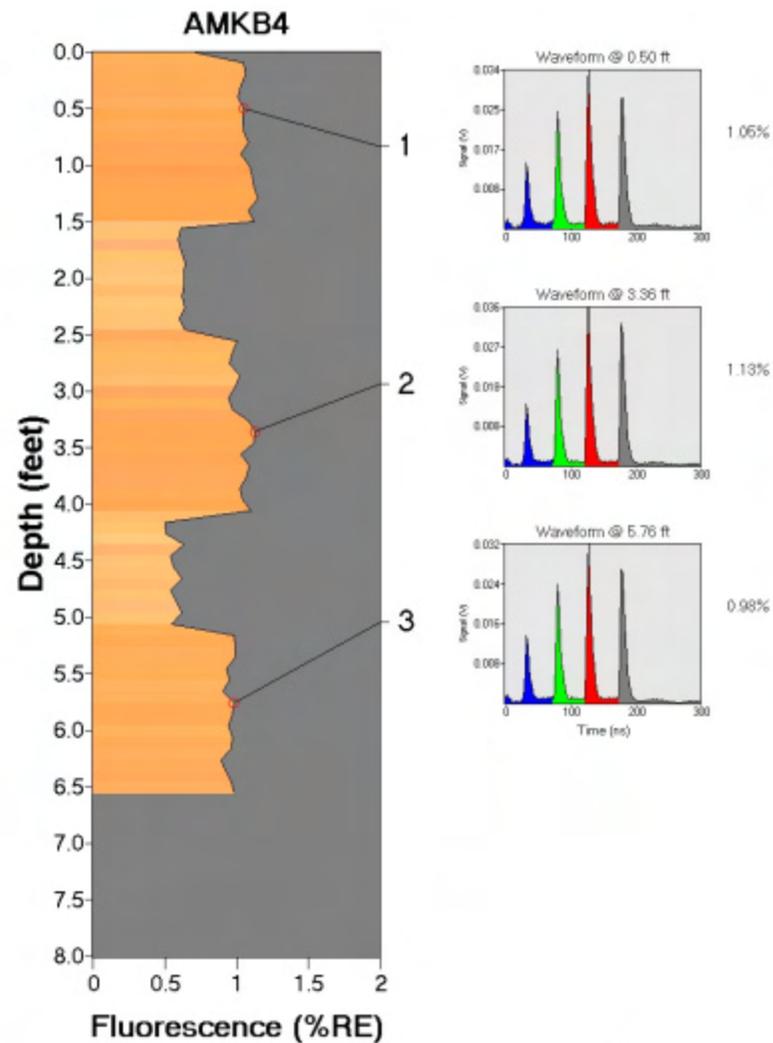
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/20/2005 @ 10:06:42 AM	Max fluorescence: 1.82% @ 1.20 ft
ROST Unit: AK FUDS	Final depth BGS: 6.60 ft
Latitude: Unavailable	Longitude: Unavailable



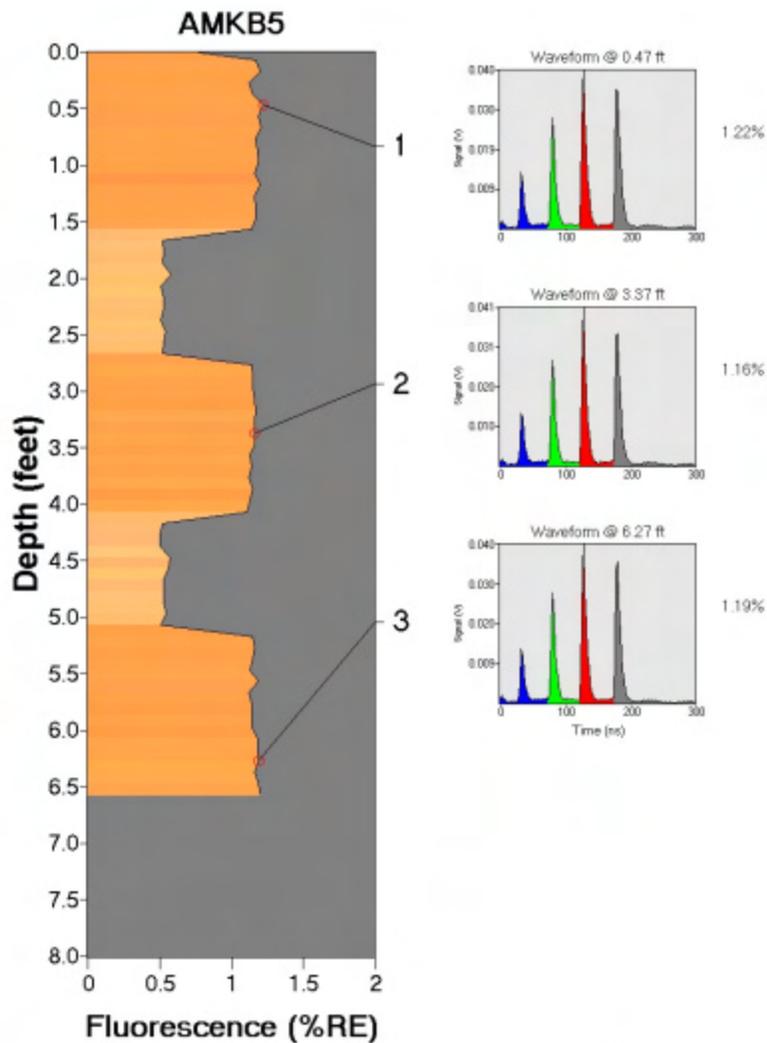
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/20/2005 @ 10:12:08 AM	Max fluorescence: 1.15% @ 1.30 ft
ROST Unit: AK FUDS	Final depth BGS: 6.56 ft
Latitude: Unavailable	Longitude: Unavailable



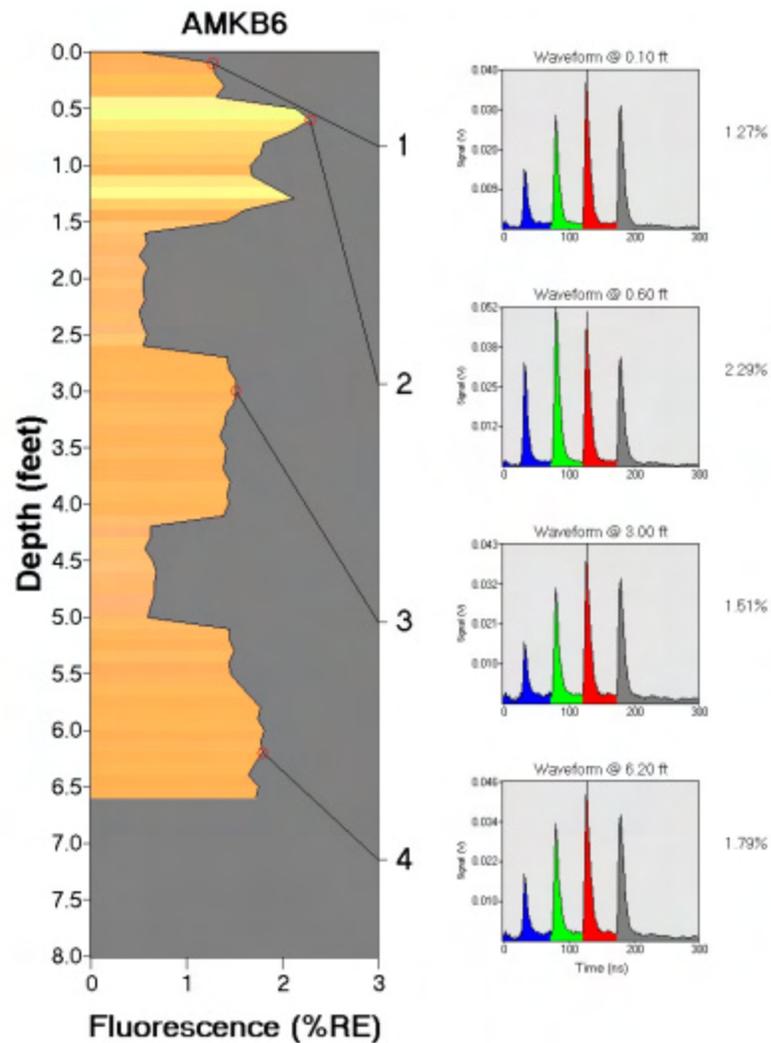
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/20/2005 @ 10:16:40 AM	Max fluorescence: 1.22% @ 0.47 ft
ROST Unit: AK FUDS	Final depth BGS: 6.57 ft
Latitude: Unavailable	Longitude: Unavailable



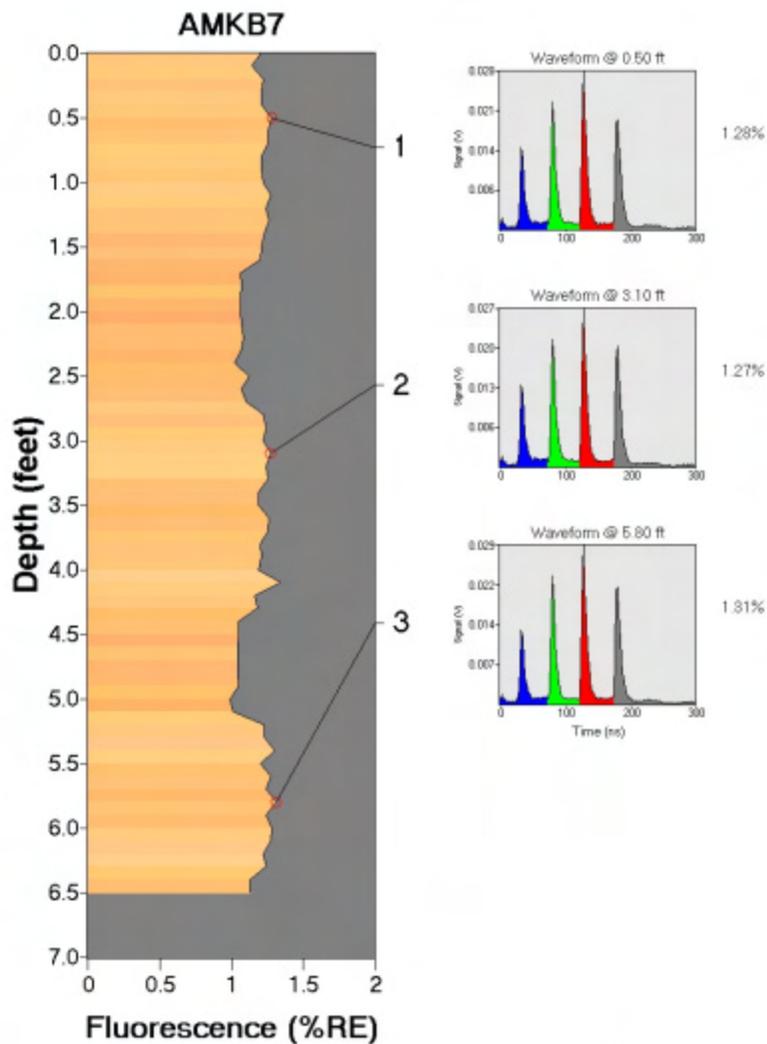
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/20/2005 @ 10:23:11 AM	Max fluorescence: 2.29% @ 0.60 ft
ROST Unit: AK FUDS	Final depth BGS: 6.60 ft
Latitude: Unavailable	Longitude: Unavailable



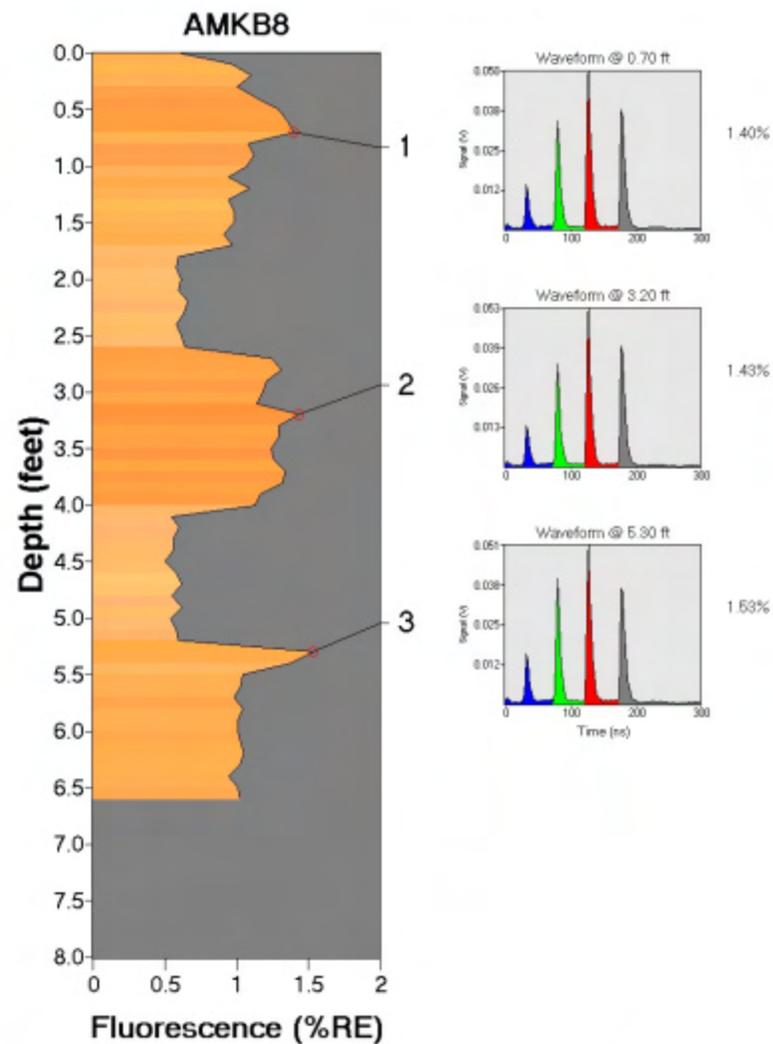
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/20/2005 @ 10:28:55 AM	Max fluorescence: 1.34% @ 4.10 ft
ROST Unit: AK FUDS	Final depth BGS: 6.50 ft
Latitude: Unavailable	Longitude: Unavailable



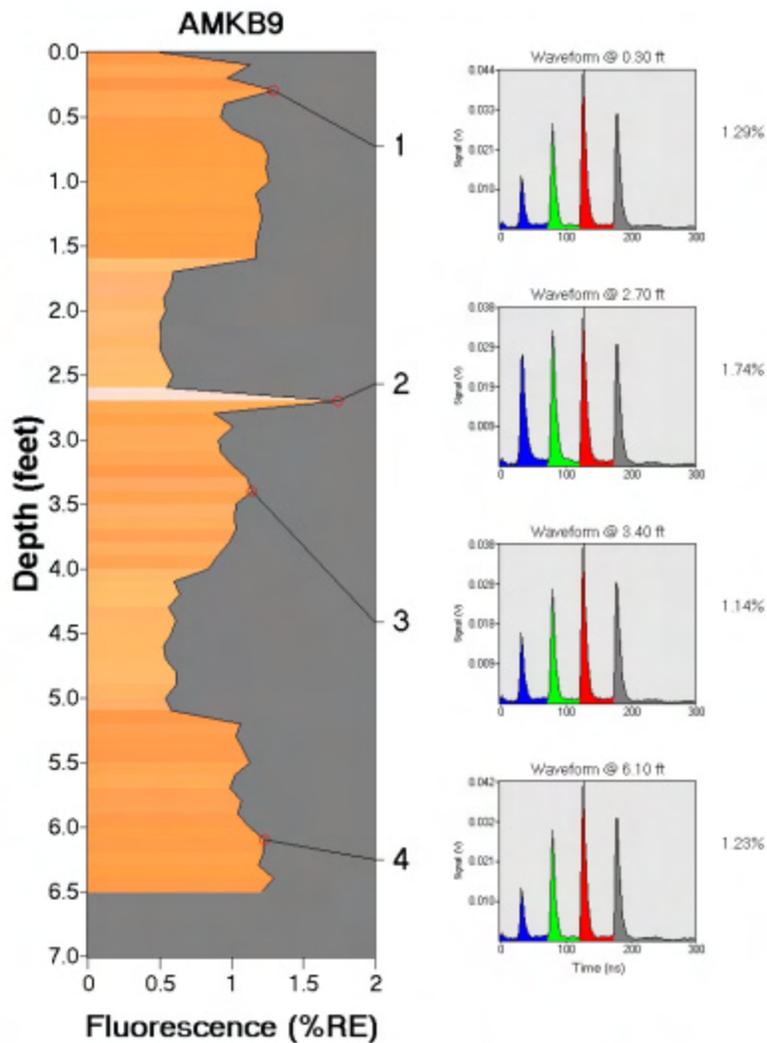
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/20/2005 @ 10:33:24 AM	Max fluorescence: 1.53% @ 5.30 ft
ROST Unit: AK FUDS	Final depth BGS: 6.60 ft
Latitude: Unavailable	Longitude: Unavailable



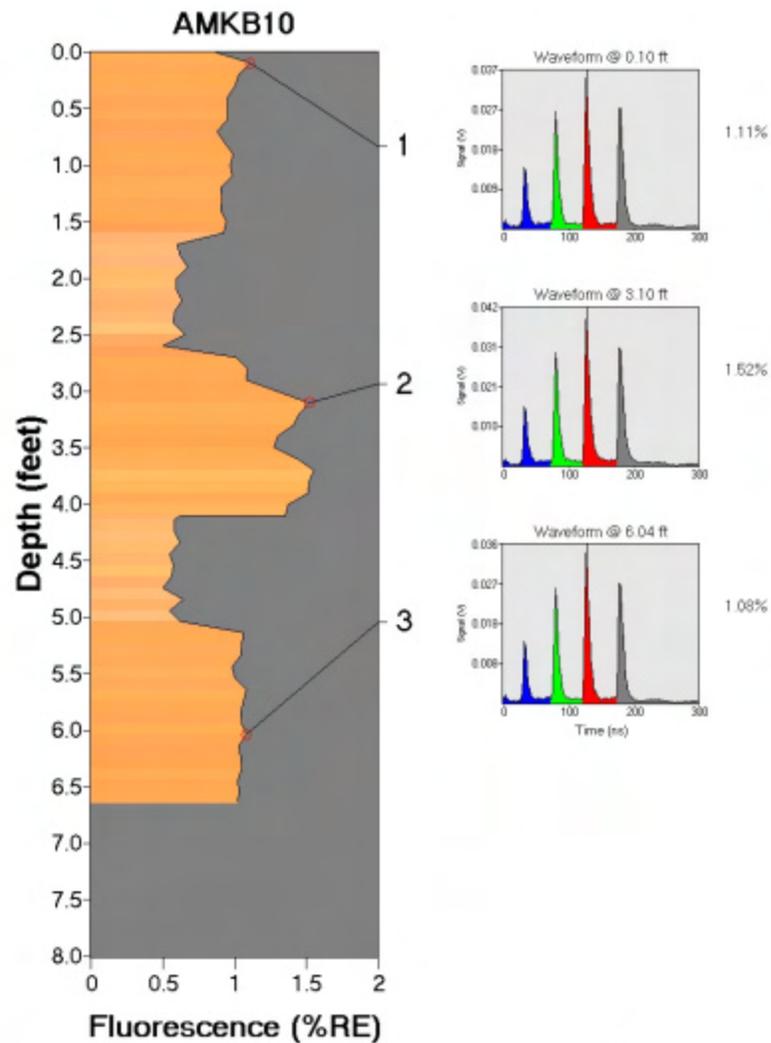
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/20/2005 @ 10:37:21 AM	Max fluorescence: 1.74% @ 2.70 ft
ROST Unit: AK FUDS	Final depth BGS: 6.50 ft
Latitude: Unavailable	Longitude: Unavailable



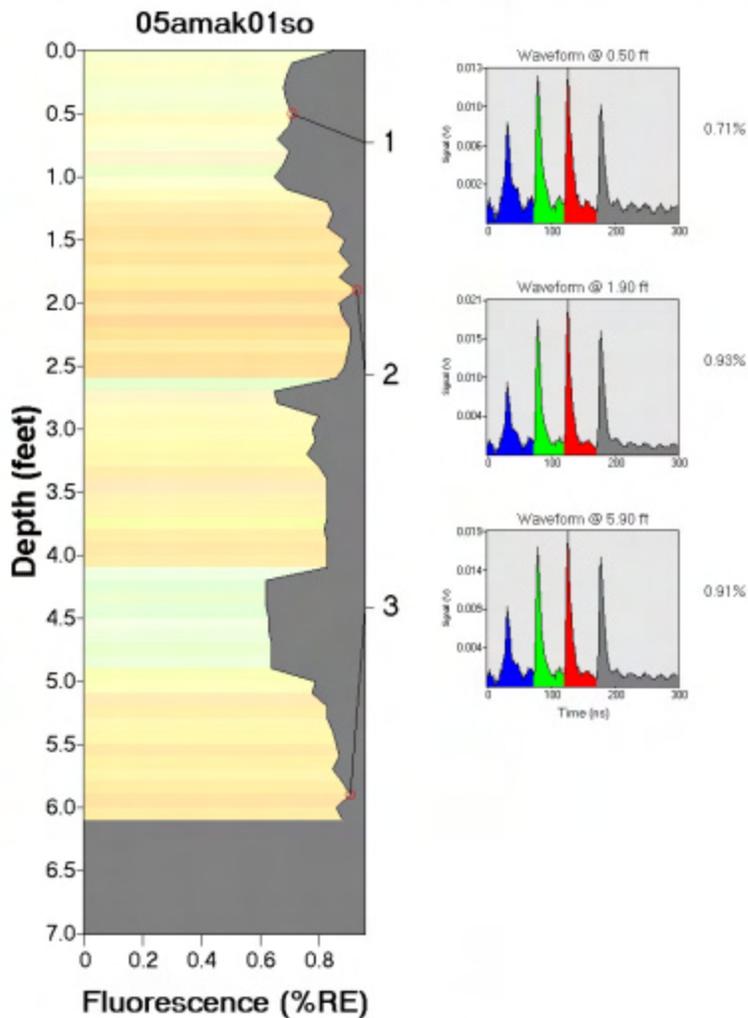
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/20/2005 @ 10:42:12 AM	Max fluorescence: 1.55% @ 3.70 ft
ROST Unit: AK FUDS	Final depth BGS: 6.64 ft
Latitude: Unavailable	Longitude: Unavailable



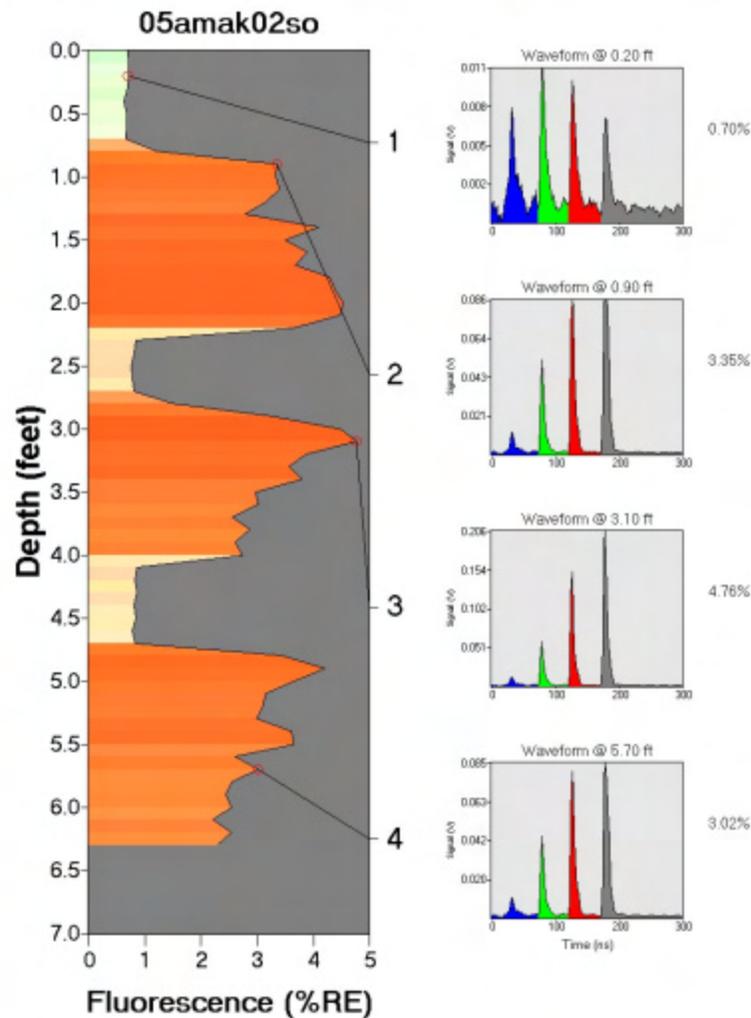
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDES	Job #: Amaknak
Date/Time: 5/21/2005 @ 4:43:13 PM	Max fluorescence: 0.93% @ 1.90 ft
ROST Unit: AK FUDES	Final depth BGS: 6.10 ft
Latitude: Unavailable	Longitude: Unavailable



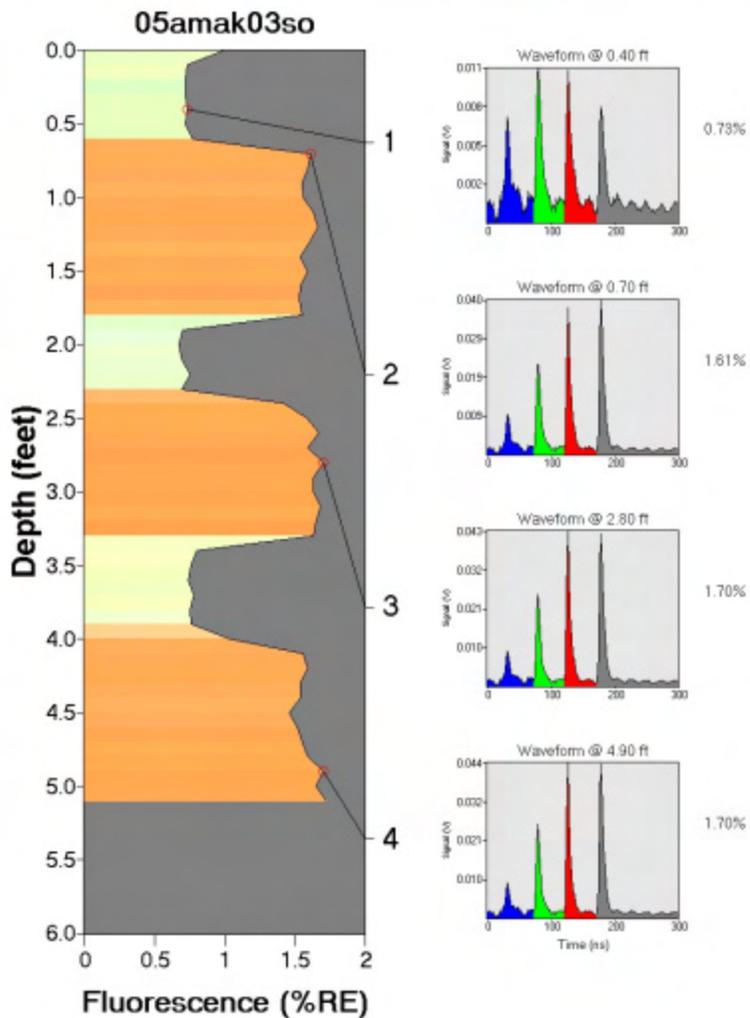
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDES	Job #: Amaknak
Date/Time: 5/21/2005 @ 5:45:52 PM	Max fluorescence: 4.76% @ 3.10 ft
ROST Unit: AK FUDES	Final depth BGS: 6.30 ft
Latitude: Unavailable	Longitude: Unavailable



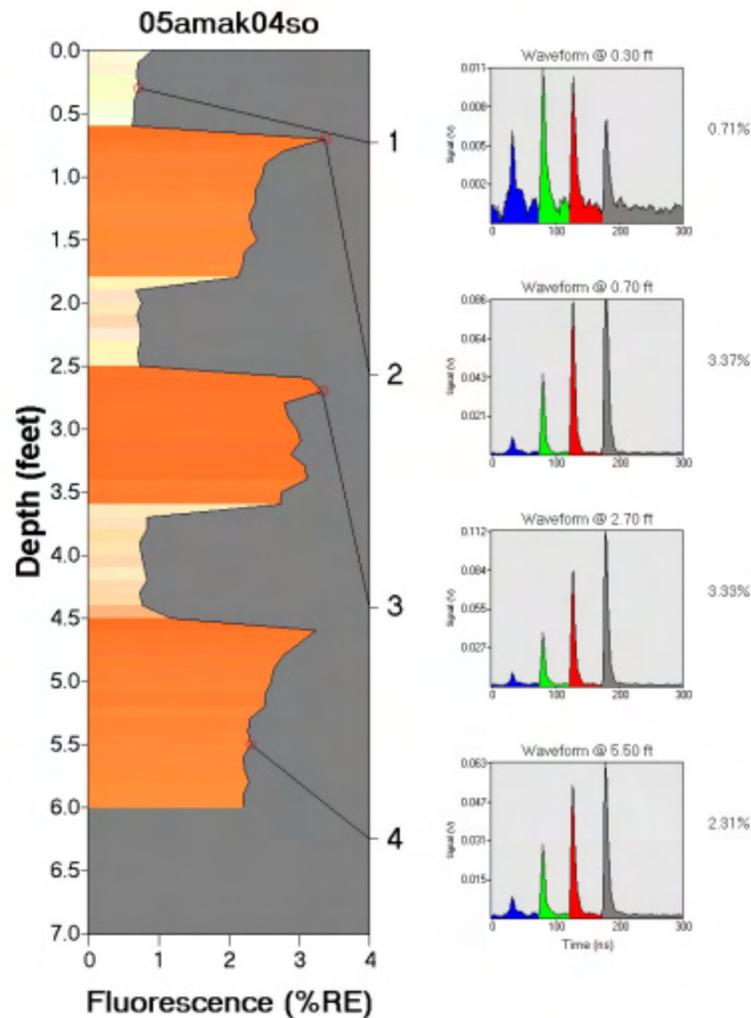
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDES	Job #: Amaknak
Date/Time: 5/21/2005 @ 6:59:19 PM	Max fluorescence: 1.72% @ 5.10 ft
ROST Unit: AK FUDES	Final depth BGS: 5.10 ft
Latitude: Unavailable	Longitude: Unavailable



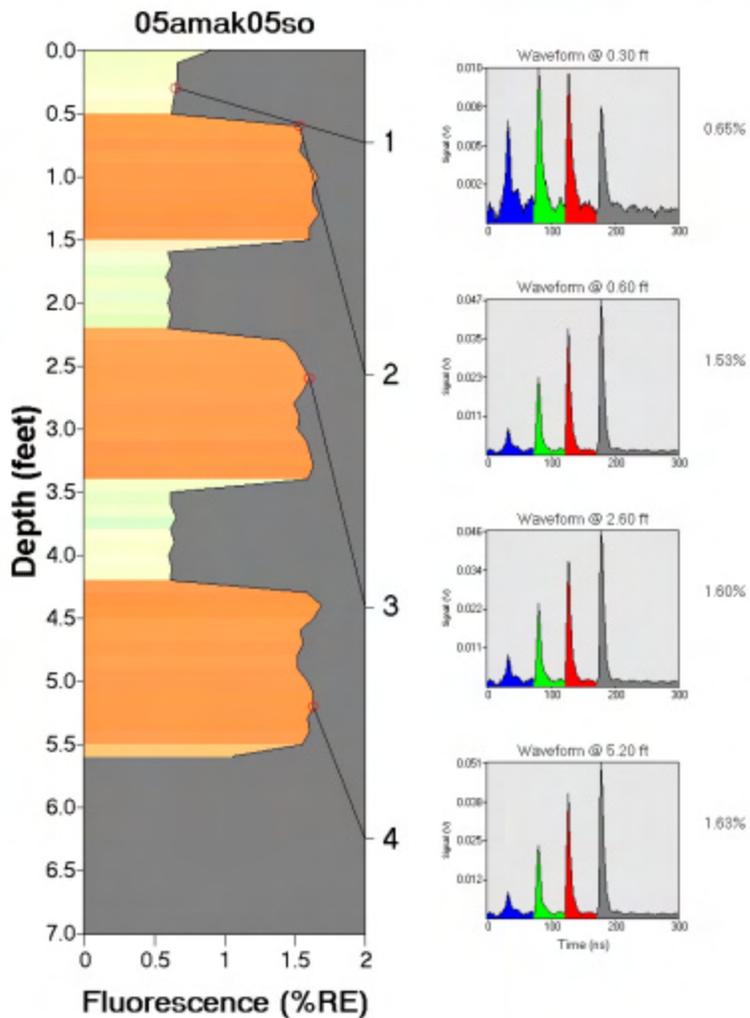
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDES	Job #: Amaknak
Date/Time: 5/22/2005 @ 1:15:29 PM	Max fluorescence: 3.37% @ 0.70 ft
ROST Unit: AK FUDES	Final depth BGS: 6.00 ft
Latitude: Unavailable	Longitude: Unavailable



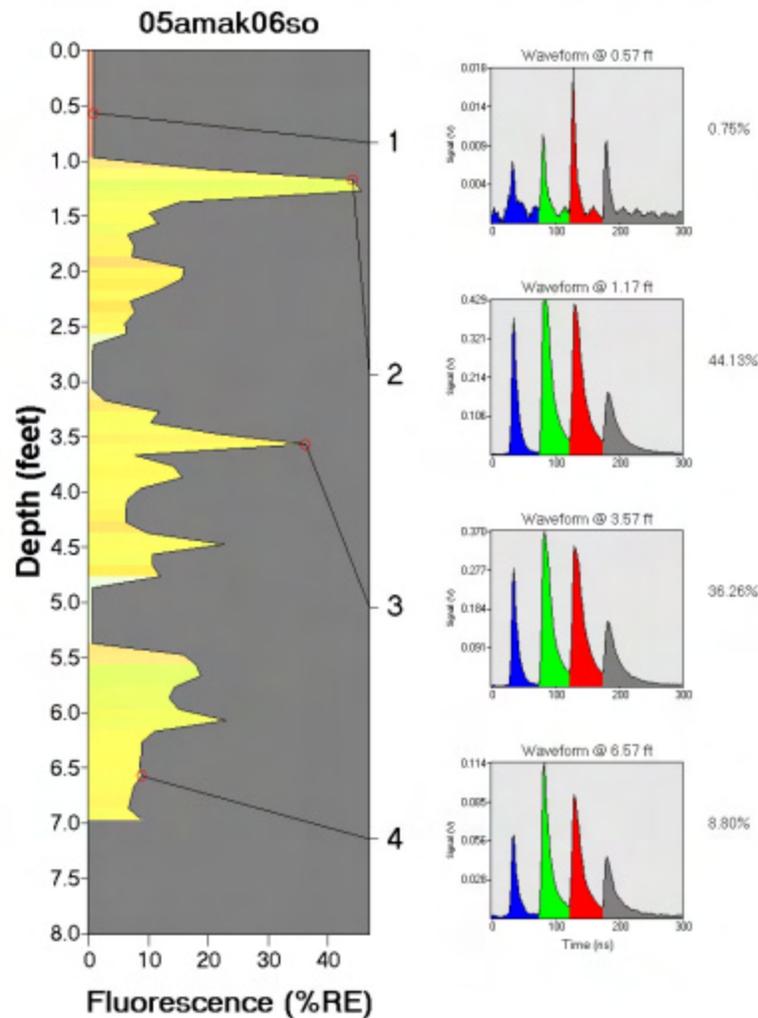
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/22/2005 @ 9:33:03 AM	Max fluorescence: 1.69% @ 4.40 ft
ROST Unit: AK FUDS	Final depth BGS: 5.60 ft
Latitude: Unavailable	Longitude: Unavailable



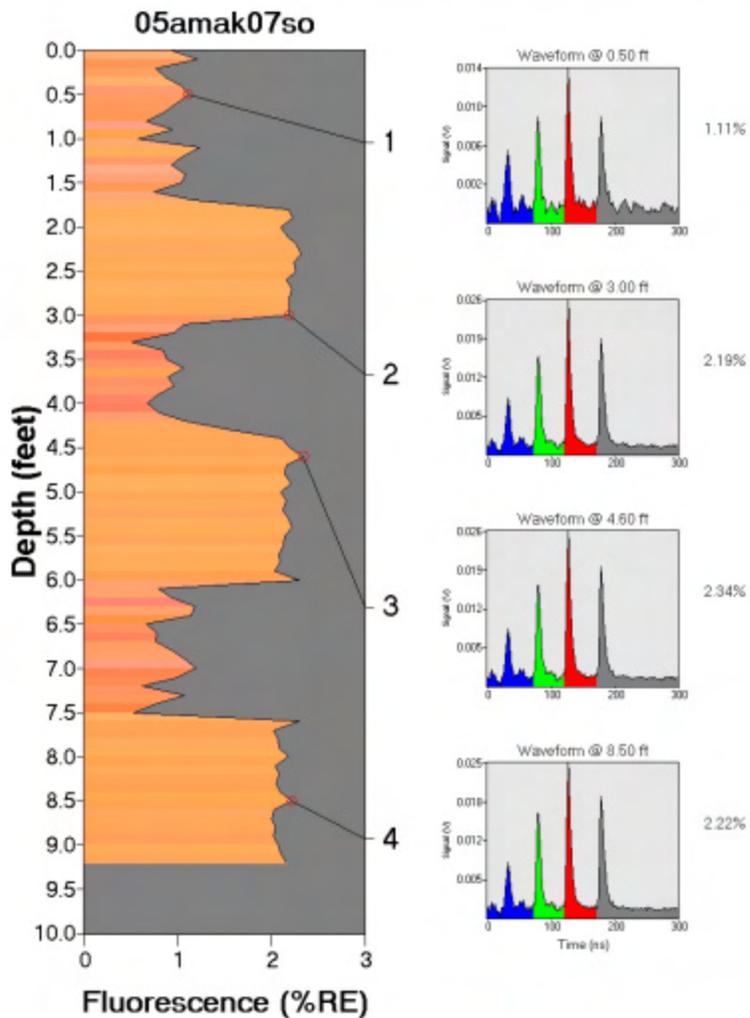
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/22/2005 @ 10:22:29 AM	Max fluorescence: 45.62% @ 1.27 ft
ROST Unit: AK FUDS	Final depth BGS: 6.97 ft
Latitude: Unavailable	Longitude: Unavailable



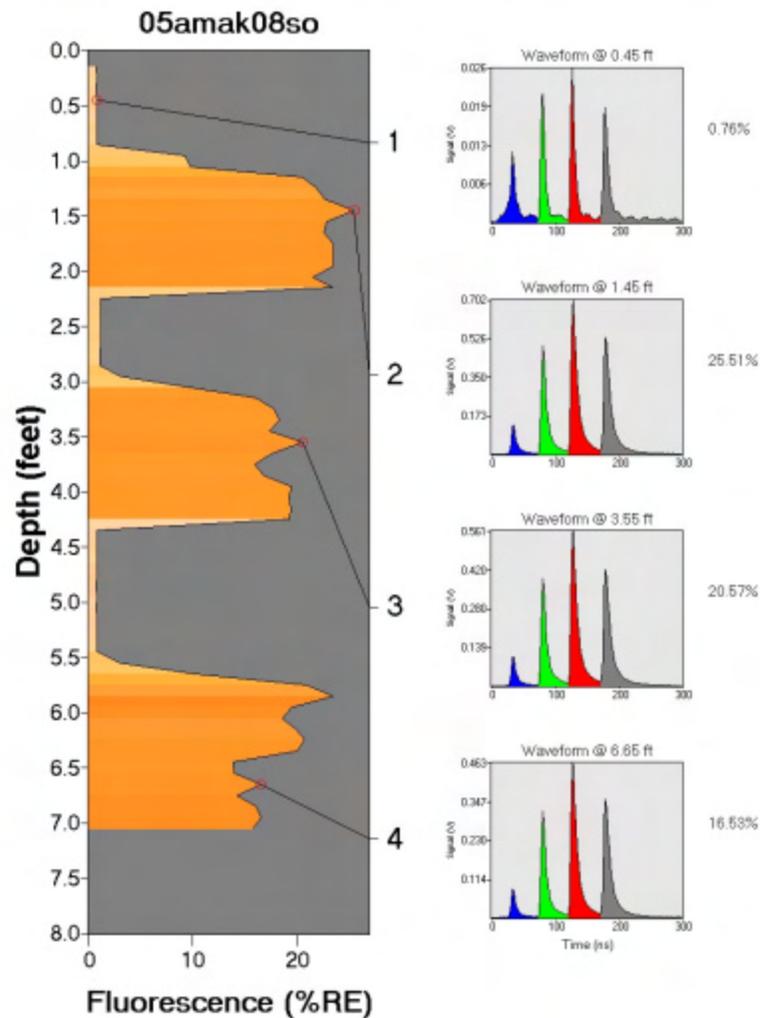
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDES	Job #: Amaknak
Date/Time: 5/23/2005 @ 4:25:02 PM	Max fluorescence: 2.34% @ 4.60 ft
ROST Unit: AK FUDS	Final depth BGS: 9.20 ft
Latitude: Unavailable	Longitude: Unavailable



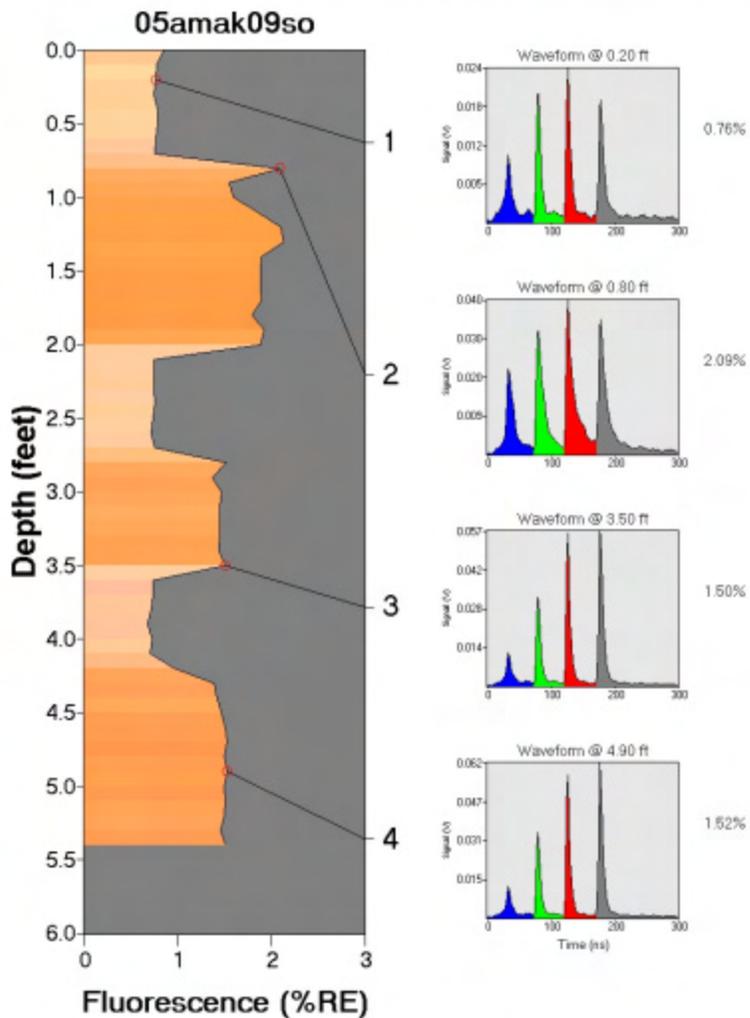
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDES	Job #: Amaknak
Date/Time: 5/23/2005 @ 6:48:58 PM	Max fluorescence: 25.51% @ 1.45 ft
ROST Unit: AK FUDS	Final depth BGS: 7.05 ft
Latitude: Unavailable	Longitude: Unavailable



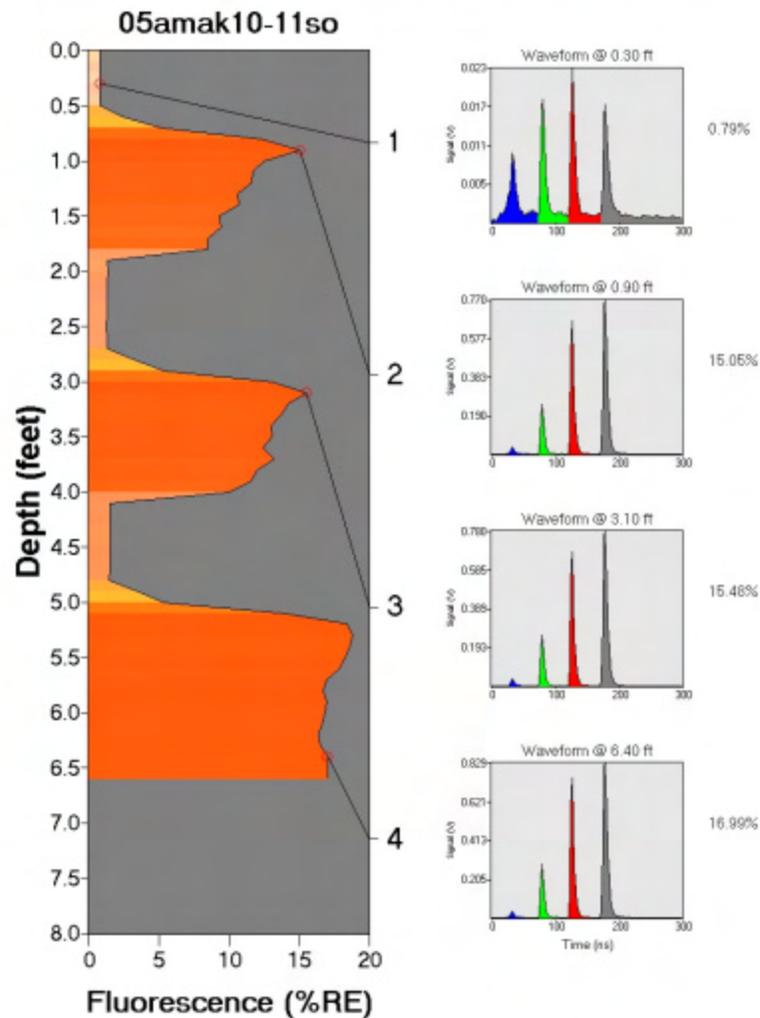
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/23/2005 @ 6:52:28 PM	Max fluorescence: 2.13% @ 1.30 ft
ROST Unit: AK FUDS	Final depth BGS: 5.40 ft
Latitude: Unavailable	Longitude: Unavailable



ROST Fluorescence Response Data

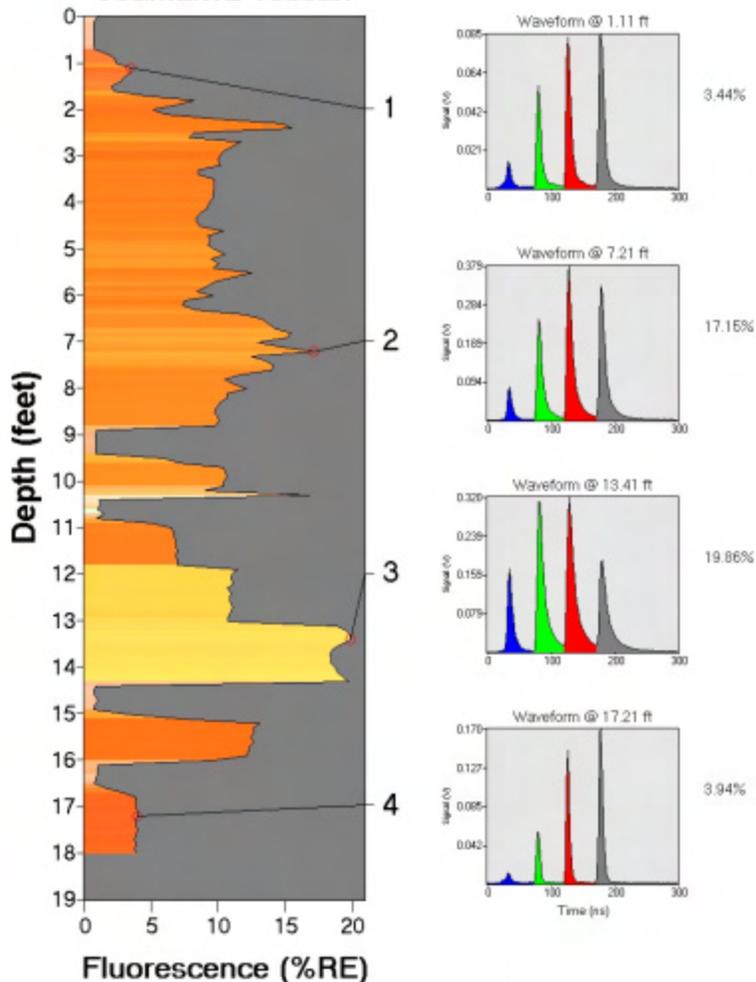
Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/23/2005 @ 7:36:59 PM	Max fluorescence: 18.79% @ 5.30 ft
ROST Unit: AK FUDS	Final depth BGS: 6.60 ft
Latitude: Unavailable	Longitude: Unavailable



ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDDS	Job #: Amaknak
Date/Time: 5/24/2005 @ 9:20:08 AM	Max fluorescence: 19.87% @ 13.31 ft
ROST Unit: AK FUDDS	Final depth BGS: 18.01 ft
Latitude: Unavailable	Longitude: Unavailable

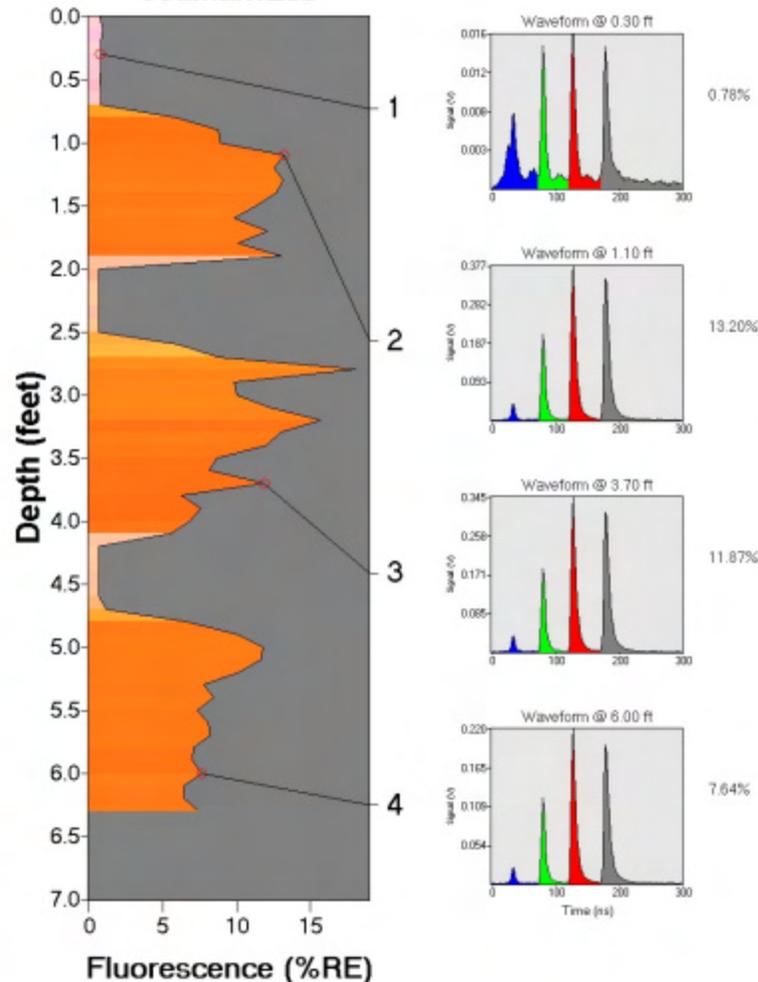
05amak12-13scan



ROST Fluorescence Response Data

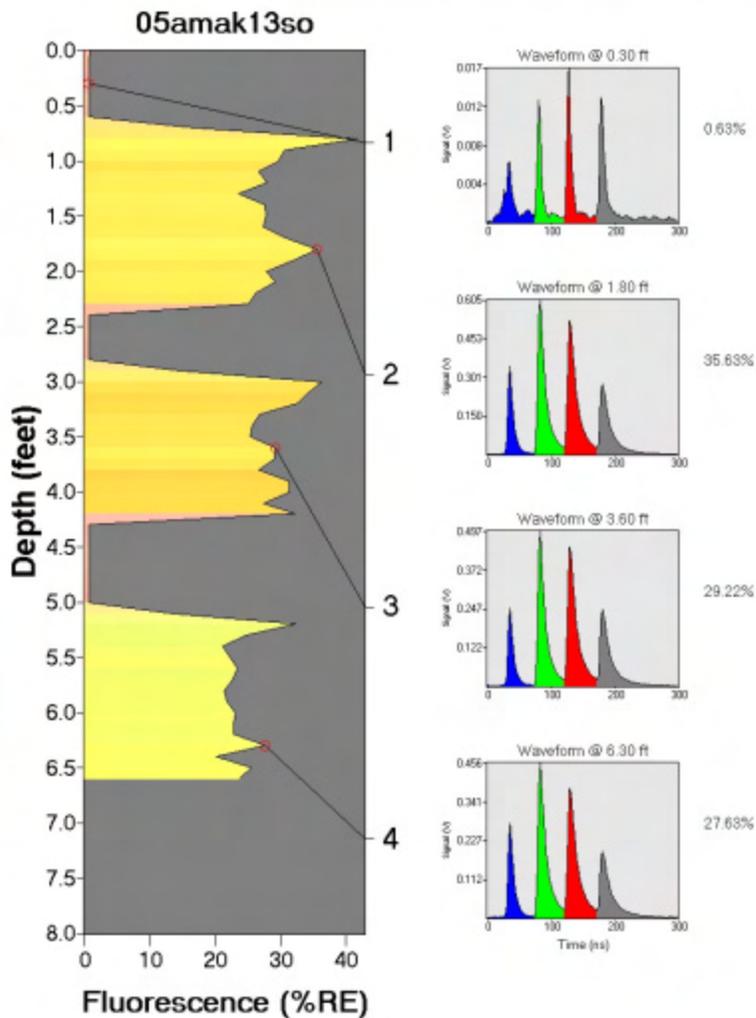
Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDDS	Job #: Amaknak
Date/Time: 5/24/2005 @ 9:29:47 AM	Max fluorescence: 18.08% @ 2.80 ft
ROST Unit: AK FUDDS	Final depth BGS: 6.30 ft
Latitude: Unavailable	Longitude: Unavailable

05amak12so



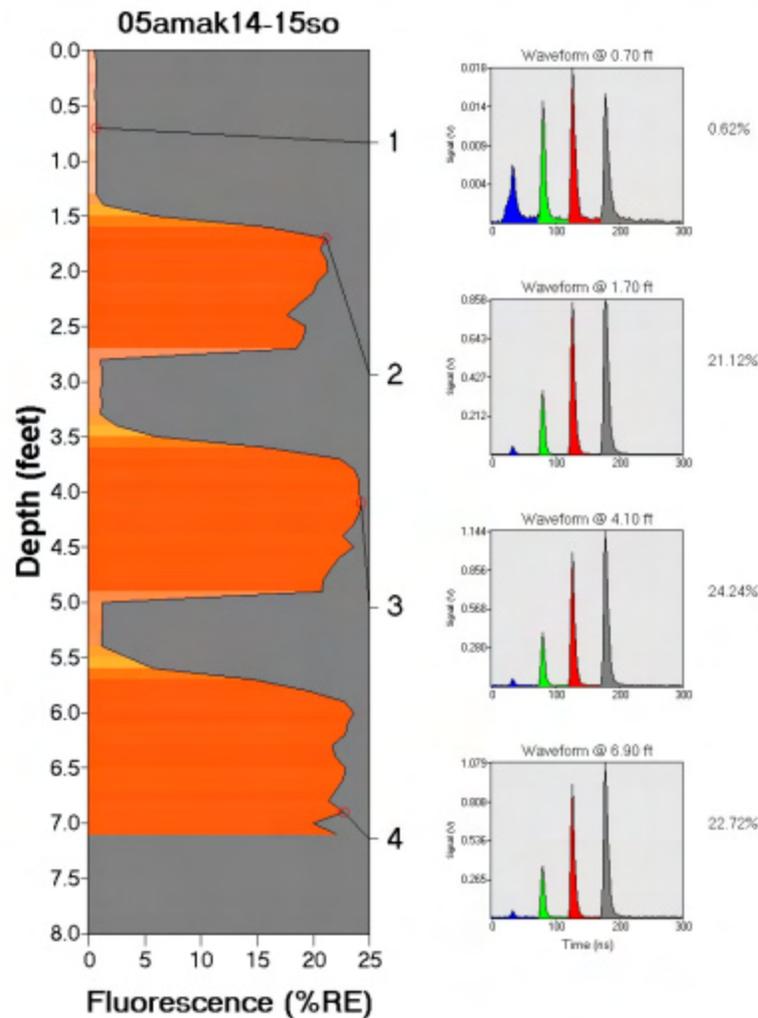
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDES	Job #: Amaknak
Date/Time: 5/24/2005 @ 9:33:01 AM	Max fluorescence: 41.73% @ 0.80 ft
ROST Unit: AK FUDS	Final depth BGS: 6.60 ft
Latitude: Unavailable	Longitude: Unavailable



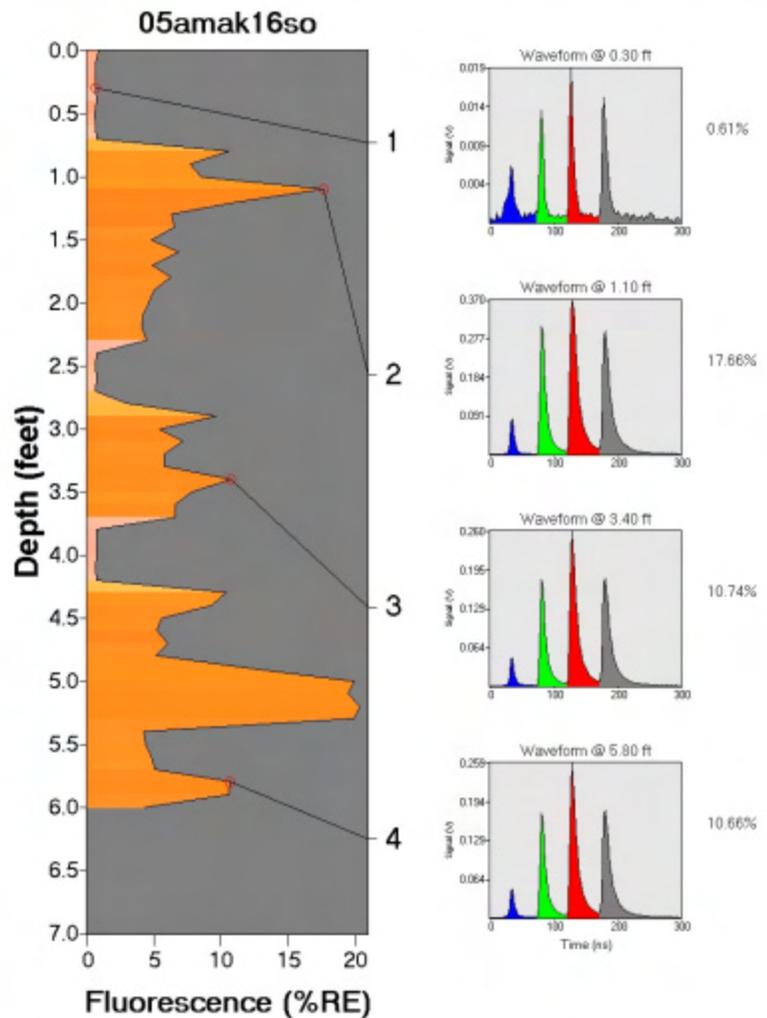
ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDES	Job #: Amaknak
Date/Time: 5/24/2005 @ 10:07:25 AM	Max fluorescence: 24.24% @ 4.10 ft
ROST Unit: AK FUDS	Final depth BGS: 7.10 ft
Latitude: Unavailable	Longitude: Unavailable



ROST Fluorescence Response Data

Site: Amaknak	Operator: K.Andraschko
Client: USACE-FUDS	Job #: Amaknak
Date/Time: 5/24/2006 @ 10:32:34 AM	Max fluorescence: 20.37% @ 5.20 ft
ROST Unit: AK FUDS	Final depth BGS: 6.00 ft
Latitude: Unavailable	Longitude: Unavailable



## **Appendix C - Chemical Analysis Package**



Seattle 11720 North Creek Pkwy N, Suite 400, Bothell, WA 98011-8244  
425.420.9200 fax 425.420.9210  
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509.924.9200 fax 509.924.9290  
Portland 9405 SW Nimbus Avenue, Beaverton, OR 97008-7132  
503.906.9200 fax 503.906.9210  
Bend 20332 Empire Avenue, Suite F-1, Bend, OR 97701-5711  
541.383.9310 fax 541.382.7588  
Anchorage 2000 W International Airport Road, Suite A-10, Anchorage, AK 99502-1119  
907.563.9200 fax 907.563.9210

## CASE NARRATIVE FOR B5E0784

Date: June 6, 2005  
Client: USACE - Alaska  
Project Manager: Chris Floyd  
Project Name: Amaknak Pre-WWII ROST Survey  
Project Number: 05-038

### 1.0 DESCRIPTION OF CASE

Eighteen soil samples were submitted for analysis of Residual Range Organics (C25-C36) by AK 103, Gasoline Range Hydrocarbons (n-Hexane to <n-Decane) by AK 101, Diesel Hydrocarbons (C10-C25) by AK102 and Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring (US Army Corps of Engineers)

### 2.0 COMMENTS ON SAMPLE RECEIPT

The samples were received May 25, 2005 by North Creek Analytical Bothell. The temperature of the samples at the time of receipt was 5.2 degrees Celsius.

### 3.0 PREPARATIONS AND ANALYSIS

#### Residual Range Organics (C25-C36) by AK 103

No additional anomalies, discrepancies, or issues were associated with sample preparation, analysis and quality control other than those already qualified in the data and described in the Notes and Definitions page at the end of the report.

#### Gasoline Range Hydrocarbons (n-Hexane to <n-Decane) by AK 101

No additional anomalies, discrepancies, or issues were associated with sample preparation, analysis and quality control other than those already qualified in the data and described in the Notes and Definitions page at the end of the report.

#### Diesel Hydrocarbons (C10-C25) by AK102

No additional anomalies, discrepancies, or issues were associated with sample preparation, analysis and quality control other than those already qualified in the data and described in the Notes and Definitions page at the end of the report.



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## **Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring (US Army Corps of Engineers)**

All criteria for acceptable QC measurements were met, with the following exceptions:

- For laboratory batch 5E27046, the percent recovery in the laboratory control sample (LCS) for chrysene was above the upper control limit of 110 at 111. The percent recovery of chrysene in the LCS duplicate was within the control limits of 55-110 at 110. The RPD between the LCS and LCSD was within the control limit of 50 at 1.36. The high recovery for chrysene in the LCS falls within the requirements for SMFs (sporadic marginal failures) according to both the USACE – Shell Document and the most current version (version 3) of the DoD QSM. The samples with detections for chrysene were qualified with an “X” and reported.

No additional anomalies, discrepancies, or issues were associated with sample preparation, analysis and quality control other than those already qualified in the data and described in the Notes and Definitions page at the end of the report.

---

Kate Haney  
Project Manager  
North Creek Analytical



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907.563.9200 fax 907.563.9210

06 June 2005

Chris Floyd  
USACE - Alaska  
PO Box 6898, Building 2212 Third Street  
Elmendorf AFB, AK/USA 99506-6898  
RE: Amaknak Pre-WWII ROST Survey

Enclosed are the results of analyses for samples received by the laboratory on 05/25/05 16:05. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Kate Haney  
Project Manager



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USACE - Alaska  
 PO Box 6898, Building 2212 Third Street  
 Elmendorf AFB, AK/USA 99506-6898

Project: Amaknak Pre-WWII ROST Survey  
 Project Number: 05-038  
 Project Manager: Chris Floyd

**Reported:**  
 06/06/05 16:54

**ANALYTICAL REPORT FOR SAMPLES**

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
05AMAK 01 SO	B5E0784-01	Soil	05/21/05 16:40	05/25/05 16:05
05AMAK 02 SO	B5E0784-02	Soil	05/21/05 17:40	05/25/05 16:05
05AMAK 03 SO	B5E0784-03	Soil	05/21/05 16:45	05/25/05 16:05
05AMAK 04 SO	B5E0784-04	Soil	05/22/05 13:30	05/25/05 16:05
05AMAK 05 SO	B5E0784-05	Soil	05/22/05 09:45	05/25/05 16:05
05AMAK 06 SO	B5E0784-06	Soil	05/22/05 10:20	05/25/05 16:05
05AMAK 07 SO	B5E0784-07	Soil	05/23/05 16:00	05/25/05 16:05
05AMAK 08 SO	B5E0784-08	Soil	05/23/05 18:22	05/25/05 16:05
05AMAK 09 SO	B5E0784-09	Soil	05/23/05 18:36	05/25/05 16:05
05AMAK 10 SO	B5E0784-10	Soil	05/23/05 19:22	05/25/05 16:05
05AMAK 11 SO	B5E0784-11	Soil	05/23/05 19:30	05/25/05 16:05
05AMAK 12 SO	B5E0784-12	Soil	05/24/05 09:04	05/25/05 16:05
05AMAK 13 SO	B5E0784-13	Soil	05/24/05 09:04	05/25/05 16:05
05AMAK 14 SO	B5E0784-14	Soil	05/24/05 09:50	05/25/05 16:05
05AMAK 15 SO	B5E0784-15	Soil	05/24/05 09:50	05/25/05 16:05
05AMAK 16 SO	B5E0784-16	Soil	05/24/05 10:20	05/25/05 16:05
05AMAK 17 SO	B5E0784-17	Soil	05/19/05 18:40	05/25/05 16:05
05AMAK 20 SO	B5E0784-18	Soil	05/22/05 08:00	05/25/05 16:05

North Creek Analytical - Bothell

Kate Haney, Project Manager

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*



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USACE - Alaska  
 PO Box 6898, Building 2212 Third Street  
 Elmendorf AFB, AK/USA 99506-6898

Project: Amaknak Pre-WWII ROST Survey  
 Project Number: 05-038  
 Project Manager: Chris Floyd

**Reported:**  
 06/06/05 16:54

**Residual Range Organics (C25-C36) by AK 103  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>05AMAK 01 SO (B5E0784-01) Soil</b> <b>Sampled: 05/21/05 16:40</b> <b>Received: 05/25/05 16:05</b>										
<b>Residual Range Organics</b>	<b>948</b>	19.7	250 mg/kg dry		10	5E27045	05/27/05	05/31/05	AK 103	
<i>Surrogate: Octacosane</i>	95.5 %		60-120			"	"	"	"	
<b>05AMAK 02 SO (B5E0784-02) Soil</b> <b>Sampled: 05/21/05 17:40</b> <b>Received: 05/25/05 16:05</b>										
<b>Residual Range Organics</b>	<b>10800</b>	241	3060 mg/kg dry		50	5E27045	05/27/05	05/31/05	AK 103	D-15
<i>Surrogate: Octacosane</i>	ND		60-120			"	"	"	"	S-01
<b>05AMAK 03 SO (B5E0784-03) Soil</b> <b>Sampled: 05/21/05 16:45</b> <b>Received: 05/25/05 16:05</b>										
<b>Residual Range Organics</b>	<b>30.3</b>	1.97	25.0 mg/kg dry		1	5E27045	05/27/05	05/31/05	AK 103	
<i>Surrogate: Octacosane</i>	87.8 %		60-120			"	"	"	"	
<b>05AMAK 04 SO (B5E0784-04) Soil</b> <b>Sampled: 05/22/05 13:30</b> <b>Received: 05/25/05 16:05</b>										
<b>Residual Range Organics</b>	<b>6290</b>	235	2980 mg/kg dry		50	5E27045	05/27/05	05/31/05	AK 103	D-15
<i>Surrogate: Octacosane</i>	ND		60-120			"	"	"	"	S-01
<b>05AMAK 05 SO (B5E0784-05) Soil</b> <b>Sampled: 05/22/05 09:45</b> <b>Received: 05/25/05 16:05</b>										
<b>Residual Range Organics</b>	<b>7.93</b>	1.97	25.0 mg/kg dry		1	5E27045	05/27/05	05/31/05	AK 103	J
<i>Surrogate: Octacosane</i>	99.2 %		60-120			"	"	"	"	
<b>05AMAK 06 SO (B5E0784-06) Soil</b> <b>Sampled: 05/22/05 10:20</b> <b>Received: 05/25/05 16:05</b>										
<b>Residual Range Organics</b>	<b>112</b>	9.85	125 mg/kg dry		5	5E27045	05/27/05	05/31/05	AK 103	J
<i>Surrogate: Octacosane</i>	101 %		60-120			"	"	"	"	
<b>05AMAK 07 SO (B5E0784-07) Soil</b> <b>Sampled: 05/23/05 16:00</b> <b>Received: 05/25/05 16:05</b>										
<b>Residual Range Organics</b>	<b>10.9</b>	1.97	25.0 mg/kg dry		1	5E27045	05/27/05	05/31/05	AK 103	J
<i>Surrogate: Octacosane</i>	90.6 %		60-120			"	"	"	"	

North Creek Analytical - Bothell

Kate Haney, Project Manager

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USACE - Alaska  
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Project: Amaknak Pre-WWII ROST Survey  
 Project Number: 05-038  
 Project Manager: Chris Floyd

**Reported:**  
 06/06/05 16:54

**Residual Range Organics (C25-C36) by AK 103  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>05AMAK 08 SO (B5E0784-08) Soil Sampled: 05/23/05 18:22 Received: 05/25/05 16:05</b>										
<b>Residual Range Organics</b>	<b>6820</b>	98.5	1250 mg/kg dry		50	5E27045	05/27/05	05/31/05	AK 103	
<i>Surrogate: Octacosane</i>	<i>ND</i>		<i>60-120</i>			"	"	"	"	<i>S-01</i>
<b>05AMAK 09 SO (B5E0784-09) Soil Sampled: 05/23/05 18:36 Received: 05/25/05 16:05</b>										
<b>Residual Range Organics</b>	<b>7.01</b>	1.97	25.0 mg/kg dry		1	5E27045	05/27/05	05/31/05	AK 103	J
<i>Surrogate: Octacosane</i>	<i>93.7 %</i>		<i>60-120</i>			"	"	"	"	
<b>05AMAK 10 SO (B5E0784-10) Soil Sampled: 05/23/05 19:22 Received: 05/25/05 16:05</b>										
<b>Residual Range Organics</b>	<b>9790</b>	246	3120 mg/kg dry		50	5E27045	05/27/05	05/31/05	AK 103	
<i>Surrogate: Octacosane</i>	<i>ND</i>		<i>60-120</i>			"	"	"	"	<i>S-01</i>
<b>05AMAK 11 SO (B5E0784-11) Soil Sampled: 05/23/05 19:30 Received: 05/25/05 16:05</b>										
<b>Residual Range Organics</b>	<b>8530</b>	249	3160 mg/kg dry		50	5E27045	05/27/05	05/31/05	AK 103	
<i>Surrogate: Octacosane</i>	<i>ND</i>		<i>60-120</i>			"	"	"	"	<i>S-01</i>
<b>05AMAK 12 SO (B5E0784-12) Soil Sampled: 05/24/05 09:04 Received: 05/25/05 16:05</b>										
<b>Residual Range Organics</b>	<b>2820</b>	98.5	1250 mg/kg dry		50	5E27045	05/27/05	05/31/05	AK 103	
<i>Surrogate: Octacosane</i>	<i>ND</i>		<i>60-120</i>			"	"	"	"	<i>S-01</i>
<b>05AMAK 13 SO (B5E0784-13) Soil Sampled: 05/24/05 09:04 Received: 05/25/05 16:05</b>										
<b>Residual Range Organics</b>	<b>1260</b>	219	2780 mg/kg dry		50	5E27045	05/27/05	05/31/05	AK 103	J
<i>Surrogate: Octacosane</i>	<i>ND</i>		<i>60-120</i>			"	"	"	"	<i>S-01</i>
<b>05AMAK 14 SO (B5E0784-14) Soil Sampled: 05/24/05 09:50 Received: 05/25/05 16:05</b>										
<b>Residual Range Organics</b>	<b>3120</b>	235	2980 mg/kg dry		50	5E27045	05/27/05	05/31/05	AK 103	
<i>Surrogate: Octacosane</i>	<i>ND</i>		<i>60-120</i>			"	"	"	"	<i>S-01</i>

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USACE - Alaska  
 PO Box 6898, Building 2212 Third Street  
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Project: Amaknak Pre-WWII ROST Survey  
 Project Number: 05-038  
 Project Manager: Chris Floyd

**Reported:**  
 06/06/05 16:54

**Residual Range Organics (C25-C36) by AK 103  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>05AMAK 15 SO (B5E0784-15) Soil Sampled: 05/24/05 09:50 Received: 05/25/05 16:05</b>										
<b>Residual Range Organics</b>	<b>3950</b>	237	3000	mg/kg dry	50	5E27045	05/27/05	05/31/05	AK 103	
<i>Surrogate: Octacosane</i>	<i>ND</i>		<i>60-120</i>			"	"	"	"	<i>S-01</i>
<b>05AMAK 16 SO (B5E0784-16) Soil Sampled: 05/24/05 10:20 Received: 05/25/05 16:05</b>										
<b>Residual Range Organics</b>	<b>40.6</b>	9.85	125	mg/kg dry	5	5E27045	05/27/05	06/01/05	AK 103	J
<i>Surrogate: Octacosane</i>	<i>85.3 %</i>		<i>60-120</i>			"	"	"	"	
<b>05AMAK 17 SO (B5E0784-17) Soil Sampled: 05/19/05 18:40 Received: 05/25/05 16:05</b>										
<b>Residual Range Organics</b>	<b>456</b>	3.94	50.0	mg/kg dry	2	5E27045	05/27/05	06/01/05	AK 103	D-06
<i>Surrogate: Octacosane</i>	<i>94.3 %</i>		<i>60-120</i>			"	"	"	"	

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Kate Haney, Project Manager

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Project: Amaknak Pre-WWII ROST Survey  
 Project Number: 05-038  
 Project Manager: Chris Floyd

Reported:  
 06/06/05 16:54

**Gasoline Range Hydrocarbons (n-Hexane to <n-Decane) by AK101  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>05AMAK 06 SO (B5E0784-06) Soil Sampled: 05/22/05 10:20 Received: 05/25/05 16:05</b>										
<b>Gasoline Range Hydrocarbons</b>	<b>1.01</b>	0.176	2.62 mg/kg dry		1	5E31031	05/31/05	05/31/05	AK 101	J
Surrogate: a,a,a-TFT (FID)	73.2 %		60-120			"	"	"	"	
Surrogate: 4-BFB (FID)	88.8 %		60-120			"	"	"	"	
<b>05AMAK 07 SO (B5E0784-07) Soil Sampled: 05/23/05 16:00 Received: 05/25/05 16:05</b>										
<b>Gasoline Range Hydrocarbons</b>	<b>415</b>	2.35	35.0 mg/kg dry		20	5E31031	05/31/05	06/01/05	AK 101	
Surrogate: a,a,a-TFT (FID)	70.6 %		60-120			"	"	"	"	
Surrogate: 4-BFB (FID)	105 %		60-120			"	"	"	"	
<b>05AMAK 08 SO (B5E0784-08) Soil Sampled: 05/23/05 18:22 Received: 05/25/05 16:05</b>										
<b>Gasoline Range Hydrocarbons</b>	<b>0.624</b>	0.187	2.79 mg/kg dry		1	5E31031	05/31/05	05/31/05	AK 101	J
Surrogate: a,a,a-TFT (FID)	68.9 %		60-120			"	"	"	"	
Surrogate: 4-BFB (FID)	79.8 %		60-120			"	"	"	"	
<b>05AMAK 09 SO (B5E0784-09) Soil Sampled: 05/23/05 18:36 Received: 05/25/05 16:05</b>										
<b>Gasoline Range Hydrocarbons</b>	<b>0.450</b>	0.172	2.55 mg/kg dry		1	5E31031	05/31/05	05/31/05	AK 101	J
Surrogate: a,a,a-TFT (FID)	77.4 %		60-120			"	"	"	"	
Surrogate: 4-BFB (FID)	77.3 %		60-120			"	"	"	"	
<b>05AMAK 10 SO (B5E0784-10) Soil Sampled: 05/23/05 19:22 Received: 05/25/05 16:05</b>										
<b>Gasoline Range Hydrocarbons</b>	<b>208</b>	0.564	8.39 mg/kg dry		2	5E31031	05/31/05	05/31/05	AK 101	G-02
Surrogate: a,a,a-TFT (FID)	77.7 %		60-120			"	"	"	"	
Surrogate: 4-BFB (FID)	186 %		60-120			"	"	"	"	S-04
<b>05AMAK 11 SO (B5E0784-11) Soil Sampled: 05/23/05 19:30 Received: 05/25/05 16:05</b>										
<b>Gasoline Range Hydrocarbons</b>	<b>133</b>	0.383	5.70 mg/kg dry		2	5E31031	05/31/05	05/31/05	AK 101	G-02
Surrogate: a,a,a-TFT (FID)	76.2 %		60-120			"	"	"	"	
Surrogate: 4-BFB (FID)	185 %		60-120			"	"	"	"	S-04

North Creek Analytical - Bothell

Kate Haney, Project Manager

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USACE - Alaska PO Box 6898, Building 2212 Third Street Elmendorf AFB, AK/USA 99506-6898	Project: Amaknak Pre-WWII ROST Survey Project Number: 05-038 Project Manager: Chris Floyd	<b>Reported:</b> 06/06/05 16:54
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**Gasoline Range Hydrocarbons (n-Hexane to <n-Decane) by AK101  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>05AMAK 12 SO (B5E0784-12) Soil</b> <b>Sampled: 05/24/05 09:04</b> <b>Received: 05/25/05 16:05</b>										
<b>Gasoline Range Hydrocarbons</b>	<b>95.3</b>	0.543	8.08	mg/kg dry	2	5E31031	05/31/05	05/31/05	AK 101	G-02
Surrogate: a,a,a-TFT (FID)	44.2 %		60-120			"	"	"	"	S-08
Surrogate: 4-BFB (FID)	161 %		60-120			"	"	"	"	S-04
<b>05AMAK 13 SO (B5E0784-13) Soil</b> <b>Sampled: 05/24/05 09:04</b> <b>Received: 05/25/05 16:05</b>										
<b>Gasoline Range Hydrocarbons</b>	<b>1090</b>	2.34	34.8	mg/kg dry	2	5E31031	05/31/05	05/31/05	AK 101	G-02
Surrogate: a,a,a-TFT (FID)	64.1 %		60-120			"	"	"	"	
Surrogate: 4-BFB (FID)	>200 %		60-120			"	"	"	"	S-04
<b>05AMAK 14 SO (B5E0784-14RE1) Soil</b> <b>Sampled: 05/24/05 09:50</b> <b>Received: 05/25/05 16:05</b>										
<b>Gasoline Range Hydrocarbons</b>	<b>133</b>	0.566	8.42	mg/kg dry	4	5F01013	05/31/05	06/01/05	AK 101	G-02
Surrogate: a,a,a-TFT (FID)	73.4 %		60-120			"	"	"	"	
Surrogate: 4-BFB (FID)	192 %		60-120			"	"	"	"	S-04
<b>05AMAK 16 SO (B5E0784-16) Soil</b> <b>Sampled: 05/24/05 10:20</b> <b>Received: 05/25/05 16:05</b>										
<b>Gasoline Range Hydrocarbons</b>	<b>7.49</b>	0.174	2.58	mg/kg dry	1	5E31031	05/31/05	05/31/05	AK 101	G-02
Surrogate: a,a,a-TFT (FID)	72.3 %		60-120			"	"	"	"	
Surrogate: 4-BFB (FID)	123 %		60-120			"	"	"	"	S-04
<b>05AMAK 20 SO (B5E0784-18) Soil</b> <b>Sampled: 05/22/05 08:00</b> <b>Received: 05/25/05 16:05</b>										
<b>Gasoline Range Hydrocarbons</b>	<b>0.906</b>	0.336	5.00	mg/kg wet	1	5E31031	05/31/05	05/31/05	AK 101	J
Surrogate: a,a,a-TFT (FID)	92.1 %		60-120			"	"	"	"	
Surrogate: 4-BFB (FID)	79.3 %		60-120			"	"	"	"	

North Creek Analytical - Bothell

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Project: Amaknak Pre-WWII ROST Survey  
 Project Number: 05-038  
 Project Manager: Chris Floyd

Reported:  
 06/06/05 16:54

**Diesel Hydrocarbons (C10-C25) by AK102  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>05AMAK 01 SO (B5E0784-01) Soil</b> <b>Sampled: 05/21/05 16:40</b> <b>Received: 05/25/05 16:05</b>										
<b>Diesel Range Hydrocarbons</b>	<b>164</b>	21.0	40.0 mg/kg dry		10	5E27045	05/27/05	05/31/05	AK 102	D-09
<i>Surrogate: 2-FBP</i>	76.9 %		60-120			"	"	"	"	
<b>05AMAK 02 SO (B5E0784-02) Soil</b> <b>Sampled: 05/21/05 17:40</b> <b>Received: 05/25/05 16:05</b>										
<b>Diesel Range Hydrocarbons</b>	<b>9120</b>	257	490 mg/kg dry		50	5E27045	05/27/05	05/31/05	AK 102	D-15
<i>Surrogate: 2-FBP</i>	ND		60-120			"	"	"	"	S-01
<b>05AMAK 03 SO (B5E0784-03) Soil</b> <b>Sampled: 05/21/05 16:45</b> <b>Received: 05/25/05 16:05</b>										
<b>Diesel Range Hydrocarbons</b>	<b>7.55</b>	2.10	4.00 mg/kg dry		1	5E27045	05/27/05	05/31/05	AK 102	D-09
<i>Surrogate: 2-FBP</i>	73.6 %		60-120			"	"	"	"	
<b>05AMAK 04 SO (B5E0784-04) Soil</b> <b>Sampled: 05/22/05 13:30</b> <b>Received: 05/25/05 16:05</b>										
<b>Diesel Range Hydrocarbons</b>	<b>5410</b>	250	476 mg/kg dry		50	5E27045	05/27/05	05/31/05	AK 102	D-15
<i>Surrogate: 2-FBP</i>	ND		60-120			"	"	"	"	S-01
<b>05AMAK 05 SO (B5E0784-05) Soil</b> <b>Sampled: 05/22/05 09:45</b> <b>Received: 05/25/05 16:05</b>										
<b>Diesel Range Hydrocarbons</b>	<b>3.22</b>	2.10	4.00 mg/kg dry		1	5E27045	05/27/05	05/31/05	AK 102	J
<i>Surrogate: 2-FBP</i>	89.1 %		60-120			"	"	"	"	
<b>05AMAK 06 SO (B5E0784-06) Soil</b> <b>Sampled: 05/22/05 10:20</b> <b>Received: 05/25/05 16:05</b>										
<b>Diesel Range Hydrocarbons</b>	<b>637</b>	10.5	20.0 mg/kg dry		5	5E27045	05/27/05	05/31/05	AK 102	
<i>Surrogate: 2-FBP</i>	91.1 %		60-120			"	"	"	"	
<b>05AMAK 07 SO (B5E0784-07) Soil</b> <b>Sampled: 05/23/05 16:00</b> <b>Received: 05/25/05 16:05</b>										
<b>Diesel Range Hydrocarbons</b>	<b>30.4</b>	2.10	4.00 mg/kg dry		1	5E27045	05/27/05	05/31/05	AK 102	
<i>Surrogate: 2-FBP</i>	74.4 %		60-120			"	"	"	"	

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Project: Amaknak Pre-WWII ROST Survey  
 Project Number: 05-038  
 Project Manager: Chris Floyd

**Reported:**  
 06/06/05 16:54

**Diesel Hydrocarbons (C10-C25) by AK102  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>05AMAK 08 SO (B5E0784-08) Soil</b> <b>Sampled: 05/23/05 18:22</b> <b>Received: 05/25/05 16:05</b>										
<b>Diesel Range Hydrocarbons</b>	<b>1300</b>	105	200 mg/kg dry		50	5E27045	05/27/05	05/31/05	AK 102	
<i>Surrogate: 2-FBP</i>	<i>ND</i>		<i>60-120</i>			"	"	"	"	<i>S-01</i>
<b>05AMAK 09 SO (B5E0784-09) Soil</b> <b>Sampled: 05/23/05 18:36</b> <b>Received: 05/25/05 16:05</b>										
<b>Diesel Range Hydrocarbons</b>	<b>2.54</b>	2.10	4.00 mg/kg dry		1	5E27045	05/27/05	05/31/05	AK 102	J
<i>Surrogate: 2-FBP</i>	<i>80.3 %</i>		<i>60-120</i>			"	"	"	"	
<b>05AMAK 10 SO (B5E0784-10) Soil</b> <b>Sampled: 05/23/05 19:22</b> <b>Received: 05/25/05 16:05</b>										
<b>Diesel Range Hydrocarbons</b>	<b>16000</b>	262	500 mg/kg dry		50	5E27045	05/27/05	05/31/05	AK 102	
<i>Surrogate: 2-FBP</i>	<i>ND</i>		<i>60-120</i>			"	"	"	"	<i>S-01</i>
<b>05AMAK 11 SO (B5E0784-11) Soil</b> <b>Sampled: 05/23/05 19:30</b> <b>Received: 05/25/05 16:05</b>										
<b>Diesel Range Hydrocarbons</b>	<b>13800</b>	265	505 mg/kg dry		50	5E27045	05/27/05	05/31/05	AK 102	
<i>Surrogate: 2-FBP</i>	<i>ND</i>		<i>60-120</i>			"	"	"	"	<i>S-01</i>
<b>05AMAK 12 SO (B5E0784-12) Soil</b> <b>Sampled: 05/24/05 09:04</b> <b>Received: 05/25/05 16:05</b>										
<b>Diesel Range Hydrocarbons</b>	<b>7600</b>	105	200 mg/kg dry		50	5E27045	05/27/05	05/31/05	AK 102	
<i>Surrogate: 2-FBP</i>	<i>ND</i>		<i>60-120</i>			"	"	"	"	<i>S-01</i>
<b>05AMAK 13 SO (B5E0784-13) Soil</b> <b>Sampled: 05/24/05 09:04</b> <b>Received: 05/25/05 16:05</b>										
<b>Diesel Range Hydrocarbons</b>	<b>19300</b>	234	445 mg/kg dry		50	5E27045	05/27/05	05/31/05	AK 102	
<i>Surrogate: 2-FBP</i>	<i>ND</i>		<i>60-120</i>			"	"	"	"	<i>S-01</i>
<b>05AMAK 14 SO (B5E0784-14) Soil</b> <b>Sampled: 05/24/05 09:50</b> <b>Received: 05/25/05 16:05</b>										
<b>Diesel Range Hydrocarbons</b>	<b>8280</b>	250	476 mg/kg dry		50	5E27045	05/27/05	05/31/05	AK 102	
<i>Surrogate: 2-FBP</i>	<i>ND</i>		<i>60-120</i>			"	"	"	"	<i>S-01</i>

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USACE - Alaska  
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Project: Amaknak Pre-WWII ROST Survey  
 Project Number: 05-038  
 Project Manager: Chris Floyd

**Reported:**  
 06/06/05 16:54

**Diesel Hydrocarbons (C10-C25) by AK102  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>05AMAK 15 SO (B5E0784-15) Soil</b> <b>Sampled: 05/24/05 09:50</b> <b>Received: 05/25/05 16:05</b>										
<b>Diesel Range Hydrocarbons</b>	<b>10000</b>	252	481 mg/kg dry		50	5E27045	05/27/05	05/31/05	AK 102	
<i>Surrogate: 2-FBP</i>	<i>ND</i>		<i>60-120</i>			<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	<i>S-01</i>
<b>05AMAK 16 SO (B5E0784-16) Soil</b> <b>Sampled: 05/24/05 10:20</b> <b>Received: 05/25/05 16:05</b>										
<b>Diesel Range Hydrocarbons</b>	<b>280</b>	10.5	20.0 mg/kg dry		5	5E27045	05/27/05	06/01/05	AK 102	
<i>Surrogate: 2-FBP</i>	<i>72.8 %</i>		<i>60-120</i>			<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	
<b>05AMAK 17 SO (B5E0784-17) Soil</b> <b>Sampled: 05/19/05 18:40</b> <b>Received: 05/25/05 16:05</b>										
<b>Diesel Range Hydrocarbons</b>	<b>292</b>	4.20	8.00 mg/kg dry		2	5E27045	05/27/05	06/01/05	AK 102	D-06
<i>Surrogate: 2-FBP</i>	<i>75.4 %</i>		<i>60-120</i>			<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	

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USACE - Alaska  
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Project: Amaknak Pre-WWII ROST Survey  
 Project Number: 05-038  
 Project Manager: Chris Floyd

Reported:  
 06/06/05 16:54

**Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring (US Army Corps of Engineers)  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>05AMAK 01 SO (B5E0784-01) Soil Sampled: 05/21/05 16:40 Received: 05/25/05 16:05</b>										
Acenaphthene	0.00216	0.00121	0.0100	mg/kg dry	1	5E27046	05/27/05	06/01/05	EPA 8270 Moc	J
Acenaphthylene	0.0202	0.000790	0.0100	"	"	"	"	"	"	
Anthracene	0.0649	0.00158	0.0100	"	"	"	"	"	"	
Benzo (a) anthracene	0.132	0.00158	0.0100	"	"	"	"	"	"	
Benzo (a) pyrene	0.512	0.000790	0.0100	"	"	"	"	"	"	
Benzo (b) fluoranthene	0.448	0.00165	0.0100	"	"	"	"	"	"	
Benzo (ghi) perylene	0.326	0.00145	0.0100	"	"	"	"	"	"	
Benzo (k) fluoranthene	0.102	0.00145	0.0100	"	"	"	"	"	"	
Chrysene	0.216	0.00145	0.0100	"	"	"	"	"	"	X
Dibenz (a,h) anthracene	0.0634	0.00165	0.0100	"	"	"	"	"	"	
Fluoranthene	0.176	0.00189	0.0100	"	"	"	"	"	"	
Fluorene	0.0151	0.000790	0.0100	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	0.242	0.00121	0.0100	"	"	"	"	"	"	
Naphthalene	0.0252	0.00158	0.0100	"	"	"	"	"	"	
Pentachlorophenol	ND	0.00730	0.0500	"	"	"	"	"	"	U
Phenanthrene	0.108	0.00112	0.0100	"	"	"	"	"	"	
Pyrene	0.224	0.00199	0.0100	"	"	"	"	"	"	
Surrogate: p-Terphenyl-d14	90.0 %		30-125			"	"	"	"	

<b>05AMAK 02 SO (B5E0784-02) Soil Sampled: 05/21/05 17:40 Received: 05/25/05 16:05</b>										
Acenaphthene	2.28	0.180	1.49	mg/kg dry	50	5E27046	05/27/05	05/31/05	EPA 8270 Moc	
Acenaphthylene	ND	0.117	1.49	"	"	"	"	"	"	U
Anthracene	4.88	0.235	1.49	"	"	"	"	"	"	
Benzo (a) anthracene	ND	0.235	1.49	"	"	"	"	"	"	U
Benzo (a) pyrene	1.19	0.117	1.49	"	"	"	"	"	"	J
Benzo (b) fluoranthene	ND	0.245	1.49	"	"	"	"	"	"	U
Benzo (ghi) perylene	0.976	0.215	1.49	"	"	"	"	"	"	J
Benzo (k) fluoranthene	ND	0.215	1.49	"	"	"	"	"	"	U
Chrysene	2.93	0.215	1.49	"	"	"	"	"	"	X
Dibenz (a,h) anthracene	ND	0.245	1.49	"	"	"	"	"	"	U
Fluoranthene	1.41	0.281	1.49	"	"	"	"	"	"	J
Fluorene	3.69	0.117	1.49	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.180	1.49	"	"	"	"	"	"	U
Naphthalene	7.92	0.235	1.49	"	"	"	"	"	"	
Pentachlorophenol	ND	1.08	7.43	"	"	"	"	"	"	U
Phenanthrene	11.5	0.166	1.49	"	"	"	"	"	"	
Pyrene	5.86	0.296	1.49	"	"	"	"	"	"	

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USACE - Alaska  
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Project: Amaknak Pre-WWII ROST Survey  
 Project Number: 05-038  
 Project Manager: Chris Floyd

Reported:  
 06/06/05 16:54

**Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring (US Army Corps of Engineers)  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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**05AMAK 02 SO (B5E0784-02) Soil Sampled: 05/21/05 17:40 Received: 05/25/05 16:05**

Surrogate: *p*-Terphenyl-d14 90.0 % 30-125 5E27046 05/27/05 05/31/05 EPA 8270 Mod

**05AMAK 03 SO (B5E0784-03) Soil Sampled: 05/21/05 16:45 Received: 05/25/05 16:05**

Acenaphthene	ND	0.00121	0.0100	mg/kg dry	1	5E27046	05/27/05	05/31/05	EPA 8270 Mod	U
<b>Acenaphthylene</b>	<b>0.000878</b>	0.000790	0.0100	"	"	"	"	"	"	J
<b>Anthracene</b>	<b>0.00878</b>	0.00158	0.0100	"	"	"	"	"	"	J
Benzo (a) anthracene	ND	0.00158	0.0100	"	"	"	"	"	"	U
<b>Benzo (a) pyrene</b>	<b>0.0105</b>	0.000790	0.0100	"	"	"	"	"	"	U
Benzo (b) fluoranthene	ND	0.00165	0.0100	"	"	"	"	"	"	U
<b>Benzo (ghi) perylene</b>	<b>0.0149</b>	0.00145	0.0100	"	"	"	"	"	"	U
Benzo (k) fluoranthene	ND	0.00145	0.0100	"	"	"	"	"	"	U
Chrysene	ND	0.00145	0.0100	"	"	"	"	"	"	U
Dibenz (a,h) anthracene	ND	0.00165	0.0100	"	"	"	"	"	"	U
<b>Fluoranthene</b>	<b>0.00527</b>	0.00189	0.0100	"	"	"	"	"	"	J
Fluorene	ND	0.000790	0.0100	"	"	"	"	"	"	U
<b>Indeno (1,2,3-cd) pyrene</b>	<b>0.0141</b>	0.00121	0.0100	"	"	"	"	"	"	U
Naphthalene	ND	0.00158	0.0100	"	"	"	"	"	"	U
Pentachlorophenol	ND	0.00730	0.0500	"	"	"	"	"	"	U
<b>Phenanthrene</b>	<b>0.00264</b>	0.00112	0.0100	"	"	"	"	"	"	J
<b>Pyrene</b>	<b>0.00264</b>	0.00199	0.0100	"	"	"	"	"	"	J

Surrogate: *p*-Terphenyl-d14 95.5 % 30-125 " " " "

**05AMAK 04 SO (B5E0784-04) Soil Sampled: 05/22/05 13:30 Received: 05/25/05 16:05**

<b>Acenaphthene</b>	<b>0.826</b>	0.00726	0.0600	mg/kg dry	2	5E27046	05/27/05	06/01/05	EPA 8270 Mod	
<b>Acenaphthylene</b>	<b>0.182</b>	0.00474	0.0600	"	"	"	"	"	"	
Anthracene	ND	0.00948	0.0600	"	"	"	"	"	"	U
<b>Benzo (a) anthracene</b>	<b>0.497</b>	0.00948	0.0600	"	"	"	"	"	"	
<b>Benzo (a) pyrene</b>	<b>0.292</b>	0.00474	0.0600	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.00990	0.0600	"	"	"	"	"	"	U
Benzo (ghi) perylene	ND	0.00870	0.0600	"	"	"	"	"	"	U
Benzo (k) fluoranthene	ND	0.00870	0.0600	"	"	"	"	"	"	U
<b>Chrysene</b>	<b>1.51</b>	0.00870	0.0600	"	"	"	"	"	"	X
Dibenz (a,h) anthracene	ND	0.00990	0.0600	"	"	"	"	"	"	U
<b>Fluoranthene</b>	<b>0.634</b>	0.0113	0.0600	"	"	"	"	"	"	
<b>Fluorene</b>	<b>1.87</b>	0.00474	0.0600	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.00726	0.0600	"	"	"	"	"	"	U
<b>Naphthalene</b>	<b>0.921</b>	0.00948	0.0600	"	"	"	"	"	"	

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Kate Haney, Project Manager



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USACE - Alaska PO Box 6898, Building 2212 Third Street Elmendorf AFB, AK/USA 99506-6898	Project: Amaknak Pre-WWII ROST Survey Project Number: 05-038 Project Manager: Chris Floyd	Reported: 06/06/05 16:54
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**Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring (US Army Corps of Engineers)  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>05AMAK 04 SO (B5E0784-04) Soil Sampled: 05/22/05 13:30 Received: 05/25/05 16:05</b>										
Pentachlorophenol	ND	0.0438	0.300	mg/kg dry	2	5E27046	05/27/05	06/01/05	EPA 8270 Mod	U
<b>Phenanthrene</b>	<b>3.94</b>	0.00672	0.0600	"	"	"	"	"	"	
<b>Pyrene</b>	<b>2.92</b>	0.0119	0.0600	"	"	"	"	"	"	
<i>Surrogate: p-Terphenyl-d14</i>	<i>91.6 %</i>		<i>30-125</i>			"	"	"	"	
<b>05AMAK 05 SO (B5E0784-05) Soil Sampled: 05/22/05 09:45 Received: 05/25/05 16:05</b>										
Acenaphthene	ND	0.00121	0.0100	mg/kg dry	1	5E27046	05/27/05	05/31/05	EPA 8270 Mod	U
Acenaphthylene	ND	0.000790	0.0100	"	"	"	"	"	"	U
Anthracene	ND	0.00158	0.0100	"	"	"	"	"	"	U
Benzo (a) anthracene	ND	0.00158	0.0100	"	"	"	"	"	"	U
Benzo (a) pyrene	ND	0.000790	0.0100	"	"	"	"	"	"	U
Benzo (b) fluoranthene	ND	0.00165	0.0100	"	"	"	"	"	"	U
Benzo (ghi) perylene	ND	0.00145	0.0100	"	"	"	"	"	"	U
Benzo (k) fluoranthene	ND	0.00145	0.0100	"	"	"	"	"	"	U
Chrysene	ND	0.00145	0.0100	"	"	"	"	"	"	U
Dibenz (a,h) anthracene	ND	0.00165	0.0100	"	"	"	"	"	"	U
Fluoranthene	ND	0.00189	0.0100	"	"	"	"	"	"	U
Fluorene	ND	0.000790	0.0100	"	"	"	"	"	"	U
Indeno (1,2,3-cd) pyrene	ND	0.00121	0.0100	"	"	"	"	"	"	U
Naphthalene	ND	0.00158	0.0100	"	"	"	"	"	"	U
Pentachlorophenol	ND	0.00730	0.0500	"	"	"	"	"	"	U
Phenanthrene	ND	0.00112	0.0100	"	"	"	"	"	"	U
Pyrene	ND	0.00199	0.0100	"	"	"	"	"	"	U
<i>Surrogate: p-Terphenyl-d14</i>	<i>114 %</i>		<i>30-125</i>			"	"	"	"	

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Reported:  
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**Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring (US Army Corps of Engineers)  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>05AMAK 06 SO (B5E0784-06) Soil Sampled: 05/22/05 10:20 Received: 05/25/05 16:05</b>										
Acenaphthene	ND	0.00121	0.0100	mg/kg dry	1	5E27046	05/27/05	06/01/05	3PA 8270 Moc	U
<b>Acenaphthylene</b>	<b>0.00527</b>	0.000790	0.0100	"	"	"	"	"	"	J
Anthracene	ND	0.00158	0.0100	"	"	"	"	"	"	U
Benzo (a) anthracene	ND	0.00158	0.0100	"	"	"	"	"	"	U
Benzo (a) pyrene	ND	0.000790	0.0100	"	"	"	"	"	"	U
Benzo (b) fluoranthene	ND	0.00165	0.0100	"	"	"	"	"	"	U
Benzo (ghi) perylene	ND	0.00145	0.0100	"	"	"	"	"	"	U
Benzo (k) fluoranthene	ND	0.00145	0.0100	"	"	"	"	"	"	U
Chrysene	ND	0.00145	0.0100	"	"	"	"	"	"	U
Dibenz (a,h) anthracene	ND	0.00165	0.0100	"	"	"	"	"	"	U
Fluoranthene	ND	0.00189	0.0100	"	"	"	"	"	"	U
Fluorene	ND	0.000790	0.0100	"	"	"	"	"	"	U
Indeno (1,2,3-cd) pyrene	ND	0.00121	0.0100	"	"	"	"	"	"	U
Naphthalene	ND	0.00158	0.0100	"	"	"	"	"	"	U
Pentachlorophenol	ND	0.00730	0.0500	"	"	"	"	"	"	U
Phenanthrene	ND	0.00112	0.0100	"	"	"	"	"	"	U
Pyrene	ND	0.00199	0.0100	"	"	"	"	"	"	U
Surrogate: p-Terphenyl-d14	107 %		30-125			"	"	"	"	

<b>05AMAK 07 SO (B5E0784-07) Soil Sampled: 05/23/05 16:00 Received: 05/25/05 16:05</b>										
Acenaphthene	ND	0.00121	0.0100	mg/kg dry	1	5E27046	05/27/05	05/31/05	3PA 8270 Moc	U
Acenaphthylene	ND	0.000790	0.0100	"	"	"	"	"	"	U
Anthracene	ND	0.00158	0.0100	"	"	"	"	"	"	U
Benzo (a) anthracene	ND	0.00158	0.0100	"	"	"	"	"	"	U
Benzo (a) pyrene	ND	0.000790	0.0100	"	"	"	"	"	"	U
Benzo (b) fluoranthene	ND	0.00165	0.0100	"	"	"	"	"	"	U
Benzo (ghi) perylene	ND	0.00145	0.0100	"	"	"	"	"	"	U
Benzo (k) fluoranthene	ND	0.00145	0.0100	"	"	"	"	"	"	U
Chrysene	ND	0.00145	0.0100	"	"	"	"	"	"	U
Dibenz (a,h) anthracene	ND	0.00165	0.0100	"	"	"	"	"	"	U
<b>Fluoranthene</b>	<b>0.00378</b>	0.00189	0.0100	"	"	"	"	"	"	J
Fluorene	ND	0.000790	0.0100	"	"	"	"	"	"	U
Indeno (1,2,3-cd) pyrene	ND	0.00121	0.0100	"	"	"	"	"	"	U
Naphthalene	ND	0.00158	0.0100	"	"	"	"	"	"	U
Pentachlorophenol	ND	0.00730	0.0500	"	"	"	"	"	"	U
<b>Phenanthrene</b>	<b>0.00454</b>	0.00112	0.0100	"	"	"	"	"	"	J
<b>Pyrene</b>	<b>0.00303</b>	0.00199	0.0100	"	"	"	"	"	"	J
Surrogate: p-Terphenyl-d14	113 %		30-125			"	"	"	"	

North Creek Analytical - Bothell

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Kate Haney, Project Manager



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USACE - Alaska Project: Amaknak Pre-WWII ROST Survey  
 PO Box 6898, Building 2212 Third Street Project Number: 05-038  
 Elmendorf AFB, AK/USA 99506-6898 Project Manager: Chris Floyd Reported: 06/06/05 16:54

**Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring (US Army Corps of Engineers)  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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**05AMAK 08 SO (B5E0784-08) Soil Sampled: 05/23/05 18:22 Received: 05/25/05 16:05**

Acenaphthene	ND	0.00605	0.0500	mg/kg dry	5	5E27046	05/27/05	06/01/05	3PA 8270 Mox	U
Acenaphthylene	ND	0.00395	0.0500	"	"	"	"	"	"	U
Anthracene	ND	0.00790	0.0500	"	"	"	"	"	"	U
Benzo (a) anthracene	ND	0.00790	0.0500	"	"	"	"	"	"	U
Benzo (a) pyrene	ND	0.00395	0.0500	"	"	"	"	"	"	U
Benzo (b) fluoranthene	ND	0.00825	0.0500	"	"	"	"	"	"	U
Benzo (ghi) perylene	ND	0.00725	0.0500	"	"	"	"	"	"	U
Benzo (k) fluoranthene	ND	0.00725	0.0500	"	"	"	"	"	"	U
Chrysene	ND	0.00725	0.0500	"	"	"	"	"	"	U
Dibenz (a,h) anthracene	ND	0.00825	0.0500	"	"	"	"	"	"	U
<b>Fluoranthene</b>	<b>0.0997</b>	0.00945	0.0500	"	"	"	"	"	"	
Fluorene	ND	0.00395	0.0500	"	"	"	"	"	"	U
Indeno (1,2,3-cd) pyrene	ND	0.00605	0.0500	"	"	"	"	"	"	U
Naphthalene	ND	0.00790	0.0500	"	"	"	"	"	"	U
Pentachlorophenol	ND	0.0365	0.250	"	"	"	"	"	"	U
<b>Phenanthrene</b>	<b>0.0923</b>	0.00560	0.0500	"	"	"	"	"	"	
<b>Pyrene</b>	<b>0.103</b>	0.00995	0.0500	"	"	"	"	"	"	

Surrogate: *p*-Terphenyl-d14 82.7 % 30-125 " " " "

**05AMAK 09 SO (B5E0784-09) Soil Sampled: 05/23/05 18:36 Received: 05/25/05 16:05**

Acenaphthene	ND	0.00121	0.0100	mg/kg dry	1	5E27046	05/27/05	05/31/05	3PA 8270 Mox	U
Acenaphthylene	ND	0.000790	0.0100	"	"	"	"	"	"	U
<b>Anthracene</b>	<b>0.00679</b>	0.00158	0.0100	"	"	"	"	"	"	J
Benzo (a) anthracene	ND	0.00158	0.0100	"	"	"	"	"	"	U
Benzo (a) pyrene	ND	0.000790	0.0100	"	"	"	"	"	"	U
Benzo (b) fluoranthene	ND	0.00165	0.0100	"	"	"	"	"	"	U
Benzo (ghi) perylene	ND	0.00145	0.0100	"	"	"	"	"	"	U
Benzo (k) fluoranthene	ND	0.00145	0.0100	"	"	"	"	"	"	U
Chrysene	ND	0.00145	0.0100	"	"	"	"	"	"	U
Dibenz (a,h) anthracene	ND	0.00165	0.0100	"	"	"	"	"	"	U
<b>Fluoranthene</b>	<b>0.00302</b>	0.00189	0.0100	"	"	"	"	"	"	J
Fluorene	ND	0.000790	0.0100	"	"	"	"	"	"	U
Indeno (1,2,3-cd) pyrene	ND	0.00121	0.0100	"	"	"	"	"	"	U
Naphthalene	ND	0.00158	0.0100	"	"	"	"	"	"	U
Pentachlorophenol	ND	0.00730	0.0500	"	"	"	"	"	"	U
Phenanthrene	ND	0.00112	0.0100	"	"	"	"	"	"	U
Pyrene	ND	0.00199	0.0100	"	"	"	"	"	"	U

Surrogate: *p*-Terphenyl-d14 116 % 30-125 " " " "

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USACE - Alaska  
 PO Box 6898, Building 2212 Third Street  
 Elmendorf AFB, AK/USA 99506-6898

Project: Amaknak Pre-WWII ROST Survey  
 Project Number: 05-038  
 Project Manager: Chris Floyd

Reported:  
 06/06/05 16:54

**Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring (US Army Corps of Engineers)  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>05AMAK 10 SO (B5E0784-10) Soil Sampled: 05/23/05 19:22 Received: 05/25/05 16:05</b>										
Acenaphthene	ND	0.0719	0.594	mg/kg dry	20	5E27046	05/27/05	06/01/05	3PA 8270 Moc	U
Acenaphthylene	ND	0.0469	0.594	"	"	"	"	"	"	U
Anthracene	ND	0.0939	0.594	"	"	"	"	"	"	U
Benzo (a) anthracene	ND	0.0939	0.594	"	"	"	"	"	"	U
Benzo (a) pyrene	ND	0.0469	0.594	"	"	"	"	"	"	U
Benzo (b) fluoranthene	ND	0.0980	0.594	"	"	"	"	"	"	U
Benzo (ghi) perylene	ND	0.0861	0.594	"	"	"	"	"	"	U
Benzo (k) fluoranthene	ND	0.0861	0.594	"	"	"	"	"	"	U
<b>Chrysene</b>	<b>1.91</b>	0.0861	0.594	"	"	"	"	"	"	X
Dibenz (a,h) anthracene	ND	0.0980	0.594	"	"	"	"	"	"	U
Fluoranthene	ND	0.112	0.594	"	"	"	"	"	"	U
Fluorene	ND	0.0469	0.594	"	"	"	"	"	"	U
Indeno (1,2,3-cd) pyrene	ND	0.0719	0.594	"	"	"	"	"	"	U
Naphthalene	ND	0.0939	0.594	"	"	"	"	"	"	U
Pentachlorophenol	ND	0.434	2.97	"	"	"	"	"	"	U
Phenanthrene	ND	0.0665	0.594	"	"	"	"	"	"	U
<b>Pyrene</b>	<b>3.90</b>	0.118	0.594	"	"	"	"	"	"	U
<i>Surrogate: p-Terphenyl-d14</i>	89.5 %		30-125			"	"	"	"	

<b>05AMAK 11 SO (B5E0784-11) Soil Sampled: 05/23/05 19:30 Received: 05/25/05 16:05</b>										
Acenaphthene	ND	0.0726	0.600	mg/kg dry	20	5E27046	05/27/05	06/01/05	3PA 8270 Moc	U
Acenaphthylene	ND	0.0474	0.600	"	"	"	"	"	"	U
Anthracene	ND	0.0948	0.600	"	"	"	"	"	"	U
Benzo (a) anthracene	ND	0.0948	0.600	"	"	"	"	"	"	U
Benzo (a) pyrene	ND	0.0474	0.600	"	"	"	"	"	"	U
Benzo (b) fluoranthene	ND	0.0990	0.600	"	"	"	"	"	"	U
Benzo (ghi) perylene	ND	0.0870	0.600	"	"	"	"	"	"	U
Benzo (k) fluoranthene	ND	0.0870	0.600	"	"	"	"	"	"	U
<b>Chrysene</b>	<b>1.50</b>	0.0870	0.600	"	"	"	"	"	"	X
Dibenz (a,h) anthracene	ND	0.0990	0.600	"	"	"	"	"	"	U
Fluoranthene	ND	0.113	0.600	"	"	"	"	"	"	U
Fluorene	ND	0.0474	0.600	"	"	"	"	"	"	U
Indeno (1,2,3-cd) pyrene	ND	0.0726	0.600	"	"	"	"	"	"	U
Naphthalene	ND	0.0948	0.600	"	"	"	"	"	"	U
Pentachlorophenol	ND	0.438	3.00	"	"	"	"	"	"	U
Phenanthrene	ND	0.0672	0.600	"	"	"	"	"	"	U
<b>Pyrene</b>	<b>3.12</b>	0.119	0.600	"	"	"	"	"	"	U
<i>Surrogate: p-Terphenyl-d14</i>	87.3 %		30-125			"	"	"	"	

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Kate Haney, Project Manager



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USACE - Alaska PO Box 6898, Building 2212 Third Street Elmendorf AFB, AK/USA 99506-6898	Project: Amaknak Pre-WWII ROST Survey Project Number: 05-038 Project Manager: Chris Floyd	Reported: 06/06/05 16:54
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**Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring (US Army Corps of Engineers)  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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**05AMAK 12 SO (B5E0784-12) Soil Sampled: 05/24/05 09:04 Received: 05/25/05 16:05**

<b>Acenaphthene</b>	<b>0.811</b>	0.0121	0.100	mg/kg dry	10	5E27046	05/27/05	06/01/05	EPA 8270 Mod	
Acenaphthylene	ND	0.00790	0.100	"	"	"	"	"	"	U
Anthracene	ND	0.0158	0.100	"	"	"	"	"	"	U
Benzo (a) anthracene	ND	0.0158	0.100	"	"	"	"	"	"	U
Benzo (a) pyrene	ND	0.00790	0.100	"	"	"	"	"	"	U
Benzo (b) fluoranthene	ND	0.0165	0.100	"	"	"	"	"	"	U
Benzo (ghi) perylene	ND	0.0145	0.100	"	"	"	"	"	"	U
Benzo (k) fluoranthene	ND	0.0145	0.100	"	"	"	"	"	"	U
<b>Chrysene</b>	<b>0.319</b>	0.0145	0.100	"	"	"	"	"	"	X
Dibenz (a,h) anthracene	ND	0.0165	0.100	"	"	"	"	"	"	U
Fluoranthene	ND	0.0189	0.100	"	"	"	"	"	"	U
<b>Fluorene</b>	<b>2.92</b>	0.00790	0.100	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.0121	0.100	"	"	"	"	"	"	U
<b>Naphthalene</b>	<b>1.93</b>	0.0158	0.100	"	"	"	"	"	"	
Pentachlorophenol	ND	0.0730	0.500	"	"	"	"	"	"	U
<b>Phenanthrene</b>	<b>3.00</b>	0.0112	0.100	"	"	"	"	"	"	
<b>Pyrene</b>	<b>0.565</b>	0.0199	0.100	"	"	"	"	"	"	
Surrogate: p-Terphenyl-d14	89.9 %		30-125			"	"	"	"	

**05AMAK 13 SO (B5E0784-13) Soil Sampled: 05/24/05 09:04 Received: 05/25/05 16:05**

<b>Acenaphthene</b>	<b>2.54</b>	0.135	1.11	mg/kg dry	50	5E27046	05/27/05	06/01/05	EPA 8270 Mod	
Acenaphthylene	ND	0.0880	1.11	"	"	"	"	"	"	U
Anthracene	ND	0.176	1.11	"	"	"	"	"	"	U
Benzo (a) anthracene	ND	0.176	1.11	"	"	"	"	"	"	U
Benzo (a) pyrene	ND	0.0880	1.11	"	"	"	"	"	"	U
Benzo (b) fluoranthene	ND	0.184	1.11	"	"	"	"	"	"	U
Benzo (ghi) perylene	ND	0.161	1.11	"	"	"	"	"	"	U
Benzo (k) fluoranthene	ND	0.161	1.11	"	"	"	"	"	"	U
Chrysene	ND	0.161	1.11	"	"	"	"	"	"	U
Dibenz (a,h) anthracene	ND	0.184	1.11	"	"	"	"	"	"	U
Fluoranthene	ND	0.210	1.11	"	"	"	"	"	"	U
<b>Fluorene</b>	<b>10.7</b>	0.0880	1.11	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.135	1.11	"	"	"	"	"	"	U
<b>Naphthalene</b>	<b>20.0</b>	0.176	1.11	"	"	"	"	"	"	
Pentachlorophenol	ND	0.813	5.57	"	"	"	"	"	"	U
<b>Phenanthrene</b>	<b>6.05</b>	0.125	1.11	"	"	"	"	"	"	
<b>Pyrene</b>	<b>0.374</b>	0.222	1.11	"	"	"	"	"	"	J

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USACE - Alaska Project: Amaknak Pre-WWII ROST Survey  
 PO Box 6898, Building 2212 Third Street Project Number: 05-038  
 Elmendorf AFB, AK/USA 99506-6898 Project Manager: Chris Floyd Reported: 06/06/05 16:54

**Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring (US Army Corps of Engineers)  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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**05AMAK 13 SO (B5E0784-13) Soil Sampled: 05/24/05 09:04 Received: 05/25/05 16:05**

Surrogate: *p*-Terphenyl-d14 92.0 % 30-125 5E27046 05/27/05 06/01/05 EPA 8270 Mod

**05AMAK 14 SO (B5E0784-14) Soil Sampled: 05/24/05 09:50 Received: 05/25/05 16:05**

Acenaphthene	0.863	0.0691	0.571	mg/kg dry	20	5E27046	05/27/05	06/01/05	EPA 8270 Mod	
Acenaphthylene	0.302	0.0451	0.571	"	"	"	"	"	"	J
Anthracene	ND	0.0903	0.571	"	"	"	"	"	"	U
Benzo (a) anthracene	ND	0.0903	0.571	"	"	"	"	"	"	U
Benzo (a) pyrene	ND	0.0451	0.571	"	"	"	"	"	"	U
Benzo (b) fluoranthene	ND	0.0943	0.571	"	"	"	"	"	"	U
Benzo (ghi) perylene	ND	0.0829	0.571	"	"	"	"	"	"	U
Benzo (k) fluoranthene	ND	0.0829	0.571	"	"	"	"	"	"	U
Chrysene	0.863	0.0829	0.571	"	"	"	"	"	"	X
Dibenz (a,h) anthracene	ND	0.0943	0.571	"	"	"	"	"	"	U
Fluoranthene	ND	0.108	0.571	"	"	"	"	"	"	U
Fluorene	1.86	0.0451	0.571	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.0691	0.571	"	"	"	"	"	"	U
Naphthalene	1.77	0.0903	0.571	"	"	"	"	"	"	
Pentachlorophenol	ND	0.417	2.86	"	"	"	"	"	"	U
Phenanthrene	2.98	0.0640	0.571	"	"	"	"	"	"	
Pyrene	1.51	0.114	0.571	"	"	"	"	"	"	

Surrogate: *p*-Terphenyl-d14 93.7 % 30-125 " " " "

**05AMAK 15 SO (B5E0784-15) Soil Sampled: 05/24/05 09:50 Received: 05/25/05 16:05**

Acenaphthene	0.922	0.0698	0.577	mg/kg dry	20	5E27046	05/27/05	06/01/05	EPA 8270 Mod	
Acenaphthylene	ND	0.0456	0.577	"	"	"	"	"	"	U
Anthracene	ND	0.0912	0.577	"	"	"	"	"	"	U
Benzo (a) anthracene	ND	0.0912	0.577	"	"	"	"	"	"	U
Benzo (a) pyrene	ND	0.0456	0.577	"	"	"	"	"	"	U
Benzo (b) fluoranthene	ND	0.0952	0.577	"	"	"	"	"	"	U
Benzo (ghi) perylene	ND	0.0837	0.577	"	"	"	"	"	"	U
Benzo (k) fluoranthene	ND	0.0837	0.577	"	"	"	"	"	"	U
Chrysene	0.878	0.0837	0.577	"	"	"	"	"	"	X
Dibenz (a,h) anthracene	ND	0.0952	0.577	"	"	"	"	"	"	U
Fluoranthene	ND	0.109	0.577	"	"	"	"	"	"	U
Fluorene	2.02	0.0456	0.577	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.0698	0.577	"	"	"	"	"	"	U
Naphthalene	ND	0.0912	0.577	"	"	"	"	"	"	U

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*Kate Haney*

Kate Haney, Project Manager



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USACE - Alaska PO Box 6898, Building 2212 Third Street Elmendorf AFB, AK/USA 99506-6898	Project: Amaknak Pre-WWII ROST Survey Project Number: 05-038 Project Manager: Chris Floyd	<b>Reported:</b> 06/06/05 16:54
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**Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring (US Army Corps of Engineers)  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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**05AMAK 15 SO (B5E0784-15) Soil Sampled: 05/24/05 09:50 Received: 05/25/05 16:05**

Pentachlorophenol	ND	0.421	2.88	mg/kg dry	20	5E27046	05/27/05	06/01/05	EPA 8270 Mod	U
<b>Phenanthrene</b>	<b>3.16</b>	0.0646	0.577	"	"	"	"	"	"	
<b>Pyrene</b>	<b>1.49</b>	0.115	0.577	"	"	"	"	"	"	
<i>Surrogate: p-Terphenyl-d14</i>	<i>92.0 %</i>		<i>30-125</i>			"	"	"	"	

**05AMAK 16 SO (B5E0784-16) Soil Sampled: 05/24/05 10:20 Received: 05/25/05 16:05**

Acenaphthene	ND	0.00121	0.0100	mg/kg dry	1	5E27046	05/27/05	06/01/05	EPA 8270 Mod	U
Acenaphthylene	ND	0.000790	0.0100	"	"	"	"	"	"	U
Anthracene	ND	0.00158	0.0100	"	"	"	"	"	"	U
Benzo (a) anthracene	ND	0.00158	0.0100	"	"	"	"	"	"	U
Benzo (a) pyrene	ND	0.000790	0.0100	"	"	"	"	"	"	U
Benzo (b) fluoranthene	ND	0.00165	0.0100	"	"	"	"	"	"	U
Benzo (ghi) perylene	ND	0.00145	0.0100	"	"	"	"	"	"	U
Benzo (k) fluoranthene	ND	0.00145	0.0100	"	"	"	"	"	"	U
Chrysene	ND	0.00145	0.0100	"	"	"	"	"	"	U
Dibenz (a,h) anthracene	ND	0.00165	0.0100	"	"	"	"	"	"	U
Fluoranthene	ND	0.00189	0.0100	"	"	"	"	"	"	U
Fluorene	ND	0.000790	0.0100	"	"	"	"	"	"	U
Indeno (1,2,3-cd) pyrene	ND	0.00121	0.0100	"	"	"	"	"	"	U
Naphthalene	ND	0.00158	0.0100	"	"	"	"	"	"	U
Pentachlorophenol	ND	0.00730	0.0500	"	"	"	"	"	"	U
<b>Phenanthrene</b>	<b>0.0414</b>	0.00112	0.0100	"	"	"	"	"	"	
<b>Pyrene</b>	<b>0.0278</b>	0.00199	0.0100	"	"	"	"	"	"	
<i>Surrogate: p-Terphenyl-d14</i>	<i>115 %</i>		<i>30-125</i>			"	"	"	"	

North Creek Analytical - Bothell

Kate Haney, Project Manager

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Project: Amaknak Pre-WWII ROST Survey  
 Project Number: 05-038  
 Project Manager: Chris Floyd

Reported:  
 06/06/05 16:54

**Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring (US Army Corps of Engineers)  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>05AMAK 17 SO (B5E0784-17) Soil Sampled: 05/19/05 18:40 Received: 05/25/05 16:05</b>										
Acenaphthene	ND	0.00121	0.0100	mg/kg dry	1	5E27046	05/27/05	06/01/05	EPA 8270 Mod	U
Acenaphthylene	<b>0.110</b>	0.000790	0.0100	"	"	"	"	"	"	
Anthracene	<b>0.383</b>	0.00158	0.0100	"	"	"	"	"	"	
Benzo (a) anthracene	<b>0.210</b>	0.00158	0.0100	"	"	"	"	"	"	
Benzo (a) pyrene	<b>0.441</b>	0.000790	0.0100	"	"	"	"	"	"	
Benzo (b) fluoranthene	<b>0.705</b>	0.00165	0.0100	"	"	"	"	"	"	
Benzo (ghi) perylene	<b>0.346</b>	0.00145	0.0100	"	"	"	"	"	"	
Benzo (k) fluoranthene	<b>0.153</b>	0.00145	0.0100	"	"	"	"	"	"	
Chrysene	<b>1.08</b>	0.00145	0.0100	"	"	"	"	"	"	X
Dibenz (a,h) anthracene	<b>0.0995</b>	0.00165	0.0100	"	"	"	"	"	"	
Fluoranthene	<b>0.199</b>	0.00189	0.0100	"	"	"	"	"	"	
Fluorene	<b>0.0254</b>	0.000790	0.0100	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	<b>0.334</b>	0.00121	0.0100	"	"	"	"	"	"	
Naphthalene	<b>0.0162</b>	0.00158	0.0100	"	"	"	"	"	"	
Pentachlorophenol	ND	0.00730	0.0500	"	"	"	"	"	"	U
Phenanthrene	<b>0.0948</b>	0.00112	0.0100	"	"	"	"	"	"	
Pyrene	<b>0.199</b>	0.00199	0.0100	"	"	"	"	"	"	
Surrogate: <i>p</i> -Terphenyl-d14	99.3 %		30-125			"	"	"	"	

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Project: Amaknak Pre-WWII ROST Survey  
 Project Number: 05-038  
 Project Manager: Chris Floyd

**Reported:**  
 06/06/05 16:54

**Physical Parameters by APHA/ASTM/EPA Methods  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>05AMAK 01 SO (B5E0784-01) Soil</b> <b>Sampled: 05/21/05 16:40</b> <b>Received: 05/25/05 16:05</b>										
Dry Weight	91.0	1.00	1.00	%	1	5E31058	05/31/05	06/01/05	SOPSPL003R1	
<b>05AMAK 02 SO (B5E0784-02) Soil</b> <b>Sampled: 05/21/05 17:40</b> <b>Received: 05/25/05 16:05</b>										
Dry Weight	91.3	1.00	1.00	%	1	5E31058	05/31/05	06/01/05	SOPSPL003R1	
<b>05AMAK 03 SO (B5E0784-03) Soil</b> <b>Sampled: 05/21/05 16:45</b> <b>Received: 05/25/05 16:05</b>										
Dry Weight	76.4	1.00	1.00	%	1	5E31058	05/31/05	06/01/05	SOPSPL003R1	
<b>05AMAK 04 SO (B5E0784-04) Soil</b> <b>Sampled: 05/22/05 13:30</b> <b>Received: 05/25/05 16:05</b>										
Dry Weight	87.7	1.00	1.00	%	1	5E31058	05/31/05	06/01/05	SOPSPL003R1	
<b>05AMAK 05 SO (B5E0784-05) Soil</b> <b>Sampled: 05/22/05 09:45</b> <b>Received: 05/25/05 16:05</b>										
Dry Weight	82.8	1.00	1.00	%	1	5E31058	05/31/05	06/01/05	SOPSPL003R1	
<b>05AMAK 06 SO (B5E0784-06) Soil</b> <b>Sampled: 05/22/05 10:20</b> <b>Received: 05/25/05 16:05</b>										
Dry Weight	88.2	1.00	1.00	%	1	5E31058	05/31/05	06/01/05	SOPSPL003R1	
<b>05AMAK 07 SO (B5E0784-07) Soil</b> <b>Sampled: 05/23/05 16:00</b> <b>Received: 05/25/05 16:05</b>										
Dry Weight	89.3	1.00	1.00	%	1	5E31058	05/31/05	06/01/05	SOPSPL003R1	
<b>05AMAK 08 SO (B5E0784-08) Soil</b> <b>Sampled: 05/23/05 18:22</b> <b>Received: 05/25/05 16:05</b>										
Dry Weight	88.8	1.00	1.00	%	1	5E31058	05/31/05	06/01/05	SOPSPL003R1	
<b>05AMAK 09 SO (B5E0784-09) Soil</b> <b>Sampled: 05/23/05 18:36</b> <b>Received: 05/25/05 16:05</b>										
Dry Weight	89.3	1.00	1.00	%	1	5E31058	05/31/05	06/01/05	SOPSPL003R1	

North Creek Analytical - Bothell

Kate Haney, Project Manager

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Project: Amaknak Pre-WWII ROST Survey  
 Project Number: 05-038  
 Project Manager: Chris Floyd

**Reported:**  
 06/06/05 16:54

**Physical Parameters by APHA/ASTM/EPA Methods  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>05AMAK 10 SO (B5E0784-10) Soil</b> <b>Sampled: 05/23/05 19:22</b> <b>Received: 05/25/05 16:05</b>										
Dry Weight	91.4	1.00	1.00	%	1	5E31058	05/31/05	06/01/05	SOPSPL003R1	
<b>05AMAK 11 SO (B5E0784-11) Soil</b> <b>Sampled: 05/23/05 19:30</b> <b>Received: 05/25/05 16:05</b>										
Dry Weight	90.9	1.00	1.00	%	1	5E31058	05/31/05	06/01/05	SOPSPL003R1	
<b>05AMAK 12 SO (B5E0784-12) Soil</b> <b>Sampled: 05/24/05 09:04</b> <b>Received: 05/25/05 16:05</b>										
Dry Weight	55.0	1.00	1.00	%	1	5E31058	05/31/05	06/01/05	SOPSPL003R1	
<b>05AMAK 13 SO (B5E0784-13) Soil</b> <b>Sampled: 05/24/05 09:04</b> <b>Received: 05/25/05 16:05</b>										
Dry Weight	44.9	1.00	1.00	%	1	5E31058	05/31/05	06/01/05	SOPSPL003R1	
<b>05AMAK 14 SO (B5E0784-14) Soil</b> <b>Sampled: 05/24/05 09:50</b> <b>Received: 05/25/05 16:05</b>										
Dry Weight	88.3	1.00	1.00	%	1	5E31058	05/31/05	06/01/05	SOPSPL003R1	
<b>05AMAK 15 SO (B5E0784-15) Soil</b> <b>Sampled: 05/24/05 09:50</b> <b>Received: 05/25/05 16:05</b>										
Dry Weight	87.6	1.00	1.00	%	1	5E31058	05/31/05	06/01/05	SOPSPL003R1	
<b>05AMAK 16 SO (B5E0784-16) Soil</b> <b>Sampled: 05/24/05 10:20</b> <b>Received: 05/25/05 16:05</b>										
Dry Weight	88.0	1.00	1.00	%	1	5E31058	05/31/05	06/01/05	SOPSPL003R1	
<b>05AMAK 17 SO (B5E0784-17) Soil</b> <b>Sampled: 05/19/05 18:40</b> <b>Received: 05/25/05 16:05</b>										
Dry Weight	56.7	1.00	1.00	%	1	5E31059	05/31/05	06/01/05	SOPSPL003R1	

North Creek Analytical - Bothell

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Project: Amaknak Pre-WWII ROST Survey  
 Project Number: 05-038  
 Project Manager: Chris Floyd

**Reported:**  
 06/06/05 16:54

**Residual Range Organics (C25-C36) by AK 103 - Quality Control**  
**North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 5E27045: Prepared 05/27/05 Using EPA 3550B**

**Blank (5E27045-BLK1)**

Residual Range Organics	ND	1.97	25.0	mg/kg							U
Surrogate: Octacosane	8.68			"	10.0		86.8 %	60-120			

**LCS (5E27045-BS2)**

Residual Range Organics	65.5	1.97	25.0	mg/kg	80.0		81.9	60-120			
Surrogate: Octacosane	9.20			"	10.0		92.0 %	60-120			

**LCS Dup (5E27045-BSD2)**

Residual Range Organics	67.9	1.97	25.0	mg/kg	80.0		84.9	60-120	3.60	20	
Surrogate: Octacosane	9.47			"	10.0		94.7 %	60-120			

**Matrix Spike (5E27045-MS2)**

**Source: B5E0784-14**

Residual Range Organics	3400	241	3060	mg/kg dry	222	3120	126	60-120			Q-03
Surrogate: Octacosane	ND			"	27.8		ND	60-120			S-01

**Matrix Spike Dup (5E27045-MSD2)**

**Source: B5E0784-14**

Residual Range Organics	3610	241	3060	mg/kg dry	222	3120	221	60-120	5.99	20	Q-03
Surrogate: Octacosane	ND			"	27.8		ND	60-120			S-01

North Creek Analytical - Bothell

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 Project Number: 05-038  
 Project Manager: Chris Floyd

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 06/06/05 16:54

**Gasoline Range Hydrocarbons (n-Hexane to <n-Decane) by AK101 - Quality Control**  
**North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 5E31031: Prepared 05/31/05 Using EPA 5030B (MeOH)**

**Blank (5E31031-BLK1)**

Gasoline Range Hydrocarbons	0.899	0.336	5.00	mg/kg							J
Surrogate: a,a,a-TFT (FID)	1.83			"	2.40		76.2 %	60-120			
Surrogate: 4-BFB (FID)	2.32			"	3.00		77.3 %	60-120			

**LCS (5E31031-BS1)**

Gasoline Range Hydrocarbons	51.9	0.336	5.00	mg/kg	50.0		104	60-120			
Surrogate: a,a,a-TFT (FID)	2.01			"	2.40		83.8 %	60-120			
Surrogate: 4-BFB (FID)	2.74			"	3.00		91.3 %	60-120			

**LCS Dup (5E31031-BSD1)**

Gasoline Range Hydrocarbons	52.5	0.336	5.00	mg/kg	50.0		105	60-120	1.15	20	
Surrogate: a,a,a-TFT (FID)	2.04			"	2.40		85.0 %	60-120			
Surrogate: 4-BFB (FID)	2.74			"	3.00		91.3 %	60-120			

**Matrix Spike (5E31031-MS1)**

**Source: B5E0784-14**

Gasoline Range Hydrocarbons	400	1.41	21.0 mg/kg dry		238	300	42.0	60-120			Q-02
Surrogate: a,a,a-TFT (FID)	1.59			"	1.14		139 %	60-120			S-04
Surrogate: 4-BFB (FID)	1.82			"	1.43		127 %	60-120			S-04

**Matrix Spike Dup (5E31031-MSD1)**

**Source: B5E0784-14**

Gasoline Range Hydrocarbons	408	1.41	21.0 mg/kg dry		238	300	45.4	60-120	1.98	20	Q-02
Surrogate: a,a,a-TFT (FID)	1.57			"	1.14		138 %	60-120			S-04
Surrogate: 4-BFB (FID)	1.85			"	1.43		129 %	60-120			S-04

**Batch 5F01013: Prepared 06/01/05 Using EPA 5030B (MeOH)**

**Blank (5F01013-BLK1)**

Gasoline Range Hydrocarbons	0.993	0.336	5.00	mg/kg							J
Surrogate: a,a,a-TFT (FID)	2.11			"	2.40		87.9 %	60-120			
Surrogate: 4-BFB (FID)	2.44			"	3.00		81.3 %	60-120			

North Creek Analytical - Bothell

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*Kate Haney*

Kate Haney, Project Manager



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**Gasoline Range Hydrocarbons (n-Hexane to <n-Decane) by AK101 - Quality Control  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 5F01013: Prepared 06/01/05 Using EPA 5030B (MeOH)**

**LCS (5F01013-BS1)**

Gasoline Range Hydrocarbons	52.1	0.336	5.00	mg/kg	50.0		104	60-120			
Surrogate: a,a,a-TFT (FID)	2.05			"	2.40		85.4 %	60-120			
Surrogate: 4-BFB (FID)	2.81			"	3.00		93.7 %	60-120			

**LCS Dup (5F01013-BSD1)**

Gasoline Range Hydrocarbons	51.1	0.336	5.00	mg/kg	50.0		102	60-120	1.94	20	
Surrogate: a,a,a-TFT (FID)	2.00			"	2.40		83.3 %	60-120			
Surrogate: 4-BFB (FID)	2.82			"	3.00		94.0 %	60-120			

**Matrix Spike (5F01013-MS1)**

**Source: B5E0776-10**

Gasoline Range Hydrocarbons	40.8	0.181	2.70	mg/kg dry	35.1	0.550	115	60-120			
Surrogate: a,a,a-TFT (FID)	1.17			"	1.69		69.2 %	60-120			
Surrogate: 4-BFB (FID)	2.08			"	2.11		98.6 %	60-120			

**Matrix Spike Dup (5F01013-MSD1)**

**Source: B5E0776-10**

Gasoline Range Hydrocarbons	41.8	0.181	2.70	mg/kg dry	35.1	0.550	118	60-120	2.42	20	
Surrogate: a,a,a-TFT (FID)	1.06			"	1.69		62.7 %	60-120			
Surrogate: 4-BFB (FID)	2.01			"	2.11		95.3 %	60-120			

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 Elmendorf AFB, AK/USA 99506-6898

Project: Amaknak Pre-WWII ROST Survey  
 Project Number: 05-038  
 Project Manager: Chris Floyd

Reported:  
 06/06/05 16:54

**Diesel Hydrocarbons (C10-C25) by AK102 - Quality Control**  
**North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 5E27045: Prepared 05/27/05 Using EPA 3550B**

**Blank (5E27045-BLK1)**

Diesel Range Hydrocarbons	ND	2.10	4.00	mg/kg							U
Surrogate: 2-FBP	7.03			"	10.0		70.3 %	60-120			

**LCS (5E27045-BS1)**

Diesel Range Hydrocarbons	64.0	2.10	4.00	mg/kg	80.0		80.0	75-125			
Surrogate: 2-FBP	7.75			"	10.0		77.5 %	60-120			

**LCS Dup (5E27045-BSD1)**

Diesel Range Hydrocarbons	62.4	2.10	4.00	mg/kg	80.0		78.0	75-125	2.53	20	
Surrogate: 2-FBP	7.42			"	10.0		74.2 %	60-120			

**Matrix Spike (5E27045-MS1)**

**Source: B5E0784-14**

Diesel Range Hydrocarbons	8370	262	500	mg/kg dry	227	8280	39.6	75-125			Q-03
Surrogate: 2-FBP	ND			"	28.3		ND	60-120			S-01

**Matrix Spike Dup (5E27045-MSD1)**

**Source: B5E0784-14**

Diesel Range Hydrocarbons	9650	255	485	mg/kg dry	220	8280	623	75-125	14.2	20	Q-03
Surrogate: 2-FBP	ND			"	27.5		ND	60-120			S-01

North Creek Analytical - Bothell

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Kate Haney, Project Manager



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USACE - Alaska PO Box 6898, Building 2212 Third Street Elmendorf AFB, AK/USA 99506-6898	Project: Amaknak Pre-WWII ROST Survey Project Number: 05-038 Project Manager: Chris Floyd	Reported: 06/06/05 16:54
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**Learn Aromatic Compounds by GC/MS with Selected Ion Monitoring (US Army Corps of Engineers) - Quality  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 5E27046: Prepared 05/27/05 Using EPA 3550B**

**Blank (5E27046-BLK1)**

Acenaphthene	ND	0.00121	0.0100	mg/kg							U
Acenaphthylene	ND	0.000790	0.0100	"							U
Anthracene	ND	0.00158	0.0100	"							U
Benzo (a) anthracene	ND	0.00158	0.0100	"							U
Benzo (a) pyrene	ND	0.000790	0.0100	"							U
Benzo (b) fluoranthene	ND	0.00165	0.0100	"							U
Benzo (ghi) perylene	ND	0.00145	0.0100	"							U
Benzo (k) fluoranthene	ND	0.00145	0.0100	"							U
Chrysene	ND	0.00145	0.0100	"							U
Dibenz (a,h) anthracene	ND	0.00165	0.0100	"							U
Fluoranthene	0.00200	0.00189	0.0100	"							J
Fluorene	ND	0.000790	0.0100	"							U
Indeno (1,2,3-cd) pyrene	ND	0.00121	0.0100	"							U
Naphthalene	ND	0.00158	0.0100	"							U
Pentachlorophenol	ND	0.00730	0.0500	"							U
Phenanthrene	ND	0.00112	0.0100	"							U
Pyrene	ND	0.00199	0.0100	"							U
Surrogate: p-Terphenyl-d14	1.75			"	1.67		105 %	30-125			

**LCS (5E27046-BS1)**

Acenaphthene	0.289	0.00121	0.0100	mg/kg	0.333		86.8	45-110			
Acenaphthylene	0.311	0.000790	0.0100	"	0.333		93.4	45-105			
Anthracene	0.309	0.00158	0.0100	"	0.333		92.8	55-105			
Benzo (a) anthracene	0.311	0.00158	0.0100	"	0.333		93.4	50-110			
Benzo (a) pyrene	0.329	0.000790	0.0100	"	0.333		98.8	50-110			
Benzo (b) fluoranthene	0.363	0.00165	0.0100	"	0.333		109	45-115			
Benzo (ghi) perylene	0.334	0.00145	0.0100	"	0.333		100	40-125			
Benzo (k) fluoranthene	0.323	0.00145	0.0100	"	0.333		97.0	45-125			
Chrysene	0.371	0.00145	0.0100	"	0.333		111	55-110			X
Dibenz (a,h) anthracene	0.331	0.00165	0.0100	"	0.333		99.4	40-125			
Fluoranthene	0.350	0.00189	0.0100	"	0.333		105	55-115			
Fluorene	0.336	0.000790	0.0100	"	0.333		101	50-110			

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*Kate Haney*

Kate Haney, Project Manager



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 Project Number: 05-038  
 Project Manager: Chris Floyd

Reported:  
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**Learn Aromatic Compounds by GC/MS with Selected Ion Monitoring (US Army Corps of Engineers) - Quality  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 5E27046: Prepared 05/27/05 Using EPA 3550B**

**LCS (5E27046-BS1)**

Indeno (1,2,3-cd) pyrene	0.331	0.00121	0.0100	mg/kg	0.333		99.4	40-120			
Naphthalene	0.307	0.00158	0.0100	"	0.333		92.2	40-105			
Pentachlorophenol	0.554	0.00730	0.0500	"	0.667		83.1	25-120			
Phenanthrene	0.322	0.00112	0.0100	"	0.333		96.7	50-110			
Pyrene	0.347	0.00199	0.0100	"	0.333		104	45-125			
Surrogate: p-Terphenyl-d14	1.69			"	1.67		101 %	30-125			

**LCS Dup (5E27046-BSD1)**

Acenaphthene	0.273	0.00121	0.0100	mg/kg	0.333		82.0	45-110	5.69	50	
Acenaphthylene	0.295	0.000790	0.0100	"	0.333		88.6	45-105	5.28	50	
Anthracene	0.305	0.00158	0.0100	"	0.333		91.6	55-105	1.30	50	
Benzo (a) anthracene	0.316	0.00158	0.0100	"	0.333		94.9	50-110	1.59	50	
Benzo (a) pyrene	0.329	0.000790	0.0100	"	0.333		98.8	50-110	0.00	50	
Benzo (b) fluoranthene	0.361	0.00165	0.0100	"	0.333		108	45-115	0.552	50	
Benzo (ghi) perylene	0.329	0.00145	0.0100	"	0.333		98.8	40-125	1.51	50	
Benzo (k) fluoranthene	0.326	0.00145	0.0100	"	0.333		97.9	45-125	0.924	50	
Chrysene	0.366	0.00145	0.0100	"	0.333		110	55-110	1.36	50	X
Dibenz (a,h) anthracene	0.325	0.00165	0.0100	"	0.333		97.6	40-125	1.83	50	
Fluoranthene	0.349	0.00189	0.0100	"	0.333		105	55-115	0.286	50	
Fluorene	0.314	0.000790	0.0100	"	0.333		94.3	50-110	6.77	50	
Indeno (1,2,3-cd) pyrene	0.327	0.00121	0.0100	"	0.333		98.2	40-120	1.22	50	
Naphthalene	0.280	0.00158	0.0100	"	0.333		84.1	40-105	9.20	50	
Pentachlorophenol	0.533	0.00730	0.0500	"	0.667		79.9	25-120	3.86	60	
Phenanthrene	0.316	0.00112	0.0100	"	0.333		94.9	50-110	1.88	50	
Pyrene	0.346	0.00199	0.0100	"	0.333		104	45-125	0.289	50	
Surrogate: p-Terphenyl-d14	1.60			"	1.67		95.8 %	30-125			

**Matrix Spike (5E27046-MS1)**

Source: B5E0784-14

Acenaphthene	1.79	0.0698	0.577	mg/kg dry	1.09	0.863	85.0	45-135			
Acenaphthylene	1.18	0.0456	0.577	"	1.09	0.302	80.6	45-135			
Anthracene	2.83	0.0912	0.577	"	1.09	ND	260	45-135			Q-02
Benzo (a) anthracene	1.35	0.0912	0.577	"	1.09	ND	124	45-135			
Benzo (a) pyrene	1.31	0.0456	0.577	"	1.09	ND	120	45-135			

North Creek Analytical - Bothell

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Kate Haney, Project Manager



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**Learn Aromatic Compounds by GC/MS with Selected Ion Monitoring (US Army Corps of Engineers) - Quality  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	Limit	RPD	RPD Limit	Notes
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**Batch 5E27046: Prepared 05/27/05 Using EPA 3550B**

**Matrix Spike (5E27046-MS1)**

**Source: B5E0784-14**

Benzo (b) fluoranthene	1.13	0.0952	0.577 mg/kg dry		1.09	ND	104	45-135			
Benzo (ghi) perylene	0.958	0.0837	0.577	"	1.09	ND	87.9	45-135			
Benzo (k) fluoranthene	0.828	0.0837	0.577	"	1.09	ND	76.0	45-135			
Chrysene	1.79	0.0837	0.577	"	1.09	0.863	85.0	45-135			X
Dibenz (a,h) anthracene	1.22	0.0952	0.577	"	1.09	ND	112	45-135			
Fluoranthene	1.66	0.109	0.577	"	1.09	ND	152	45-135			Q-02
Fluorene	3.09	0.0456	0.577	"	1.09	1.86	113	45-135			
Indeno (1,2,3-cd) pyrene	1.18	0.0698	0.577	"	1.09	ND	108	45-135			
Naphthalene	2.66	0.0912	0.577	"	1.09	1.77	81.7	45-135			
Pentachlorophenol	ND	0.421	2.88	"	2.18	ND		45-135	NA		Q-02, U
Phenanthrene	3.92	0.0646	0.577	"	1.09	2.98	86.2	45-135			
Pyrene	2.83	0.115	0.577	"	1.09	1.51	121	45-135			
Surrogate: p-Terphenyl-d14	4.75			"	5.44		87.3 %	30-125			

**Matrix Spike Dup (5E27046-MSD1)**

**Source: B5E0784-14**

Acenaphthene	1.74	0.0698	0.577 mg/kg dry		1.09	0.863	80.5	45-135	2.83	60	
Acenaphthylene	1.13	0.0456	0.577	"	1.09	0.302	76.0	45-135	4.33	60	
Anthracene	2.70	0.0912	0.577	"	1.09	ND	248	45-135	4.70	60	Q-02
Benzo (a) anthracene	1.35	0.0912	0.577	"	1.09	ND	124	45-135	0.00	60	
Benzo (a) pyrene	1.35	0.0456	0.577	"	1.09	ND	124	45-135	3.01	60	
Benzo (b) fluoranthene	0.871	0.0952	0.577	"	1.09	ND	79.9	45-135	25.9	60	
Benzo (ghi) perylene	1.00	0.0837	0.577	"	1.09	ND	91.7	45-135	4.29	60	
Benzo (k) fluoranthene	1.09	0.0837	0.577	"	1.09	ND	100	45-135	27.3	60	
Chrysene	1.74	0.0837	0.577	"	1.09	0.863	80.5	45-135	2.83	60	X
Dibenz (a,h) anthracene	1.26	0.0952	0.577	"	1.09	ND	116	45-135	3.23	60	
Fluoranthene	1.66	0.109	0.577	"	1.09	ND	152	45-135	0.00	60	Q-02
Fluorene	2.96	0.0456	0.577	"	1.09	1.86	101	45-135	4.30	60	
Indeno (1,2,3-cd) pyrene	1.18	0.0698	0.577	"	1.09	ND	108	45-135	0.00	60	
Naphthalene	2.40	0.0912	0.577	"	1.09	1.77	57.8	45-135	10.3	60	
Pentachlorophenol	ND	0.421	2.88	"	2.18	ND		45-135	NA	60	Q-02, U
Phenanthrene	3.75	0.0646	0.577	"	1.09	2.98	70.6	45-135	4.43	60	
Pyrene	2.70	0.115	0.577	"	1.09	1.51	109	45-135	4.70	60	

North Creek Analytical - Bothell

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**Learn Aromatic Compounds by GC/MS with Selected Ion Monitoring (US Army Corps of Engineers) - Quality  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 5E27046: Prepared 05/27/05 Using EPA 3550B**

**Matrix Spike Dup (5E27046-MSD1)**

**Source: B5E0784-14**

Surrogate: <i>p</i> -Terphenyl-d14	4.92			mg/kg dry	5.44		90.4 %	30-125			
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North Creek Analytical - Bothell

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**Physical Parameters by APHA/ASTM/EPA Methods - Quality Control  
 North Creek Analytical - Bothell**

Analyte	Result	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 5E31058: Prepared 05/31/05 Using Dry Weight**

**Blank (5E31058-BLK1)**

Dry Weight	99.8	1.00	1.00	%							
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**Batch 5E31059: Prepared 05/31/05 Using Dry Weight**

**Blank (5E31059-BLK1)**

Dry Weight	99.8	1.00	1.00	%							
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**Reported:**  
 06/06/05 16:54

**Notes and Definitions**

- D-06 The sample chromatographic pattern does not resemble the fuel standard used for quantitation.
- D-09 Results in the diesel organics range are primarily due to overlap from a heavy oil range product.
- D-15 Hydrocarbon pattern most closely resembles a Heavy Fuel Oil Range product.
- G-02 The chromatogram for this sample does not resemble a typical gasoline pattern. Please refer to the sample chromatogram.
- J Estimated value.
- Q-02 The spike recovery for this QC sample is outside of NCA established control limits due to sample matrix interference.
- Q-03 The percent recovery for this QC spike sample cannot be accurately calculated due to the high concentration of analyte already present in the sample.
- S-01 The surrogate recovery for this sample is not available due to sample dilution required from high analyte concentration and/or matrix interferences.
- S-04 The surrogate recovery for this sample is outside of established control limits due to a sample matrix effect.
- S-08 The surrogate recovery for this sample is outside of the established acceptance criterion due to bias from low percent solids results.
- U Analyte included in the analysis but not detected.
- X See case narrative.
- DET Analyte DETECTED
- ND Analyte NOT DETECTED at or above the reporting limit
- NR Not Reported
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference

North Creek Analytical - Bothell

Kate Haney, Project Manager

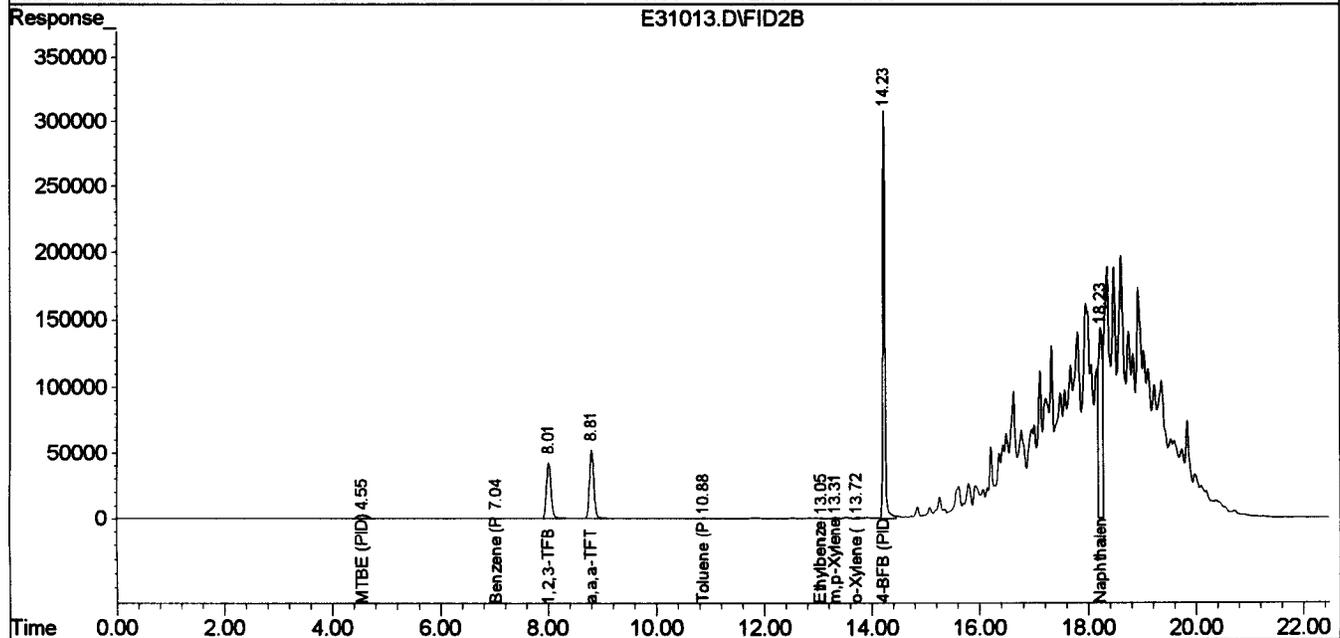
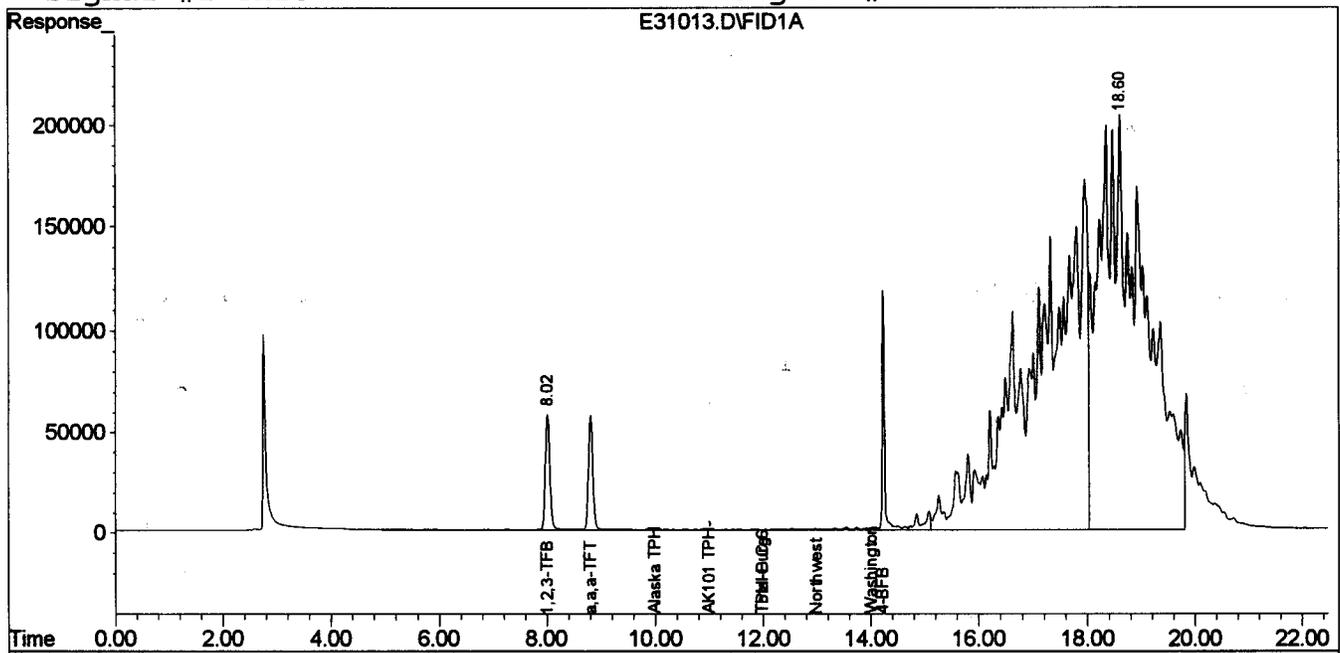
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Quantitation Report

Signal #1 : C:\HPCHEM\2\DATA\053105\E31013.D\FID1A.CH Vial: 13  
Signal #2 : C:\HPCHEM\2\DATA\053105\E31013.D\FID2B.CH  
Acq On : 31 May 2005 17:02 Operator: smt  
Sample : b5e0784-06 Inst : GC #4  
Misc : 1x 100uL Multiplr: 1.00  
IntFile Signal #1: SURR.E IntFile Signal #2: SURR2.E  
Quant Time: May 31 17:25 2005 Quant Results File: TGE2005.RES

Quant Method : C:\HPCHEM\2\METHODS\TGE2005.M (Chemstation Integrator)  
Title : TPH-G/BTEX 8015/8021 Method  
Last Update : Tue May 24 12:13:56 2005  
Response via : Multiple Level Calibration  
DataAcq Meth : TGE2005.M

Volume Inj. :  
Signal #1 Phase : Signal #2 Phase:  
Signal #1 Info : Signal #2 Info :

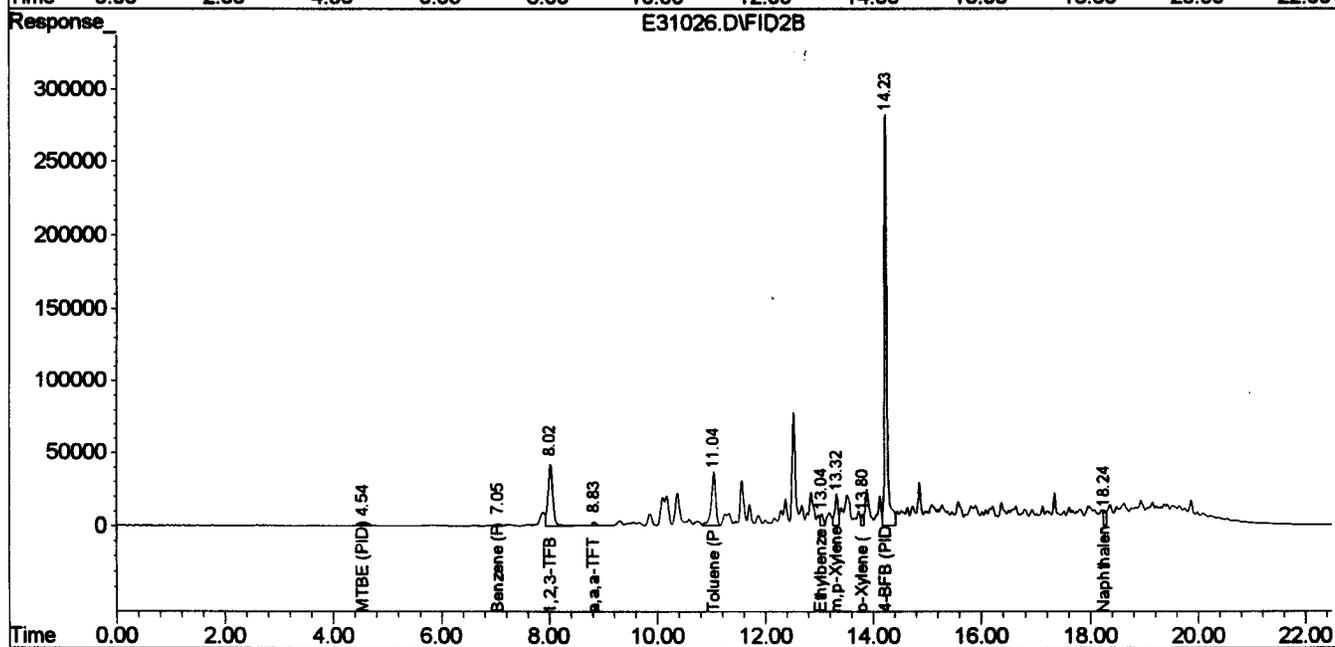
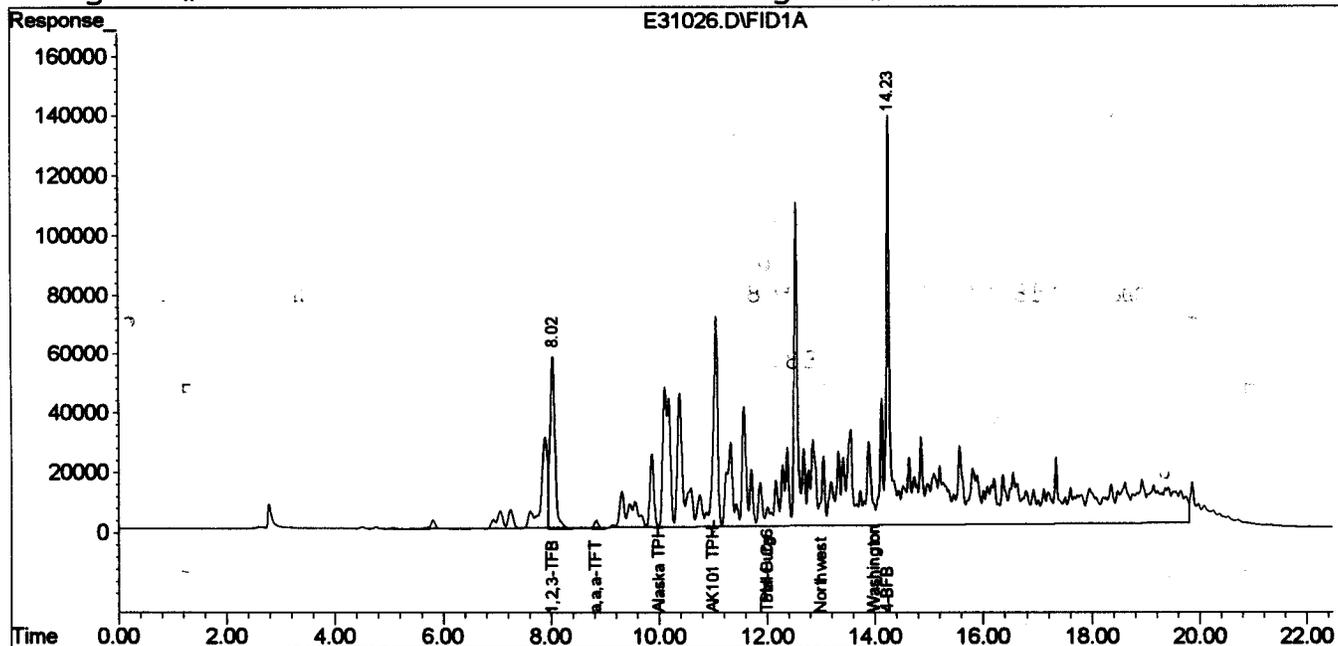


# Quantitation Report

Signal #1 : C:\HPCHEM\2\DATA\053105\E31026.D\FID1A.CH Vial: 26  
 Signal #2 : C:\HPCHEM\2\DATA\053105\E31026.D\FID2B.CH  
 Acq On : 1 Jun 2005 00:07 Operator: smt  
 Sample : b5e0784-07 r1 Inst : GC #4  
 Misc : 20x 5 uL Multiplr: 1.00  
 IntFile Signal #1: SURR.E IntFile Signal #2: SURR2.E  
 Quant Time: Jun 1 13:09 2005 Quant Results File: TGE2005.RES

Quant Method : C:\HPCHEM\2\METHODS\TGE2005.M (Chemstation Integrator)  
 Title : TPH-G/BTEX 8015/8021 Method  
 Last Update : Tue May 24 12:13:56 2005  
 Response via : Multiple Level Calibration  
 DataAcq Meth : TGE2005.M

Volume Inj. :  
 Signal #1 Phase : Signal #2 Phase:  
 Signal #1 Info : Signal #2 Info :

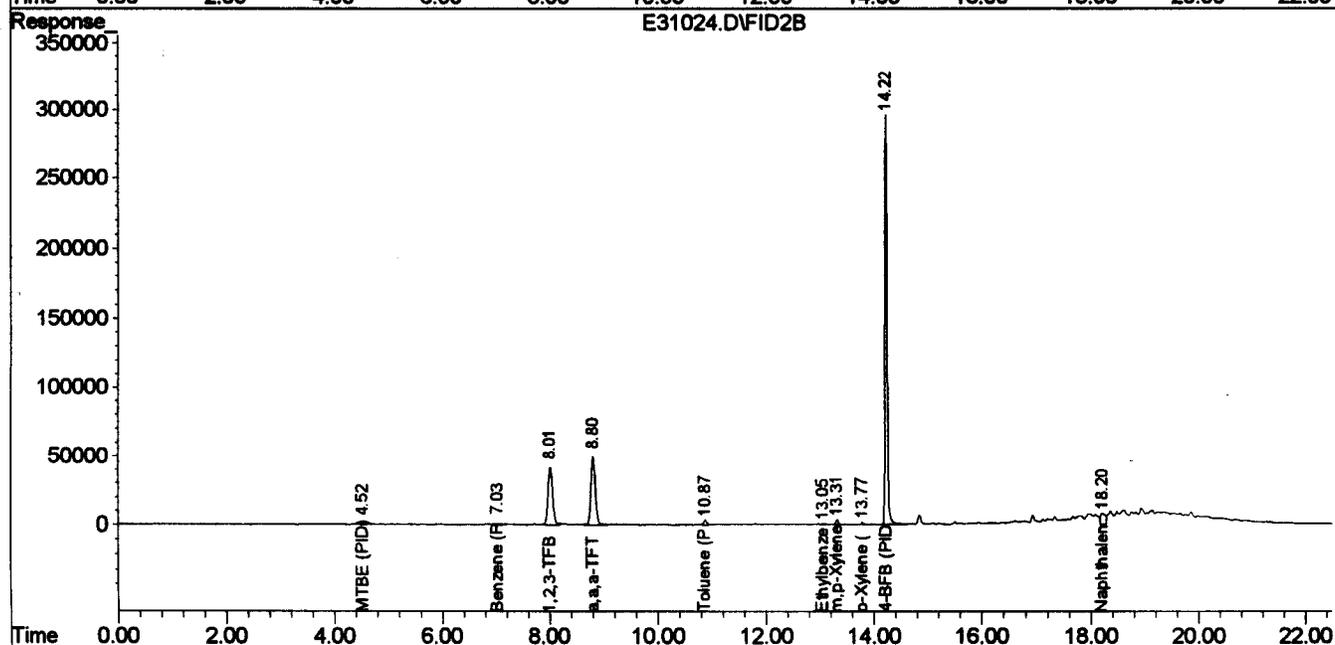
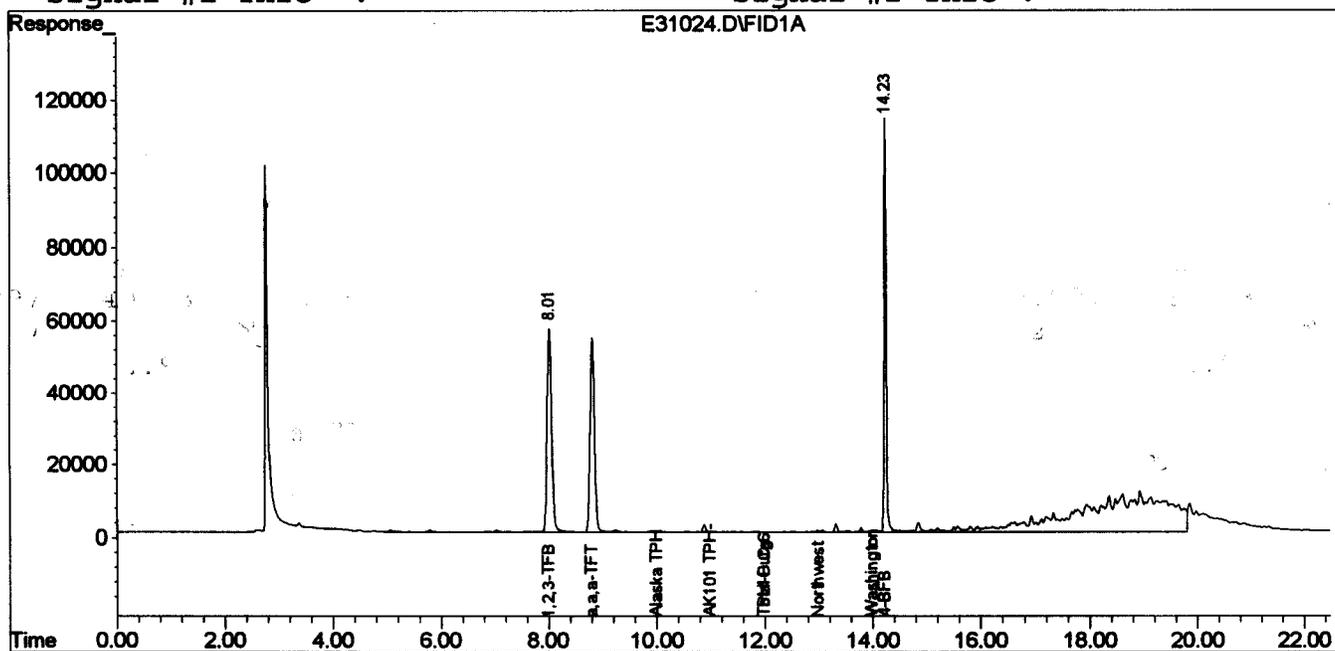


Quantitation Report

Signal #1 : C:\HPCHEM\2\DATA\053105\E31024.D\FID1A.CH Vial: 24  
Signal #2 : C:\HPCHEM\2\DATA\053105\E31024.D\FID2B.CH  
Acq On : 31 May 2005 23:07 Operator: smt  
Sample : b5e0784-08 r1 Inst : GC #4  
Misc : 1x 100 uL Multiplr: 1.00  
IntFile Signal #1: SURR.E IntFile Signal #2: SURR2.E  
Quant Time: May 31 23:30 2005 Quant Results File: TGE2005.RES

Quant Method : C:\HPCHEM\2\METHODS\TGE2005.M (Chemstation Integrator)  
Title : TPH-G/BTEX 8015/8021 Method  
Last Update : Tue May 24 12:13:56 2005  
Response via : Multiple Level Calibration  
DataAcq Meth : TGE2005.M

Volume Inj. :  
Signal #1 Phase : Signal #2 Phase:  
Signal #1 Info : Signal #2 Info :

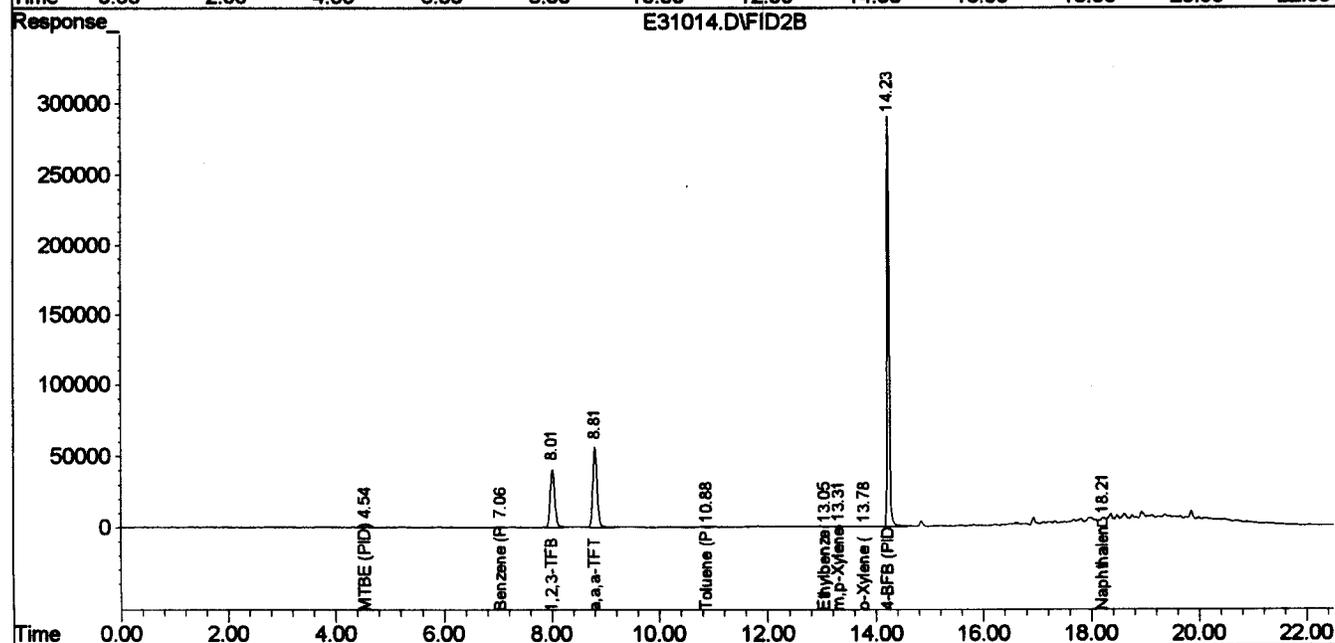
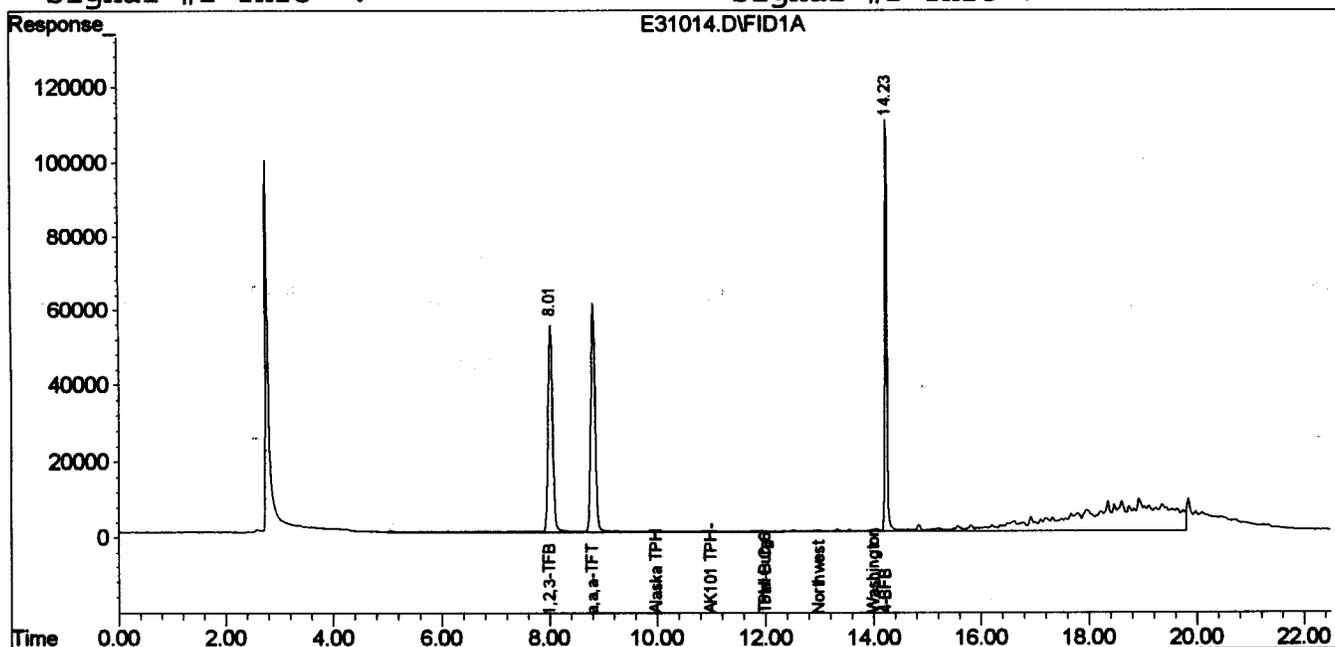


Quantitation Report

Signal #1 : C:\HPCHEM\2\DATA\053105\E31014.D\FID1A.CH Vial: 14  
 Signal #2 : C:\HPCHEM\2\DATA\053105\E31014.D\FID2B.CH  
 Acq On : 31 May 2005 17:32 Operator: smt  
 Sample : b5e0784-09 Inst : GC #4  
 Misc : 1x 100uL Multiplr: 1.00  
 IntFile Signal #1: SURR.E IntFile Signal #2: SURR2.E  
 Quant Time: May 31 17:55 2005 Quant Results File: TGE2005.RES

Quant Method : C:\HPCHEM\2\METHODS\TGE2005.M (Chemstation Integrator)  
 Title : TPH-G/BTEX 8015/8021 Method  
 Last Update : Tue May 24 12:13:56 2005  
 Response via : Multiple Level Calibration  
 DataAcq Meth : TGE2005.M

Volume Inj. :  
 Signal #1 Phase : Signal #2 Phase:  
 Signal #1 Info : Signal #2 Info :

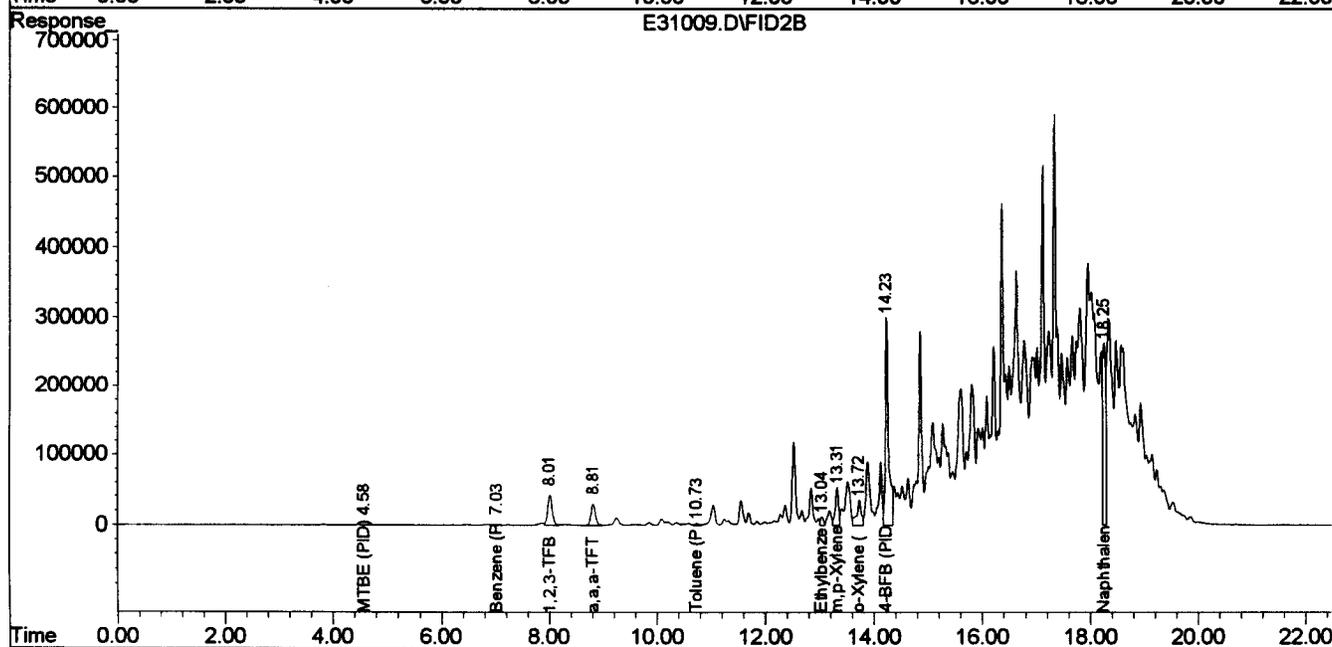
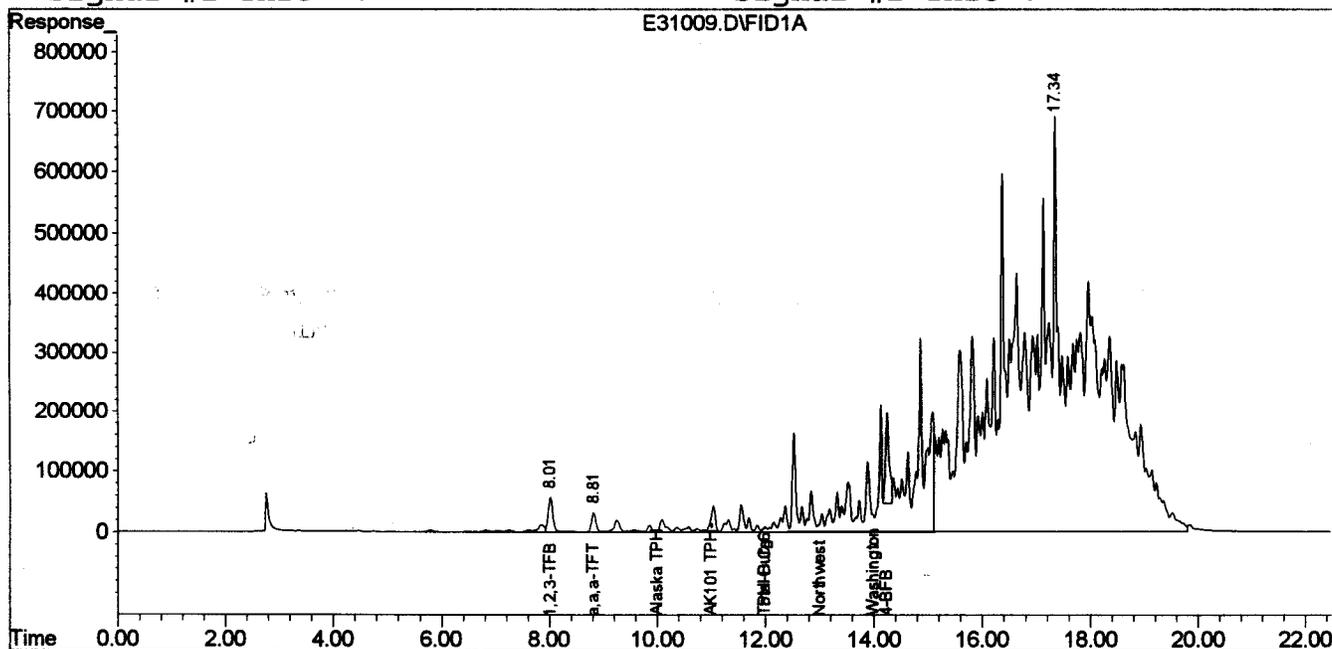


# Quantitation Report

Signal #1 : C:\HPCHEM\2\DATA\053105\E31009.D\FID1A.CH Vial: 9  
 Signal #2 : C:\HPCHEM\2\DATA\053105\E31009.D\FID2B.CH  
 Acq On : 31 May 2005 14:06 Operator: smt  
 Sample : b5e0784-10 Inst : GC #4  
 Misc : 2x 50uL Multiplr: 1.00  
 IntFile Signal #1: SURR.E IntFile Signal #2: SURR2.E  
 Quant Time: Jun 1 12:59 2005 Quant Results File: TGE2005.RES

Quant Method : C:\HPCHEM\2\METHODS\TGE2005.M (Chemstation Integrator)  
 Title : TPH-G/BTEX 8015/8021 Method  
 Last Update : Tue May 24 12:13:56 2005  
 Response via : Multiple Level Calibration  
 DataAcq Meth : TGE2005.M

Volume Inj. :  
 Signal #1 Phase : Signal #2 Phase:  
 Signal #1 Info : Signal #2 Info :

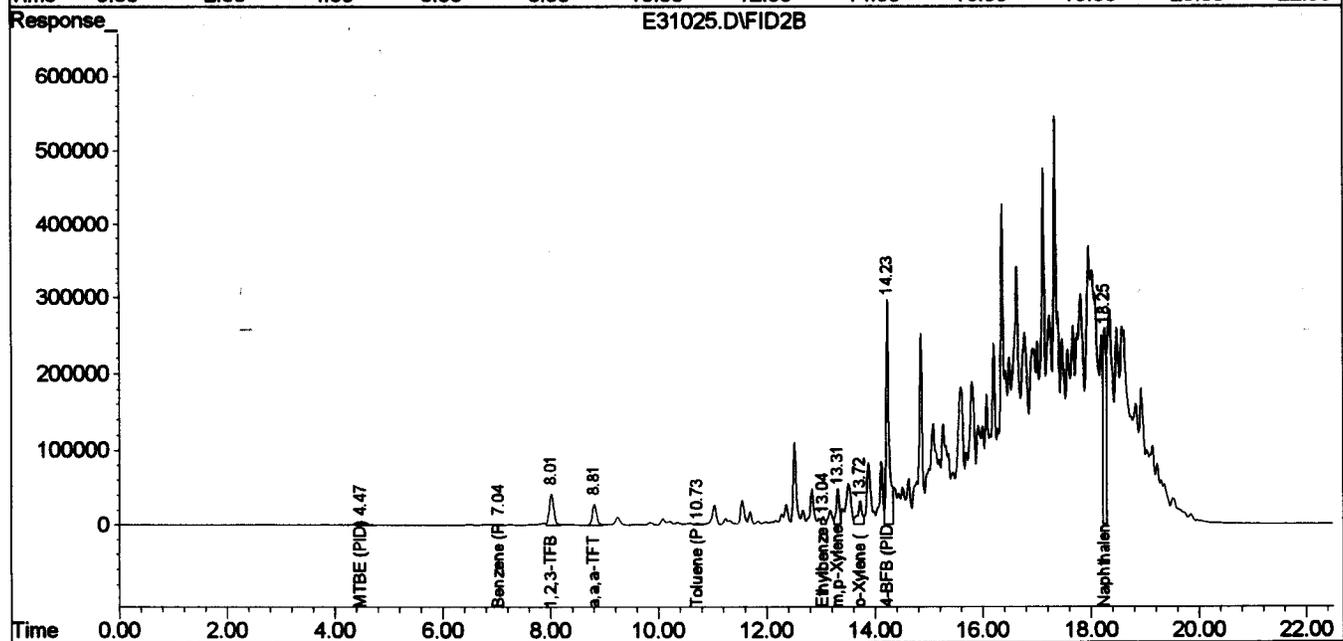
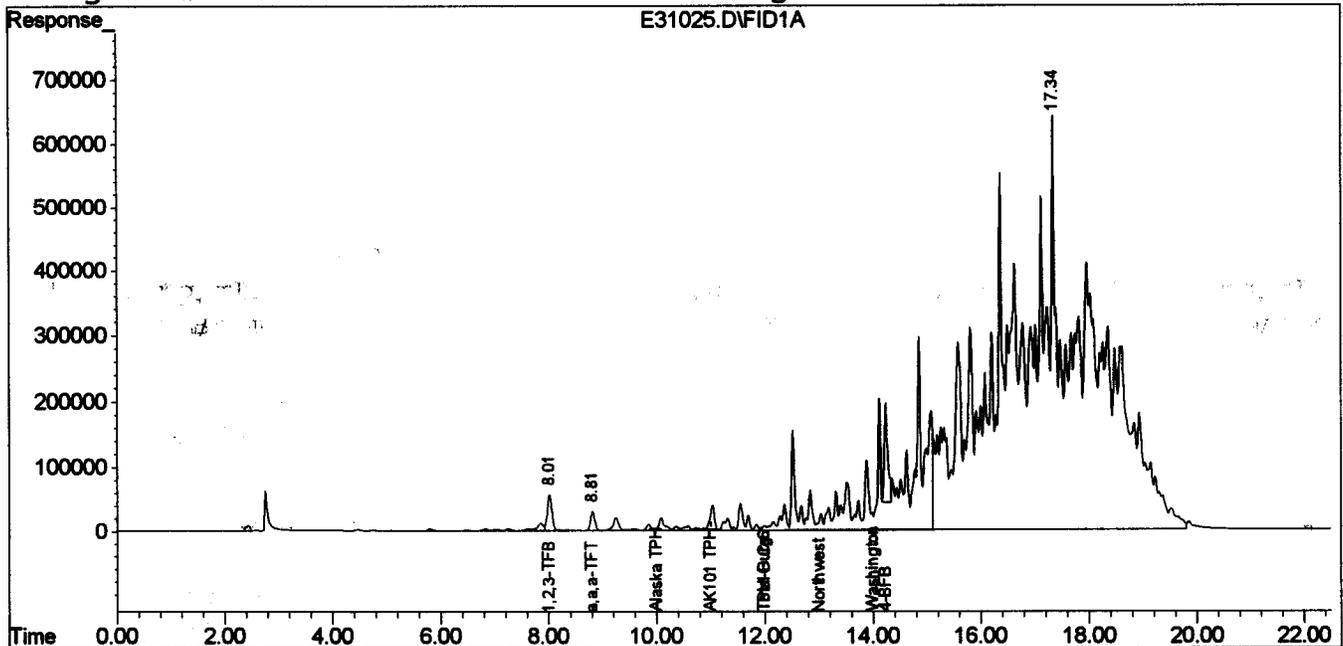


Quantitation Report

Signal #1 : C:\HPCHEM\2\DATA\053105\E31025.D\FID1A.CH Vial: 25  
Signal #2 : C:\HPCHEM\2\DATA\053105\E31025.D\FID2B.CH  
Acq On : 31 May 2005 23:37 Operator: smt  
Sample : b5e0784-11 r1 Inst : GC #4  
Misc : 2x 50 uL Multiplr: 1.00  
IntFile Signal #1: SURR.E IntFile Signal #2: SURR2.E  
Quant Time: Jun 1 13:08 2005 Quant Results File: TGE2005.RES

Quant Method : C:\HPCHEM\2\METHODS\TGE2005.M (Chemstation Integrator)  
Title : TPH-G/BTEX 8015/8021 Method  
Last Update : Tue May 24 12:13:56 2005  
Response via : Multiple Level Calibration  
DataAcq Meth : TGE2005.M

Volume Inj. :  
Signal #1 Phase : Signal #2 Phase:  
Signal #1 Info : Signal #2 Info :

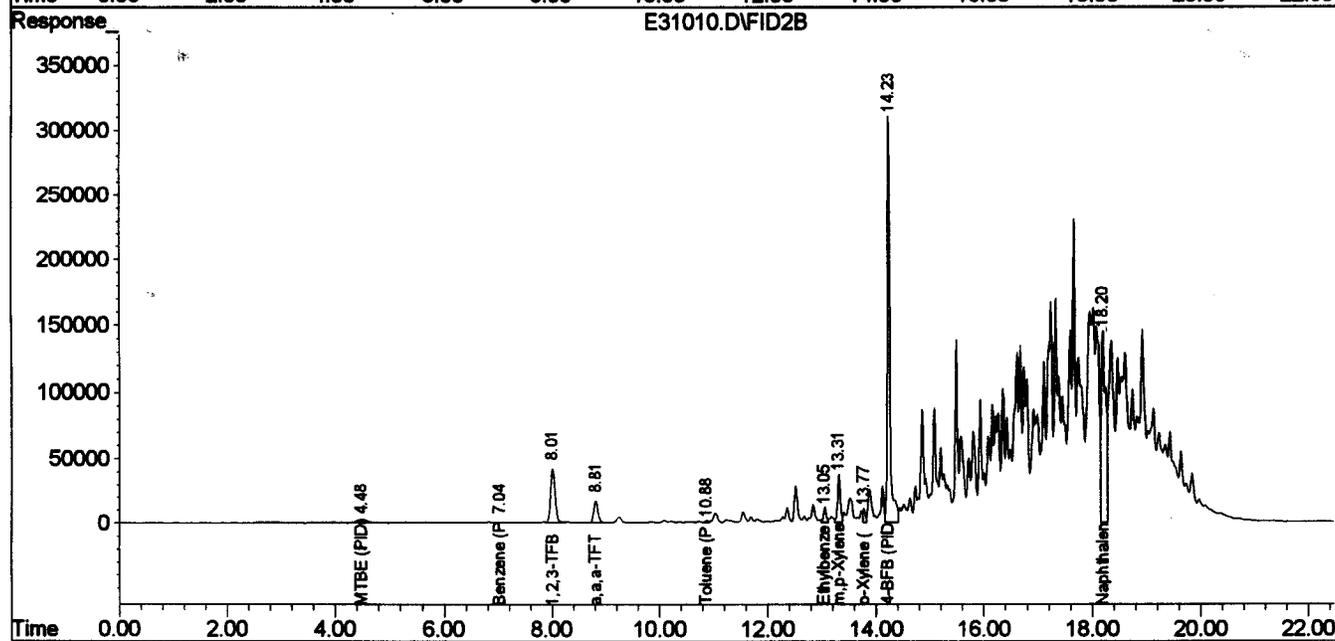
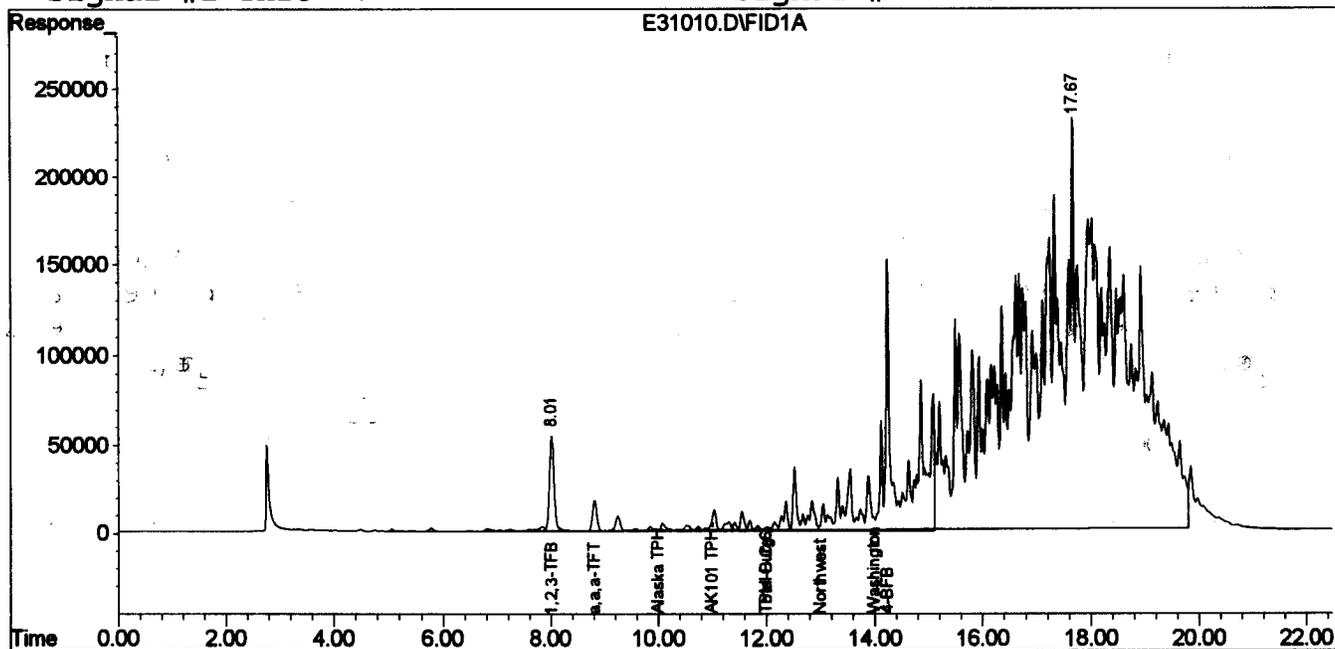


Quantitation Report

Signal #1 : C:\HPCHEM\2\DATA\053105\E31010.D\FID1A.CH Vial: 10  
Signal #2 : C:\HPCHEM\2\DATA\053105\E31010.D\FID2B.CH  
Acq On : 31 May 2005 15:33 Operator: smt  
Sample : b5e0784-12 Inst : GC #4  
Misc : 2x 50uL Multiplr: 1.00  
IntFile Signal #1: SURR.E IntFile Signal #2: SURR2.E  
Quant Time: May 31 15:56 2005 Quant Results File: TGE2005.RES

Quant Method : C:\HPCHEM\2\METHODS\TGE2005.M (Chemstation Integrator)  
Title : TPH-G/BTEX 8015/8021 Method  
Last Update : Tue May 24 12:13:56 2005  
Response via : Multiple Level Calibration  
DataAcq Meth : TGE2005.M

Volume Inj. :  
Signal #1 Phase : Signal #2 Phase:  
Signal #1 Info : Signal #2 Info :

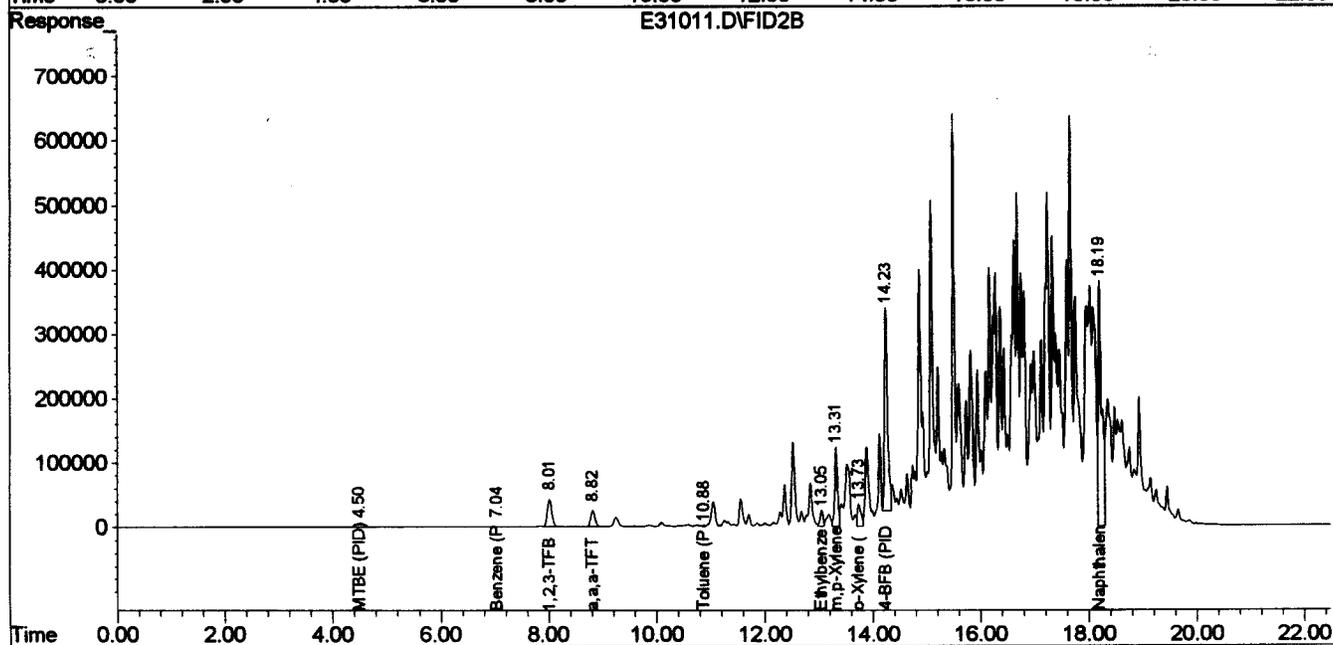
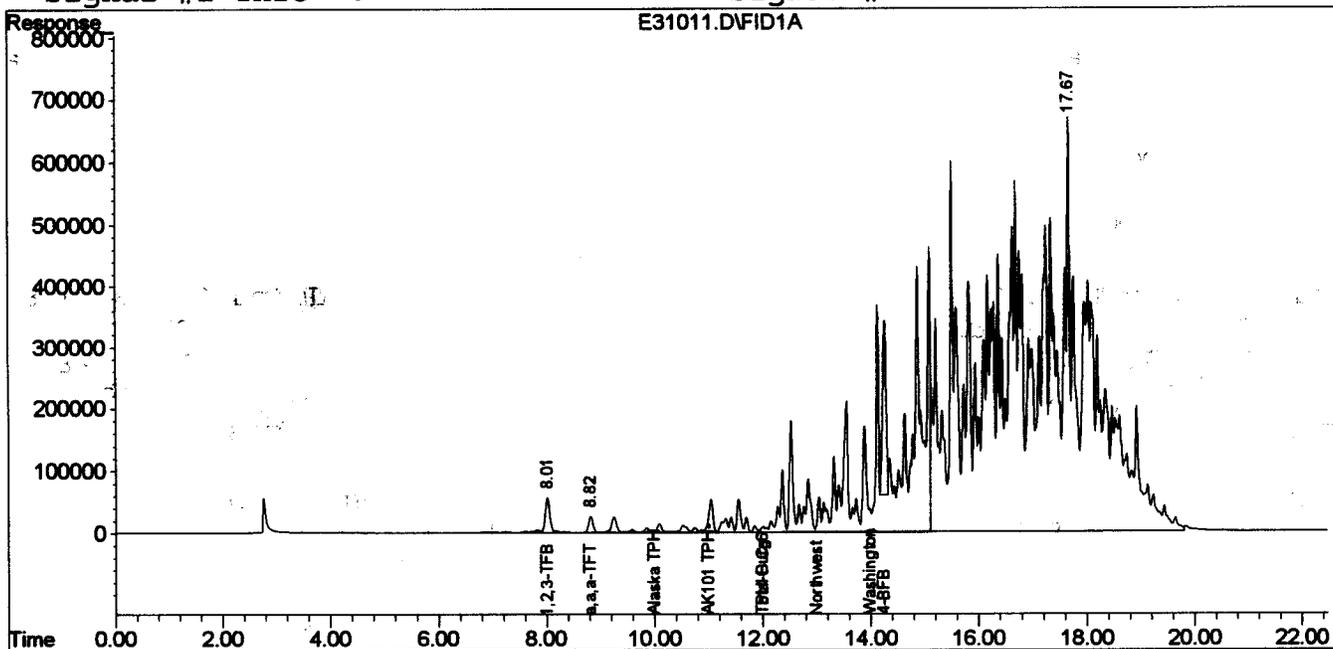


Quantitation Report

Signal #1 : C:\HPCHEM\2\DATA\053105\E31011.D\FID1A.CH Vial: 11  
 Signal #2 : C:\HPCHEM\2\DATA\053105\E31011.D\FID2B.CH  
 Acq On : 31 May 2005 16:03 Operator: smt  
 Sample : b5e0784-13 Inst : GC #4  
 Misc : 2x 50uL Multiplr: 1.00  
 IntFile Signal #1: SURR.E IntFile Signal #2: SURR2.E  
 Quant Time: Jun 1 8:07 2005 Quant Results File: TGE2005.RES

Quant Method : C:\HPCHEM\2\METHODS\TGE2005.M (Chemstation Integrator)  
 Title : TPH-G/BTEX 8015/8021 Method  
 Last Update : Tue May 24 12:13:56 2005  
 Response via : Multiple Level Calibration  
 DataAcq Meth : TGE2005.M

Volume Inj. :  
 Signal #1 Phase : Signal #2 Phase:  
 Signal #1 Info : Signal #2 Info :

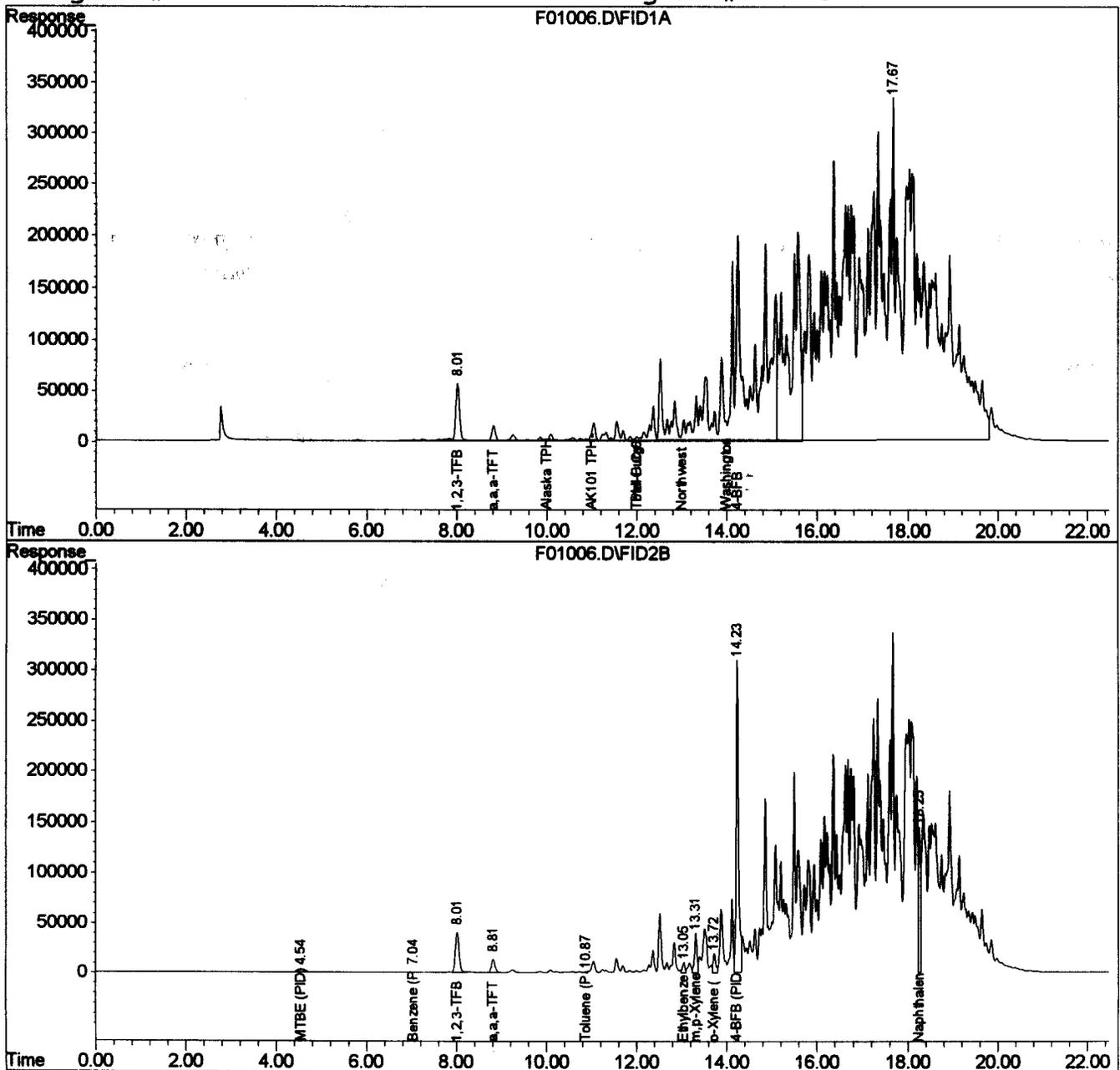


Quantitation Report

Signal #1 : C:\HPCHEM\2\DATA\060105\F01006.D\FID1A.CH Vial: 6  
Signal #2 : C:\HPCHEM\2\DATA\060105\F01006.D\FID2B.CH  
Acq On : 1 Jun 2005 10:47 Operator: smt  
Sample : b5e0784-14rel Inst : GC #4  
Misc : 4x 25 uL Multiplr: 1.00  
IntFile Signal #1: SURR.E IntFile Signal #2: SURR2.E  
Quant Time: Jun 2 19:47 2005 Quant Results File: TGE2005.RES

Quant Method : C:\HPCHEM\2\METHODS\TGE2005.M (Chemstation Integrator)  
Title : TPH-G/BTEX 8015/8021 Method  
Last Update : Tue May 24 12:13:56 2005  
Response via : Multiple Level Calibration  
DataAcq Meth : TGE2005.M

Volume Inj. :  
Signal #1 Phase : Signal #2 Phase:  
Signal #1 Info : Signal #2 Info :

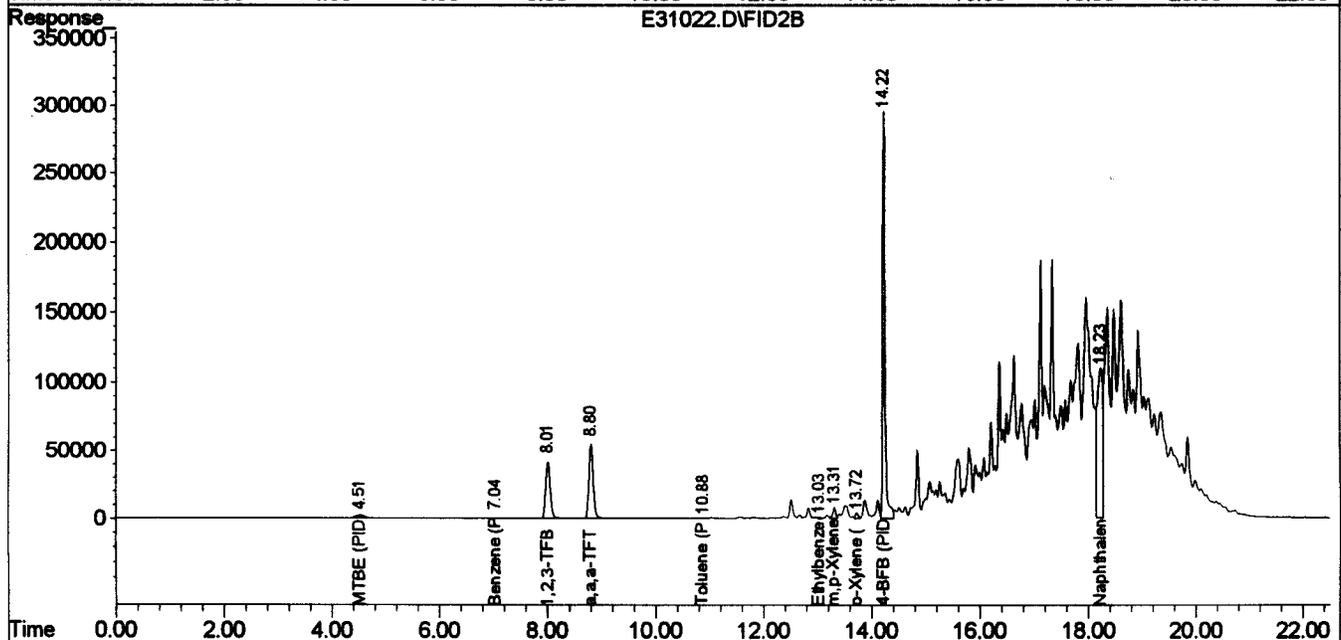
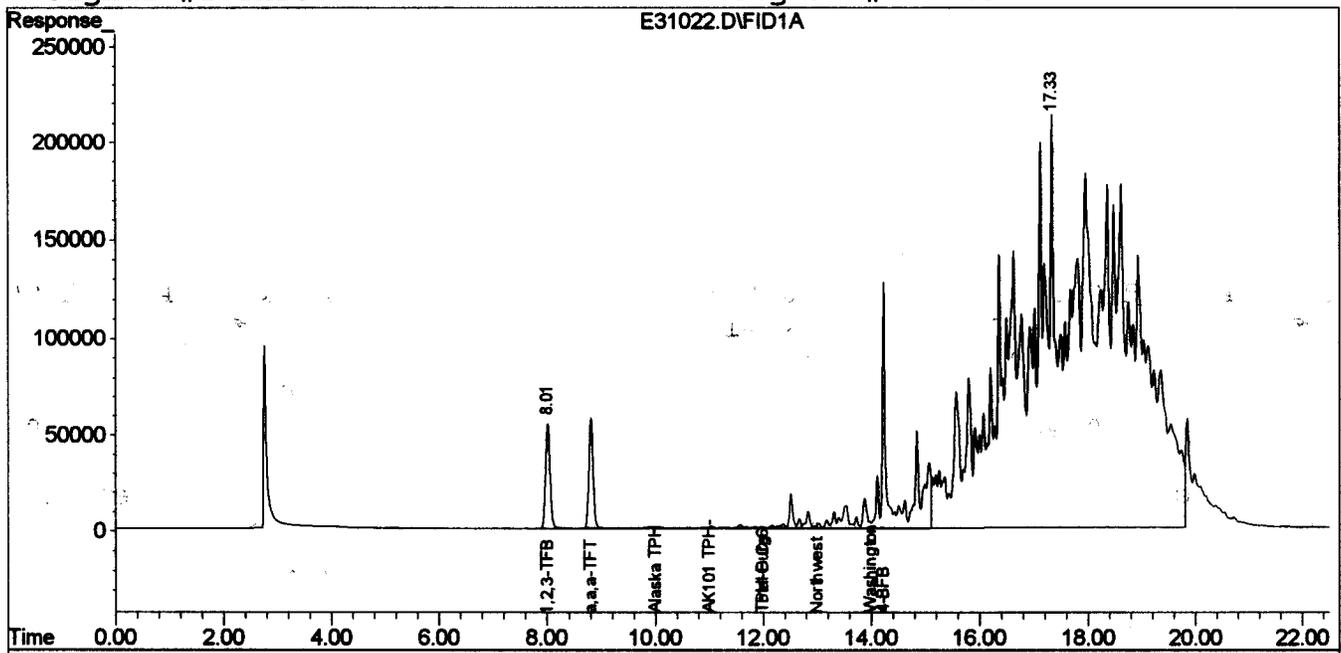


Quantitation Report

Signal #1 : C:\HPCHEM\2\DATA\053105\E31022.D\FID1A.CH Vial: 22  
Signal #2 : C:\HPCHEM\2\DATA\053105\E31022.D\FID2B.CH  
Acq On : 31 May 2005 22:08 Operator: smt  
Sample : b5e0784-16 r1 Inst : GC #4  
Misc : 1x 100 uL Multiplr: 1.00  
IntFile Signal #1: SURR.E IntFile Signal #2: SURR2.E  
Quant Time: May 31 22:31 2005 Quant Results File: TGE2005.RES

Quant Method : C:\HPCHEM\2\METHODS\TGE2005.M (Chemstation Integrator)  
Title : TPH-G/BTEX 8015/8021 Method  
Last Update : Tue May 24 12:13:56 2005  
Response via : Multiple Level Calibration  
DataAcq Meth : TGE2005.M

Volume Inj. :  
Signal #1 Phase : Signal #2 Phase:  
Signal #1 Info : Signal #2 Info :

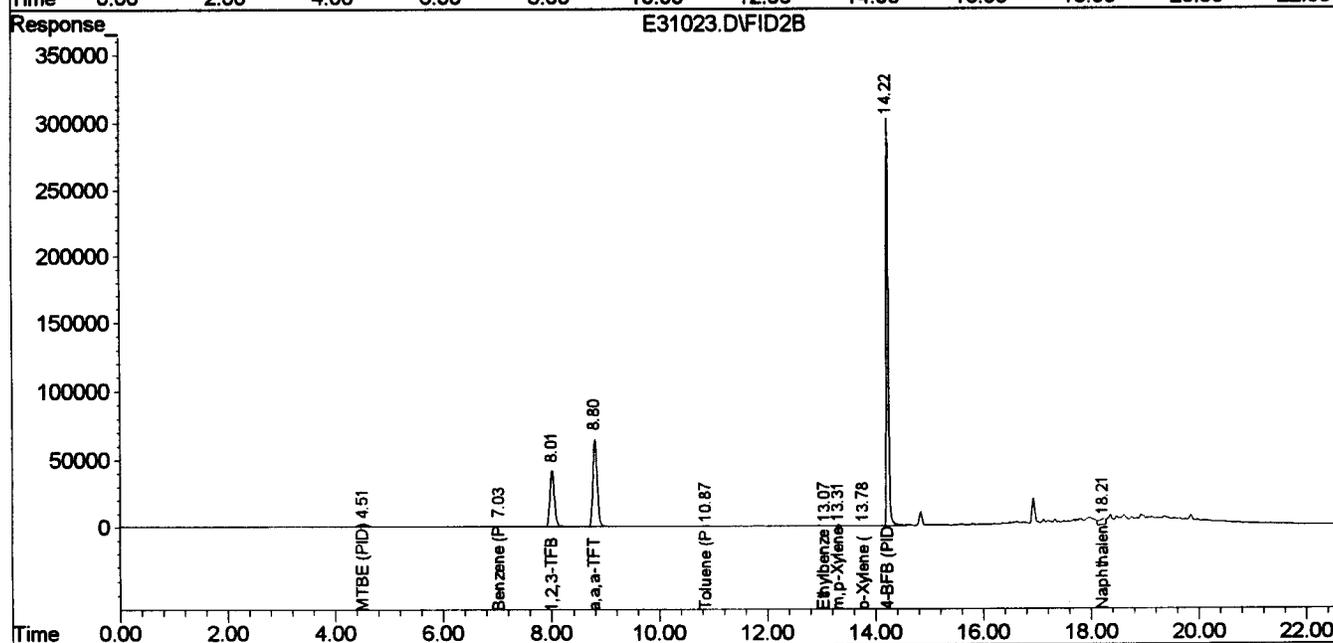
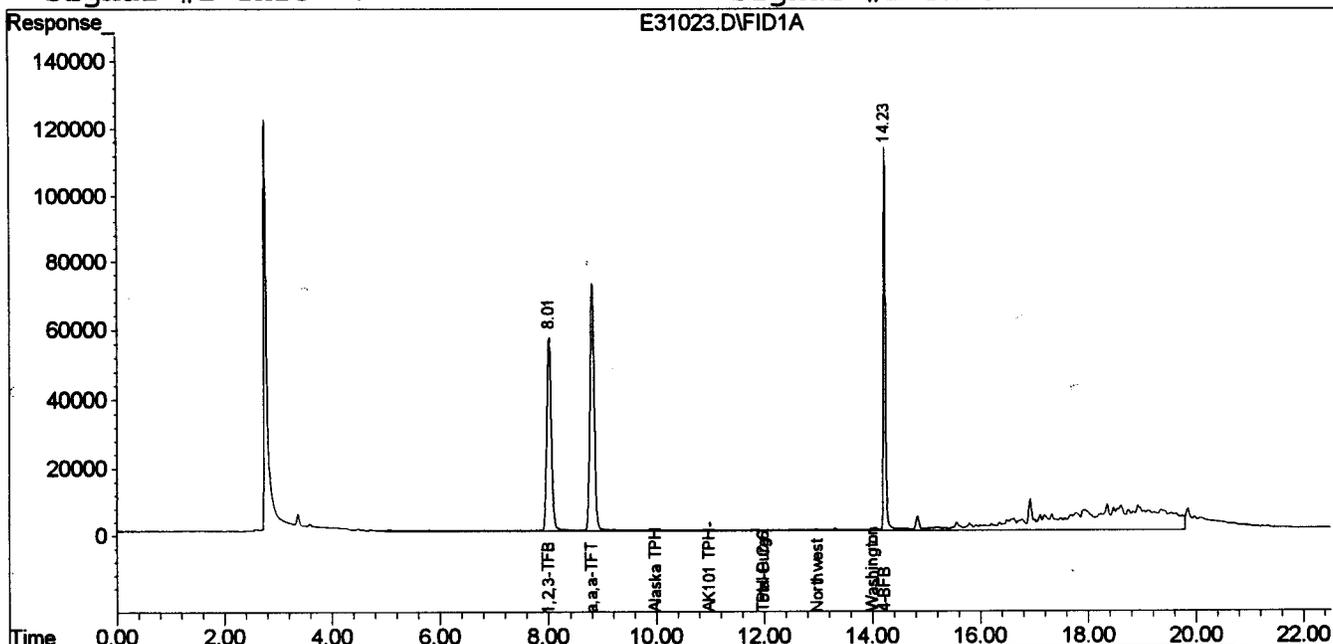


Quantitation Report

Signal #1 : C:\HPCHEM\2\DATA\053105\E31023.D\FID1A.CH Vial: 23  
Signal #2 : C:\HPCHEM\2\DATA\053105\E31023.D\FID2B.CH  
Acq On : 31 May 2005 22:38 Operator: smt  
Sample : b5e0784-20 r1 Inst : GC #4  
Misc : 1x 100 uL 19 *ms* *06/01/05* Multiplr: 1.00  
IntFile Signal #1: SURR.E IntFile Signal #2: SURR2.E  
Quant Time: May 31 23:01 2005 Quant Results File: TGE2005.RES

Quant Method : C:\HPCHEM\2\METHODS\TGE2005.M (Chemstation Integrator)  
Title : TPH-G/BTEX 8015/8021 Method  
Last Update : Tue May 24 12:13:56 2005  
Response via : Multiple Level Calibration  
DataAcq Meth : TGE2005.M

Volume Inj. :  
Signal #1 Phase : Signal #2 Phase:  
Signal #1 Info : Signal #2 Info :



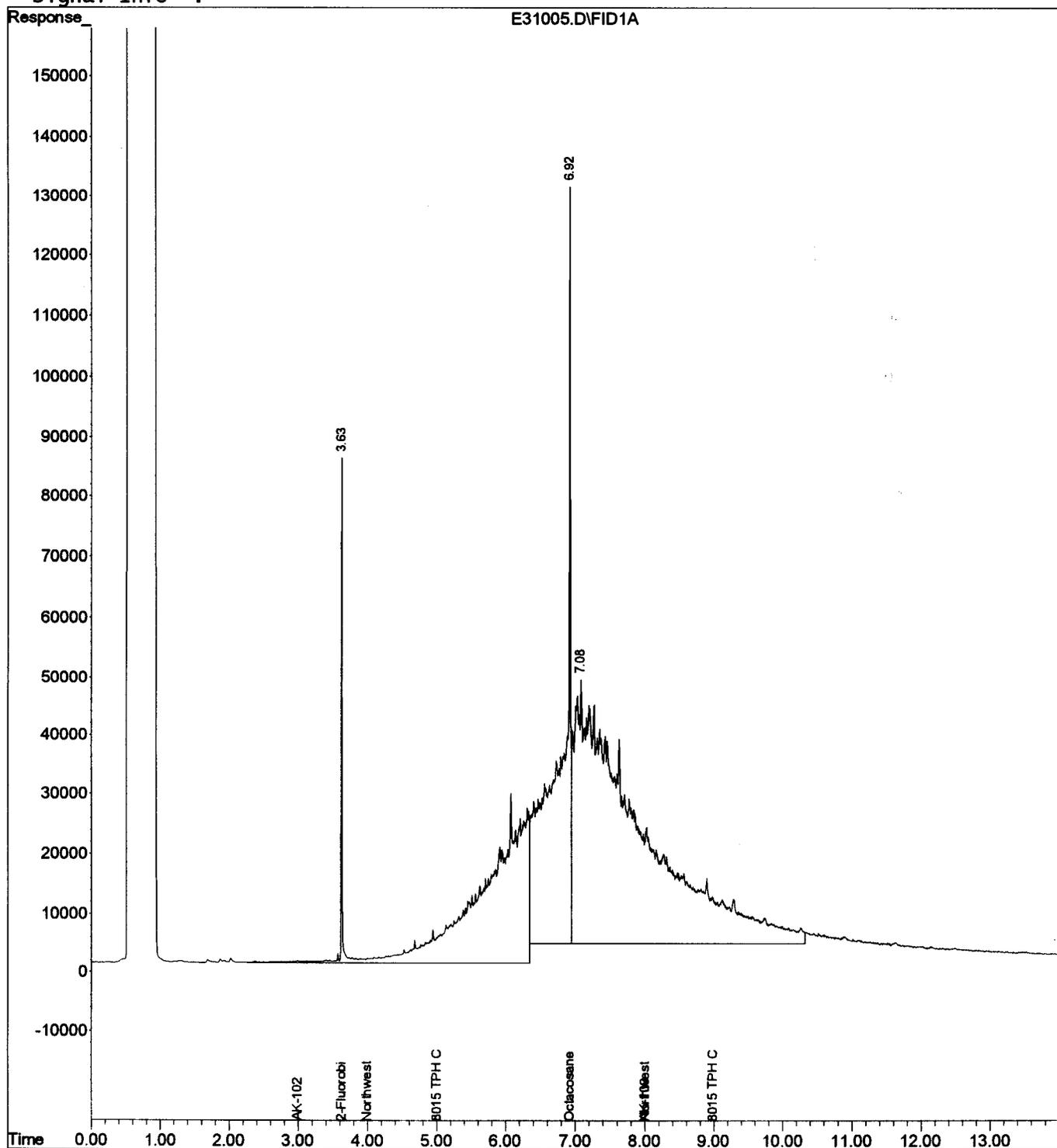
Data File : D:\HPCHEM\1\DATA\053105\E31005.D  
 Acq On : 31 May 2005 12:50  
 Sample : b5e0784-01  
 Misc : 10x ak102/103 s r1  
 IntFile : SURR.E  
 Quant Time: May 31 13:08 2005

Vial: 15  
 Operator: tmk  
 Inst : GC-7  
 Multiplr: 1.00

Quant Results File: TFE1805.RES

Quant Method : D:\HPCHEM\1\METHODS\TFE1805.M (Chemstation Integrator)  
 Title : GC#7 TPH-Dx Rear Column  
 Last Update : Wed May 18 18:25:35 2005  
 Response via : Multiple Level Calibration  
 DataAcq Meth : TFE1805.M

Volume Inj. :  
 Signal Phase :  
 Signal Info :



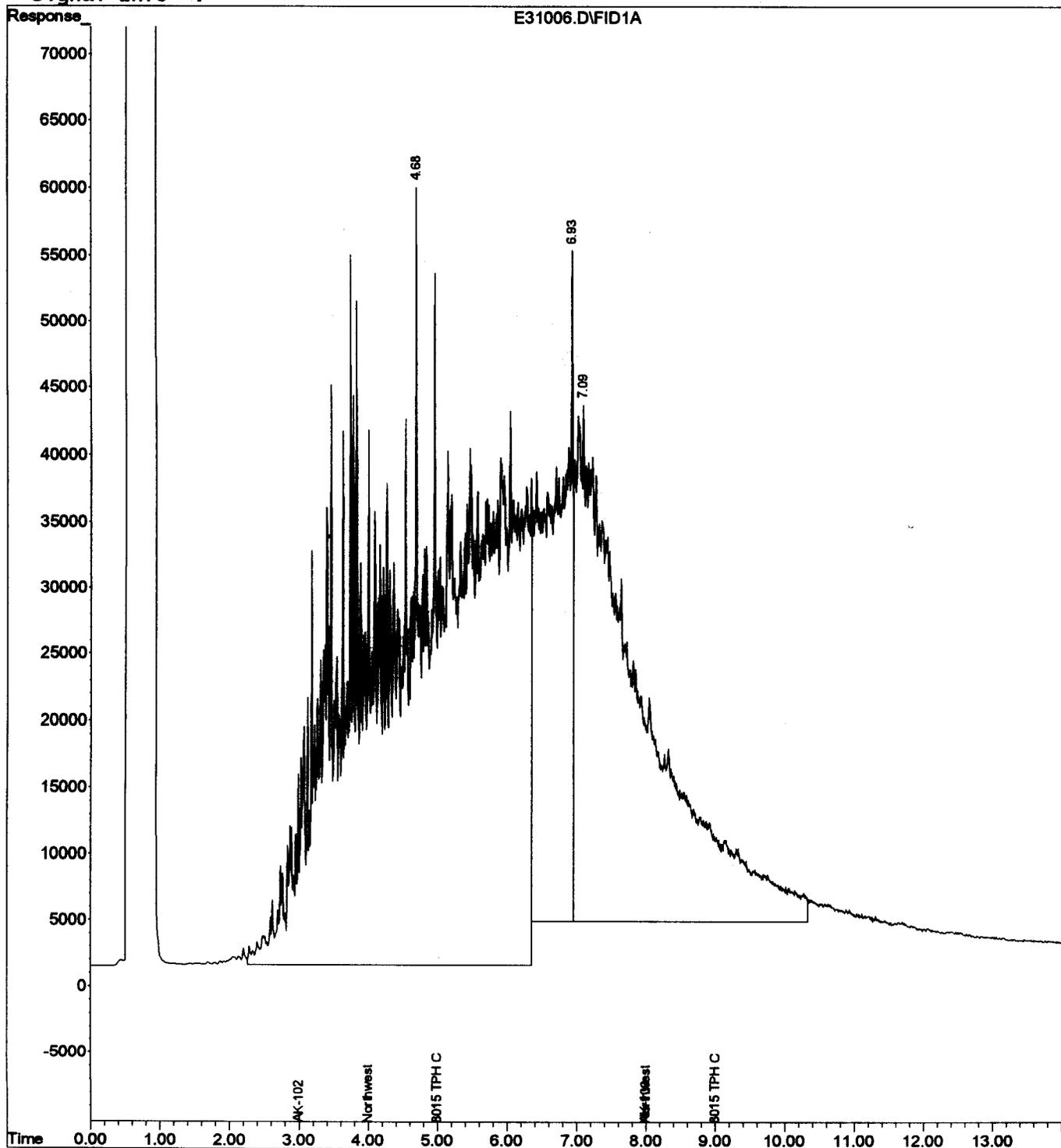
Data File : D:\HPCHEM\1\DATA\053105\E31006.D  
Acq On : 31 May 2005 13:11  
Sample : b5e0784-02  
Misc : 50x ak102/103 s r1  
IntFile : SURR.E  
Quant Time : May 31 13:25 2005

Vial: 19  
Operator: tmk  
Inst : GC-7  
Multiplr: 1.00

Quant Results File: TFE1805.RES

Quant Method : D:\HPCHEM\1\METHODS\TFE1805.M (Chemstation Integrator)  
Title : GC#7 TPH-Dx Rear Column  
Last Update : Wed May 18 18:25:35 2005  
Response via : Multiple Level Calibration  
DataAcq Meth : TFE1805.M

Volume Inj. :  
Signal Phase :  
Signal Info :



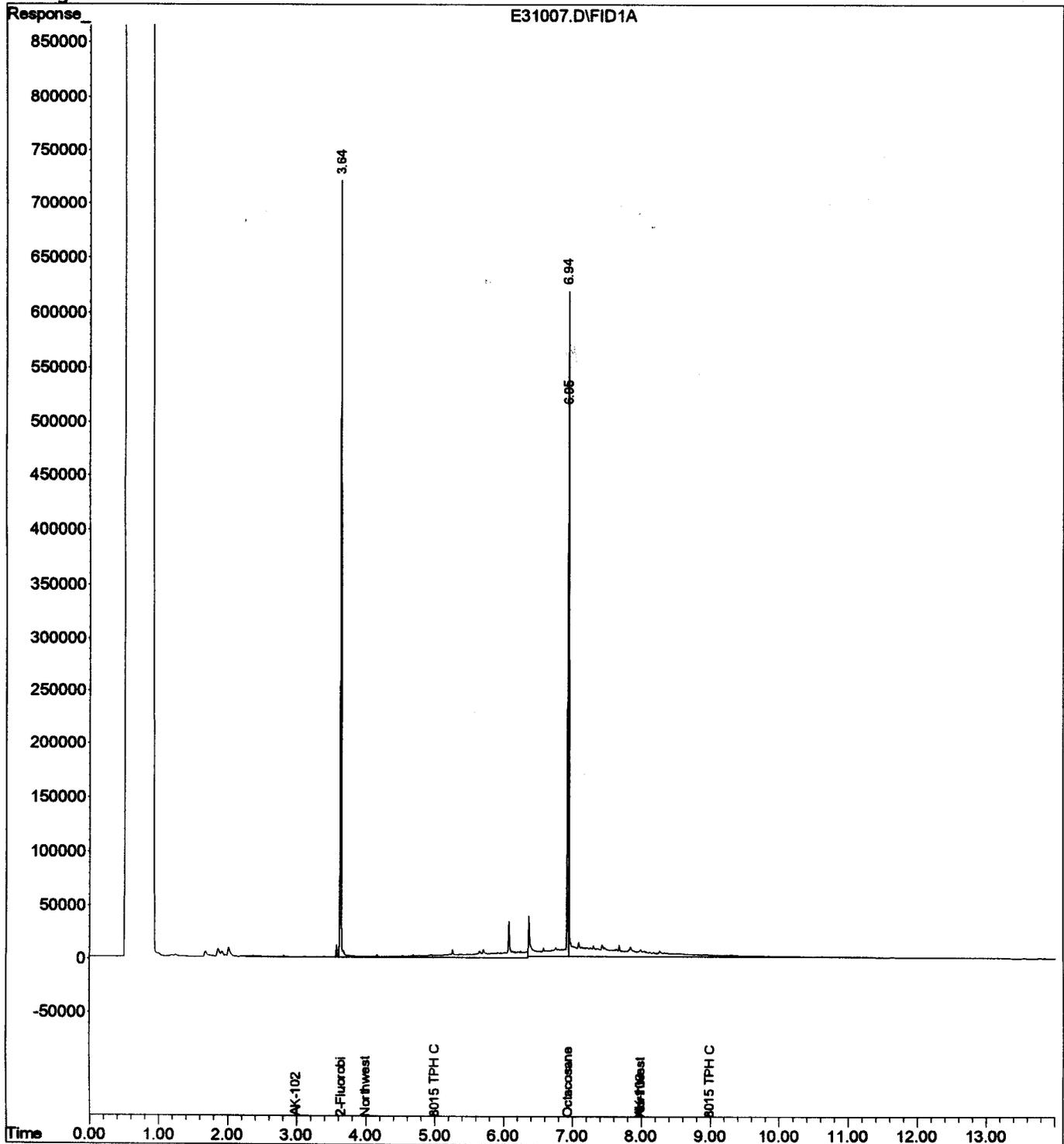
Data File : D:\HPCHEM\1\DATA\053105\E31007.D  
 Acq On : 31 May 2005 13:32  
 Sample : b5e0784-03  
 Misc : 1x ak102/103 s r1  
 IntFile : SURR.E  
 Quant Time: May 31 13:46 2005

Vial: 20  
 Operator: tmk  
 Inst : GC-7  
 Multiplr: 1.00

Quant Results File: TFE1805.RES

Quant Method : D:\HPCHEM\1\METHODS\TFE1805.M (Chemstation Integrator)  
 Title : GC#7 TPH-Dx Rear Column  
 Last Update : Wed May 18 18:25:35 2005  
 Response via : Multiple Level Calibration  
 DataAcq Meth : TFE1805.M

Volume Inj. :  
 Signal Phase :  
 Signal Info :

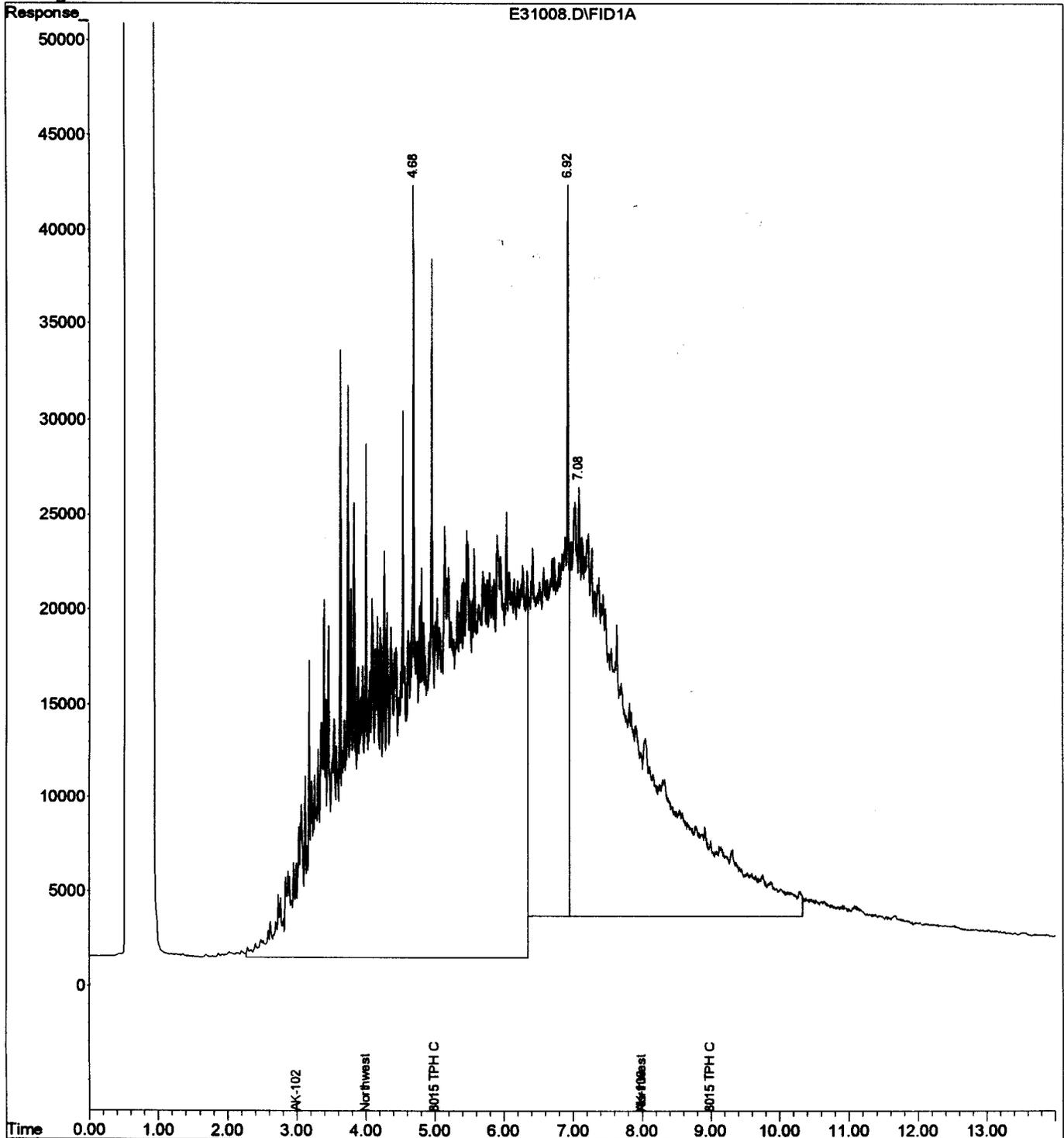


Data File : D:\HPCHEM\1\DATA\053105\E31008.D  
Acq On : 31 May 2005 13:53  
Sample : b5e0784-04  
Misc : 50x ak102/103 s r1  
IntFile : SURR.E  
Quant Time: May 31 14:08 2005

Vial: 21  
Operator: tmk  
Inst : GC-7  
Multiplr: 1.00

Quant Method : D:\HPCHEM\1\METHODS\TFE1805.M (Chemstation Integrator)  
Title : GC#7 TPH-Dx Rear Column  
Last Update : Wed May 18 18:25:35 2005  
Response via : Multiple Level Calibration  
DataAcq Meth : TFE1805.M

Volume Inj. :  
Signal Phase :  
Signal Info :



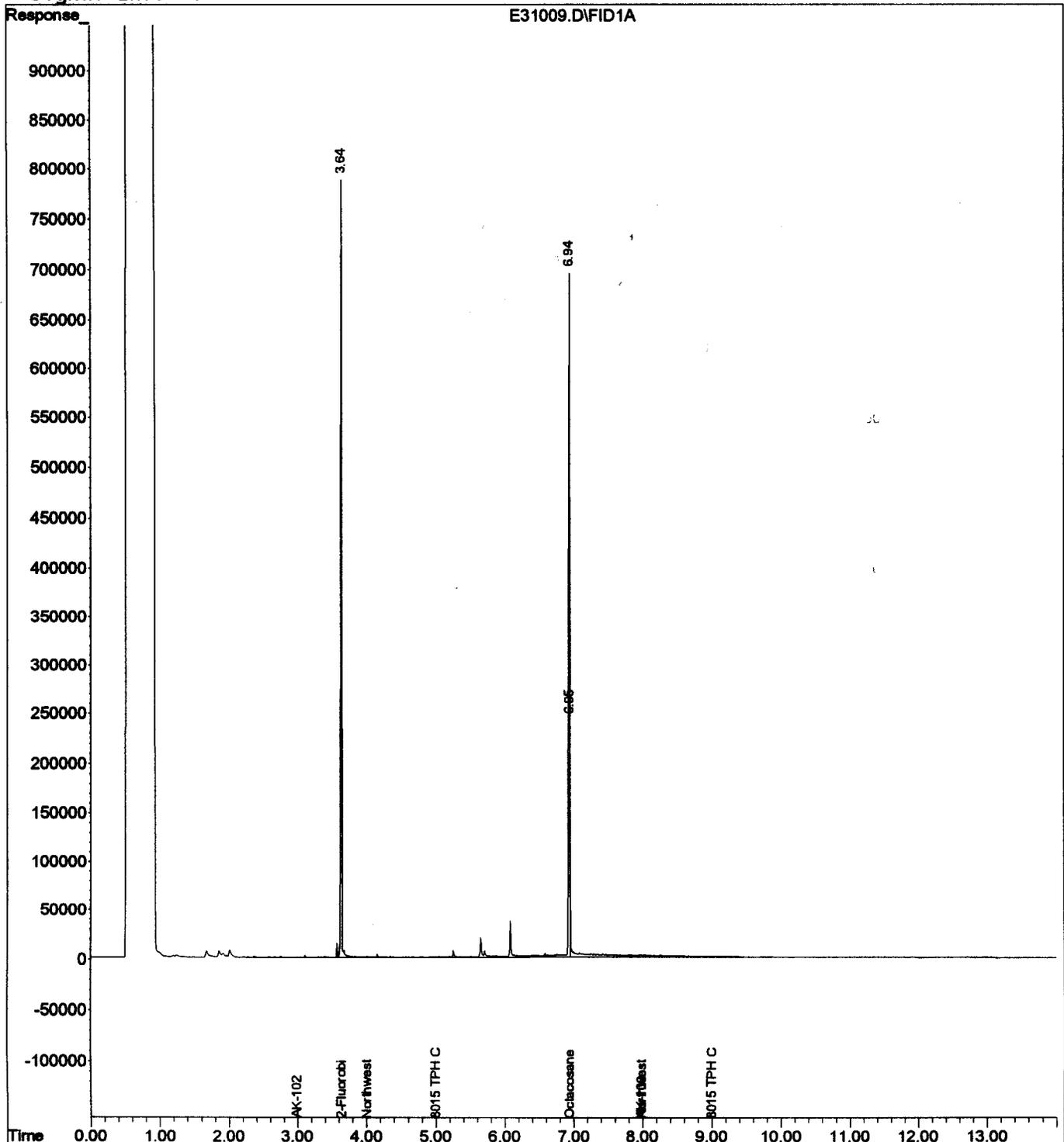
Data File : D:\HPCHEM\1\DATA\053105\E31009.D  
 Acq On : 31 May 2005 14:15  
 Sample : b5e0784-05  
 Misc : 1x ak102/103 s r1  
 IntFile : SURR.E  
 Quant Time: May 31 14:29 2005

Vial: 22  
 Operator: tmk  
 Inst : GC-7  
 Multiplr: 1.00

Quant Results File: TFE1805.RES

Quant Method : D:\HPCHEM\1\METHODS\TFE1805.M (Chemstation Integrator)  
 Title : GC#7 TPH-Dx Rear Column  
 Last Update : Wed May 18 18:25:35 2005  
 Response via : Multiple Level Calibration  
 DataAcq Meth : TFE1805.M

Volume Inj. :  
 Signal Phase :  
 Signal Info :



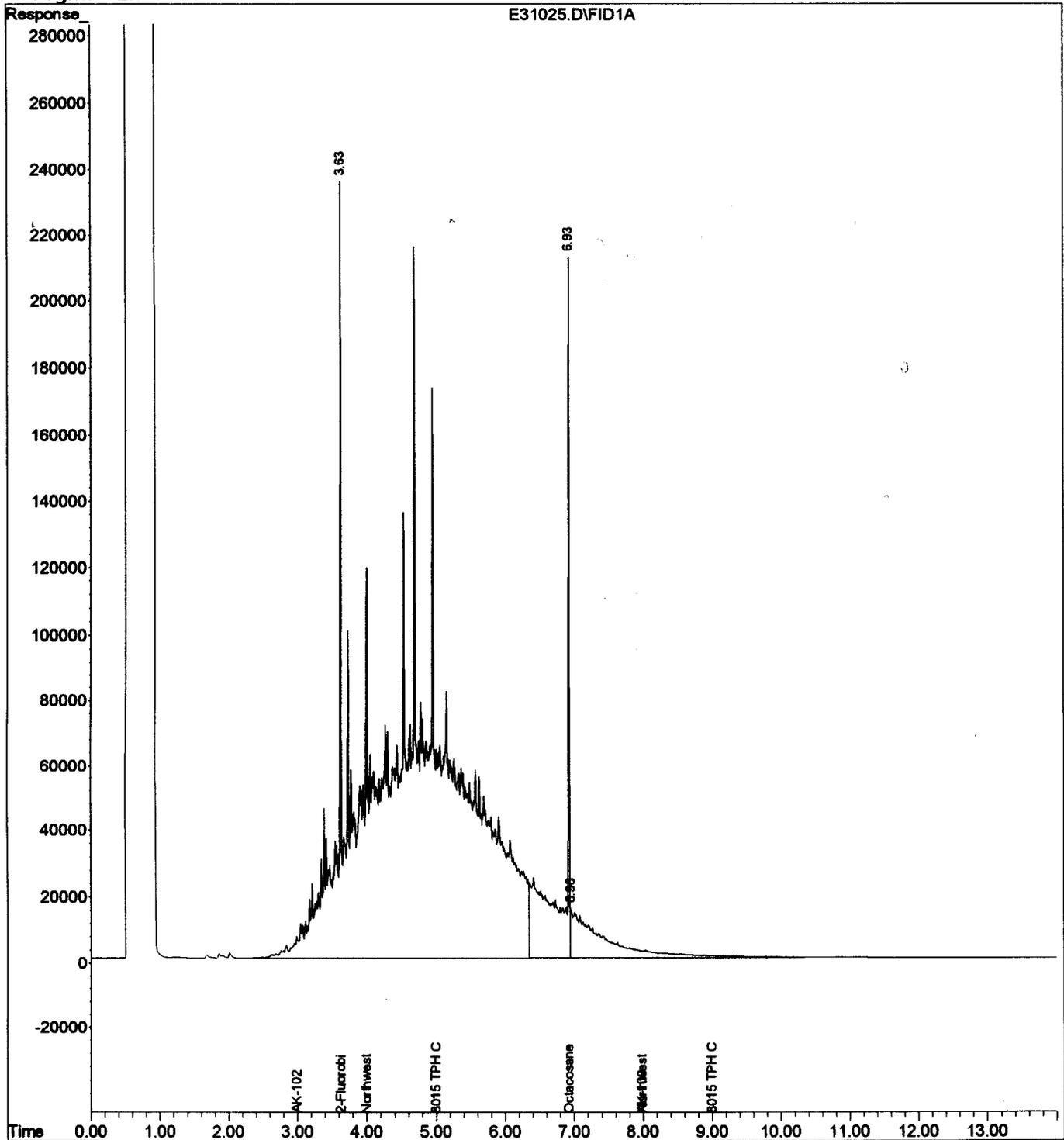
Data File : D:\HPCHEM\1\DATA\053105\E31025.D  
 Acq On : 31 May 2005 20:02  
 Sample : b5e0784-06  
 Misc : 5x ak102/103 s r2  
 IntFile : SURR.E  
 Quant Time: May 31 20:23 2005

Vial: 38  
 Operator: tmk  
 Inst : GC-7  
 Multiplr: 1.00

Quant Results File: TFE1805.RES

Quant Method : D:\HPCHEM\1\METHODS\TFE1805.M (Chemstation Integrator)  
 Title : GC#7 TPH-DX Rear Column  
 Last Update : Wed May 18 18:25:35 2005  
 Response via : Multiple Level Calibration  
 DataAcq Meth : TFE1805.M

Volume Inj. :  
 Signal Phase :  
 Signal Info :

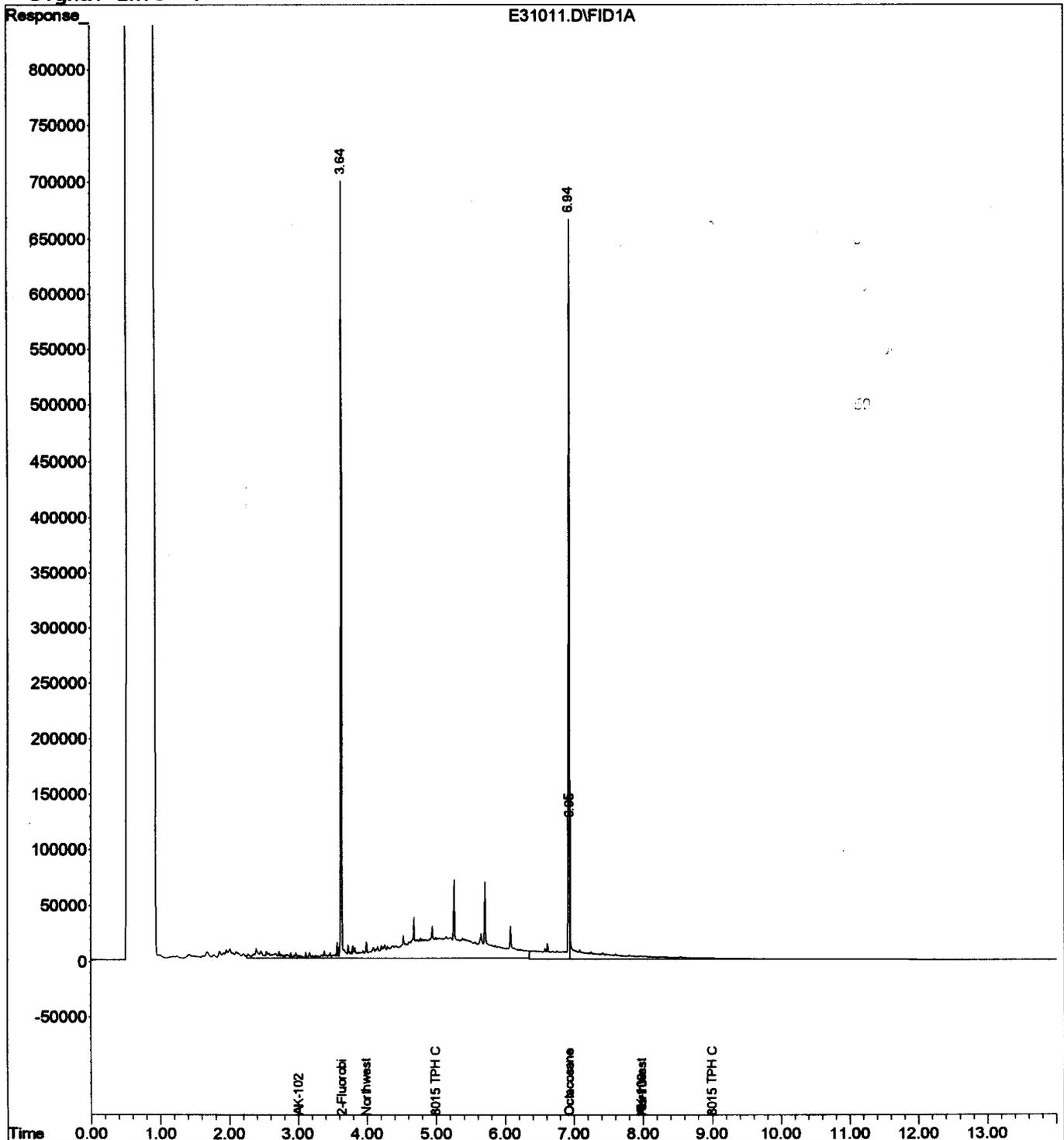


Data File : D:\HPCHEM\1\DATA\053105\E31011.D  
Acq On : 31 May 2005 14:58  
Sample : b5e0784-07  
Misc : 1x ak102/103 s  
IntFile : SURR.E  
Quant Time: May 31 15:12 2005

Vial: 24  
Operator: tmk  
Inst : GC-7  
Multiplr: 1.00

Quant Method : D:\HPCHEM\1\METHODS\TFE1805.M (Chemstation Integrator)  
Title : GC#7 TPH-Dx Rear Column  
Last Update : Wed May 18 18:25:35 2005  
Response via : Multiple Level Calibration  
DataAcq Meth : TFE1805.M

Volume Inj. :  
Signal Phase :  
Signal Info :



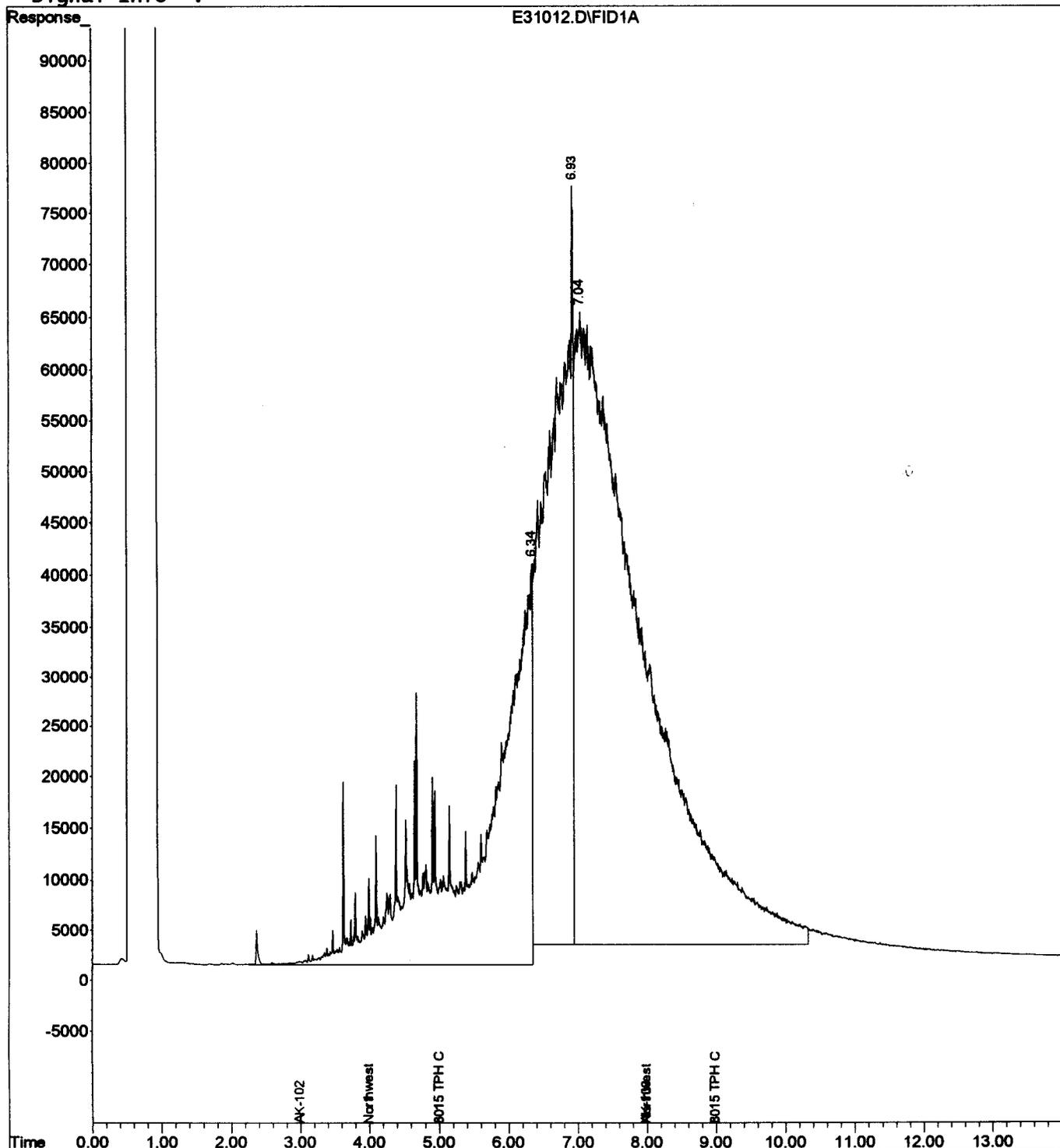
Data File : D:\HPCHEM\1\DATA\053105\E31012.D  
Acq On : 31 May 2005 15:19  
Sample : b5e0784-08  
Misc : 50x ak102/103 s  
IntFile : SURR.E  
Quant Time: May 31 15:33 2005

Vial: 25  
Operator: tmk  
Inst : GC-7  
Multiplr: 1.00

Quant Results File: TFE1805.RES

Quant Method : D:\HPCHEM\1\METHODS\TFE1805.M (Chemstation Integrator)  
Title : GC#7 TPH-Dx Rear Column  
Last Update : Wed May 18 18:25:35 2005  
Response via : Multiple Level Calibration  
DataAcq Meth : TFE1805.M

Volume Inj. :  
Signal Phase :  
Signal Info :



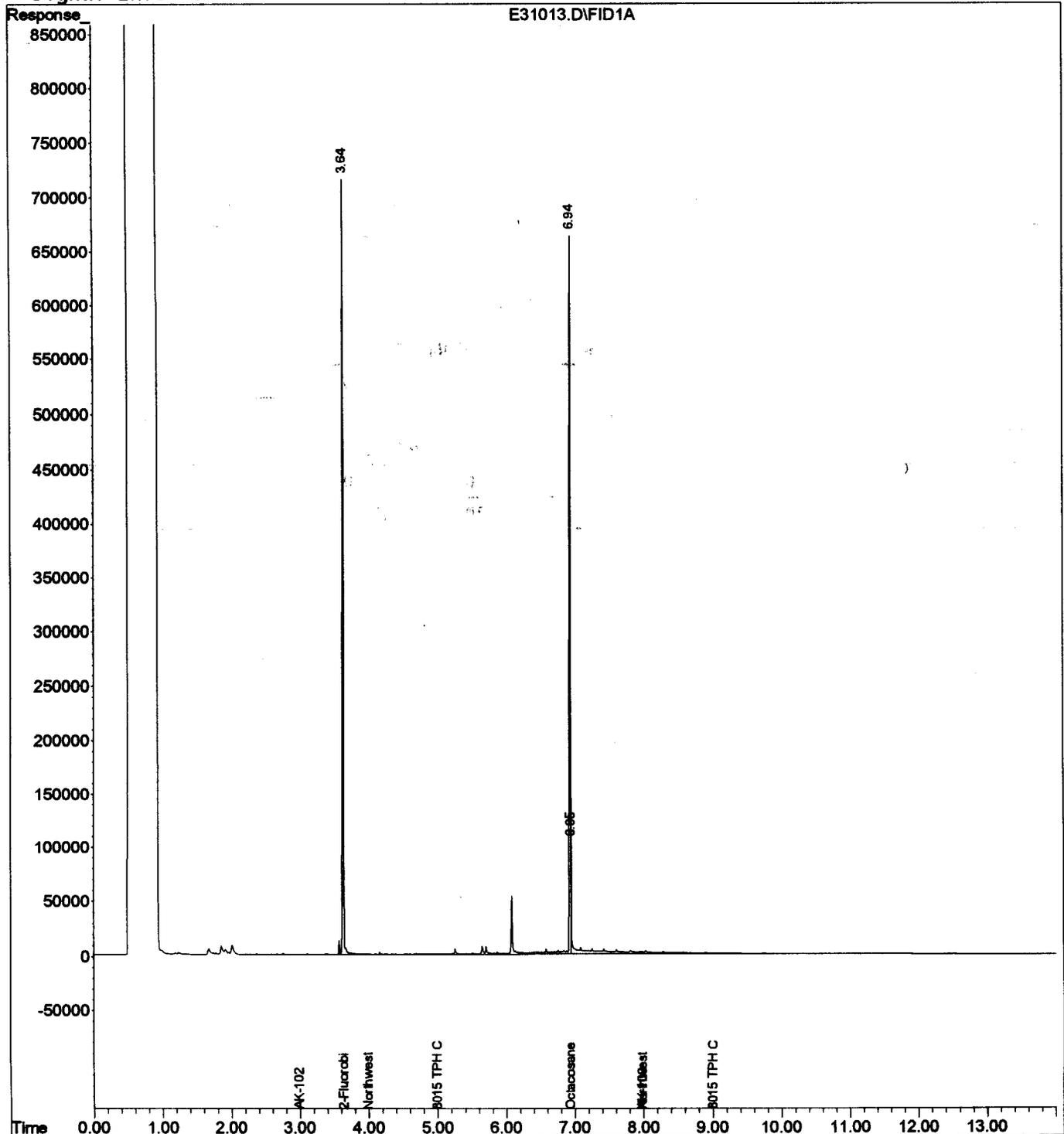
Data File : D:\HPCHEM\1\DATA\053105\E31013.D  
 Acq On : 31 May 2005 15:40  
 Sample : b5e0784-09  
 Misc : 1x ak102/103 s  
 IntFile : SURR.E  
 Quant Time: May 31 15:55 2005

Vial: 26  
 Operator: tmk  
 Inst : GC-7  
 Multiplr: 1.00

Quant Results File: TFE1805.RES

Quant Method : D:\HPCHEM\1\METHODS\TFE1805.M (Chemstation Integrator)  
 Title : GC#7 TPH-Dx Rear Column  
 Last Update : Wed May 18 18:25:35 2005  
 Response via : Multiple Level Calibration  
 DataAcq Meth : TFE1805.M

Volume Inj. :  
 Signal Phase :  
 Signal Info :



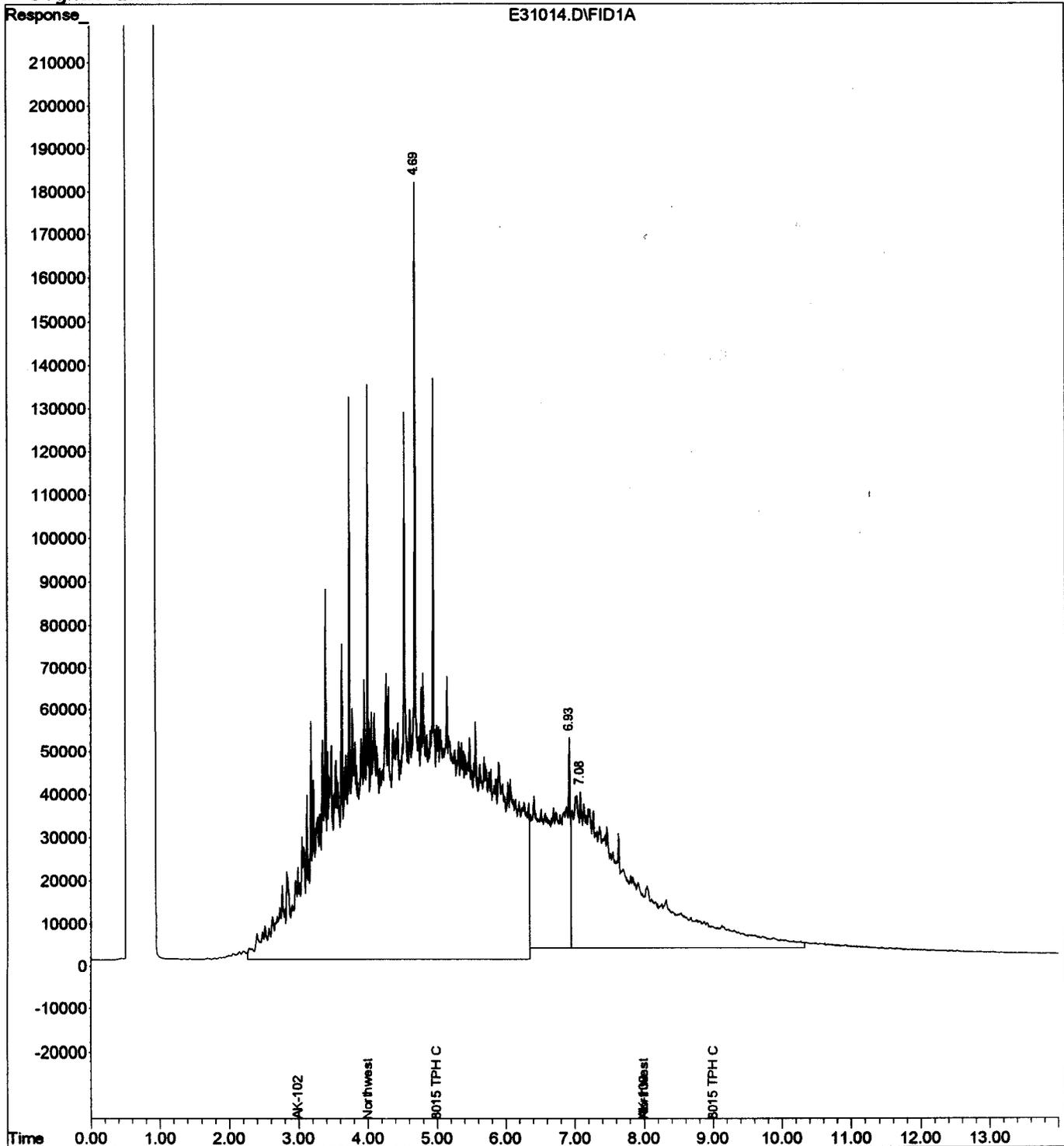
Data File : D:\HPCHEM\1\DATA\053105\E31014.D  
 Acq On : 31 May 2005 16:02  
 Sample : b5e0784-10  
 Misc : 50x ak102/103 s  
 IntFile : SURR.E  
 Quant Time: May 31 16:16 2005

Vial: 27  
 Operator: tmk  
 Inst : GC-7  
 Multiplr: 1.00

Quant Results File: TFE1805.RES

Quant Method : D:\HPCHEM\1\METHODS\TFE1805.M (Chemstation Integrator)  
 Title : GC#7 TPH-Dx Rear Column  
 Last Update : Wed May 18 18:25:35 2005  
 Response via : Multiple Level Calibration  
 DataAcq Meth : TFE1805.M

Volume Inj. :  
 Signal Phase :  
 Signal Info :



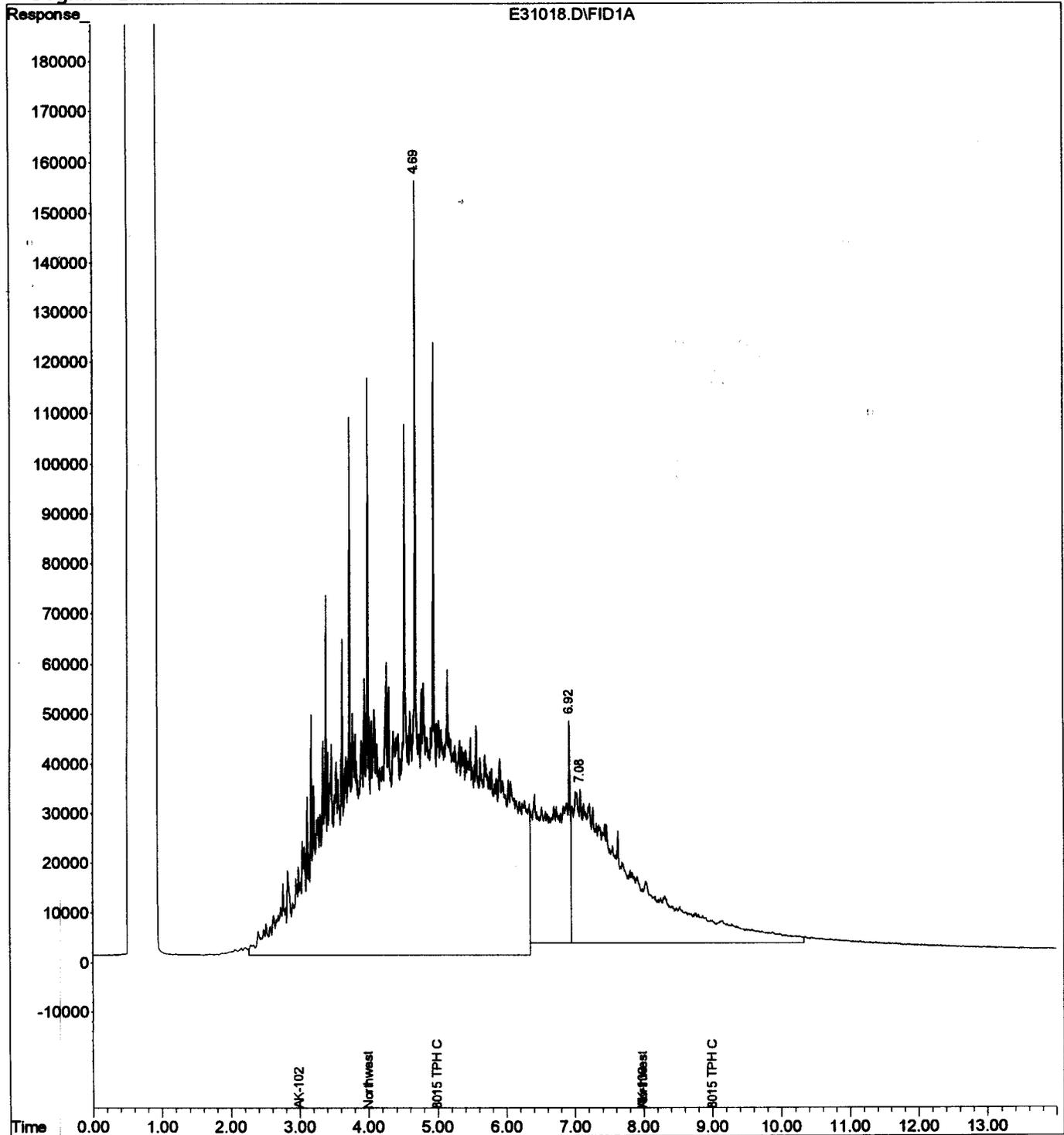
Data File : D:\HPCHEM\1\DATA\053105\E31018.D  
 Acq On : 31 May 2005 17:33  
 Sample : b5e0784-11  
 Misc : 50x ak102/103 s  
 IntFile : SURR.E  
 Quant Time: May 31 17:47 2005

Vial: 31  
 Operator: tmk  
 Inst : GC-7  
 Multiplr: 1.00

Quant Results File: TFE1805.RES

Quant Method : D:\HPCHEM\1\METHODS\TFE1805.M (Chemstation Integrator)  
 Title : GC#7 TPH-Dx Rear Column  
 Last Update : Wed May 18 18:25:35 2005  
 Response via : Multiple Level Calibration  
 DataAcq Meth : TFE1805.M

Volume Inj. :  
 Signal Phase :  
 Signal Info :

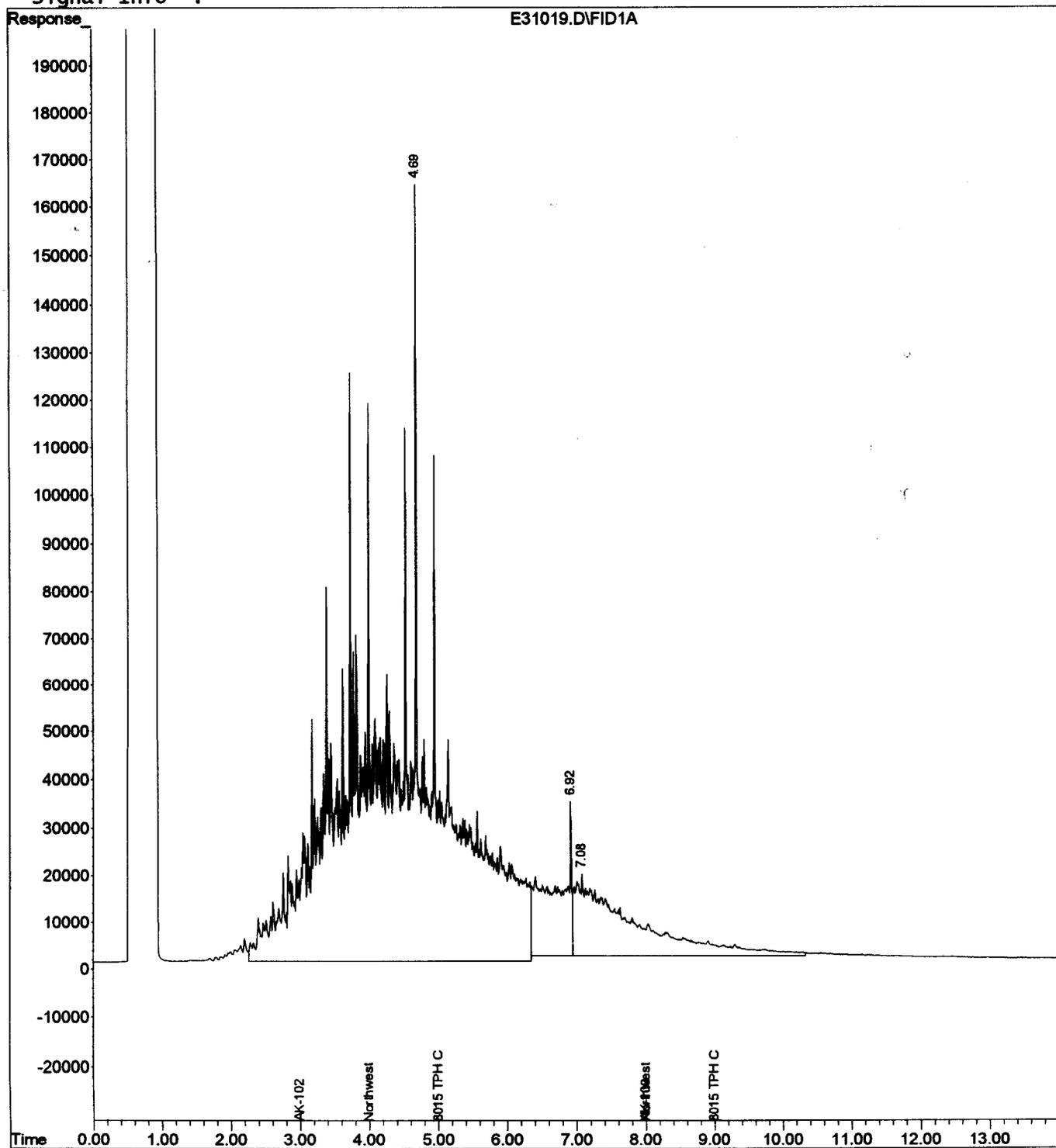


Data File : D:\HPCHEM\1\DATA\053105\E31019.D  
 Acq On : 31 May 2005 17:54  
 Sample : b5e0784-12  
 Misc : 50x ak102/103 s  
 IntFile : SURR.E  
 Quant Time: May 31 18:08 2005

Vial: 32  
 Operator: tmk  
 Inst : GC-7  
 Multiplr: 1.00

Quant Method : D:\HPCHEM\1\METHODS\TFE1805.M (Chemstation Integrator)  
 Title : GC#7 TPH-Dx Rear Column  
 Last Update : Wed May 18 18:25:35 2005  
 Response via : Multiple Level Calibration  
 DataAcq Meth : TFE1805.M

Volume Inj. :  
 Signal Phase :  
 Signal Info :



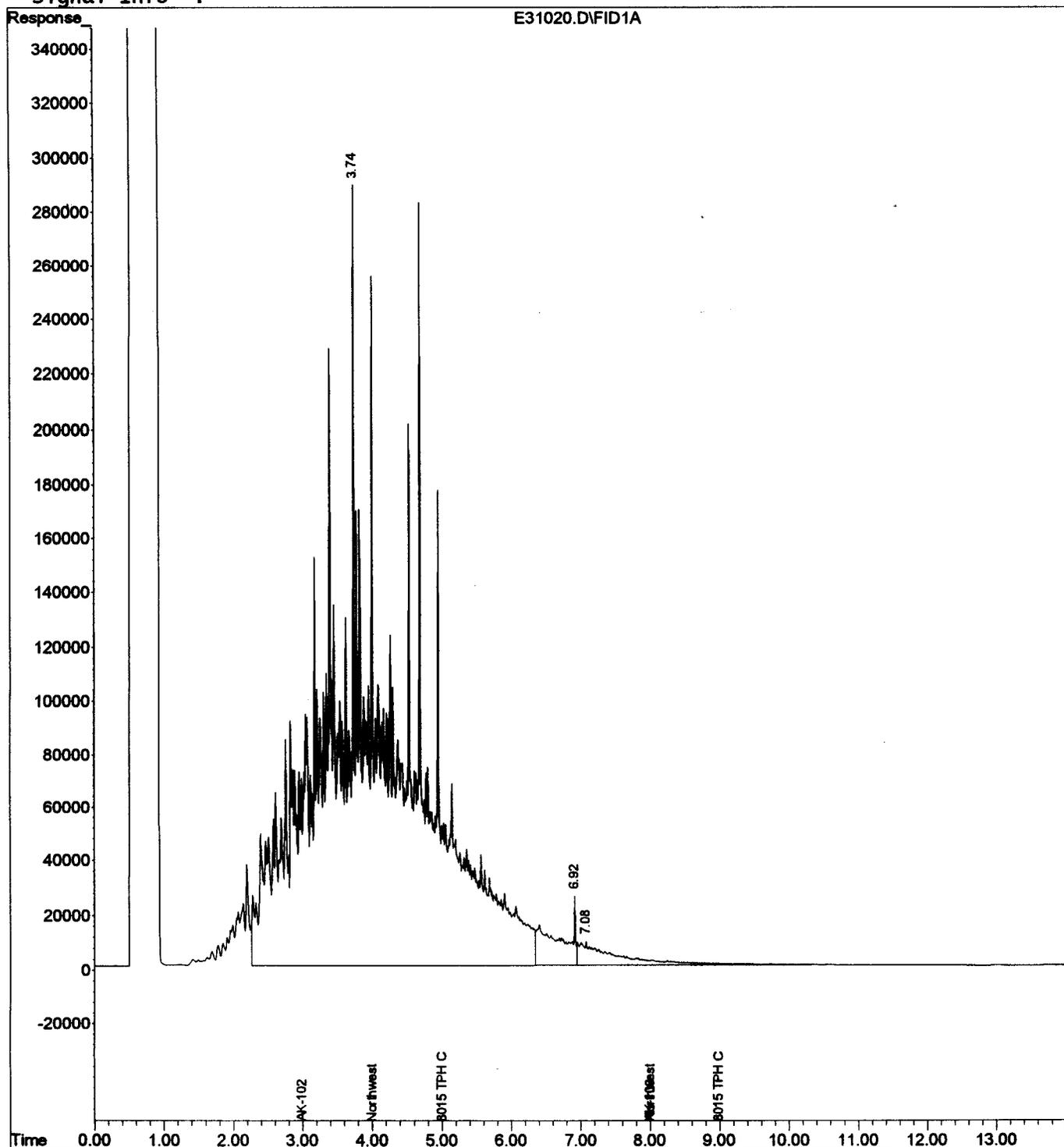
Data File : D:\HPCHEM\1\DATA\053105\E31020.D  
Acq On : 31 May 2005 18:15  
Sample : b5e0784-13  
Misc : 50x ak102/103 s  
IntFile : SURR.E  
Quant Time: May 31 18:29 2005

Vial: 33  
Operator: tmk  
Inst : GC-7  
Multiplr: 1.00

Quant Results File: TFE1805.RES

Quant Method : D:\HPCHEM\1\METHODS\TFE1805.M (Chemstation Integrator)  
Title : GC#7 TPH-DX Rear Column  
Last Update : Wed May 18 18:25:35 2005  
Response via : Multiple Level Calibration  
DataAcq Meth : TFE1805.M

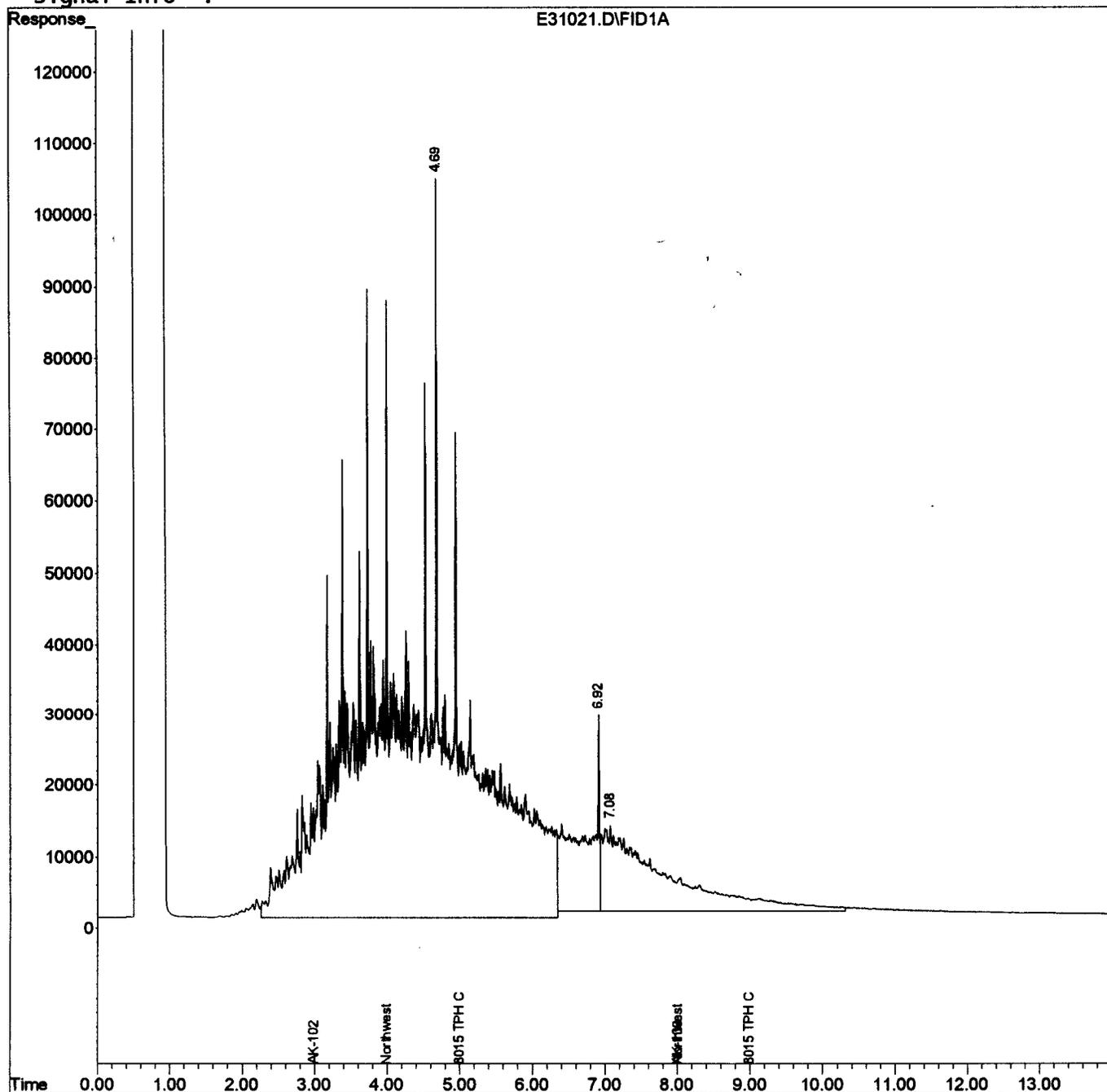
Volume Inj. :  
Signal Phase :  
Signal Info :



Data File : D:\HPCHEM\1\DATA\053105\E31021.D Vial: 34  
 Acq On : 31 May 2005 18:36 Operator: tmk  
 Sample : b5e0784-14 Inst : GC-7  
 Misc : 50x ak102/103 s Multiplr: 1.00  
 IntFile : SURR.E  
 Quant Time: May 31 18:51 2005 Quant Results File: TFE1805.RES

Quant Method : D:\HPCHEM\1\METHODS\TFE1805.M (Chemstation Integrator)  
 Title : GC#7 TPH-DX Rear Column  
 Last Update : Wed May 18 18:25:35 2005  
 Response via : Multiple Level Calibration  
 DataAcq Meth : TFE1805.M

Volume Inj. :  
 Signal Phase :  
 Signal Info :



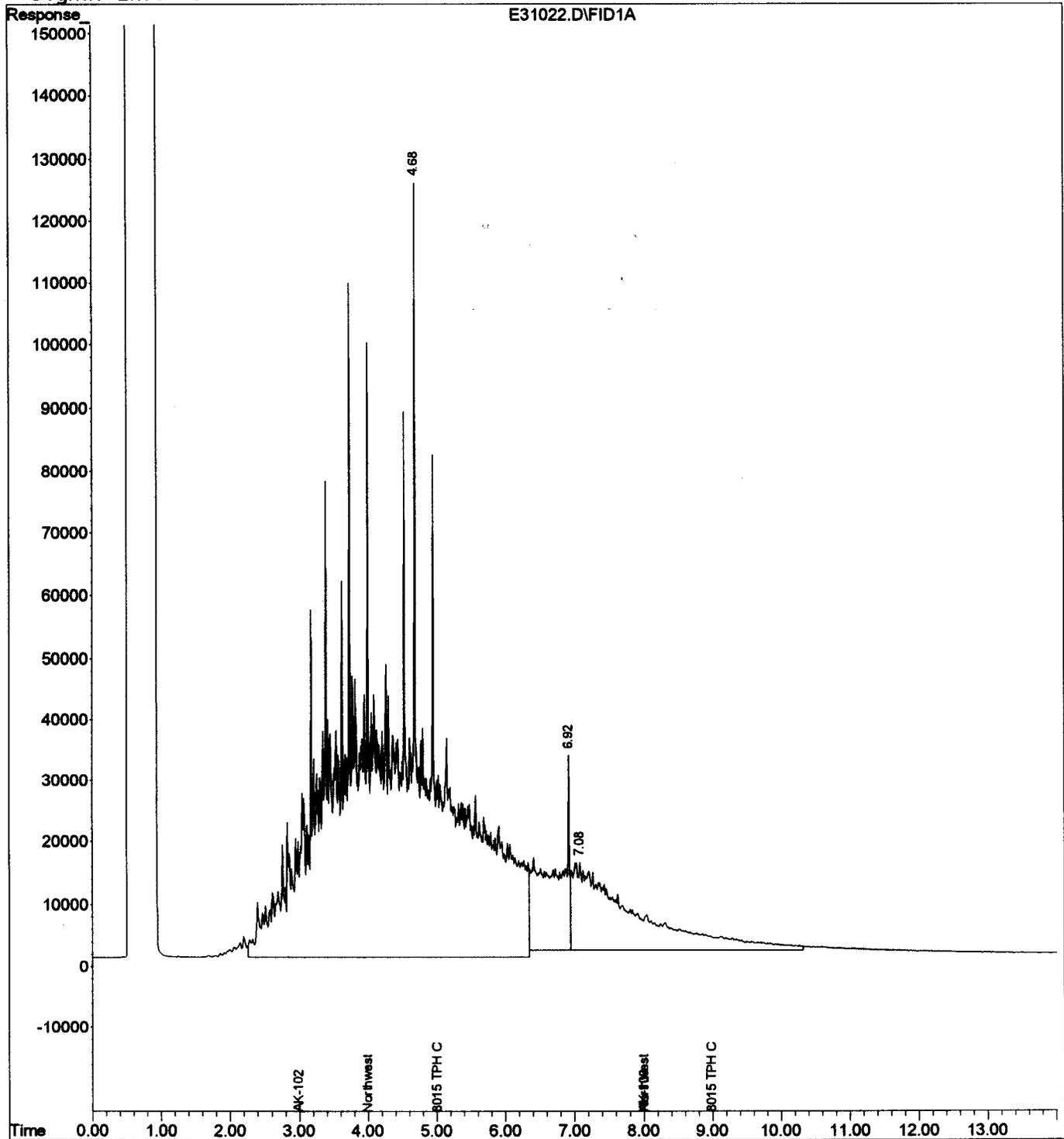
Data File : D:\HPCHEM\1\DATA\053105\E31022.D  
 Acq On : 31 May 2005 18:58  
 Sample : b5e0784-15  
 Misc : 50x ak102/103 s  
 IntFile : SURR.E  
 Quant Time: May 31 19:12 2005

Vial: 35  
 Operator: tmk  
 Inst : GC-7  
 Multiplr: 1.00

Quant Results File: TFE1805.RES

Quant Method : D:\HPCHEM\1\METHODS\TFE1805.M (Chemstation Integrator)  
 Title : GC#7 TPH-DX Rear Column  
 Last Update : Wed May 18 18:25:35 2005  
 Response via : Multiple Level Calibration  
 DataAcq Meth : TFE1805.M

Volume Inj. :  
 Signal Phase :  
 Signal Info :



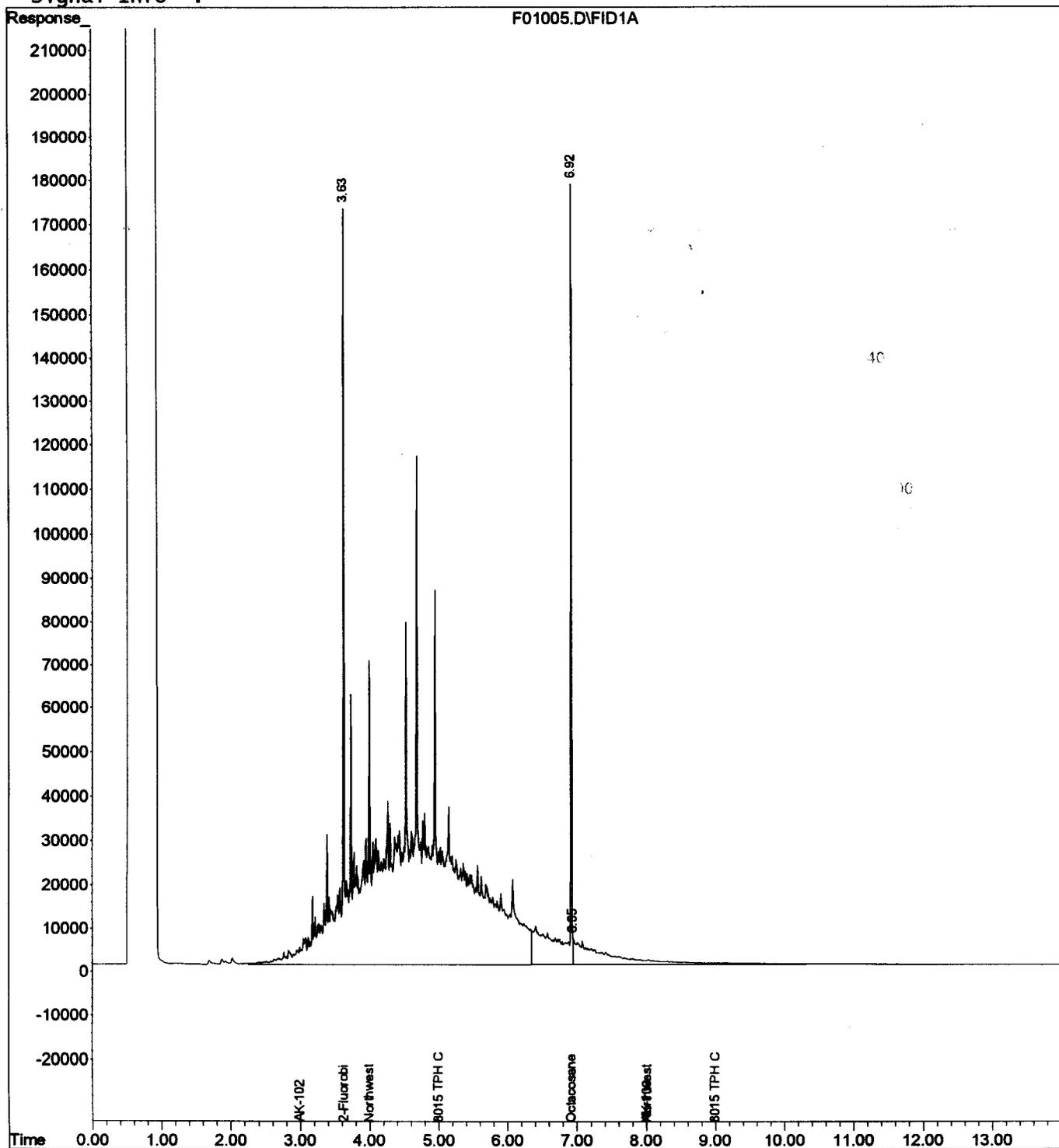
Data File : D:\HPCHEM\1\DATA\060105\F01005.D  
Acq On : 1 Jun 2005 11:42  
Sample : b5e0784-16  
Misc : 5X ak102/103 s r1  
IntFile : SURR.E  
Quant Time: Jun 1 13:07 2005

Vial: 5  
Operator: tmk  
Inst : GC-7  
Multiplr: 1.00

Quant Results File: TFE1805.RES

Quant Method : D:\HPCHEM\1\METHODS\TFE1805.M (Chemstation Integrator)  
Title : GC#7 TPH-Dx Rear Column  
Last Update : Wed May 18 18:25:35 2005  
Response via : Multiple Level Calibration  
DataAcq Meth : TFE1805.M

Volume Inj. :  
Signal Phase :  
Signal Info :

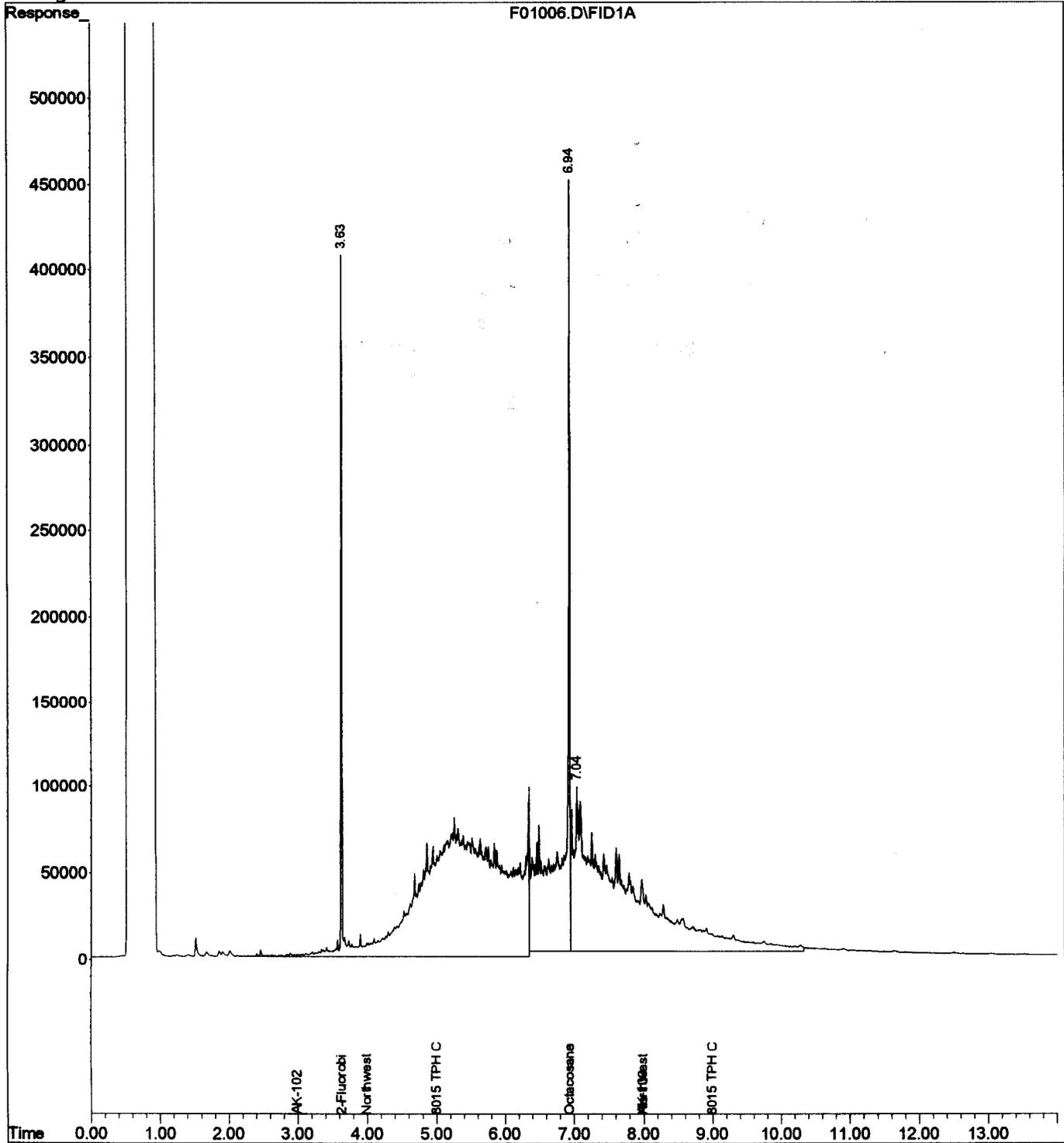


Data File : D:\HPCHEM\1\DATA\060105\F01006.D  
Acq On : 1 Jun 2005 12:03  
Sample : b5e0784-17  
Misc : 2X ak102/103 s r2  
IntFile : SURR.E  
Quant Time: Jun 1 13:08 2005

Vial: 6  
Operator: tmk  
Inst : GC-7  
Multiplr: 1.00

Quant Method : D:\HPCHEM\1\METHODS\TFE1805.M (Chemstation Integrator)  
Title : GC#7 TPH-DX Rear Column  
Last Update : Wed May 18 18:25:35 2005  
Response via : Multiple Level Calibration  
DataAcq Meth : TFE1805.M

Volume Inj. :  
Signal Phase :  
Signal Info :



CHAIN OF CUSTODY RECORD

PROJ NO. 05-038		PROJECT NAME Amaknak Pre-WWII TF ROST Survey				NUMBER OF CONTAINERS	a. GRO	b. DRO/RRO	c. PAHs	CF	Pg / of /	REMARKS
SAMPLERS: Chris Floyd, CEPOA-EN-ES-M		Chris Floyd										
SAMPLE ID #	Date	Time	Station Location									
-01	05AMAK 01 SO	21 MAY 05	1640	AMK 001, 3-4'		1					a. AK-101 Gasoline-Range Organics	
-02	05AMAK 02 SO		1740	AMK 001, 12-13'		1					b. AK102/103 Diesel & Residual Range Organics	
-03	05AMAK 03 SO	↓	1645	AMK 071, 5-7'		1					c. 8270 SIMS Polyaromatic Hydrocarbons	
-04	05AMAK 04 SO	22 MAY 05	1330	AMK 017, 10-12'		7					d. 8015m Optimized Diesel GC Scan - CF	
-05	05AMAK 05 SO		0945	AMK 041, 4-5'		1						
-06	05AMAK 06 SO	↓	1020	AMK 041, 12-13'		2						
-07	05AMAK 07 SO	23 MAY 05	1600	AMK 097, 12-14'		2						
-08	05AMAK 08 SO		1822	AMK 069, 1-3'		2						
-09	05AMAK 09 SO		1836	AMK 069, 4-5'		2						
-10	05AMAK 10 SO		1922	AMK 069, 11.5-13'		2						
-11	05AMAK 11 SO	↓	1930	AMK 069, #3		2						
-12	05AMAK 12 SO	24 MAY 05	0904	AMK 087, 3-4'		2						
-13	05AMAK 13 SO		0904	AMK 087, 4.5-6'		2						
-14	05AMAK 14 SO		0950	AMK 087, 11-12'		2						
-15	05AMAK 15 SO		0950	AMK 087, #3		1						
-16	05AMAK 16 SO	↓	1020	AMK 087, 14-15'		2						
-17	05AMAK 17 SO	19 MAY 05	1840	AMK B18		1						
-18	05AMAK 20 SO	22 MAY 05	0800	TRIP BLANK								
05AMAK SO												
Relinquished by: (Signature)		Date	Time	Received by: (Signature)		Relinquish (Signature)		Date	Time	Received by: (Signature)		
Chris Floyd		21 MAY 05	1430	Denny Torkis				5/25	1605			
Relinquished by: (Signature)		Date	Time	Received by: (Signature)		Relinquish (Signature)		Date	Time	Received by: (Signature)		
Relinquished by: (Signature)		Date	Time	Received for laboratory by: (Signature)		Date	Time					

Distribution: Original accompanies Shipment; Copy to Coordinate Field Files

END OF PROJECT

Cooler Temp: 4.6

Temp Blank Temp: 6.0

Please perform MS/MSD analyses on excess sample volumes of -14 So



Project communication record:

Who was called? R. Reagle By whom? K. Huey (date) 5/26/05

Topic of discussion: lack of times on labels

Record of discussion: Sample containers had no sampled time

Resolution: logged in per. COC

Project communication record:

Who was called? \_\_\_\_\_ By whom? \_\_\_\_\_ (date) \_\_\_/\_\_\_/\_\_\_

Topic of discussion:

Record of discussion:

Resolution:

Project communication record:

Who was called? \_\_\_\_\_ By whom? \_\_\_\_\_ (date) \_\_\_/\_\_\_/\_\_\_

Topic of discussion:

Record of discussion:

Resolution:

Additional Comments:

TAT: \_\_\_\_\_  
Short Hold: \_\_\_\_\_

Non-Conformances?  
Circle Y or N  
(If Y, see other side)

### NCA SAMPLE RECEIPT CHECKLIST

Received By: \_\_\_\_\_

Checked-in By: \_\_\_\_\_

Cooler ID: 1 (1 of 2)

Date: 5/25/05  
Time: 1605  
Initials: RTY

Date: 5/26/05  
Time: 1600  
Initials: TD

Work Order No. B 5E0784  
Client: USACE - Alaska  
Project: Amaknak Pre-WWII Rost Survey

Container Type:  
 Cooler  
 Box  
 Other  
 None

COC Seals:  
 Ship. Container  
 On Bottles  
 None

Packing Material:  
 Bubble Bags  
 Foam Packs  
 Styrofoam  
 Other \_\_\_\_\_  
 None

Refrigerant:  
 Gel Ice Pack  
 Loose Ice  
 None/Other Frozen ice *substituted*

Received Via:  
 Fed Ex  
 UPS  
 DHL  
 Client  
 Courier  
 Other Goldstreak

Cooler Temperature (IR / Digital): 6.0 °C (Frozen filters, Tedlars and aqueous Metals exempt) CA#: \_\_\_\_\_

Temperature Blank?  or N

Sample Containers:  
Intact?  or N  
Correct Type?  or N  
Adequately Labeled? Y or  N  
(ID, date and time)  
#Containers match COC?  or N  
IDs/time/date match COC?  or N  
Properly Preserved? Y or N Soil  
Adequate Volume?  or N  
(for tests requested)

Soil VOAs: Headspace? Y or  N  
Water VOAs: Headspace? Y or N  
Preserved? Y or N  
ID MeOH CA# \_\_\_\_\_

#### PROJECT MANAGEMENT

Is the Chain of Custody complete?  or N  
Is client information in ELEMENT accurate?  
Is project information in ELEMENT accurate?

Address?  or N  
Phone #?  or N  
PM?  or N  
Proj. Name?  or N  
Proj. #?  or N  
Contact?  or N  
Bid/Prices?  or N  
Invoice info?  or N  
Tax info?  or N  
Analyses?  or N

*Client will be contacted via ph. 5/26 ✓*

Has client been contacted regarding non-conformances?

PM Initials: uu Date: 5/26/05 Time: 0910

If Y, 5/26, 1649  
Date Time

Non-Conformances?  
Circle Y or N  
(If Y, see other side)

NCA Sample Receiving  
Corrective Action Form

Date: 5/26/05  
Time: 11030  
Initials: ku

Cooler ID: 1 (1 of 2) <sup>Ⓢ</sup>  
Work Order No. B-55074804  
Client: USAID-AR  
Project: Qmaknak ProWWT  
REST Survey

Describe Corrective Action: (Reference CA# from Sample Receipt Checklist next to CA below and/or describe CA in comment section)

CA#	CA#	CA#
<input type="checkbox"/> Salvaged Sample	<input type="checkbox"/> Replaced Bottle	<input type="checkbox"/> Replaced Lid
<input type="checkbox"/> Verified ID w/client	<input type="checkbox"/> Notified PM	<input type="checkbox"/> Notified Client
<input type="checkbox"/> Preserved Sample w/ _____ from Lot#/Reagent ID _____		
<input type="checkbox"/> Preserved Sample w/ _____ from Lot#/Reagent ID _____		

Cooler Temp: \_\_\_\_\_ °C (Frozen filters, Tedlars and aqueous Metals exempt) CA#: \_\_\_\_\_ Select either comment below

**Comment:** Samples were received outside the recommended temperature range (4°C±2°C). Samples were received on-ice, within 4 hours of collection, but may not have had sufficient time to equilibrate. A temperature range from ambient to 2°C is considered acceptable. The samples will be analyzed as scheduled unless otherwise directed by the client.

**Comment:** Samples were received outside the recommended temperature range (4°C±2°C). The COC was stamped with "Samples were not received @ 2-6°C upon receipt." The samples will be analyzed as scheduled unless otherwise directed by the client.

Comments or Other Actions Taken:

① All containers lack times - login per COC  
Trip Blank lacks time on label - login per COC

Reviewed and approved by: [Signature]  
PM Signature

5/26/05  
Date

6 for 1

**CUSTODY SEAL**

Date 24 MAY 2005

Signature Ch. Foye



**nca**<sup>TM</sup>  
www.ncalabs.com

North Creek Analytical, Inc.  
Environmental Laboratory Network

**CUSTODY SEAL**

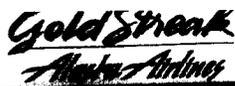
Date 24 MAY 2005

Signature Ch. Foye



**nca**<sup>TM</sup>  
www.ncalabs.com

North Creek Analytical, Inc.  
Environmental Laboratory Network



www.ALASKAAIR.com  
1-800-2ALASKA

P.O. Box 68900  
Seattle, WA 98168

027-

3699 9712

From Shipper: **CHRIS TOWN - US ARMY CORBUENG**

Address: **77 1/2 W 2 ST** Phone: **907-753-2700**

City: **FAIRBANKS AK** State: **AK** Zip Code: **99706**

I certify that this shipment does not contain any unauthorized explosives, destructive devices or hazardous materials.

Shipper's Signature: **X** PRINTED NAME: **CHRIS TOWN** Date: **20 MAY 2005**

Domestic  International

Insured Value: \_\_\_\_\_ Declared Value For Customs: \_\_\_\_\_

Airport of Departure: \_\_\_\_\_ First Carrier: \_\_\_\_\_ Airport of Destination: \_\_\_\_\_

Nature and Quantity of Goods: **SOIL SAMPLES**

Handling Information: **NDA**

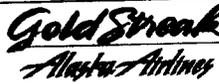
To Consignee: (Complete Consignee information required on package)  
**LT LANEY - US ARMY CORBUENG**

Address: **1170 N. CROCKETT BLVD N** Phone: **425-426-9700**

City: **SCHEEL WA** State: **WA** Zip Code: **98011**

Consignee's Printed Name - Signature (Received in Good Order Except as Noted) \_\_\_\_\_ Time \_\_\_\_\_ a.m. / p.m.  
Date \_\_\_\_\_

Airline: **027-** Origin: \_\_\_\_\_ AIR WAYBILL Number: **3699 9712**



Total Pieces: **2** Total Weight: \_\_\_\_\_

Form of Payment  
 Cash  Check  GBL-Attach GBL  
 AS / QX Account Number  
 Credit Card Number

Validate Approval \_\_\_\_\_  
(Required for all except cash and GBL)

AIRPORT TO AIRPORT SERVICE

PICK-UP ONLY  DELIVERY ONLY  DOOR TO DOOR

Executed By: Date/Time \_\_\_\_\_ a.m. / p.m.

Carrier	Flight	Destination	E.T.A.
AS			

Remarks: \_\_\_\_\_

MULTIPLE PIECES FOR AS FLIGHTS ONLY			
Please <input checked="" type="checkbox"/> If Live Animal <input type="checkbox"/>			
PCS.	WT RANGE	RATE	CHARGE
	GSX LETTER		
	1-15		
2	16-50	70	140
	51-70		
	71-100		
Subtotal Charges			
AS COURIER CHARGES			
Other Charges			
1st Carrier			
2nd Carrier			
3rd Carrier			
Tax (Offline only)			
Pickup (NON AS COURIER)			
Delivery (NON AS COURIER)			
Special Service			
Insurance			
TOTAL			

This is a non-negotiable AIR WAYBILL subject to the terms and conditions set forth on the reverse of shippers copy.

NORTH CREEK ANALYTICAL SAMPLE RECEIPT FORM

(Army Corp. compliant)

Client: USACE - AK COC # 2 of 2

1. Please sign for receipt and opening of:  Cooler  Other: \_\_\_\_\_

By (print) PRANU TONTU (sign) [Signature]

2. Date cooler received 05/25/05 Date cooler opened: Same  or 1/1

3. Delivered by  NCA courier  Fed-Ex  UPS  Express Mess.  Client  Other  
Air bill # if applicable 3699-9712 (Put copy of shipping papers, etc. in file)

4. There were 2 custody seals present, signed by Chris Floyd date May/24/05

5. Were custody seals unbroken and intact at the date and time of arrival?  yes  no

6. Was ice used?  yes  no Type of ice:  blue ice  gel ice  real ice  dry ice  
Temperature (degrees C) 4.1 Raytek Thermometer 4.5 Digi-Thermo (probe for temp. blank)  
inside cooler

7. Were samples screened for radioactivity using the Geiger Counter?  yes  no  
Background average counts per minute: 7 Samples counts per minute: 12

8. Are custody papers sealed in a plastic bag and taped inside to the lid?  yes  no N/A  
NO COC in cooler 2 of 2

9. Were custody papers filled out properly (ink, signed in appropriate places, etc.)?  yes  no  
If "no" please specify: \_\_\_\_\_

10. Was project identifiable from custody papers?  yes  no  
Name of the project AMAKNAK Pre-WW II (if applicable)

11. Initial and date for unpacking of cooler: TB (initials) date 5/26/05

12. Packing in cooler:  bubble wrap/bag  styrofoam  cardboard  other

13. Were all containers sealed in separate plastic bags?  yes  no

14. Did all containers indicated on the COC arrive?  yes  no  
If "no" please indicate which containers were absent \_\_\_\_\_

15. Were all containers unbroken and labels in good condition?  yes  no  
If "no" please indicate which containers \_\_\_\_\_

16. Were all bottle labels complete (ID, date, time, signature, etc.)?  yes  no  
Do the ID's, times, etc. agree with the COC?  yes  no  
If "no" please indicate which containers None of the labels have times

17. Were samples received in proper containers for the indicated analysis?  yes  no  
Are containers properly preserved for the indicated analysis?  yes  no  
Is there adequate volume for the indicated analysis?  yes  no

18. If voa vials were submitted, are they free of bubbles?  N/A  yes  no  
If "no" please indicate which containers \_\_\_\_\_

19. Log-in Phase: Date samples were logged in: 5/26/05 Element Project # B5E0784

20. Logged in by (print) Tom Blankinship (sign) [Signature]

21. Was the project manager notified of status? (Use back of form as a record)  yes  no

Project communication record:

Who was called? R. Raabe By whom? K. Shuey (date) 5/26/05

Topic of discussion: lack of time on label

Record of discussion: Sample containers lacked sampled times.

Resolution: logged in per COC

Project communication record:

Who was called? \_\_\_\_\_ By whom? \_\_\_\_\_ (date) \_\_\_/\_\_\_/\_\_\_

Topic of discussion:

Record of discussion:

Resolution:

Project communication record:

Who was called? \_\_\_\_\_ By whom? \_\_\_\_\_ (date) \_\_\_/\_\_\_/\_\_\_

Topic of discussion:

Record of discussion:

Resolution:

Additional Comments:

2072

TAT: \_\_\_\_\_

Short Hold: \_\_\_\_\_

Non-Conformances?  
Circle Y or N  
(If Y, see other side)

### NCA SAMPLE RECEIPT CHECKLIST

**Received By:**

**Checked-in By:**

Cooler ID: 2 (2 of 2)

Date: 5/25/05  
Time: 1605  
Initials: py

Date: 5/26/05  
Time: 1600  
Initials: ID

Work Order No. B 5E0784  
Client: USACE - Alaska  
Project: Amaknak Pre-WWI ROST Survey

Container Type:

- Cooler
- Box
- Other
- None

COC Seals:

- Ship. Container
- On Bottles
- None

Packing Material:

- Bubble Bags
- Foam Packs
- Styrofoam
- Other \_\_\_\_\_
- None

Refrigerant:

- Gel Ice Pack
- Loose Ice
- None/Other Frozen ice in  
Cubertainer

Received Via:

- Fed Ex
- UPS
- DHL

GS# 3699-9712

- Client
- Courier Jon
- Other \_\_\_\_\_

Cooler Temperature 4.5 °C (Frozen filters, Tedlars and aqueous Metals exempt) CA#: \_\_\_\_\_

Temperature Blank?  or N

Sample Containers:

- Intact?  or N
- Correct Type?  or N
- Adequately Labeled?  or  ID, date and time
- #Containers match COC?  or N
- IDs/time/date match COC?  or N
- Properly Preserved?  or N Soil
- Adequate Volume?  or N (for tests requested)

- |                        |        | <u>ID</u> | <u>CA#</u> |
|------------------------|--------|-----------|------------|
| Soil VOAs: Headspace?  | Y or N | _____     | _____      |
| Water VOAs: Headspace? | Y or N | _____     | _____      |
| Preserved?             | Y or N | _____     | _____      |

### PROJECT MANAGEMENT

- Is the Chain of Custody complete?  or N
  - Is client information in ELEMENT accurate?  or N
  - Is project information in ELEMENT accurate?  or N
- |               |                                       |
|---------------|---------------------------------------|
| Address?      | <input checked="" type="radio"/> or N |
| Phone #?      | <input checked="" type="radio"/> or N |
| PM?           | <input checked="" type="radio"/> or N |
| Proj. Name?   | <input checked="" type="radio"/> or N |
| Proj. #?      | <input checked="" type="radio"/> or N |
| Contact?      | <input checked="" type="radio"/> or N |
| Bid/Prices?   | <input checked="" type="radio"/> or N |
| Invoice info? | <input checked="" type="radio"/> or N |
| Tax info?     | <input checked="" type="radio"/> or N |
| Analyses?     | <input checked="" type="radio"/> or N |

Has client been contacted regarding non-conformances?  or N

PM Initials: UW Date: 5/26/05 Time: 0918

If Y, 5/26/05 1649  
Date Time

2 of 2

Non-Conformances?  
Circle Y or N  
(If Y, see other side)

NCA Sample Receiving  
Corrective Action Form

Date: 5/26/05  
Time: 1630  
Initials: ku

Cooler ID: 2 (2 of 2)  
Work Order No. BSEN784  
Client: USACE-DC  
Project: Amaknak PM WWII  
Rost Survey

Describe Corrective Action: (Reference CA# from Sample Receipt Checklist next to CA below and/or describe CA in comment section)

CA #	CA #	CA #
<input type="checkbox"/> Salvaged Sample	<input type="checkbox"/> Replaced Bottle	<input type="checkbox"/> Replaced Lid
<input type="checkbox"/> Verified ID w/client	<input type="checkbox"/> Notified PM	<input type="checkbox"/> Notified Client
<input type="checkbox"/> Preserved Sample w/ _____ from Lot#/Reagent ID _____		
<input type="checkbox"/> Preserved Sample w/ _____ from Lot#/Reagent ID _____		

Cooler Temp: \_\_\_\_\_ °C (Frozen filters, Tedlars and aqueous Metals exempt) CA#: \_\_\_\_\_ Select either comment below

**Comment:** Samples were received outside the recommended temperature range (4°C±2°C). Samples were received on-ice, within 4 hours of collection, but may not have had sufficient time to equilibrate. A temperature range from ambient to 2°C is considered acceptable. The samples will be analyzed as scheduled unless otherwise directed by the client.

**Comment:** Samples were received outside the recommended temperature range (4°C±2°C). The COC was stamped with "Samples were not received @ 2-6°C upon receipt." The samples will be analyzed as scheduled unless otherwise directed by the client.

Comments or Other Actions Taken:

① All containers lack times. - log in per COC

Reviewed and approved by:

Kawley  
PM Signature

5/26/05  
Date



**CUSTODY SEAL**

Date 24 MAY 2005  
Signature [Handwritten Signature]

**CUSTODY SEAL**

Date 24 MAY 2005  
Signature [Handwritten Signature]



North Creek Analytical, Inc.  
Environmental Laboratory Network



www.ALASKAAIR.com  
1-800-2ALASKA

Airline **027-** | Origin **DXF** | AIR WAYBILL Number **3699 9712**

P.O. Box 68900  
Seattle, WA 98168

SHIPPER TO COMPLETE ALL SHaded AREAS  
SHIPPER'S NAME: **US ARMY CORP OF ENG**  
Address: **POST OFFICE BOX 133**  
City: **SPRINGFIELD** | State: **AK** | Zip Code: **99506**  
Phone: **907-753-2700**

DATE: **24 MAY 2005**  
I certify that this shipment does not contain any unauthorized explosives, destructive devices or hazardous materials.

SHIPPER'S PHONE: **907-753-2700**  
SHIPPER'S FAX: **907-753-2700**  
SHIPPER'S E-MAIL: **ALASKA@ALASKAAIR.COM**

SHIPPER'S SIGNATURE: **[Signature]**  
Date: **24 MAY 2005**

SHIPPER'S ADDRESS: **1720 N. CREEK PKWY N**  
City: **BOOTHILL** | State: **WA** | Zip Code: **98011**  
Phone: **425-420-9200**

SHIPPER'S CONTACT: **[Signature]**  
Date: **24 MAY 2005**

SHIPPER'S PHONE: **907-753-2700**  
SHIPPER'S FAX: **907-753-2700**  
SHIPPER'S E-MAIL: **ALASKA@ALASKAAIR.COM**

SHIPPER'S SIGNATURE: **[Signature]**  
Date: **24 MAY 2005**

### 4. Delivery Receipt

Door-To-Door Service: (800) 634-7113

Total Pieces: <b>2</b>		Total Weight: <b>8.2</b>		Please <input type="checkbox"/> if Live Animal <input type="checkbox"/>	
Form of Payment: <input type="checkbox"/> Cash <input type="checkbox"/> Check <input type="checkbox"/> A/S/OX Account Number		Credit Card Number: <b>90-180</b>		Subtotal Charges: <b>180</b>	
Validata Approval: <b>QUICK SERVICE ONLY</b>		Airport to Airport Service: <input checked="" type="checkbox"/>		Other Charges: <b>180</b>	
Carrier: <b>AS</b>		Flight: <b>240</b>		1st Carrier: <b>AS</b>	
Destination: <b>DXF</b>		ETA: <b>3:00</b>		2nd Carrier: <b>AS</b>	
Executed By: <b>[Signature]</b>		Date/Time: <b>24 MAY 2005 1:00 p.m.</b>		3rd Carrier: <b>AS</b>	
Tax: <b>(Offline only)</b>		Pickup: <b>(With AS Courier)</b>		Delivery: <b>(With AS Courier)</b>	
Special Service		Insurance		TOTAL: <b>180</b>	
Remarks: <b>ACCEPTED FOR DELIVERY</b>					

SHIPPER'S SIGNATURE: **[Signature]**  
Date: **24 MAY 2005**

Airline **027-** | Origin **DXF** | AIR WAYBILL Number **3699 9712**

GoldStream  
Alaska Airlines

SHIPPER'S SIGNATURE: **[Signature]**  
Date: **24 MAY 2005**

SHIPPER'S PHONE: **907-753-2700**  
SHIPPER'S FAX: **907-753-2700**  
SHIPPER'S E-MAIL: **ALASKA@ALASKAAIR.COM**

SHIPPER'S ADDRESS: **1720 N. CREEK PKWY N**  
City: **BOOTHILL** | State: **WA** | Zip Code: **98011**  
Phone: **425-420-9200**

SHIPPER'S CONTACT: **[Signature]**  
Date: **24 MAY 2005**

SHIPPER'S SIGNATURE: **[Signature]**  
Date: **24 MAY 2005**

DEPARTMENT OF THE ARMY  
Corps of Engineers  
Environmental Chemistry Branch  
Omaha Laboratory

Sample Report

Project Name: Amaknak ROST	Date Sampled: 05/21/05	Matrix: Soil
Project Number: 7254	Date Received: 05/27/05	Units: mg/kg
Client Sample ID: 05AMAK02SO	Date Reported: 08/03/05	Sample Amount:
CQAB Sample ID : M050328-001		% Solids: 89.9
Analyst: Woster		Dilution Factor: 1
Method: SW846 8015B	Date Analyzed : 07/08/05	Batch ID: WG16529

CAS Number	Target Analyte	Result	Sample Reporting Limit	Sample Detection Limit
68476-30-2	DIESEL	16000 D	270	3

D: Result quantitated from a 1:10 dilution.

Laboratory Comments:

Quality Control			
Surrogate Standard	Recovery (%)	Acceptable	Spike (mg/kg)
PENTACOSANE	139	46-150	200

Method Blank : WG16529-1  
Matrix Spike : WG16529-4

Laboratory Duplicate : WG16529-3  
Matrix Spike Duplicate : WG16529-5

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PHONE: (402) 444-4300

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Sample Report

Project Name: Amaknak ROST	Date Sampled: 05/22/05	Matrix: Soil
Project Number: 7254	Date Received: 05/27/05	Units: mg/kg
Client Sample ID: 05AMAK04SO	Date Reported: 08/03/05	Sample Amount:
CQAB Sample ID : M050328-002		% Solids: 88.4
<hr/>		
Analyst: Woster	Date Extracted:	Dilution Factor: 1
Method: SW846 8015B	Date Analyzed : 07/08/05	Batch ID: WG16529

CAS Number	Target Analyte	Result	Sample Reporting Limit	Sample Detection Limit
68476-30-2	DIESEL	7000 D	270	3

\*: Indicates the value is outside acceptance limits.  
Laboratory Comments:

Quality Control			
Surrogate Standard	Recovery (%)	Acceptable	Spike (mg/kg)
PENTACOSANE	98	46-150	200

Method Blank : WG16529-1  
Matrix Spike : WG16529-4

Laboratory Duplicate : WG16529-3  
Matrix Spike Duplicate : WG16529-5

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Sample Report

Project Name: Amaknak ROST	Date Sampled: 05/23/05	Matrix: Soil
Project Number: 7254	Date Received: 05/27/05	Units: mg/kg
Client Sample ID: 05AMAK07SO	Date Reported: 08/03/05	Sample Amount:
CQAB Sample ID : M050328-003		% Solids: 89.7
<hr/>		
Analyst: Woster	Date Extracted:	Dilution Factor: 1
Method: SW846 8015B	Date Analyzed : 07/08/05	Batch ID: WG16529

CAS Number	Target Analyte	Result	Sample Reporting Limit	Sample Detection Limit
68476-30-2	DIESEL	49	28	3

Laboratory Comments:

Quality Control

Surrogate Standard	Recovery (%)	Acceptable	Spike (mg/kg)
PENTACOSANE	79	46-150	200

Method Blank : WG16529-1  
Matrix Spike : WG16529-4

Laboratory Duplicate : WG16529-3  
Matrix Spike Duplicate : WG16529-5

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Sample Report

Project Name: Amaknak ROST	Date Sampled: 05/23/05	Matrix: Soil
Project Number: 7254	Date Received: 05/27/05	Units: mg/kg
Client Sample ID: 05AMAK08SO	Date Reported: 08/03/05	Sample Amount:
CQAB Sample ID : M050328-004		% Solids: 89.8

Analyst: Woster	Date Extracted:	Dilution Factor: 1
Method: SW846 8015B	Date Analyzed : 07/08/05	Batch ID: WG16529

CAS Number	Target Analyte	Result	Sample Reporting Limit	Sample Detection Limit
68476-30-2	DIESEL	5000 D	260	3

D: Result quantitated from a 1:10 dilution.

Laboratory Comments:

Quality Control

Surrogate Standard	Recovery (%)	Acceptable	Spike (mg/kg)
PENTACOSANE	140	46-150	200

Method Blank : WG16529-1  
Matrix Spike : WG16529-4

Laboratory Duplicate : WG16529-3  
Matrix Spike Duplicate : WG16529-5

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Sample Report

Project Name: Amaknak ROST	Date Sampled: 05/23/05	Matrix: Soil
Project Number: 7254	Date Received: 05/27/05	Units: mg/kg
Client Sample ID: 05AMAK09S0	Date Reported: 08/03/05	Sample Amount:
CQAB Sample ID : M050328-005		% Solids: 91.0

---

Analyst: Woster	Date Extracted:	Dilution Factor: 1
Method: SW846 8015B	Date Analyzed : 07/08/05	Batch ID: WG16529

CAS Number	Target Analyte	Result	Sample Reporting Limit	Sample Detection Limit
68476-30-2	DIESEL	u	27	3

u: Compound was analyzed for but not detected at or above the sample reporting limit

Laboratory Comments:

Quality Control

Surrogate Standard	Recovery (%)	Acceptable	Spike (mg/kg)
PENTACOSANE	75	46-150	200

Method Blank : WG16529-1  
Matrix Spike : WG16529-4

Laboratory Duplicate : WG16529-3  
Matrix Spike Duplicate : WG16529-5

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Environmental Chemistry Branch  
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Sample Report

Project Name: Amaknak ROST	Date Sampled: 05/23/05	Matrix: Soil	Units: mg/kg
Project Number: 7254	Date Received: 05/27/05	Sample Amount:	
Client Sample ID: 05AMAK10SO	Date Reported: 08/03/05	% Solids:	92.5
CQAB Sample ID : M050328-006			

---

Analyst: Woster	Date Extracted:	Dilution Factor: 1	
Method: SW846 8015B	Date Analyzed : 07/08/05	Batch ID:	WG16529

CAS Number	Target Analyte	Result	Sample Reporting Limit	Sample Detection Limit
68476-30-2	DIESEL	14000 D	250	3

D: Result quantitated from a 1:10 dilution.

Laboratory Comments:

Quality Control

Surrogate Standard	Recovery (%)	Acceptable	Spike (mg/kg)
PENTACOSANE	116	46-150	200

Method Blank : WG16529-1  
Matrix Spike : WG16529-4

Laboratory Duplicate : WG16529-3  
Matrix Spike Duplicate : WG16529-5

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Sample Report

Project Name: Amaknak ROST	Date Sampled: 05/23/05	Matrix: Soil
Project Number: 7254	Date Received: 05/27/05	Units: mg/kg
Client Sample ID: 05AMAK11S0	Date Reported: 08/03/05	Sample Amount:
CQAB Sample ID : M050328-007		% Solids: 91.2

Analyst: Woster	Date Extracted:	Dilution Factor: 1
Method: SW846 8015B	Date Analyzed : 07/08/05	Batch ID: WG16529

CAS Number	Target Analyte	Result	Sample Reporting Limit	Sample Detection Limit
68476-30-2	DIESEL	18000 D	270	3

D: Result quantitated from a 1:10 dilution.

Laboratory Comments:

Quality Control

Surrogate Standard	Recovery (%)	Acceptable	Spike (mg/kg)
PENTACOSANE	128	46-150	200

Method Blank : WG16529-1  
Matrix Spike : WG16529-4

Laboratory Duplicate : WG16529-3  
Matrix Spike Duplicate : WG16529-5

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Environmental Chemistry Branch  
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Sample Report

Project Name: Amaknak ROST	Date Sampled: 05/24/05	Matrix: Soil	
Project Number: 7254	Date Received: 05/27/05	Units: mg/kg	
Client Sample ID: 05AMAK12S0	Date Reported: 08/03/05	Sample Amount:	
CQAB Sample ID : M050328-008		% Solids: 56.0	
Analyst: Woster		Date Extracted:	
Method: SW846 8015B	Date Analyzed : 07/08/05	Dilution Factor: 1	Batch ID: WG16529

CAS Number	Target Analyte	Result	Sample Reporting Limit	Sample Detection Limit
68476-30-2	DIESEL	12000 D	880	3

D: Result quantitated from a 1:20 dilution.

Laboratory Comments:

Quality Control

Surrogate Standard	Recovery (%)	Acceptable	Spike (mg/kg)
PENTACOSANE	120	46-150	200

Method Blank : WG16529-1  
Matrix Spike : WG16529-4

Laboratory Duplicate : WG16529-3  
Matrix Spike Duplicate : WG16529-5

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DEPARTMENT OF THE ARMY  
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Sample Report

Project Name: Amaknak ROST	Date Sampled: 05/24/05	Matrix: Soil
Project Number: 7254	Date Received: 05/27/05	Units: mg/kg
Client Sample ID: 05AMAK13SO	Date Reported: 08/03/05	Sample Amount:
CQAB Sample ID : M050328-009		% Solids: 46.3
Analyst: Woster	Date Extracted:	Dilution Factor: 1
Method: SW846 8015B	Date Analyzed : 07/08/05	Batch ID: WG16529

CAS Number	Target Analyte	Result	Sample Reporting Limit	Sample Detection Limit
68476-30-2	DIESEL	22000 D	500	3

D: Result quantitated from a 1:10 dilution.

Laboratory Comments:

Quality Control

Surrogate Standard	Recovery (%)	Acceptable	Spike (mg/kg)
PENTACOSANE	87	46-150	200

Method Blank : WG16529-1  
Matrix Spike : WG16529-4

Laboratory Duplicate : WG16529-3  
Matrix Spike Duplicate : WG16529-5

DEPARTMENT OF THE ARMY  
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Environmental Chemistry Branch  
Omaha Laboratory

Sample Report

Project Name: Amaknak ROST	Date Sampled: 05/24/05	Matrix: Soil
Project Number: 7254	Date Received: 05/27/05	Units: mg/kg
Client Sample ID: 05AMAK14SO	Date Reported: 08/03/05	Sample Amount:
CQAB Sample ID : M050328-010		% Solids: 90.2

Analyst: Woster	Date Extracted:	Dilution Factor: 1
Method: SW846 8015B	Date Analyzed : 07/08/05	Batch ID: WG16529

CAS Number	Target Analyte	Result	Sample Reporting Limit	Sample Detection Limit
68476-30-2	DIESEL	12000 D	260	3

D: Result quantitated from a 1:10 dilution.

Laboratory Comments:

Quality Control

Surrogate Standard	Recovery (%)	Acceptable	Spike (mg/kg)
PENTACOSANE	116	46-150	200

Method Blank : WG16529-1  
Matrix Spike : WG16529-4

Laboratory Duplicate : WG16529-3  
Matrix Spike Duplicate : WG16529-5

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Sample Report

Project Name: Amaknak ROST	Date Sampled: 05/24/05	Matrix: Soil
Project Number: 7254	Date Received: 05/27/05	Units: mg/kg
Client Sample ID: 05AMAK16SO	Date Reported: 08/03/05	Sample Amount:
CQAB Sample ID : M050328-011		% Solids: 89.3
Analyst: Woster	Date Extracted:	Dilution Factor: 1
Method: SW846 8015B	Date Analyzed : 07/08/05	Batch ID: WG16529

CAS Number	Target Analyte	Result	Sample Reporting Limit	Sample Detection Limit
68476-30-2	DIESEL	310	26	3

Laboratory Comments:

Quality Control

Surrogate Standard	Recovery (%)	Acceptable	Spike (mg/kg)
PENTACOSANE	77	46-150	200

Method Blank : WG16529-1  
Matrix Spike : WG16529-4

Laboratory Duplicate : WG16529-3  
Matrix Spike Duplicate : WG16529-5

DEPARTMENT OF THE ARMY  
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Chemistry Quality Assurance Branch  
Omaha Laboratory

Method Blank Report

Method Blank Sample ID: WG16529-1      Date Reported: 08/03/05      Matrix: Soil  
Units: mg/kg

Analyst: Woster      Date Extracted: 06/02/05      Dilution Factor: 1  
Method: SW846 8015B      Date Analyzed: 07/08/05      Batch ID: WG16529

CAS Number	Target Analyte	Result	Sample Reporting Limit	Sample Detection Limit
68476-30-2	DIESEL	u	24	3

u: Compound was analyzed for but not detected at or above the sample reporting limit

Laboratory Comments:

Quality Control			
Surrogate Standard	Recovery (%)	Acceptable	Spike (mg/kg)
PENTACOSANE	75	46-150	200

DEPARTMENT OF THE ARMY  
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Environmental Chemistry Branch  
Omaha Laboratory

Laboratory Matrix Duplicate Report

LD Sample ID: WG16529-3  
Sample ID: M050328-005

Date Reported: 08/03/05

Matrix: Soil  
Units: mg/kg  
Sample Amount: 10.0 g  
% Solids: 91.0

Analyst: Woster  
Method: SW846 8015B

Date Extracted: 06/02/05  
Date Analyzed: 07/08/05

Batch ID: WG16529  
Dilution Factor: 1

CAS Number	Target Analyte	Sample Result	LD Result	Sample Reporting Limit	Sample Detection Limit	RPD	QC Limits
68476-30-2	DIESEL	u	u	27	3	NC	33

u: Compound was analyzed for but not detected at or above the sample reporting limit  
NC: Not Calculable

Laboratory Comments:

$$RPD = (|Sample\ Result - LD\ Result| \times 100) / ((Sample\ Result + LD\ Result) / 2)$$

Quality Control							
Surrogate Standard	Recovery (%)		Acceptable	Spike (mg/kg)	RPD	QC Limits	
	Sample	LD					
PENTACOSANE	75	77	46-150	200	2		33

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Matrix Spike/Matrix Spike Duplicate Report

MS Sample ID: WG16529-4		Date Reported: 08/03/05	Matrix: Soil
MSD Sample ID: WG16529-5			Units: mg/kg
Sample ID: M050328-003			% Solids: 89.7

Analyst: Woster	Date Extracted: 06/02/05	Batch ID: WG16529
Method: SW846 8015B	Date Analyzed: 07/08/05	

CAS Number	Target Analyte	Sample Result	Spike Added	Conc MS	%Rec MS	QC Limits	Conc MSD	%Rec MSD	RPD	RPD Limits
68476-30-2	DIESEL	49	210	240	91	53-121	210	77	10	33

\*: Indicates the value is outside acceptance limits.

Laboratory Comments:

RPD = (|MS Result - MSD Result| x 100)/((MS Result + MSD Result)/2)  
Normal sample amount is 25 g.

Quality Control						
Surrogate Standard	Recovery (%)		Acceptable	Spike (mg/kg)	RPD	QC Limits
	MS	MSD				
PENTACOSANE	106	80	46-150	200	30	33

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Laboratory Control Sample Report

LCS ID: WG16529-2

Date Reported: 08/03/05

Matrix: Soil  
Units: mg/kg

Analyst: Woster  
Method: SW846 8015B

Date Extracted: 06/02/05  
Date Analyzed: 07/08/05  
Batch ID: WG16529

MOD 8015

CAS Number	Compound	Result	True Value	Sample Detection Limit	Sample Reporting Limit	% Rec	Acceptance Limits (%)
68476-30-2	DIESEL	190	190	3	23	100	53-121

\*: Indicates the value is outside acceptance limits.

Laboratory Comments:

Quality Control

Surrogate Standard	Recovery (%)	Acceptable	Spike (mg/kg)
PENTACOSANE	112	46-150	200

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Plot Title	Start Time	End Time	Scale	Offset
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DATB039.raw	0.00	29.99	75.00	20.00
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Sample Name : D1000

Sample Number: Diesel Std 1000 mg/L

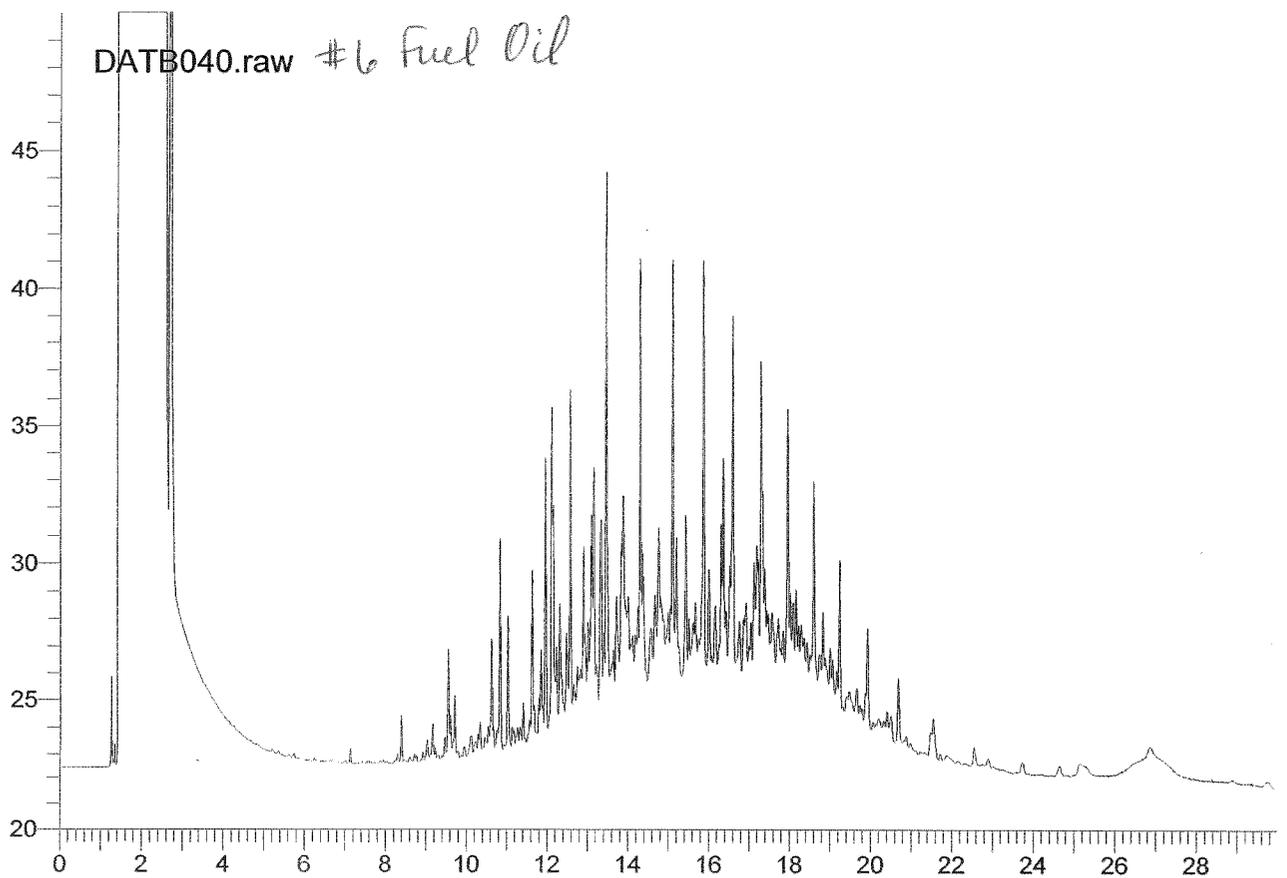
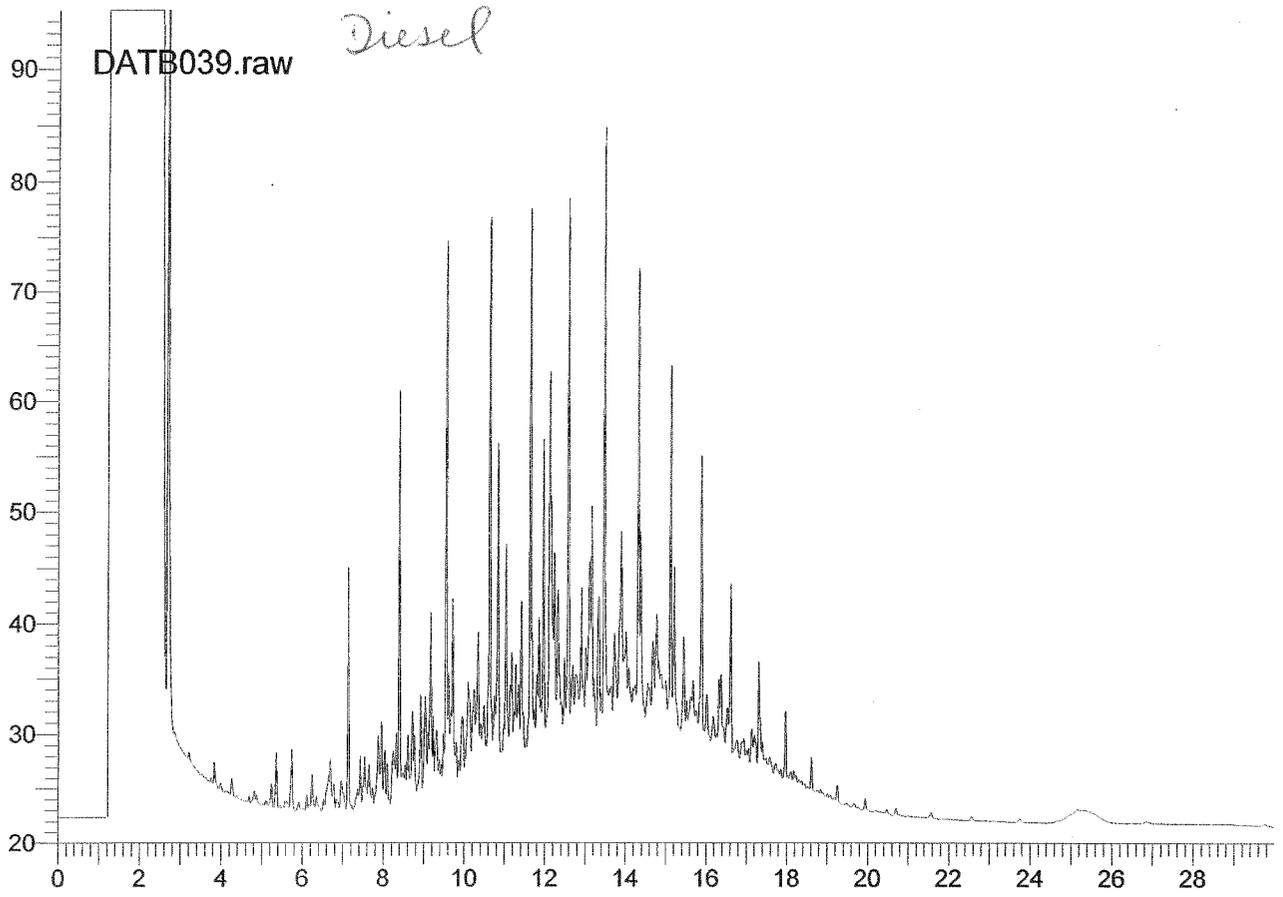
Instrument File Name: C:\TCWS\HP64176\MOD'8015\M8015-050707

DATB040.raw	0.00	29.99	30.00	20.00
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Sample Name : #6 FO 1000

Sample Number: #6 Fuel Oil Std 1000 mg/L

Instrument File Name: C:\TCWS\HP64176\MOD'8015\M8015-050707



Plot Title	Start Time	End Time	Scale	Offset
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DATB024.raw	0.00	29.99	30.00	20.00
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Sample Name : M050328-005

Sample Number: 05 AMAK 09 50

Instrument File Name: C:\TCWS\HP64176\MOD'8015\M8015-050707

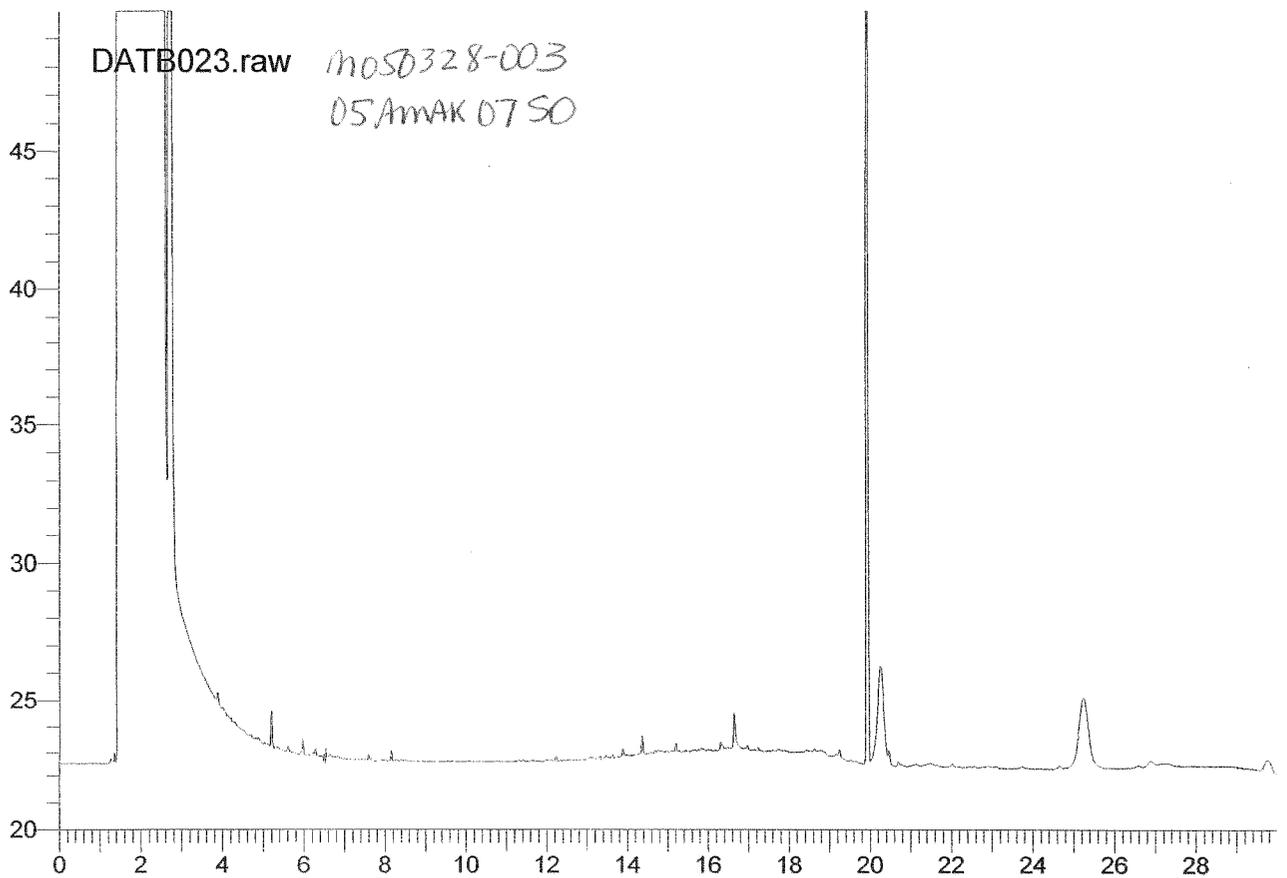
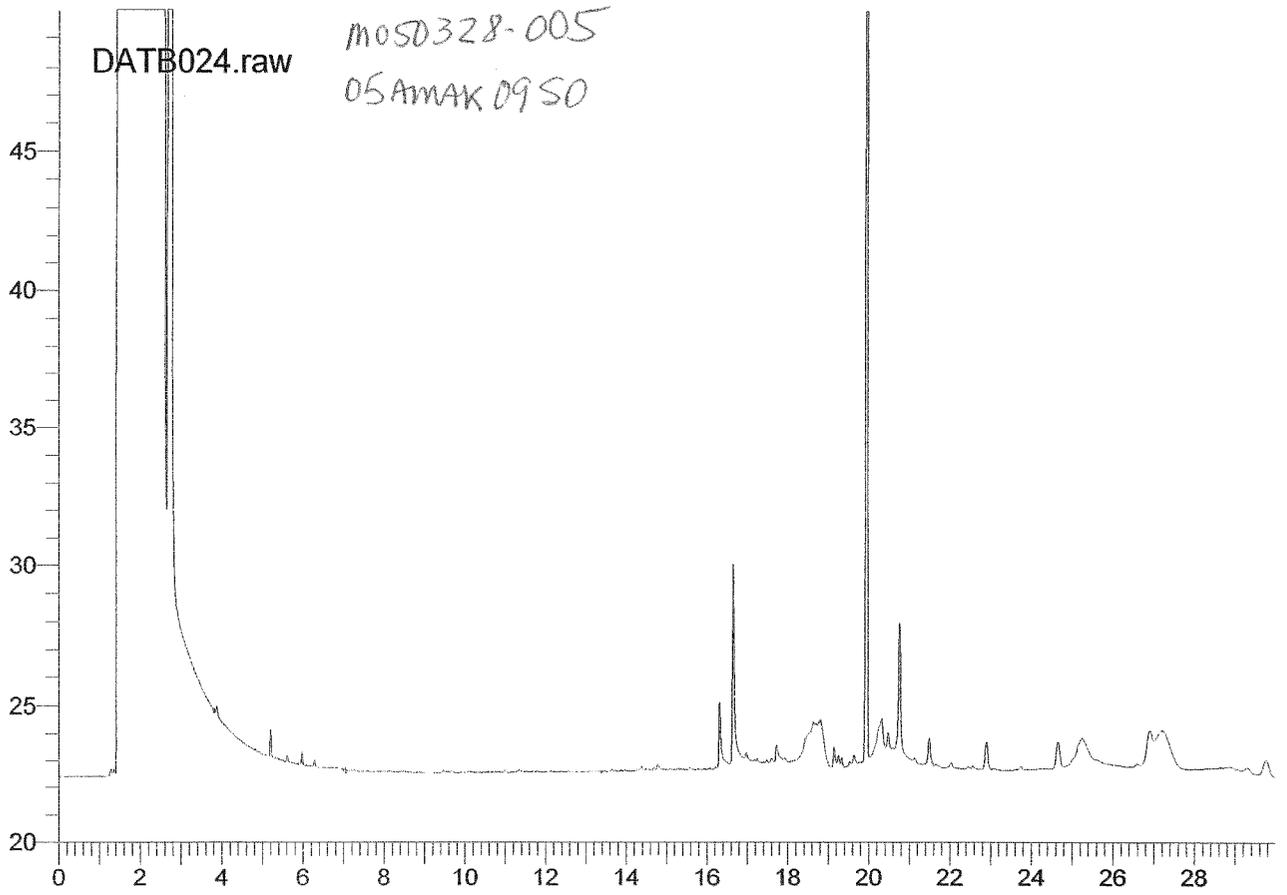
DATB023.raw	0.00	29.99	30.00	20.00
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Sample Name : M050328-003

Sample Number: 05 AMAK 07 50

Instrument File Name: C:\TCWS\HP64176\MOD'8015\M8015-050707

"clean" samples

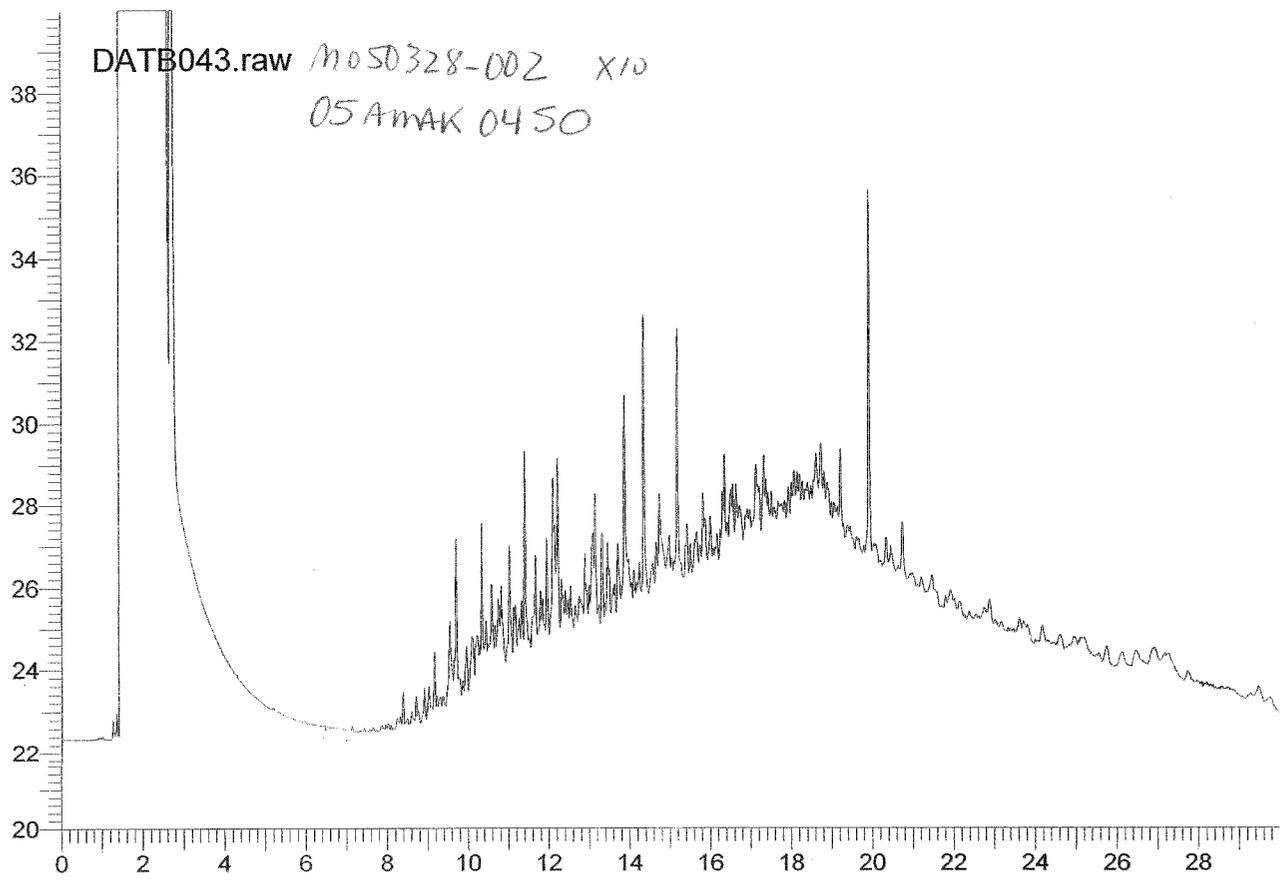
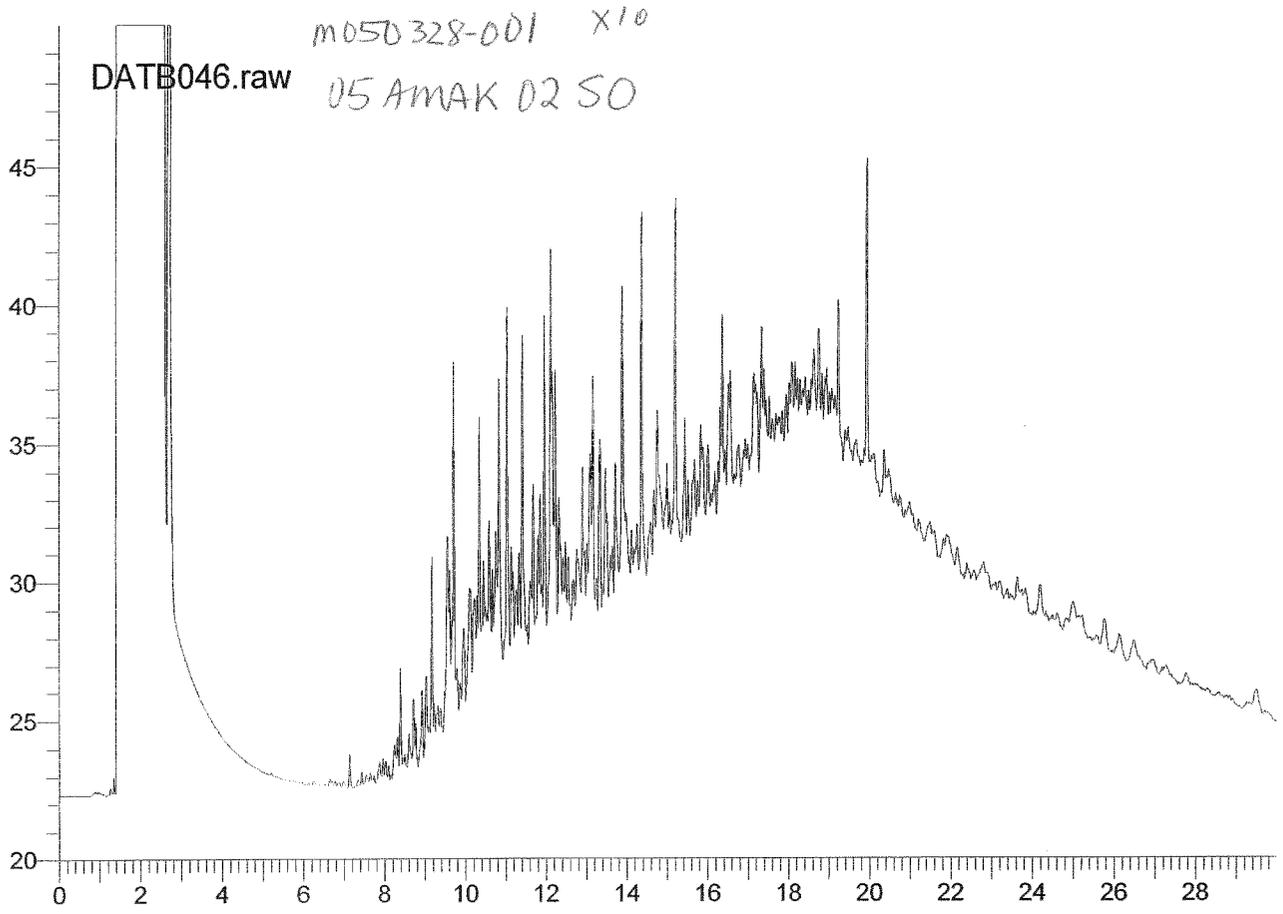


Plot Title	Start Time	End Time	Scale	Offset
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DATB046.raw	0.00	29.99	30.00	20.00
Sample Name :	M050328-001 X10			
Sample Number:	05AMAK 02 50			
Instrument File Name:	C:\TCWS\HP64176\MOD'8015\M8015-050707			

DATB043.raw	0.00	29.99	20.00	20.00
Sample Name :	M050328-002 X10			
Sample Number:	05AMAK 04 50			
Instrument File Name:	C:\TCWS\HP64176\MOD'8015\M8015-050707			



Plot Title	Start Time	End Time	Scale	Offset
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DATB030.raw	0.00	29.99	50.00	20.00
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Sample Name : M050328-009 X10

Sample Number: 05AmAK 13 SO

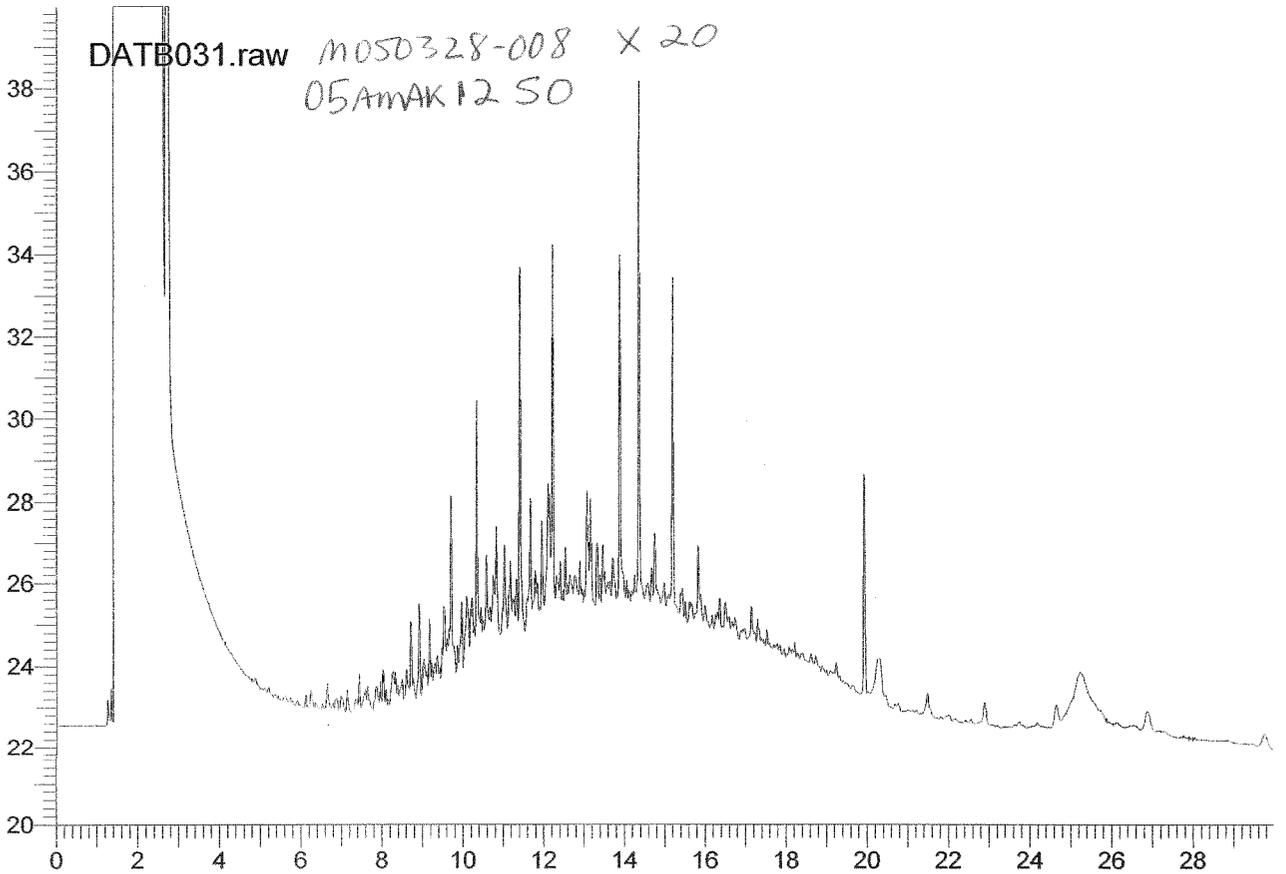
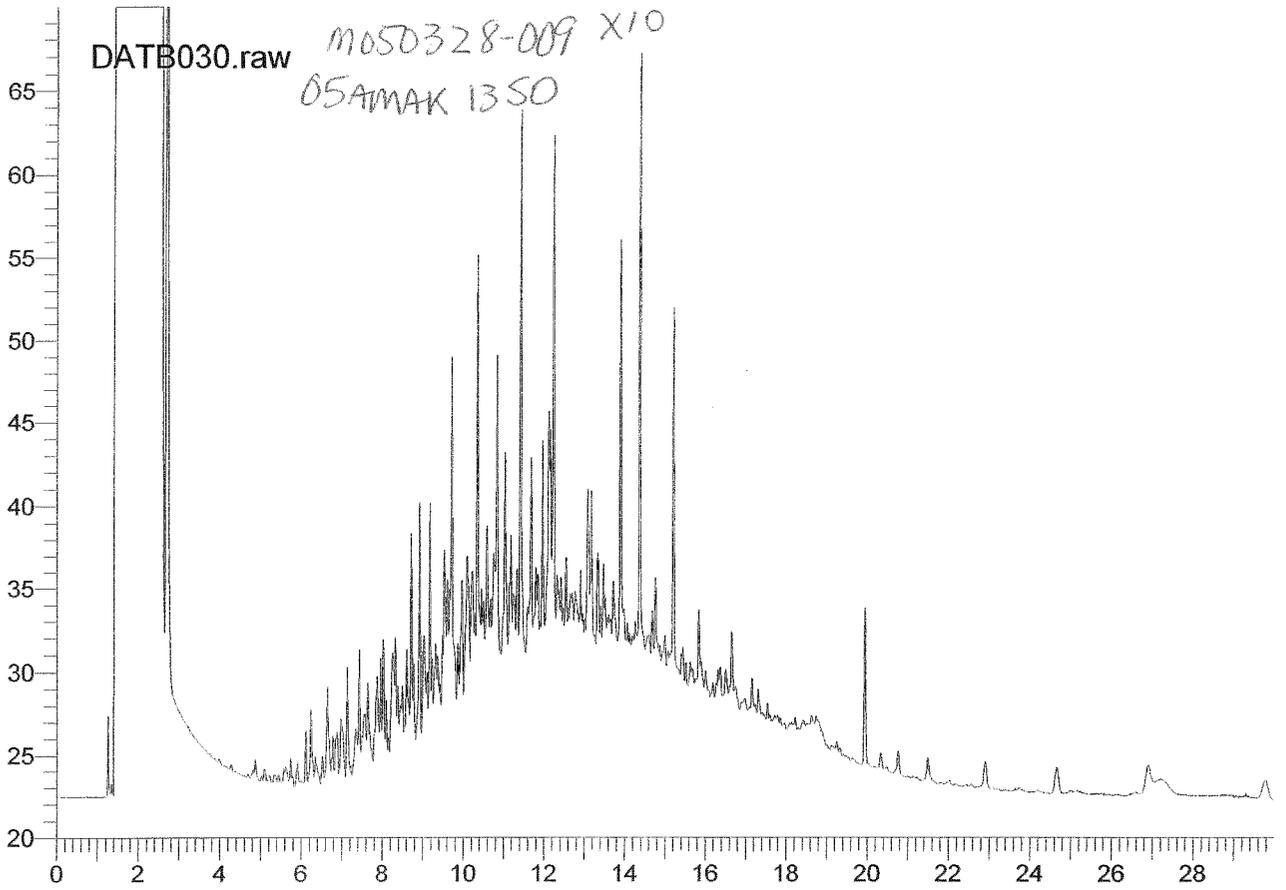
Instrument File Name: C:\TCWS\HP64176\MOD'8015\M8015-050707

DATB031.raw	0.00	29.99	20.00	20.00
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Sample Name : M050328-008 X20

Sample Number: 05AmAK 12 SO

Instrument File Name: C:\TCWS\HP64176\MOD'8015\M8015-050707



Plot Title	Start Time	End Time	Scale	Offset
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DATB044.raw	0.00	29.99	50.00	20.00
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Sample Name : M050328-006 X10

Sample Number: 05 AMAK 10 50

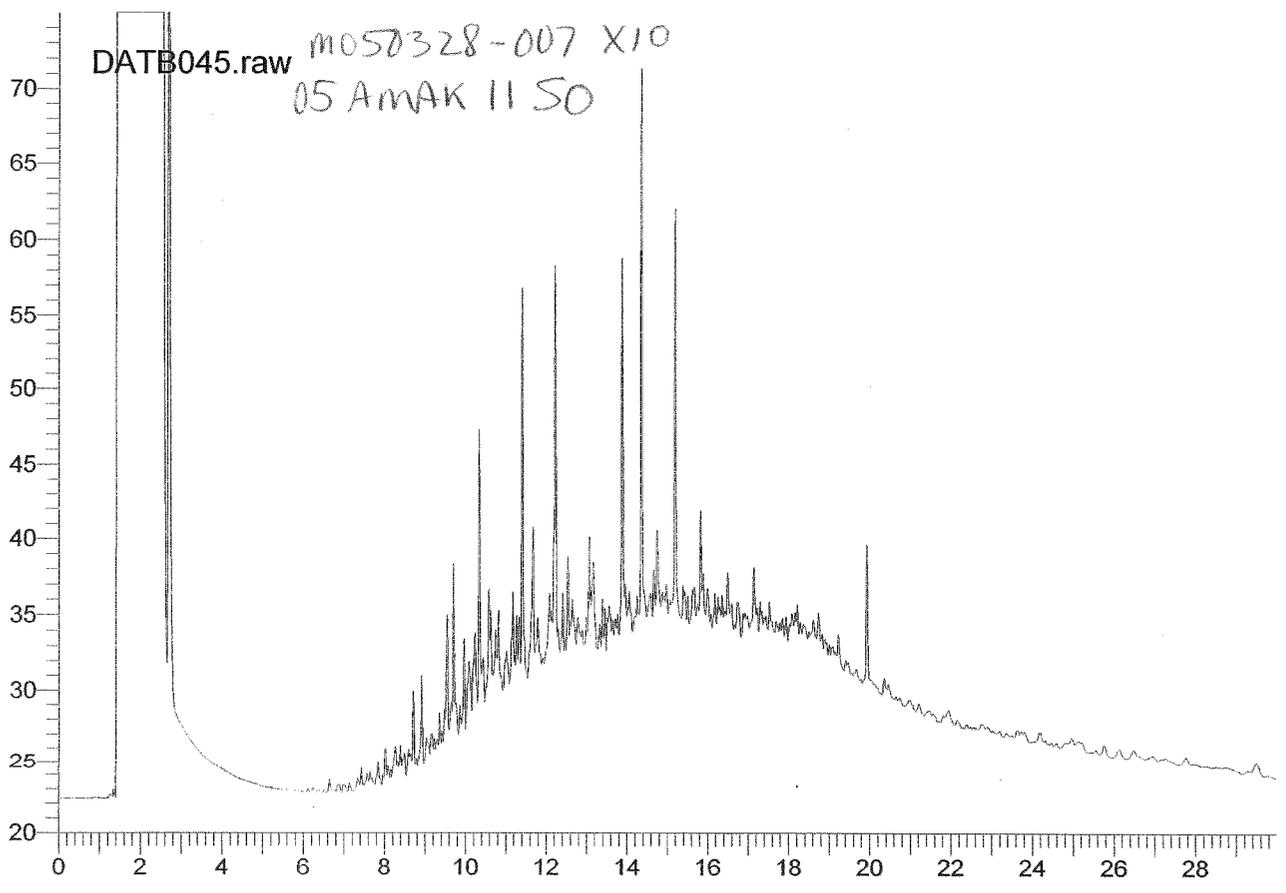
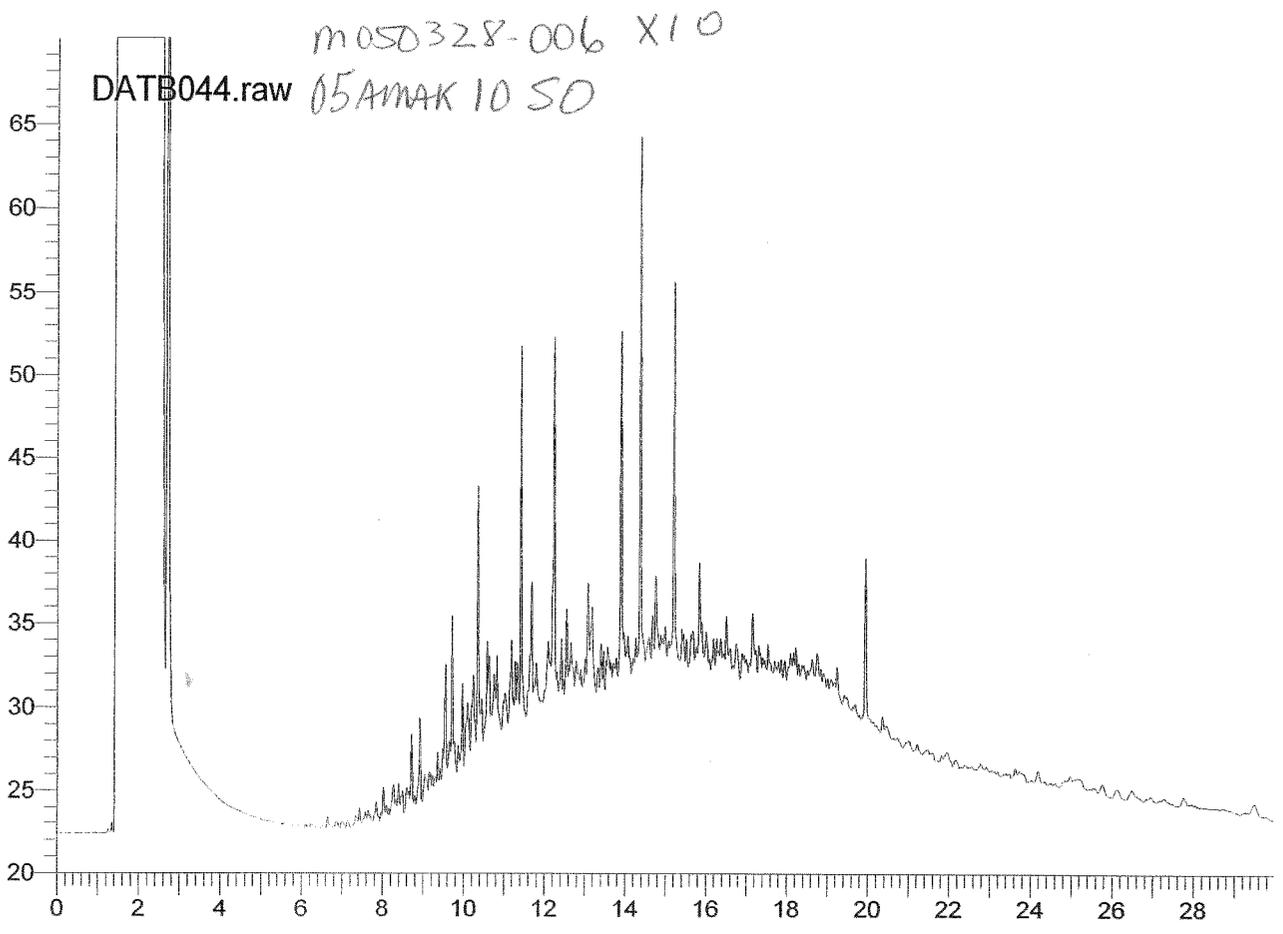
Instrument File Name: C:\TCWS\HP64176\MOD'8015\M8015-050707

DATB045.raw	0.00	29.99	55.00	20.00
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Sample Name : M050328-007 X10

Sample Number: 05 AMAK 11 50

Instrument File Name: C:\TCWS\HP64176\MOD'8015\M8015-050707



Plot Title Start Time End Time Scale Offset

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DATB025.raw 0.00 29.99 30.00 20.00

Sample Name : M050328-011

Sample Number: 05AMAK 16 SO

Instrument File Name: C:\TCWS\HP64176\MOD'8015\M8015-050707

DATB042.raw 0.00 29.99 45.00 20.00

Sample Name : M050328-010 X10

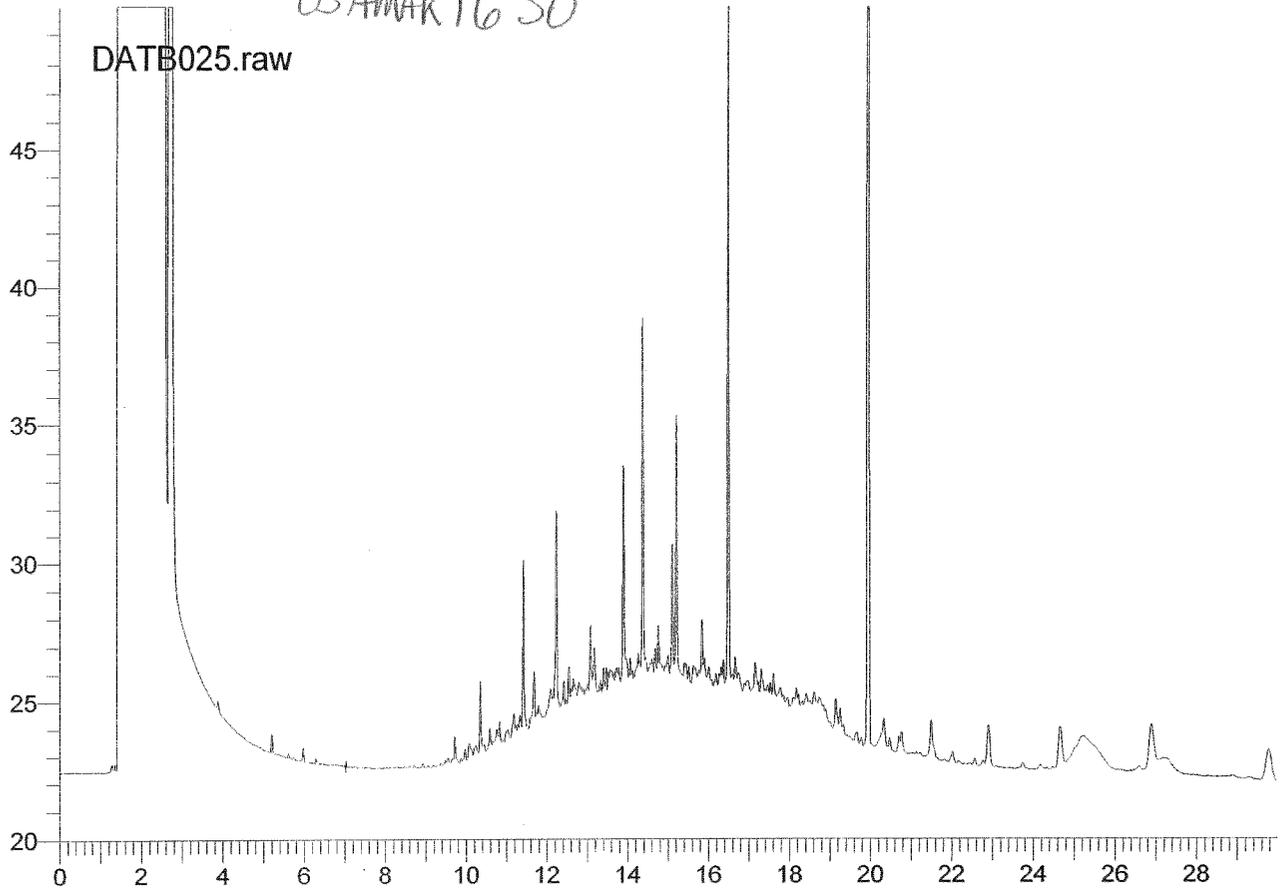
Sample Number: 05AMAK 14 SO

Instrument File Name: C:\TCWS\HP64176\MOD'8015\M8015-050707

M050328-011 X10

05AMAK1650

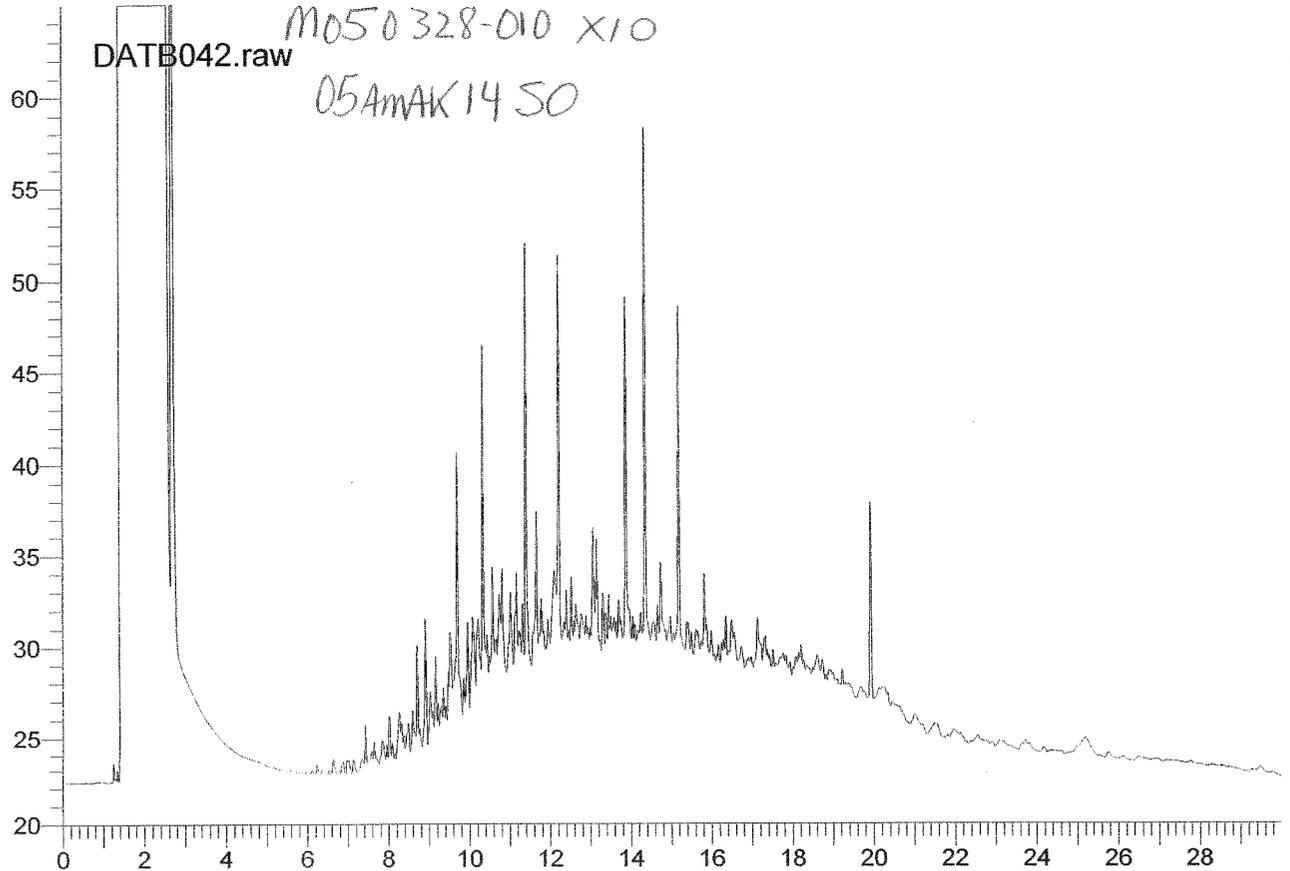
DATB025.raw



M050328-010 X10

05AMAK1450

DATB042.raw



Plot Title	Start Time	End Time	Scale	Offset
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DATB028.raw	0.00	29.99	20.00	20.00
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Sample Name : D200 P100

Sample Number:

Instrument File Name: C:\TCWS\HP64176\MOD'8015\M8015-050707

DATB041.raw	0.00	29.99	20.00	20.00
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Sample Name : M050328-004 X10

Sample Number: 05 AMAK 08 SO

Instrument File Name: C:\TCWS\HP64176\MOD'8015\M8015-050707

