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FINAL ANTI-AIRCRAFT ARTILLERY RANGERS SITE INVESTIGATION REPORT SURPLUS
OPERABLE UNIT FORT SHERIDAN IL
3/16/2001
U S ARMY ENVIRONMENTAL CENTER

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**U.S. Army
Environmental
Center**

**FINAL ANTI-AIRCRAFT ARTILLERY RANGES
SITE INVESTIGATION REPORT
SURPLUS OPERABLE UNIT,
FORT SHERIDAN, ILLINOIS**

March 16, 2001

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U.S. ARMY ENVIRONMENTAL CENTER
Base Closure Division
Aberdeen Proving Ground, Maryland 21010-5401**

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**Final Anti-Aircraft Artillery Ranges
Site Investigation Report
Surplus Operable Unit,
Fort Sheridan, Illinois**

Prepared for:
U.S. Army Environmental Center
Base Closure Division
Aberdeen Proving Ground, Maryland 21010-5901

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St. Louis, Missouri

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Harding ESE Project No. 490-2087-0600

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List of Abbreviations and Acronyms

AAA	Anti-Aircraft Artillery
ANL	Argonne National Laboratory
BCT	BRAC Cleanup Team
BEC	BRAC Environmental Coordinator
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
DGPS	Directional Global Positioning System
DI	deionized
DoD	Department of Defense
EOD	explosive/ordnance/disposal
°F	degrees Fahrenheit
FR	Federal Register
GIS	Geographical Information System
GPS	Global Positioning System
HMX	High Melting Explosive
HP	Highland Park raw water
HPSED	Highland Park sediment
HPSW	Highland Park surface water
HW	Highwood raw water
HWSW	Highwood surface water
IDW	Investigative Derived Waste
IEPA	Illinois Environmental Protection Agency
IZSED	impact zone sediment
MDL	method detection limit
mm	millimeters
NA	not analyzed
NC	not confirmed
OU	Operable Unit
PAs	Preliminary assessments
RDX	Royal Demolition Explosives, Hexahydro-1,3,5-trinitro-1,3,5-triazine
RI	Remedial Investigation

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List of Abbreviations and Acronyms (continued)

SAIC	Science Applications International Corporation
SAP	Sampling and Analysis Plan
SI	Site Investigation
stu	standard turbidity unit
TM	Technical Memorandum
TNT	trinitrotoluene
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UXO	unexploded ordnance

1.0 Introduction

This section of the Anti-Aircraft Artillery Ranges Site Investigation Report (AAA Ranges SI) includes a brief description and history of Fort Sheridan and the Surplus Operable Unit (OU) and a discussion of the objectives, scope, and approach for the AAA ranges.

1.1 Investigative and Site History

Preliminary assessments (PAs) of Fort Sheridan, conducted in 1982 and 1989, identified several former AAA firing points along Fort Sheridan [Gross *et al.*, 1982; Argonne National Laboratory (ANL), 1989]. AAA training occurred at Fort Sheridan from 1930 through the 1950s. AAA training commenced with the arrival of the 61st Coast Artillery. Five locations were considered suitable for firing positions for AAA at Fort Sheridan. These five locations are shown in Figure 1-1. Location A was the original firing point, but, because of complaints from local residents, location B became the primary firing location [U.S. Army Corps of Engineers (USACE), 1995]. Other sources indicate that locations C and D were also used as firing points (ANL, 1989).

The vast majority of firing was conducted against towed aerial targets. An archives search found evidence that ammunition used at the AAA ranges consisted of 37 millimeter (mm), 40 mm, 3 inch, 90 mm, and 120 mm projectiles (USACE, 1995). These projectiles consisted primarily of machined iron or steel casings and contained explosive fillers. Explosive fillers for the majority of these sizes of ordnance would have been tetryl, trinitrotoluene (TNT), black powder, or 50/50 ammonium nitrate and TNT [Complete Round Chart No. 5981, 1944 and 1945; War Department Technical Memorandum (TM) 9-1904, 1944; TM 9-1901, 1950; TM 9-1300-203, 1967]. Small amounts of brass, aluminum or zinc-lead alloy may have been used in the fuses of these projectiles. An analysis of the ranges of these various projectiles indicates that the majority of unexploded rounds would be from 3.7 miles to 10.6 miles from shore, with a decreasing potential of rounds out to 15.4 miles (USACE, 1995).

Initial sampling efforts have been conducted at Fort Sheridan in relation to the potential for unexploded ordnance (UXO) and related explosives compounds to be present in Lake Michigan. Two Sediment grab samples were collected in approximately 3 feet of water in the area between Janes and Hutchinson Ravines, just east of firing point D. A low concentration (just above the detection limit) of 1,3-dinitrobenzene was detected in one of the Sediment samples collected. Given the proximity of this sampling location to the shore and to a former ordnance disposal location, however, this detection is not likely related to the AAA ranges. This sampling effort is discussed in the Final Remedial Investigation (RI)/Baseline Risk Assessment for the Ravines and Beach Area Study Areas (QST, 1998).

A total of 20 offshore sediment samples were also collected at various locations along the Fort Sheridan shoreline along transects oriented perpendicular to the shoreline at distances of 30 feet and 70 feet. These sediment samples were collected to help evaluate the impact on Lake Michigan, if any, of surface water runoff and other types of discharge (e.g., groundwater) from Fort Sheridan. Six samples were collected offshore from the Lake Forest Nature Preserve; six samples were collected offshore from Landfill #7; four samples were collected offshore south of Shenck Ravine and near the southern boundary of Fort Sheridan; and the remaining four samples were collected offshore from the mouths of Janes, Hutchinson, Bartlett, and Van Horne Ravines. No explosives constituents were detected in any of the sediment samples. Three surface water samples were also collected during the offshore sediment sampling. One sample was collected offshore from the Lake Forest Nature Preserve; one sample was collected offshore from Landfill #7; and one sample was collected offshore at the southern boundary of Fort Sheridan. Octahydrotetranitrotetrazocine-High Melting Explosive (HMX) was detected below the method detection limit (MDL) in the surface water samples collected at the southern boundary of Fort Sheridan. This sampling effort is discussed in the Final RI Report for the Department of Defense (DoD) Operable Unit [Science Applications International Corporation (SAIC), 1999].

To monitor whether or not the former AAA ranges are affecting drinking water (Lake Michigan is the source of drinking water for the surrounding communities), four raw (untreated) water samples had also been collected, one at the Highwood water treatment plant and three at the Highland Park water treatment plant. None of these samples contained detectable concentrations of explosives compounds. The analytical results for these previous samples are provided in Appendix A.

Additionally, in response to a citizen petition, U.S. Environmental Protection Agency (USEPA) completed its own PA of the AAA ranges. USEPA's PA assumed that the lake sediments in the vicinity of water plant intakes have been affected and, therefore, determined that further investigation of the AAA ranges was warranted (Muno, 1998). Pursuant to Executive Order 12580, the Army requested the sampling documented in this SI Report to further evaluate the nature and extent of potential explosives constituents in surface water and sediment near local Lake Michigan municipal water intakes and sediment in the AAA training impact zone. Harding ESE, under Contract DAAA15-90-D-0017, Delivery Order 0002, performed this additional sampling on September 7-11, 1999 and on August 9, 2000 to further assess whether or not chemical constituents in artillery fired at the former AAA ranges have impacted or have the potential to impact Lake Michigan, a valuable ecological resource as well as a local source of drinking water. In addition to USEPA's conclusion that further investigation of these AAA ranges was warranted under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the Army determined that further investigation of these ranges was appropriate to address anticipated requirements of the proposed Range Rule (see below) and to address community questions about the potential impacts of these ranges.

On September 26, 1998, the DoD issued a proposed rule that identifies a process for evaluating appropriate response actions on closed, transferred, and transferring military ranges (Range Rule) [Federal Register (FR), Volume 62, Number 187, Page 50795 (62FR50795)]. The proposed Range Rule contains a process that was inconsistent with CERCLA and was tailored to the special risks posed by military munitions and military ranges. DoD withdrew the proposed Range Rule in November 2000 to further evaluate the numerous comments received on the proposed rule. According to a November 2000 fact sheet entitled "DOD Policy for Closed, Transferred, and Transferring Ranges Containing Military Munitions," DoD intends to issue an internal directive in 2001 and continue working towards re-proposing the Range Rule. The DoD directive would establish internal DoD policy for evaluating and responding to military munitions, to include UXO, and other constituents on closed, transferred, and transferring military ranges. As indicated above, in addition to meeting CERCLA requirements, this SI was designed to address anticipated requirements of the proposed Range Rule, however, the final DoD directive or a future Range Rule may impose additional requirements for these AAA ranges.

1.2 Scientific Literature Research

As part of the September 1999 and August 2000 AAA ranges investigation, a literature search was conducted on the potential fate of explosives compounds in the Lake Michigan underwater environment. This research focused on the degradation or breakdown of explosive compounds and on Lake Michigan Sediment transport. These two factors have the potential to affect the detectability of AAA range constituents.

Research on the environmental fate of explosives indicates these compounds can break down. Once dissolved in water, TNT and tetryl readily decompose by interaction with water (hydrolysis) and/or by interaction with sunlight (photolysis). This decomposition can occur within hours or days. Conversely, TNT breakdown products form tightly bound complexes with sediments that are resistant to biodegradation (Walsh, 1990; Darrach and Chutjian, 1997; Naval Explosive Ordnance Disposal Technology Center, 1988; Layton *et al.*, 1987; Zappi, 1998). Thus, explosives constituents present in sediment are expected to degrade more slowly than explosives constituents dissolved in water. For this reason, chemical analysis must include TNT breakdown products. For additional information on the environmental fate of TNT and tetryl, please refer to Appendix B of the Final AAA Ranges Sampling and Analysis Plan (AAA Ranges SAP) (ESE, 1999).

The subsurface environment in Lake Michigan, including bottom sediments, is dynamic. Waves and currents in the lake are directly related to wind. Sediment distribution in Lake Michigan is primarily determined by wind-driven surface waves (Chang-Hee and Hawley, 1998). Lake currents have a well-established counter-clockwise pattern around the southern basin of the lake for most of the year. These currents affect the distribution of sediments, resulting in a general southward migration of sediments

(Edgington and Robbins, 1990; Lineback and Gross, 1972). In addition, the Illinois coast of Lake Michigan is exposed to waves approaching from either the northeast or southeast quadrants. The predominance of northeasterly waves adds to the net southward transport of sediment (Foyle *et al.*, 1998). During a major storm event, wind-driven currents can affect the lake bottom to a depth of 25 to 30 meters (82 to 98 feet) (Chang-Hee and Hawley, 1998; Booth, 1994; Berkson *et al.*, 1975). Records indicate that the most recent AAA training occurred in the early 1950's (USACE, 1995); however, studies of UXO in underwater environments indicate that UXO can last a long time in an underwater environment (at least 50 years) and can release their contents at a very slow rate through corroded pinholes, joints, or screw threads (Darrach and Chutjian, 1997). Therefore, if UXO are present in Lake Michigan offshore from Fort Sheridan, even though the sediments are dispersing in depths of up to 30 meters, a constant source of explosive constituents from an item of UXO may be detectable through sediment sampling.

1.3 AAA Ranges SI Objective

The objective of the September 1999 and August 2000 AAA ranges investigation was to define the nature and extent (if any) of potential explosives constituents in sediment and surface water adjacent to the water intakes and in sediment in the AAA impact zone. The data collected would permit conclusions to be drawn regarding the presence of explosives near the water intakes and in the impact zone, and corresponding potential risks (if any) to human health and/or the environment. Because the Army and other services of the DoD (and perhaps non-military entities) historically conducted artillery training over Lake Michigan, the scope of the AAA Ranges SI was limited to the evaluation of the potential effects of Fort Sheridan AAA training on the lake. The rationale and methodology used to select the sample locations is contained in the final Anti-Aircraft Artillery Ranges Sampling Analysis Plan, Fort Sheridan, Illinois (ESE, 1999). This SI was not intended to search out items of UXO in the Lake Michigan impact zones. Although the risk of exposure to items of UXO in Lake Michigan is considered low, this SI does not preclude the Army from taking response actions in the future to protect human health and the environment in the event that changing environmental conditions (such as wave action) reveal a UXO safety hazard.

2.0 Investigation and Results

The investigation activities presented in this AAA Ranges SI were conducted in consultation with representatives from USEPA and Illinois EPA (IEPA). These two agency representatives, together with the Fort Sheridan BRAC Environmental Coordinator (BEC), comprise the BRAC Cleanup Team (BCT). Investigation activities were also conducted in accordance with the Final AAA Ranges SAP (ESE, 1999).

A combination of Global Positioning System (GPS) and ArcView Geographical Information System (GIS) software were used to establish impact zone sampling locations prior to entering the field. The accurate establishment of sampling locations prior to initiating field activities allowed for efficient use of field time and ensured that the study area was sufficiently and systematically covered during field activities. Geo-referenced sample points were first graphically determined using ArcView GIS software. Once determined, sample point data were transferred to the GPS software whereby waypoints were created and uploaded into the GPS datalogger for precise in-field navigation.

Once in the field, sample locations were ascertained using the field GPS unit with waypoints previously created. U.S. Coast Guard Directional GPS (DGPS) signals were utilized at all times to provide real-time differential correction of GPS signals.

2.1 Water Intake Sampling

Municipal water intake coordinates were provided by the Cities of Highland Park and Highwood. Coordinates were the best available as recorded by the respective water treatment facilities. The coordinates were entered into Trimble Navigation's GPS software. Waypoints were created and overlaid on a U.S. Geological Survey (USGS) digital raster graphic topographical map to verify information accuracy. Waypoints of the two intake locations were uploaded to Trimble Navigation's Pro XR with TDC1 datalogger. Once in the field, sample locations were ascertained using the field GPS unit with waypoints previously created. U.S. Coast Guard DGPS signals were utilized at all times to provide real-time differential correction of GPS signals. The water intake locations are presented in Figure 2-1.

2.1.1 Highland Park Intake Sampling

The Highland Park intake crib was located during the September 1999 AAA ranges investigation. Once the workboat reached the coordinates provided by Highland Park, a buoy was dropped. The onboard depth finder indicated a significant rise in bottom topography at this location. A field team member with snorkeling gear entered the water at this location and verified the intake crib's presence. The field team member relocated the buoy to the center of the intake crib. Four additional buoys were placed approximately 100 feet north, south, east and west of the center buoy. The intake crib center and sample

collection locations were recorded using the GPS unit. The GPS coordinates are provided in Appendix B.

Water intake surface water and sediment sampling was conducted by scuba-certified personnel with current explosive/ordnance/disposal (EOD) and commercial diver certifications. Following placement of the sample buoys, divers entered the water and surveyed the area around each buoy anchor. A 10-foot line was attached to the buoy anchor line and divers performed reconnaissance within a 10-foot diameter circle around the buoy anchor to search for possible UXO. Once the area was determined to be clear of UXO, divers surfaced and informed the surface crew that the sample area was clear to sample. The diving support report is provided in Appendix C.

Following UXO reconnaissance, divers collected surface water and sediment samples. Prior to collecting samples, divers were provided with appropriate sample jars and instructed as to which samples were to go into each jar (i.e., sample location and type). Surface water and sediment samples were collected starting south of the intake and proceeding northward. Two water samples and two sediment samples were collected along each of the four sides of the intake crib base as shown in Figure 2-2. Sampling stations were located using the 10-foot line. Thus, sampling stations were located 10 feet on either side of the buoy. At each sampling station, surface water samples were collected first and directly (approximately 12 inches) above the sediment surface by the scuba diver. Care was taken to prevent disturbance of the sediment before water sampling. Surface water samples were collected directly into clean glass sample containers. Sealed sample containers were lowered to the sampling point above the sediment and opened. Upon filling, the sample containers were resealed and brought to the surface. The sample containers were then placed in a prechilled ice chest for subsequent shipment to the laboratory.

Upon completion of the surface water sampling at each station, sediment samples were collected by the diver. Sediment samples were collected at the same locations as were water samples. Sediment samples were collected from the upper sediment (0 to 6 inches) layer. Divers were instructed to collect sediment consisting of fine-grained (clay-silt-sand) material. Sediment sampling was conducted by directly pushing the sample container through the sediment to fill each sample container. Once filled, the sample container was resealed and brought to the surface. The containers were then placed in a prechilled ice chest for subsequent shipment to the laboratory.

2.1.2 Highwood Intake

As part of the September 1999 sampling activities, numerous attempts were made to locate the Highwood intake. A number of circular and zig-zag search patterns were employed to locate the intake in the vicinity of the provided coordinates in an attempt to locate the intake via depth finder. Additionally, divers entered the water numerous times in an attempt to locate the intake. Only large boulders were

observed. An additional set of coordinates provided by the Lake County Sheriff's Department was also investigated. However, the intake was not observed at these coordinates. On a final attempt, divers entered the water at the pump house in an effort to locate and follow the intake pipe utilizing a hand held metal detector. A definite reading was not observed.

Activities to locate the Highwood intake were curtailed during the winter of 1999-2000 due to cold weather and rough lake conditions. Efforts to locate the Highwood water intake were reintensified during the spring and summer of 2000. A local commercial charter and salvage service (West Shore Diving Charters, Inc.) was contracted to search for and locate the Highwood water intake using a side mounted sonar scan and an underwater magnetometer. The Highwood Water Plant was also contacted to learn about the location and physical condition of the intake. The manager of the Highwood Water Plant indicated that the intake consisted of a "Johnson Screen" (a screened pipe), rather than a crib structure. With this information, the location of the Highwood water intake was finally determined in July 2000. The GPS coordinates of the Highwood water intake are provided in Appendix B.

Sampling activities at the Highwood water intake occurred on August 9, 2000. Once the workboat reached the predetermined coordinates provided by West Shore Diving Charters, Inc., the anchor was dropped. A field team member with diving gear entered the water at this location and verified the presence of the intake pipe. The diving support report is provided in Appendix A. Water intake surface water and sediment sampling was conducted by scuba-certified personnel with current EOD and commercial diver certifications. Once the area was determined to be clear of UXO, divers surfaced and informed the surface crew that the sample area was clear to sample. The diving support report is provided in Appendix C.

Surface water and sediment samples were collected starting south of the intake pipe and proceeding northward. Eight water samples and eight sediment samples were collected from the area surrounding the intake pipe as shown in Figure 2-3. Sampling stations were located at distances of 5 or 15 feet from the pipe. At each sampling station, surface water samples were collected first and directly (approximately 12 inches) above the sediment surface by the scuba diver. Care was taken to prevent disturbance of the sediment before water sampling. Surface water samples were collected directly into clean glass sample containers. Sealed sample containers were lowered to the sampling point above the sediment and opened. Upon filling, the sample containers were resealed and brought to the surface. The water sample containers were then placed in a prechilled ice chest for subsequent shipment to the laboratory.

Upon completion of the surface water sampling at each station, sediment samples were collected by the diver. Sediment samples were collected at the same locations as were water samples. Sediment samples were collected from the upper sediment (0-6 inches) layer. Divers were instructed to collect sediment consisting of fine-grained (clay-silt-sand) material. Sediment sampling was conducted by directly

pushing the sample container through the sediment to fill each sample container. Once filled, the sample container was resealed and brought to the surface. The containers were then placed in a prechilled ice chest for subsequent shipment to the laboratory.

2.2 Water Treatment Plant Sampling

In accordance with the Final AAA Ranges SAP, Harding ESE made every attempt to collect raw water samples during or after storm events in order to get as much suspended sediment in the sample as possible. Turbidity measurements made at the Highland Park Water Treatment Plant were monitored by Harding ESE during and after storm events during the fall and winter months of 1999 and 2000. Although several storm events occurred, from September 1999 through March 2000, none produced turbidity levels significantly higher than normal. Finally, two storm events occurred during spring 2000 that resulted in elevated turbidity levels.

Raw water samples were collected from the Highland Park and Highwood water plants on April 8, 2000 and on May 19, 2000. One sample was collected from each plant on each sampling day. Based on measurements performed by the Highland Park water plant, the samples collected on April 8, 2000 were observed with approximately 20 standard turbidity units (stu), while the samples collected on May 19, 2000 were observed with approximately 50 stu. The normal range of turbidity measured by the Highland Park water plant is in the range of 5 to 10 stu. No data on turbidity was available from the Highwood water plant.

Water samples were collected from a tap on the water intake pipe prior to any treatment process. Water samples were collected using clean glass sample containers. Upon filling, the sample containers were sealed and placed in a prechilled ice chest for subsequent shipment to the laboratory.

2.3 AAA Impact Zone Sampling

Sediment sampling in the AAA ranges impact zone was conducted during the September 1999 field investigations and began in the southern portion of the impact zone and proceeded northward. Impact zone samples were collected at the locations previously established in the AAA Ranges SAP. Sample locations were navigated to using field GPS equipment. Once over the pre-established location, the workboat engines were used to reduce boat drift caused by wind. A petite ponar dredge was lowered and retrieved from the workboat to obtain the sediment samples. In areas where bottom substrates were primarily composed of cobble and boulders, three attempts were made to collect the sample. If sediment was unobtainable, the field crew moved to the next sample location. Only 10 of the 20 impact zone samples identified in the AAA Ranges SAP were sampled. The reasons for this are explained in Section 2.4. The AAA Impact Zone sediment sample locations are shown in Figure 2-4.

The sediment collected by the petite ponar was placed in a stainless-steel bowl. If multiple grab samples were obtained from any one sampling location in order to collect the sample volume needed, each ponar grab sample was placed in the same stainless-steel bowl. Following sample collection, sediments were homogenized and then placed into sample containers. The sediment placed in the sample containers consisted of fine grained (clay-silt-sand) sized material. The larger material (gravel size and above) was excluded from the samples. After filling, the sample containers were placed in a prechilled ice chest for subsequent shipment to the laboratory. GPS coordinates of each sample location were obtained in the field and recorded in the field notebook. The GPS coordinates of the AAA impact zone samples are provided in Appendix B.

2.4 Field Observations

Surface water and sediment samples were collected from the Highland Park intake locations indicated in Figure 2-2 on September 8, 1999. The weather was partly cloudy, with winds out of the west at 15 to 20 knots and chop of 1 to 3 feet. The water temperature was 77°F with visibility at approximately 15 feet.

Sediment sampling in the impact zone began on September 10, 1999. The weather was partly cloudy, with 10 to 20 knot winds out of the east, 2- to 4-foot chop, and a water temperature of 77°F. Sampling efforts were conducted at sampling locations IZSED1-6. At locations IZSED1-5, no fine-grained material was obtained in the first sampling attempt as only small and/or large rock were retrieved by the petite ponar. At least two more attempts were made at each of these locations to obtain a sufficient amount of fine or small grained material for subsequent analysis. Because these subsequent attempts yielded only rocks, no samples were collected from these locations. At location IZSED 6, a sufficient amount of sandy silt material was collected for analysis.

On September 11, 1999, sediment sampling continued at the remaining locations within the impact zone. The weather was clear, with 5 to 10 knot winds out of the east, 1- to 3-foot chop, and a water temperature of 77°F. At sampling locations IZSED 7-9 and IZSED18, no fine-grained material was obtained in the first sampling attempt as only small and/or large rock were retrieved by the petite ponar. Two more attempts were made at each of these locations to obtain a sufficient amount of fine or small grained material for subsequent analysis. Because these subsequent attempts yielded only rocks, no samples were collected from these locations. A decision was made to abandon the failed sampling locations because other sampling locations provided representative coverage of the impact zones. At locations IZSED 10-17,19 and 20, the sediment material retrieved by the petite ponar consisted of a sand, silt, and clay mixture. At each of these locations, a sufficient amount of material was collected for analysis.

Surface water and sediment samples were collected from the Highwood intake location indicated in Figure 2-3 on August 9, 2000. The weather was partly cloudy (thunderstorm possible) with winds relatively calm, but minor chop was present. The water temperature was 73°F with fair visibility.

Representative photographs from the sampling are presented in Appendix D.

2.5 Decontamination Procedures

Stainless-steel sampling spoons and bowls and the petite ponar dredge were decontaminated by the following procedure between sample points:

1. Liquinox™ wash and thorough potable water rinse;
2. Ten percent nitric acid rinse (applied from a spray bottle);
3. Thorough deionized (DI) water rinse;
4. Pesticide-grade isopropanol rinse (applied from a spray bottle);
5. Air dry; and
6. Wrap in aluminum foil.

2.6 Investigative Derived Waste (IDW)

The IDW generated consisted only of de minimus quantities of each of the following reagents: detergent water, isopropanol, and 10 percent nitric acid. This IDW was collected and containerized in lidded 5-gallon buckets. The isopropanol was allowed to evaporate off and the 10 percent nitric acid was neutralized to a pH of 7. Because of the de minimus quantities of liquid IDW that was generated, the liquid was containerized in 5-gallon lidded buckets and was discharged into the Fort Sheridan sanitary sewer system by Harding ESE.

3.0 Laboratory Analytical Results

The analytical results for the intake and impact zone sampling are presented in this section. Also presented is a summary of the data validation performed. The analytical data sheets are presented in Appendix E.

3.1 Data Validation

Analytical data were validated in accordance with the National Functional Guidelines (USEPA, 1994). The results of the data validation are presented in Appendix F. As a result of the validation, no data were rejected.

Through the data validation process, six of the surface water samples collected from the Highwood water intake pipe were qualified. The method blank was non-detect for target analytes with the exception of 1,3,2-dinitrobenzene at 0.29 micrograms per liter ($\mu\text{g/L}$) and 0.34 $\mu\text{g/L}$ on the primary and confirmation column, respectively. All of the associated samples were qualified as "U" since sample concentrations were greater than the reporting limit but less than 5 times the blank concentrations. The samples (HWSW-S1, HWSW-SE, HWSW-E1, HWSW-N1, HWSW-SW and HWSW-SWDUP) had the qualifier "U" placed on the results for 1,3-dinitrobenzene. The "U" qualifier represents that the analyte was analyzed for but was not detected above the reported sample quantitation limit or the sample detection limit. See Appendix F for a complete discussion of the results of the data validation.

3.2 Analytical Results

The analytical data are presented in Tables 3-1 through 3-6.

The analytical data for the Highland Park intake surface water and sediment samples are presented in Tables 3-1 and 3-2. As shown in these tables, no explosive constituents were detected in any of the surface water or sediment samples collected from the Highland Park water intake crib. It should be noted that while some samples were observed as having a positive detection in the primary column (identified as NC in Tables 3-1 and 3-2), this detection was not confirmed by the secondary column. These samples are HPSED#4, HPSED#5, HPSED#7, and HPSW#7.

The analytical data for the Highwood intake surface water and sediment samples are presented in Tables 3-3 and 3-4. As shown in these tables, no explosive constituents were detected in any of the surface water and sediment samples collected from the Highwood water intake pipe. As discussed previously, results for 1,3-dinitrobenzene in six surface water samples were qualified with "U" because

sample concentrations were greater than the reporting limit but were not detected above the reported sample quantitation limit or the sample detection limit. It should be noted that while these samples were observed as having a positive detection of 1,3-dinitrobenzene in both the primary and secondary column, this constituent was also detected in the equipment blank. It should also be noted that a secondary column confirmation analysis for Royal Demolition Explosives, Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) was conducted on one sediment sample (HWSED-SE), however, no positive detections were confirmed.

The analytical data for the Highland Park and Highwood water treatment plants raw water samples are presented in Table 3-5. No explosive constituents were detected in any of the raw water samples collected.

The analytical data for the AAA impact zone sediment samples are presented in Table 3-6. No explosive constituents were detected in any of the sediment samples collected.

4.0 Summary/Conclusion

Environmental samples were collected to assess whether or not chemical constituents in artillery fired at the former AAA ranges have impacted or have the potential to impact Lake Michigan, a valuable ecological resource as well as a local source of drinking water. Samples of raw (untreated) water were collected from the Highland Park and Highwood water treatment plants. Surface water and sediment samples were collected from the Highland Park and Highwood water intakes and from the AAA impact zone. Samples were analyzed for explosive constituents (i.e., nitroaromatics and nitroamines). No explosive constituents were reported at concentrations above the sample detection limits in any of the samples collected. The results indicate that the chemical constituents in artillery fired at the former AAA ranges have not impacted Lake Michigan. In addition, there is no evidence from this investigation that would suggest any potential impact on Lake Michigan.

5.0 References

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Table 3-1. Analytical Results for Highland Park Intake Surface Water and QC Samples ($\mu\text{g/L}$), Surplus OU, Fort Sheridan, Illinois

Parameter Name	HPSW #1	HPSW #2	HPSW #3	HPSW #4	HPSW #5	HPSW #6	HPSW #7	HPSW #7	HPSW #8	HPSW #8 Dup	Equip Blank
1,3-Dinitrobenzene	<0.52U	<0.42U	<0.49U	<0.56U	<0.55U	<0.66U	<0.56U	NA	<0.52U	<0.40U	<0.41U
2,4-Dinitrotoluene	<0.52U	<0.42U	<0.49U	<0.56U	<0.55U	<0.66U	<0.56U	NA	<0.52U	<0.40U	<0.41U
2,6-Dinitrotoluene	<0.52U	<0.42U	<0.49U	<0.56U	<0.55U	<0.66U	<0.56U	NA	<0.52U	<0.40U	<0.41U
2-amino-4,6-Dinitrotoluene	<0.52U	<0.42U	<0.49U	<0.56U	<0.55U	<0.66U	<0.56U	NA	<0.52U	<0.40U	<0.41U
4-amino-2,6-Dinitrotoluene	<0.52U	<0.42U	<0.49U	<0.56U	<0.55U	<0.66U	<0.56U	NA	<0.52U	<0.40U	<0.41U
HMX	<0.78U	<0.62U	<0.74	<0.83U	<0.82U	<0.99U	2.3NC	<0.21U	<0.78U	<0.60U	<0.61U
Nitrobenzene	<0.78U	<0.62U	<0.74	<0.83U	<0.82U	<0.99U	<0.83U	NA	<0.78U	<0.60U	<0.61U
2-Nitrotoluene	<0.78U	<0.62U	<0.74	<0.83U	<0.82U	<0.99U	<0.83U	NA	<0.78U	<0.60U	<0.61U
3-Nitrotoluene	<0.78U	<0.62U	<0.74	<0.83U	<0.82U	<0.99U	<0.83U	NA	<0.78U	<0.60U	<0.61U
4-Nitrotoluene	<0.78U	<0.62U	<0.74	<0.83U	<0.82U	<0.99U	<0.83U	NA	<0.78U	<0.60U	<0.61U
RDX	<0.78U	<0.62U	<0.74	<0.83U	<0.82U	<0.99U	1.8NC	<0.21U	<0.78U	<0.60U	<0.61U
Tetryl	<0.52U	<0.42U	<0.49U	<0.56U	<0.55U	<0.66U	<0.56U	NA	<0.52U	<0.40U	<0.41U
1,3,5-Trinitrobenzene	<0.52U	<0.42U	<0.49U	<0.56U	<0.55U	<0.66U	<0.56U	NA	<0.52U	<0.40U	<0.41U
2,4,6-Trinitrotoluene	<0.52U	<0.42U	<0.49U	<0.56U	<0.55U	<0.66U	<0.56U	NA	<0.52U	<0.40U	<0.41U

HPSW = Highland Park surface water.

NC = not confirmed.

NA = not analyzed.

U = The analyte was analyzed for but was not detected above the reported sample quantitation limit.

Table 3-2. Analytical Results for Highland Park Intake Sediment Samples ($\mu\text{g}/\text{kg-dry}$), Surplus OU, Fort Sheridan, Illinois (Page 1 of 2)

Parameter Name	HPSED#1	HPSED#2	HPSED#3	HPSED#4	HPSED#4	HPSED#5
1,3-Dinitrobenzene	<440U	<430U	<470U	<480U	NA	<450U
2,4-Dinitrotoluene	<440U	<430U	<470U	<480U	NA	<450U
2,6-Dinitrotoluene	<440U	<430U	<470U	<480U	NA	<450U
2-amino-4,6-Dinitrotoluene	<440U	<430U	<470U	<480U	NA	<450U
4-amino-2,6-Dinitrotoluene	<440U	<430U	<470U	<480U	NA	<450U
HMX	<630U	<610U	<680U	<680U	NA	790NC
Nitrobenzene	<630U	<610U	<680U	<680U	NA	<640U
2-Nitrotoluene	<440U	<430U	<470U	<480U	NA	<450U
3-Nitrotoluene	<440U	<430U	<470U	<480U	NA	<450U
4-Nitrotoluene	<440U	<430U	<470U	<480U	NA	<450U
RDX	<630U	<610U	<680U	710NC	<170U	<640U
Tetryl	<440U	<430U	<470U	<480U	NA	<450U
1,3,5-Trinitrobenzene	<440U	<430U	<470U	<480U	NA	<450U
2,4,6-Trinitrotoluene	<440U	<430U	<470U	<480U	NA	<450U
Moisture %	21U	18U	26U	27U	NA	22U

Table 3-2. Analytical Results for Highland Park Intake Sediment Samples ($\mu\text{g}/\text{kg-dry}$), Surplus OU, Fort Sheridan, Illinois (Page 2 of 2)

Parameter Name	HPSED#5	HPSED#6	HPSED#7	HPSED#7	HPSED#8	DUP HPSED#8
1,3-Dinitrobenzene	NA	<510U	<470U	NA	<440U	<440U
2,4-Dinitrotoluene	NA	<510U	<470U	NA	<440U	<440U
2,6-Dinitrotoluene	NA	<510U	<470U	NA	<440U	<440U
2-amino-4,6-Dinitrotoluene	NA	<510U	<470U	NA	<440U	<440U
4-amino-2,6-Dinitrotoluene	NA	<510U	<470U	NA	<440U	<440U
HMX	<640U	<720U	920NC	<170U	<620U	<630U
Nitrobenzene	NA	<720U	<670U	NA	<620U	<630U
2-Nitrotoluene	NA	<510U	<470U	NA	<440U	<440U
3-Nitrotoluene	NA	<510U	<470U	NA	<440U	<440U
4-Nitrotoluene	NA	<510U	<470U	NA	<440U	<440U
RDX	NA	<720U	<670U	NA	<620U	<630U
Tetryl	NA	<510U	<470U	NA	<440U	<440U
1,3,5-Trinitrobenzene	NA	<510U	<470U	NA	<440U	<440U
2,4,6-Trinitrotoluene	NA	<510U	<470U	NA	<440U	<440U
Moisture %	NA	31U	25U	NA	20U	21U

HPSED = Highland Park sediment.

NA = not analyzed.

NC = not confirmed.

U = The analyte was analyzed for but was not detected above the reported sample quantitation limit.

Table 3-3. Analytical Results for Highwood Intake Surface Water and QC Samples ($\mu\text{g/L}$), Surplus OU, Fort Sheridan, Illinois

Parameter Name	HWSW-S1	HWSW-SE	HWSW-E1	HWSW-NE	HWSW-N1	HWSW-NW	HWSW-W1	HWSW-SW	HWSW-SW DUP	EQUIP BLANK
1,3-Dinitrobenzene	0.33UB	0.31UB	0.32UB	<0.21U	0.39UB	<0.19U	<0.21U	0.82UB	0.95UB	0.34U
2,4-Dinitrotoluene	<0.24U	<0.23U	<0.23U	<0.21U	<0.23U	<0.19U	<0.21U	<0.19U	<0.23U	<0.076U
2,6-Dinitrotoluene	<0.24U	<0.23U	<0.23U	<0.21U	<0.23U	<0.19U	<0.21U	<0.19U	<0.23U	<0.076U
2-amino-4,6-Dinitrotoluene	<0.24U	<0.23U	<0.23U	<0.21U	<0.23U	<0.19U	<0.21U	<0.19U	<0.23U	<0.076U
4-amino-2,6-Dinitrotoluene	<0.24U	<0.23U	<0.23U	<0.21U	<0.23U	<0.19U	<0.21U	<0.19U	<0.23U	<0.076U
HMX	<0.36U	<0.34U	<0.34U	<0.31U	<0.35U	<0.29U	<0.31U	<0.28U	<0.35U	<0.11U
Nitrobenzene	<0.36U	<0.34U	<0.34U	<0.31U	<0.35U	<0.29U	<0.31U	<0.28U	<0.35U	<0.11U
2-Nitrotoluene	<0.36U	<0.34U	<0.34U	<0.31U	<0.35U	<0.29U	<0.31U	<0.28U	<0.35U	<0.46U
3-Nitrotoluene	<0.36U	<0.34U	<0.34U	<0.31U	<0.35U	<0.29U	<0.31U	<0.28U	<0.35U	<0.46U
4-Nitrotoluene	<0.36U	<0.34U	<0.34U	<0.31U	<0.35U	<0.29U	<0.31U	<0.28U	<0.35U	>0.11U
RDX	<0.73U	<0.68U	<0.68U	<0.62U	<0.70U	<0.58U	<0.62U	<0.56U	<0.70U	<0.23U
Tetryl	<0.24U	<0.23U	<0.23U	<0.21U	<0.23U	<0.19U	<0.21U	<0.19U	<0.23U	<0.076U
1,3,5-Trinitrobenzene	<0.24U	<0.23U	<0.23U	<0.21U	<0.23U	<0.19U	<0.21U	<0.19U	<0.23U	<0.076U
2,4,6-Trinitrotoluene	<0.24U	<0.23U	<0.23U	<0.21U	<0.23U	<0.19U	<0.21U	<0.19U	<0.23U	<0.076U

HWSW = Highwood surface water.

B = confirmed, constituent also detected in blank.

U = The analyte was analyzed for but was not detected above the reported sample quantitation limit.

Table 3-4. Analytical Results for Highwood Intake Sediment Samples ($\mu\text{g}/\text{kg}\text{-day}$), Surplus OU, Fort Sheridan, Illinois

Parameter Name	HWSED-S1	HWSED-SE	HWSED-E1	HWSED-NE	HWSED-N1	HWSED-NW	HWSED-W1	HWSED-SW	HWSED-SW DUP
1,3-Dinitrobenzene	<560U	<430U	<440U	<570U	<380U	<430U	<440U	<400U	<410U
2,4-Dinitrotoluene	<560U	<430U	<440U	<570U	<380U	<430U	<440U	<400U	<410U
2,6-Dinitrotoluene	<560U	<430U	<440U	<570U	<380U	<430U	<440U	<400U	<410U
2-amino-4,6-Dinitrotoluene	<560U	<430U	<440U	<570U	<380U	<430U	<440U	<400U	<410U
4-amino-2,6-Dinitrotoluene	<560U	<430U	<440U	<570U	<380U	<430U	<440U	<400U	<410U
HMX	<810U	<610U	<620U	<820U	<540U	<610U	<630U	<570U	<590U
Nitrobenzene	<810U	<610U	<620U	<820U	<540U	<610U	<630U	<570U	<590U
2-Nitrotoluene	<560U	<430U	<440U	<570U	<380U	<430U	<440U	<400U	<410U
3-Nitrotoluene	<560U	<430U	<440U	<570U	<380U	<430U	<440U	<400U	<410U
4-Nitrotoluene	<560U	<430U	<440U	<570U	<380U	<430U	<440U	<400U	<410U
RDX	<810U	<610U	<620U	<820U	<540U	<610U	<630U	<570U	<590U
Tetryl	<560U	<430U	<440U	<570U	<380U	<430U	<440U	<400U	<410U
1,3,5-Trinitrobenzene	<560U	<430U	<440U	<570U	<380U	<430U	<440U	<400U	<410U
2,4,6-Trinitrotoluene	<560U	<430U	<440U	<570U	<380U	<430U	<440U	<400U	<410U
Moisture %	38U	18U	20U	39U	8U	18U	21U	13U	15U

HWSED = Highwood sediment.

U = The analyte was analyzed for but was not detected above the reported sample quantitation limit.

Table 3-5. Analytical Results for Highland Park and Highwood Water Treatment Plants Raw Water Samples ($\mu\text{g/L}$), Surplus OU, Fort Sheridan, Illinois

Parameter Name	HP-0408	HP-0408 DUP	HW-0408	HP-0519	HP-0519 DUP	HW-0519
1,3-Dinitrobenzene	<0.36U	<0.40U	<0.31U	<0.24U	<0.29U	<0.17U
2,4-Dinitrotoluene	<0.36U	<0.40U	<0.31U	<0.24U	<0.29U	<0.17U
2,6-Dinitrotoluene	<0.36U	<0.40U	<0.31U	<0.24U	<0.29U	<0.17U
2-amino-4,6-Dinitrotoluene	<0.36U	<0.40U	<0.31U	<0.24U	<0.29U	<0.17U
4-amino-2,6-Dinitrotoluene	<0.36U	<0.40U	<0.31U	<0.24U	<0.29U	<0.17U
HMX	<0.54U	<0.60U	<0.46U	<0.36U	<0.44U	<0.26U
Nitrobenzene	<0.54U	<0.60U	<0.46U	<0.36U	<0.44U	<0.26U
2-Nitrotoluene	<0.54U	<0.60U	<0.46U	<0.36U	<0.44U	<0.26U
3-Nitrotoluene	<0.54U	<0.60U	<0.46U	<0.36U	<0.44U	<0.26U
4-Nitrotoluene	<0.54U	<0.60U	<0.46U	<0.36U	<0.44U	<0.26U
RDX	<0.54U	<0.60U	<0.46U	<0.36U	<0.44U	<0.26U
Tetryl	<0.36U	<0.40U	<0.31U	<0.24U	<0.29U	<0.17U
1,3,5-Trinitrobenzene	<0.36U	<0.40U	<0.31U	<0.24U	<0.29U	<0.17U
2,4,6-Trinitrotoluene	<0.36U	<0.40U	<0.31U	<0.24U	<0.29U	<0.17U

HP = Highland Park raw water.

HW = Highwood raw water.

U = The analyte was analyzed for but was not detected above the reported sample quantitation limit.

Table 3-6. Analytical Results for AAA Ranges Impact Zone Sediment Samples ($\mu\text{g}/\text{kg-dry}$), Surplus OU, Fort Sheridan, Illinois (Page 1 of 2)

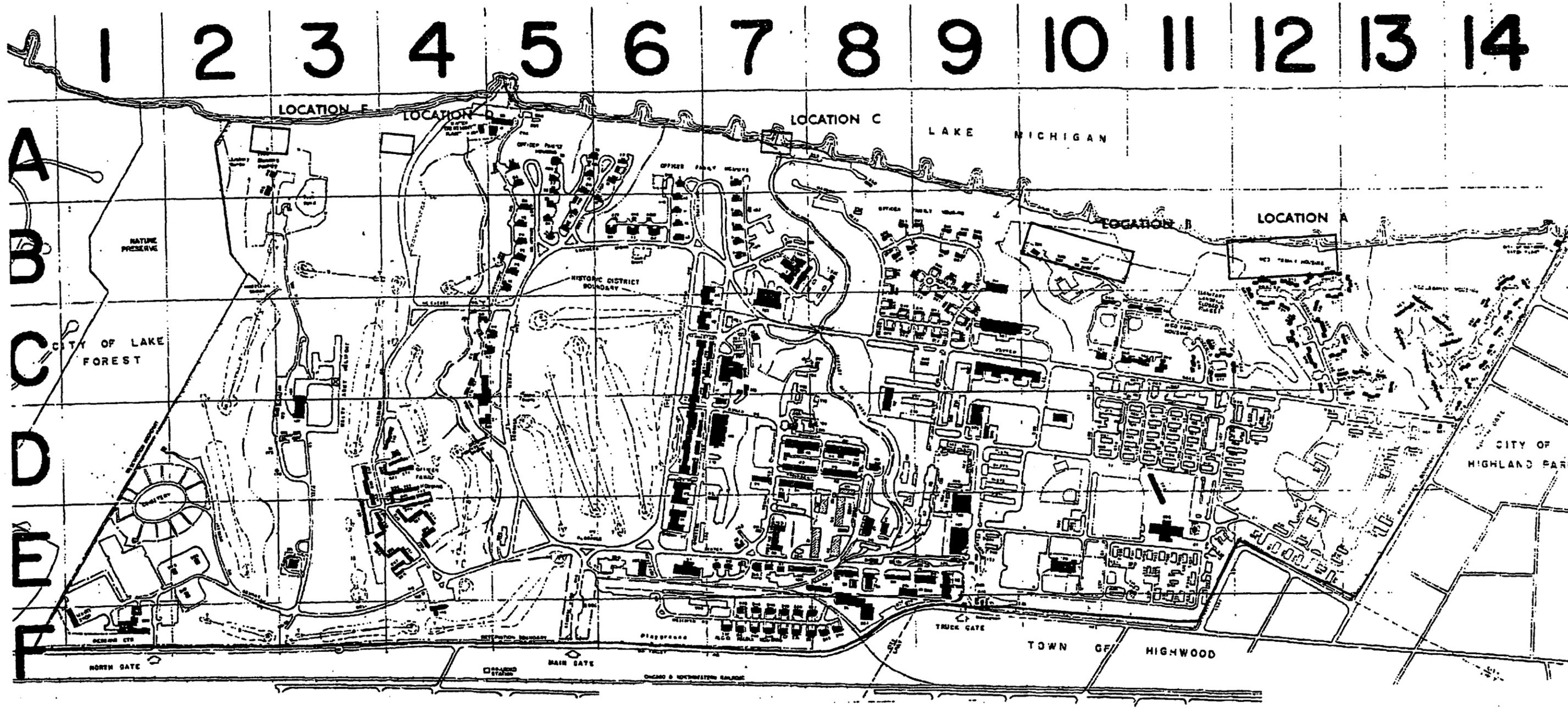
Parameter Name	IZSED#6	IZSED#10	IZSED#11	IZSED#12	IZSED#13	IZSED#14	IZSED#15
1,3-Dinitrobenzene	<440U	<970U	<480U	<460U	<420U	<470U	<760U
2,4-Dinitrotoluene	<440U	<970U	<480U	<460U	<420U	<470U	<760U
2,6-Dinitrotoluene	<440U	<970U	<480U	<460U	<420U	<470U	<760U
2-amino-4,6-Dinitrotoluene	<440U	<970U	<480U	<460U	<420U	<470U	<760U
4-amino-2,6-Dinitrotoluene	<440U	<970U	<480U	<460U	<420U	<470U	<760U
HMX	<620U	<1400U	<680U	<660U	<600U	<680U	<1100U
Nitrobenzene	<620U	<1400U	<680U	<660U	<600U	<680U	<1100U
2-Nitrotoluene	<440U	<970U	<480U	<460U	<420U	<470U	<760U
3-Nitrotoluene	<440U	<970U	<480U	<460U	<420U	<470U	<760U
4-Nitrotoluene	<440U	<970U	<480U	<460U	<420U	<470U	<760U
RDX	<620U	<1400U	<680U	<660U	<600U	<680U	<1100U
Tetryl	<440U	<970U	<480U	<460U	<420U	<470U	<760U
1,3,5-Trinitrobenzene	<440U	<970U	<480U	<460U	<420U	<470U	<760U
2,4,6-Trinitrotoluene	<440U	<970U	<480U	<460U	<420U	<470U	<760U
Moisture %	20U	64U	27U	24U	17U	26U	54U

Table 3-6. Analytical Results for AAA Ranges Impact Zone Sediment Samples ($\mu\text{g}/\text{kg-dry}$), Surplus OU, Fort Sheridan, Illinois (Page 2 of 2)

Parameter Name	IZSED#16	IZSED#17	IZSED#19	IZSED#19 DUP	IZSED#20	SED#20 DUP
1,3-Dinitrobenzene	<550U	<480U	<450U	<460U	<490U	<510U
2,4-Dinitrotoluene	<550U	<480U	<450U	<460U	<490U	<510U
2,6-Dinitrotoluene	<550U	<480U	<450U	<460U	<490U	<510U
2-amino-4,6-Dinitrotoluene	<550U	<480U	<450U	<460U	<490U	<510U
4-amino-2,6-Dinitrotoluene	<550U	<480U	<450U	<460U	<490U	<510U
HMX	<780U	<680U	<640U	<660U	<700U	<740U
Nitrobenzene	<780U	<680U	<640U	<660U	<700U	<740U
2-Nitrotoluene	<550U	<480U	<450U	<460U	<490U	<510U
3-Nitrotoluene	<550U	<480U	<450U	<460U	<490U	<510U
4-Nitrotoluene	<550U	<480U	<450U	<460U	<490U	<510U
RDX	<780U	<680U	<640U	<660U	<700U	<740U
Tetryl	<550U	<480U	<450U	<460U	<490U	<510U
1,3,5-Trinitrobenzene	<550U	<480U	<450U	<460U	<490U	<510U
2,4,6-Trinitrotoluene	<550U	<480U	<450U	<460U	<490U	<510U
Moisture %	36U	27U	22U	24U	29U	32U

IZSED = impact zone sediment.

U = The analyte was analyzed for but was not detected above the reported sample quantitation limit.



Source: USACE, 1995

Figure 1-1
 SUITABLE ARTILLERY FIRING POSITIONS
 Draft Anti-Aircraft Artillery Ranges Site Investigation Report
 Fort Sheridan, Illinois



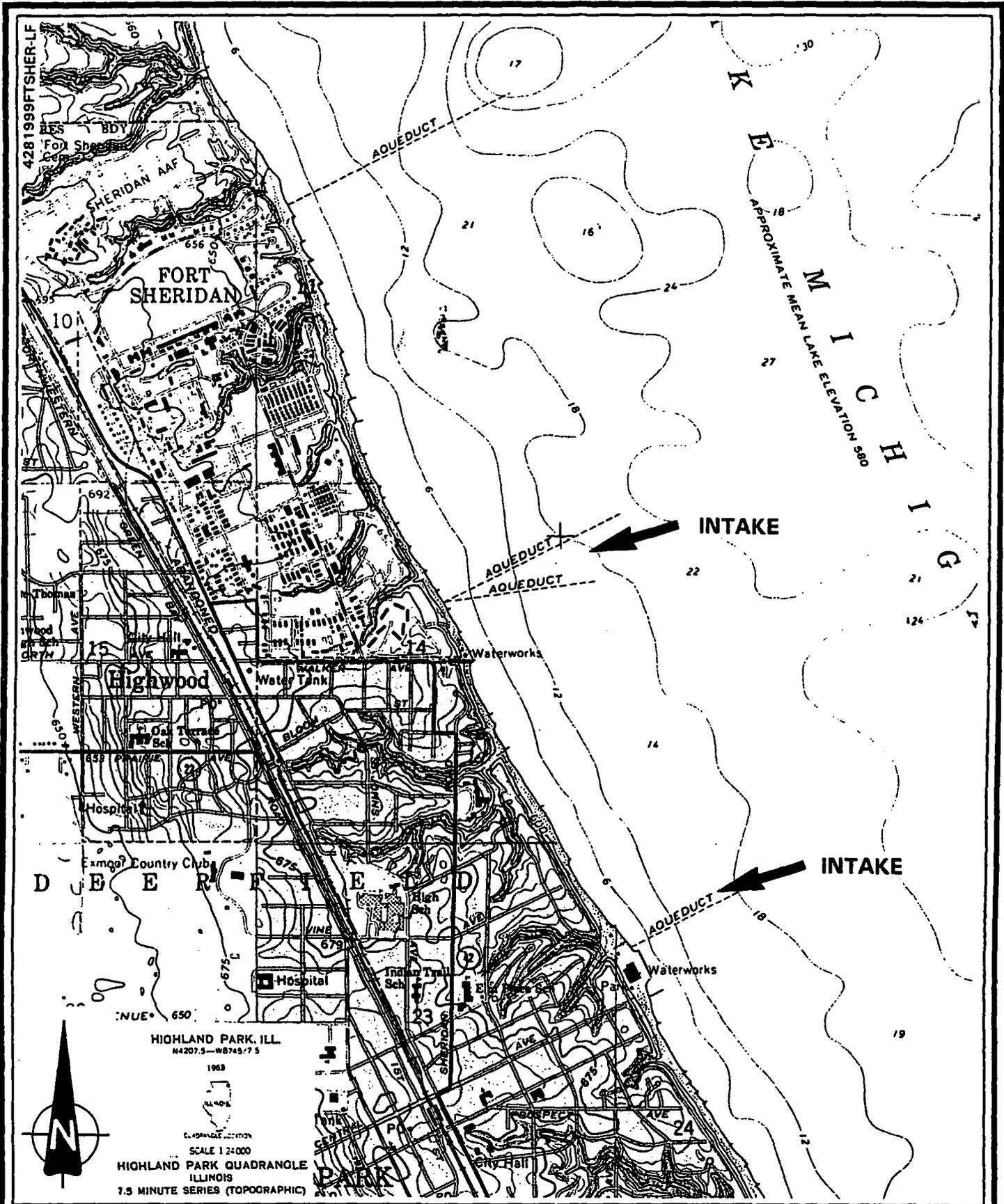
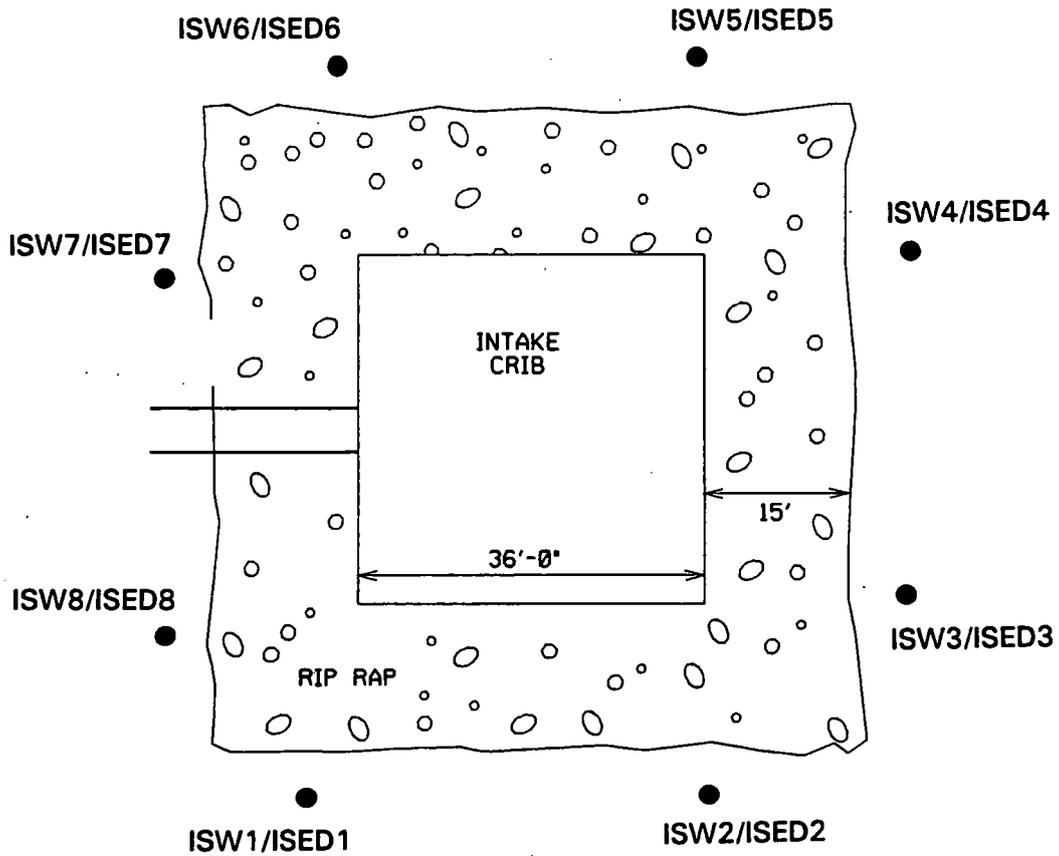


Figure 2-1
 LOCATION OF HIGHWOOD AND
 HIGHLAND PARK WATER INTAKES
 Final Anti-Aircraft Artillery Ranges
 Site Investigation Report
 Fort Sheridan, Illinois



SCALE IN FEET



Figure 2-2
 HIGHLAND PARK WATER INTAKE SURFACE WATER/SEDIMENT
 SAMPLING STATIONS
 Final Anti-Aircraft Artillery Ranges Site Investigation Report
 Fort Sheridan, Illinois



HWSW-NW/HWSED-NW

HWSW-NE/HWSED-NE

HWSW-NI/HWSED-NI

15 feet

5 feet

HWSW-WI/HWSED-WI

HWSW-EI/HWSED-EI

5 feet

HWSW-SI/HWSED-SI

HWSW-EI/HWSED-SW

HWSW-SE/HWSED-SE

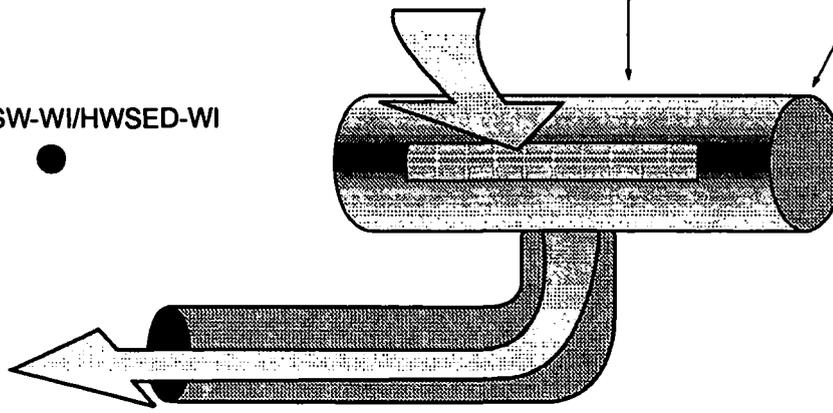
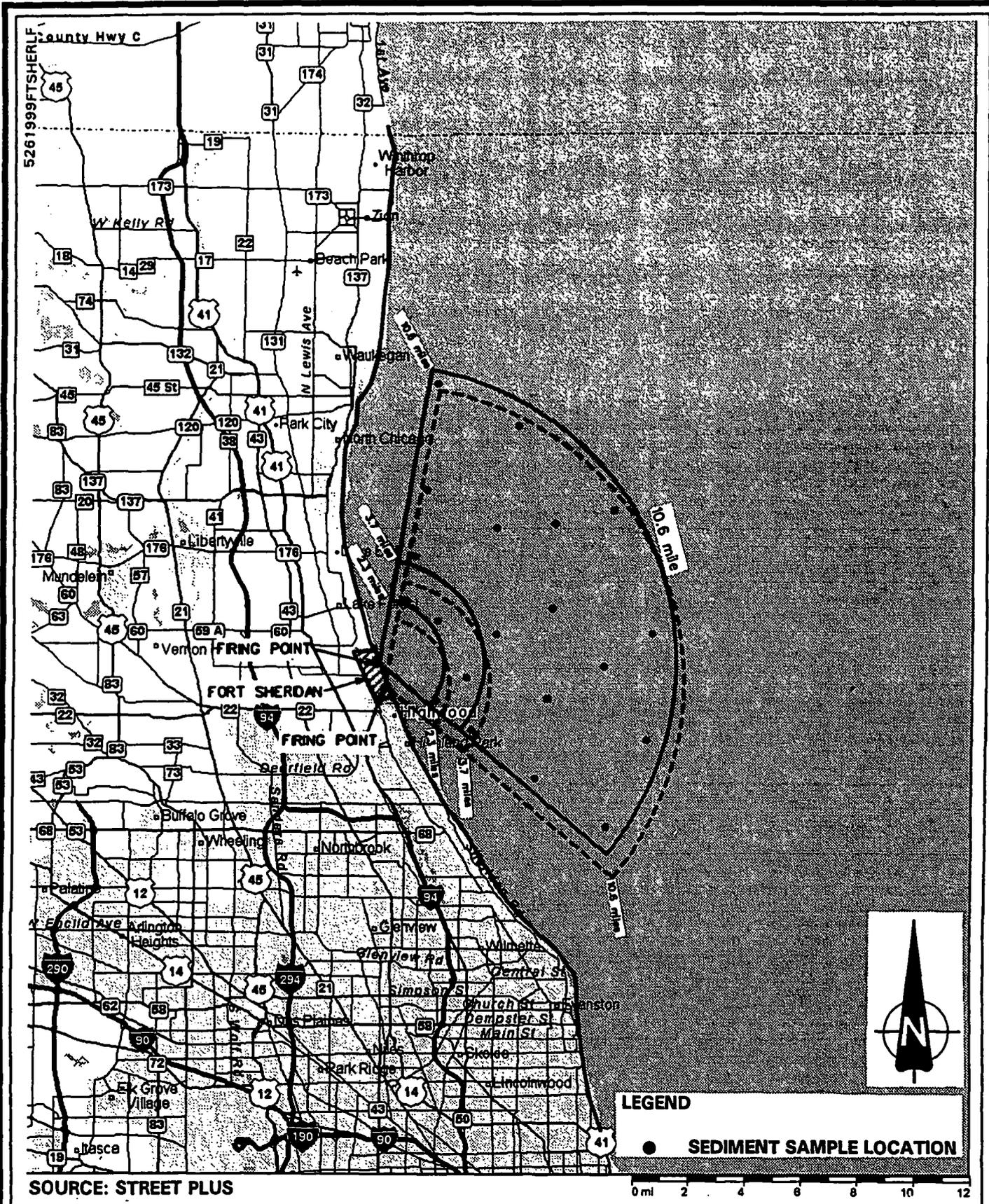


Figure 2-3
Highwood Intake Surface Water/Sediment Sampling Stations
Draft Anti-Aircraft Artillery Ranges Site Investigation Report
Fort Sheridan, Illinois





SOURCE: STREET PLUS

Figure 2-4
 AAA IMPACT ZONE SEDIMENT SAMPLE LOCATIONS
 Final Anti-Aircraft Artillery Ranges Site Investigation Report
 Fort Sheridan, Illinois



Appendix A

Laboratory Results of Previous Raw Water Samples Collected from Highwood and Highland Park Water Treatment Plants

490-2087
2.1



DEPARTMENT OF THE ARMY
HEADQUARTERS, FORT McCOY
FORT McCOY, WISCONSIN 54656-5146

REPLY TO
ATTENTION OF

July 29, 1998

BRAC Environmental Coordinator

Mr. Timothy Wiberg
Assistant to the City Manager
City of Highland Park
1707 St. Johns Avenue
Highland Park, IL 60035

Dear Mr. Wiberg,

As stated in my July 21, 1998, fax, enclosed is a copy of the complete laboratory analytical report for the two water samples recently collected from the city's Water Treatment Plant. Again, no detectable levels of explosives were present in the samples.

If you have any questions, please feel free to call me at (847) 266-6323.

Sincerely,

Colleen Reilly
BRAC Environmental Office
Fort Sheridan

Enclosure

cc (with enclosure):
Mr. Mark Rooney, City of Highwood
Mr. Paul Lake, Illinois Environmental Protection Agency
Mr. Owen Thompson, U.S. Environmental Protection Agency



CASE NARRATIVE - SDG FTSHW4.1

Two water samples were collected on July 15, 1998. All samples were received at QST Environmental on July 16, 1998 at 4 degrees Centigrade. All samples were analyzed as requested in the traffic forms. All samples were extracted and analyzed within EPA holding time.

Low level explosives in water.

Analysis

Explosives (8330/LOW)

Lab Batch

G91503

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness except as detailed in this case narrative.

July 28, 1998

QST ENVIRONMENTAL

A handwritten signature in black ink, appearing to read 'Andrew G. Weitz'.

Andrew G. Weitz
Chemistry Project Manager

Lab Sample Cross Reference and Date Report

Client ID	Lab ID	Method	Collect	Receipt	Extract	HT	Analysis HT		Batch
			Date	Date	Date	Days	Date	Days	
HPWT-1	FTSHW4*1	Explosives (8330/LOW)	07/15/98	07/16/98	07/16/98		7(1)	07/16/98	40(0) G91503
HPWT-2	FTSHW4*2	Explosives (8330/LOW)	07/15/98	07/16/98	07/16/98		7(1)	07/16/98	40(0) G91503

Actual days in parentheses

G91503:

CASE NARRATIVE

```
//
Batch      G91503
Lot        RLNR
Method     EPA 8330W
Project    Lonestar, Ft. Sheridan
```

The sample extraction procedure was followed according to the EPA 8330 method (SOP-GLM1243-020, Rev.3, 6/18/97). Due to lack of sample, only an MS (no MSD) was extracted in this batch. Data for samples FTSHW4*1,2 was already reported to client verbally, with the documentation present in this batch.

The primary analysis was performed using an ODS column according to the method, with the initial calibration standards analyzed on 5/4/98. The daily calibration consists of the mid level standard (CCV) run in triplicate and this same standard is used as the Continuing Calibration Standard (CCS). PE Nelson's Turbochrom software is used for integration, and the parameters are set to optimize the program's ability to integrate all peaks in the chromatograms of standards and samples. However, there are times when manual integration is necessary to achieve correct and consistent baselines. In this set of samples, for example, due to the lack of interferences in the baseline, very little manual integration is required. However, the software has difficulty integrating around negative dips in the baseline (affecting RDX and 1,3,5-TNB), so these peaks usually require manual integration for correction. All manual integration in the chromatography is indicated on the hard copy (+M and -M for start and stop of manual integration) and stored as a modified file electronically.

The second column confirmation analysis using a Cyano column was performed on samples LNSTARW1*3,4, with the results located in the Instrument Run Log/Chromatogram section of the batch report.

The mean retention times for the retention windows are established using the calibration standards in this batch. The windows are $\pm 3 \times$ standard deviation of calibration standards analyzed 2/17/98 through 2/23/98 for the primary analysis, and 2/24/98 to 2/26/98 for the confirmation analysis. There are no retention time failures in this batch.

The CCV, CCS and Initial Calibration Verification standard (ICV) responses are within criteria. The standard LCS recoveries, sample matrix spike (MS) recoveries, and surrogate recoveries are also all within the acceptable criteria.

SAMPLE ID'S PARAMETERS UNITS	STORET METHOD	HPWT-1	HPWT-2
		FTSHW4 1	FTSHW4 2
DATE		07/15/98	07/15/98
TIME		12:25	12:25
HMX UG/L	99431 8330/LOW-G	<0.100	<0.100
RDX UG/L	81364 8330/LOW-G	<0.100	<0.100
1,3,5-TRINITROBENZENE UG/L	99735 8330/LOW-G	<0.050	<0.050
1,3-DINITROBENZENE UG/L	99724 8330/LOW-G	<0.050	<0.050
TETRYL TOTAL UG/L	99733 8330/LOW-G	<0.100	<0.100
NITROBENZENE UG/L	34447 8330/LOW-G	<0.050	<0.050
2,4,6-TRINITROTOLUENE UG/L	81360 8330/LOW-G	<0.050	<0.050
4-AMINO-2,6-DINITROTOLUENE UG/L	96252 8330/LOW-G	<0.050	<0.050
2-AMINO-4,6-DINITROTOLUENE UG/L	96253 8330/LOW-G	<0.050	<0.050
2,6-DINITROTOLUENE UG/L	34626 8330/LOW-G	<0.050	<0.050
2,4-DINITROTOLUENE UG/L	34611 8330/LOW-G	<0.050	<0.050
2-NITROTOLUENE UG/L	98593 8330/LOW-G	<0.100	<0.100
4-NITROTOLUENE UG/L	96254 8330/LOW-G	<0.100	<0.100
3-NITROTOLUENE UG/L	99793 8330/LOW-G	<0.100	<0.100

Quanterra Incorporated
880 Riverside Parkway
West Sacramento, California 95605

916 373-5600 Telephone
916 372-1059 Fax

January 18, 1999

QUANTERRA INCORPORATED PROJECT NUMBER: **303280**

PO/CONTRACT: 490-2087

Mr. Scott George
QST Environmental
11665 Lilburn Park Rd.
St. Louis, MO 63146

Dear Mr. George:

This report contains the analytical results for the three aqueous samples which were received under chain of custody by Quanterra Incorporated on 17 December 1998.

The case narrative is an integral part of this report.

If you have any questions, please feel free to call.

Sincerely,



Gordon Lane
Project Manager
Advanced Technology

TABLE OF CONTENTS**QUANTERRA INCORPORATED PROJECT NUMBER 303280**

Case Narrative

Quanterra's Quality Assurance Program

Sample Description Information

Chain of Custody Documentation

Nitroaromatics and Nitramines by HPLC - Method 8330

Includes Sample(s): 1 through 3

Sample Data Sheets

Method Blank Sheet

Sample Data Sheets

Laboratory Control Sample

CASE NARRATIVE

QUANTERRA INCORPORATED PROJECT NUMBER 303280

There were no anomalies associated with this report.

QUANTERRA INCORPORATED QUALITY CONTROL PROGRAM

Quanterra has implemented an extensive Quality Control (QC) program to ensure the production of scientifically sound, legally defensible data of known documentable quality. This QC program is based upon requirements in "Test Methods for Evaluating Solid Waste", USEPA SW-846, Third Edition. It applies whenever SW-846 analytical methods are used. It also applies in whole or in part whenever project requirements fail to specify some aspect of QC practices described here. It does not apply when other well defined QC programs (e.g. CLP or CLP-like) are specified. This is Quanterra's base QC program for environmental analysis.

Definitions:

Quality Control Batch. The quality control (QC) batch is a set of up to 20 field samples plus associated laboratory QC samples that are similar in composition (matrix) and that are processed within the same time period with the same reagent and standard lots.

Surrogate. A surrogate (or internal standard) is an organic compound similar in chemical behavior to the target analyte, but not normally found in environmental samples. Surrogates (or IS) are added to all samples in a batch to monitor the effects of both the matrix and the analytical process on accuracy.

Method Blank. A method blank (MB) is a control sample prepared using the same reagents used for the samples. As part of the QC batch, it accompanies the samples through all steps of the sample extraction and cleanup procedure. The method blank is used to monitor the level of contamination introduced to a batch of samples as a result of processing in the laboratory.

Laboratory Control Sample. A laboratory control sample (LCS) is prepared using a well characterized matrix (e.g., reagent water or Ottawa sand) that is spiked with known amounts of representative analytes. Alternate matrices (e.g., glass beads) may be used for soil analyses when Ottawa sand is not appropriate. As part of a QC batch, it accompanies the samples through all steps of the sample extraction and cleanup process. The LCS is used to monitor the accuracy of the analytical process independent of possible interference effects due to sample matrix.

Duplicate Control Sample. A duplicate laboratory control sample (DCS) consists of a pair of LCSs analyzed within the same QC batch to monitor precision and accuracy independent of sample matrix effects.

SAMPLE DESCRIPTION INFORMATION
for
QST Environmental

Lab ID	Client ID	Matrix	Sampled		Received
			Date	Time	Date
303280-0001-SA	Highwood Filtration Plant	AQUEOUS	16 DEC 98	12:45	17 DEC 98
303280-0002-SA	Highland Park Water Plant	AQUEOUS	16 DEC 98	13:20	17 DEC 98
303280-0003-SA	Trip Blank	AQUEOUS	16 DEC 98		17 DEC 98



Nitroaromatics and Nitramines by HPLC

Method 8330

Client Name: QST Environmental
Client ID: Highwood Filtration Plant
Lab ID: 303280-0001-SA
Matrix: AQUEOUS
Authorized: 17 DEC 98

Sampled: 16 DEC 98
Prepared: 23 DEC 98

Received: 17 DEC 98
Analyzed: 30 DEC 98

Parameter	Result	Units	Reporting Limit
HMX	ND	ug/L	1.0
1,3,5-Trinitrobenzene	ND	ug/L	0.30
RDX	ND	ug/L	0.80
1,3-Dinitrobenzene	ND	ug/L	0.10
Nitrobenzene	ND	ug/L	1.0
2,4,6-Trinitrotoluene	ND	ug/L	0.10
Tetryl	ND	ug/L	1.0
2,4-Dinitrotoluene	ND	ug/L	0.10
2,6-Dinitrotoluene	ND	ug/L	0.30
2-Am-DNT	ND	ug/L	0.10
4-Am-DNT	ND	ug/L	0.10
2-Nitrotoluene	ND	ug/L	1.0
4-Nitrotoluene	ND	ug/L	1.0
3-Nitrotoluene	ND	ug/L	1.0
Surrogate	Recovery		
2,4-Dinitrofluorobenzene	91	%	

ND = Not detected
NA = Not applicable

Reported By: Jon Edmondson

Approved By: Kris Rogers

The cover letter is an integral part of this report.
Rev 230787



Nitroaromatics and Nitramines by HPLC

Method 8330

Client Name: QST Environmental
Client ID: Highland Park Water Plant
Lab ID: 303280-0002-SA
Matrix: AQUEOUS
Authorized: 17 DEC 98

Sampled: 16 DEC 98
Prepared: 23 DEC 98

Received: 17 DEC 98
Analyzed: 30 DEC 98

Parameter	Result	Units	Reporting Limit
HMX	ND	ug/L	1.0
1,3,5-Trinitrobenzene	ND	ug/L	0.30
RDX	ND	ug/L	0.80
1,3-Dinitrobenzene	ND	ug/L	0.10
Nitrobenzene	ND	ug/L	1.0
2,4,6-Trinitrotoluene	ND	ug/L	0.10
Tetryl	ND	ug/L	1.0
2,4-Dinitrotoluene	ND	ug/L	0.10
2,6-Dinitrotoluene	ND	ug/L	0.30
2-Am-DNT	ND	ug/L	0.10
4-Am-DNT	ND	ug/L	0.10
2-Nitrotoluene	ND	ug/L	1.0
4-Nitrotoluene	ND	ug/L	1.0
3-Nitrotoluene	ND	ug/L	1.0
Surrogate	Recovery		
2,4-Dinitrofluorobenzene	88	%	

ND = Not detected
NA = Not applicable

Reported By: Jon Edmondson

Approved By: Kris Rogers

The cover letter is an integral part of this report.
Rev 230787



Nitroaromatics and Nitramines by HPLC

Method 8330

Client Name: QST Environmental
Client ID: Trip Blank
Lab ID: 303280-0003-SA
Matrix: AQUEOUS
Authorized: 17 DEC 98

Sampled: 16 DEC 98
Prepared: 23 DEC 98

Received: 17 DEC 98
Analyzed: 30 DEC 98

Parameter	Result	Units	Reporting Limit
HMX	ND	ug/L	1.0
1,3,5-Trinitrobenzene	ND	ug/L	0.30
RDX	ND	ug/L	0.80
1,3-Dinitrobenzene	ND	ug/L	0.10
Nitrobenzene	ND	ug/L	1.0
2,4,6-Trinitrotoluene	ND	ug/L	0.10
Tetryl	ND	ug/L	1.0
2,4-Dinitrotoluene	ND	ug/L	0.10
2,6-Dinitrotoluene	ND	ug/L	0.30
2-Am-DNT	ND	ug/L	0.10
4-Am-DNT	ND	ug/L	0.10
2-Nitrotoluene	ND	ug/L	1.0
4-Nitrotoluene	ND	ug/L	1.0
3-Nitrotoluene	ND	ug/L	1.0
Surrogate	Recovery		
2,4-Dinitrofluorobenzene	89	%	

ND = Not detected
NA = Not applicable

Reported By: Jon Edmondson

Approved By: Kris Rogers

The cover letter is an integral part of this report.

Rev 230787

QC LOT ASSIGNMENT REPORT - MS QC
HPLC Analysis Area

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
303280-0001-SA	AQUEOUS	8330-LOW-A	23 DEC 98-7A	23 DEC 98-7A	23 DEC 98-7A
303280-0002-SA	AQUEOUS	8330-LOW-A	23 DEC 98-7A	23 DEC 98-7A	23 DEC 98-7A
303280-0003-SA	AQUEOUS	8330-LOW-A	23 DEC 98-7A	23 DEC 98-7A	23 DEC 98-7A

METHOD BLANK REPORT
 HPLC Analysis Area
 Project: 303280

Test: 8330-LOW-A
 Method: 8330
 Matrix: AQUEOUS
 QC Lot: 23 DEC 98-7A
 Analyzed: 30 DEC 98

Nitroaromatics and Nitramines by HPLC

QC Run: 23 DEC 98-7A
 Time: 00:33

Analyte	Result	Units	Reporting Limit	Qualifier
HMX	ND	ug/L	1.0	
1,3,5-Trinitrobenzene	ND	ug/L	0.30	
RDX	ND	ug/L	0.80	
1,3-Dinitrobenzene	ND	ug/L	0.10	
Nitrobenzene	ND	ug/L	1.0	
2,4,6-Trinitrotoluene	ND	ug/L	0.10	
Tetryl	ND	ug/L	1.0	
2,4-Dinitrotoluene	ND	ug/L	0.10	
2,6-Dinitrotoluene	ND	ug/L	0.30	
2-Am-DNT	ND	ug/L	0.10	
4-Am-DNT	ND	ug/L	0.10	
2-Nitrotoluene	ND	ug/L	1.0	
4-Nitrotoluene	ND	ug/L	1.0	
3-Nitrotoluene	ND	ug/L	1.0	
Surrogate	% Recovery	Acceptable Range		
2,4-Dinitrofluorobenzene	84	65 -135		

ND = Not Detected

DUPLICATE CONTROL SAMPLE REPORT
 HPLC Analysis Area
 Project: 303280

Category: 8330-LOW-A Explosives by HPLC

Testcode: 8330-LOW-A

Matrix: AQUEOUS

QC Lot: 23 DEC 98-7A

Analyzed Date: 30 DEC 98

Method: 8330

Concentration Units: ug/L

Time: 01:49

Analyte	Spiked	-----Concentration-----		Accuracy (%)		Limits	Precision (RPD)	
		-----Measured-----		DCS1	DCS2		DCS1	DCS2
HMX	0.500	DCS1	DCS2	103	102	65-135	0.87	35
1,3,5-Trinitrobenzene	0.500	0.514	0.510	102	100	65-135	2.3	35
RDX	0.500	0.511	0.500	101	95	65-135	5.9	35
1,3-Dinitrobenzene	0.500	0.504	0.476	97	96	65-135	1.2	35
Nitrobenzene	0.500	0.484	0.478	92	93	65-135	1.3	35
2,4,6-Trinitrotoluene	0.500	0.458	0.463	92	93	65-135	1.3	35
Tetryl	0.500	0.498	0.501	100	100	65-135	0.60	35
2,4-Dinitrotoluene	0.500	0.515	0.538	103	108	65-135	4.4	35
2,6-Dinitrotoluene	0.500	0.545	0.550	109	110	65-135	0.90	35
2-Am-DNT	0.500	0.509	0.533	102	107	65-135	4.7	35
4-Am-DNT	0.500	0.482	0.479	96	96	65-135	0.53	35
2-Nitrotoluene	0.500	0.470	0.464	94	93	65-135	1.2	35
4-Nitrotoluene	0.500	0.447	0.471	89	94	65-135	5.3	35
3-Nitrotoluene	0.500	0.438	0.446	88	89	65-135	1.8	35
	0.500	0.443	0.470	89	94	65-135	6.0	35

Surrogate	Spiked	-----Concentration-----		Accuracy (%)		Limits
		-----Measured-----		DCS1	DCS2	
2,4-Dinitrofluorobenzene	2.6	DCS1	DCS2	90	89	65-135
		2.3	2.3			

Calculations are performed before rounding to avoid round-off errors in calculated results.

Appendix B

GPS Coordinates for Water Intake and AAA Impact Zone Samples

Table B-1. Highland Park Municipal Water Intake Sample Location Coordinates

<u>Sample ID</u>	<u>Coordinates*</u>	<u>Sample ID</u>	<u>Coordinates</u>
HP-N	42° 11' 55.192" 87° 46' 17.387"	HP-E	42° 11' 54.179" 87° 46' 16.236"
HP-S	42° 11' 52.988" 87° 46' 17.148"	HP-W	42° 11' 54.428" 87° 46' 18.594"
HP-C	42° 11' 54.141" 87° 46' 17.592"		

*Coordinates provided in Latitude/Longitude, WGS 1984.

Source: Harding ESE, 2000.

Table B-2. Impact Zone Sample Location Coordinates

<u>Sample ID</u>	<u>Coordinates*</u>	<u>Sample ID</u>	<u>Coordinates</u>
IZSED - 1	42° 12' 24.17" 87° 46' 18.955"	IZSED - 11	42° 14' 16.096" 87° 37' 49.551"
IZSED - 2	42° 11' 25.117" 87° 44' 58.108"	IZSED - 12	42° 15' 07.79" 87° 41' 54.174"
IZSED - 3	42° 9' 50.279" 87° 42' 16.797"	IZSED - 13	42° 15' 25.021" 87° 47' 32.654"
IZSED - 4	42° 8' 19.343" 87° 39' 21.738"	IZSED - 14	42° 16' 46.671" 87° 47' 26.699"
IZSED - 5	42° 11' 04.349" 87° 37' 54.612"	IZSED - 15	42° 17' 38.488" 87° 44' 11.932"
IZSED - 6	42° 12' 19.39" 87° 41' 54.061"	IZSED - 16	42° 17' 47.101" 87° 41' 57.679"
IZSED - 7	42° 13' 02.184" 87° 45' 11.454"	IZSED - 17	42° 18' 12.549" 87° 39' 36.612"
IZSED - 8	42° 14' 51.785" 87° 46' 27.728"	IZSED - 18	42° 18' 53.763" 87° 47' 05.600"
IZSED - 9	42° 14' 20.32" 87° 44' 07.882"	IZSED - 19	42° 20' 49.117" 87° 43' 39.232"
IZSED - 10	42° 13' 18.474" 87° 39' 40.517"	IZSED - 20	42° 22' 12.021" 87° 46' 55.839"

*Coordinates provided in Latitude/Longitude, WGS 1984.

Source: Harding ESE, 2000.

Table B-3. Highwood Municipal Water Intake Pipe Location Coordinates

<u>Sample ID</u>	<u>Coordinates*</u>
HW - C	42° 12' 29.24"
	87° 47' 23.80"

*Coordinates provided in Latitude/Longitude, WGS 1984.

Source: Harding ESE, 2000.

Appendix C

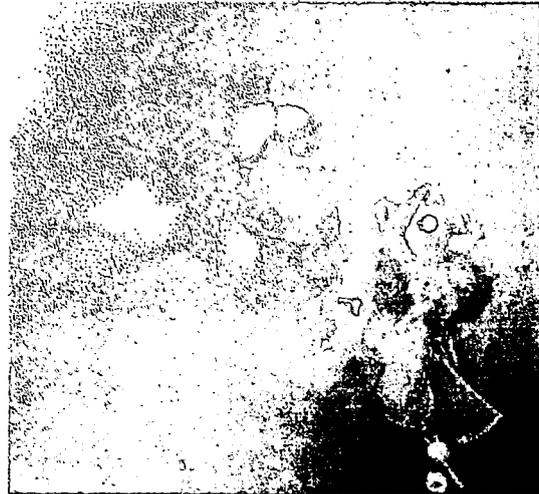
Diving Support Report



UXB International, Inc

Fort Sheridan, Illinois

UXO Diving Support – Lake Michigan
February 12, 2001



Prepared For:

Environmental Science and Engineering
3199 Riverport Tech Center Drive
St. Louis, Missouri 63043

Prepared By:

UXB International, Inc.
21641 Beaumeade Circle
Suite 301
Ashburn, Virginia 20147-6002

Fort Sheridan, Illinois

UXO Diving Support – Lake Michigan

General

Environmental Science and Engineering (ESE) contracted with UXB International (UXB) in the Spring of 2000 to provide unexploded ordnance (UXO) diving support for investigation work they were performing in Lake Michigan. Specifically, UXB was tasked to:

- 1) Prepare a work and safety plan detailing the methods and safety procedures to be used in support of the ESE investigation (this was performed under a similar task in August 1999).
- 2) Perform underwater sweeps with SCUBA qualified UXO Technicians to determine if any UXO exists around the Highwood water intake in Lake Michigan. If UXO was located, mark its location and photograph it in situ. UXO was not to be moved or disturbed in any way. Upon completion of the UXO sweep, a minimum of eight water and sediment samples were to be collected in the vicinity of the intake.
- 3) Prepare a letter report documenting UXB's activities on this project.

Conclusion

UXB supported ESE during the week of August 7th, 2000. During that time, a team of UXB UXO Technicians conducted UXO Diving and Support operations. The combined ESE and UXB team located the Highwood water intake and survey/sampled the area. There was no evidence of UXO at the intake crib, nor was there any evidence of UXO present in the sediment samples collected from the impact area.

Equipment and Personnel

The following UXB personnel and equipment were used in support of this investigation:

- | | |
|----------------------------------|------------------------------------|
| ■ Hugh Sease III | Project Manager (not on site) |
| ■ Stuart Eanes | Senior UXO Supervisor, Dive Master |
| ■ Parris Mancuso | UXO Dive Technician |
| ■ Art Johnson | UXO Dive Technician |
| ■ Mark Soha | UXO Dive Technician |
| ■ SCUBA Sets, Complete | |
| ■ Rental Vehicle | |
| ■ White's Underwater UXO Locator | |
-

- Safety Lines and Gear
- Sampling Jars and Equipment (ESE Supplied)
- Work and Dive Boat (ESE Supplied)
- Underwater Camera

Summary of Activities

August - September 1999 (Conducted under previous contract)

ESE contracted UXB in August 1999 to provide unexploded ordnance (UXO) diving support for investigation work they were performing in Lake Michigan.

In September, work and safety plans were finalized for the operation and forwarded to ESE. These plans were appended to their approved Sampling and Analysis Plan (dated 27 Aug 99). UXB's "Safe Practices Manual for Commercial and Contract Diving Operations" also supplemented the UXO plan titled "UXO Avoidance and Sampling at Highwood Park and Highwood Municipal Water Intake in Lake Michigan". These plans formed the basis for safe field operations. While not a part of this task order, these plans were used to conduct this operation.

During the week of September 6, 1999, UXB conducted diving and UXO survey investigations. During this investigation, only one of the two intake cribs could be located. The Highwood intake crib was not found and the required UXO survey and sampling was not completed.

Subsequently, the decision was made to complete the investigation, having obtained a definitive location of the Highwood intake crib.

Current Contract Activities

August 7-8, 2000

The primary activity for these days was mobilization of the workforce. Messieurs Eanes and Mancuso drove the rental vehicle with diving equipment and project equipment from the corporate office in Ashburn, Virginia to Highwood Park, Illinois. The remainder of the team flew in from various locations. Mr. Eanes met with the ESE project leader and the owner of the boat to discuss the operation and insure all items were ready.

Mr. Eanes met with the divers, reviewed dive procedures and performed fit tests of dive equipment. Additionally, extra air bottles and alternate dive masks and mouthpieces were procured to insure that the team was able to conduct continuous dive operations.

August 9, 2000

The dive team met ESE personnel and the boat captain at the Waukegan pier at approximately 0900 hrs to begin the day's operations. A safety brief was conducted¹; equipment loaded; and the boat left the pier for the Highwood sampling site. Transit time to the first site took approximately 1-1/2 hours. Lake conditions were relatively calm, but

¹ See attached safety briefing log, Enclosure A

minor chop was present. For control purposes and ease of the sampling process, the area around the intake crib was divided into four quadrants, represented by the points of the compass (North, South, East, and West).

Once on site (by GPS coordinates), the anchor was set and preparations made for the first dive. Water depth at the intake was approximately 30 feet. At 1105 hrs, divers entered the water and made the first of several dives. During the first two dives, the survey for UXO was performed, and no UXO located in the area of the intake pipe.

The third dive began sampling operations and sediment and water samples were taken. Water samples were collected, returned to the surface where sediment sample jars were given to the divers. The divers returned to the bottom and collected sediment samples in accordance with the instructions they had received. Diving investigation and sampling operations were completed at 1402 hrs and dive equipment was secured. The boat departed the area at 1420 and secured to the pier at 1550 hrs².



Photo 1 - Diver with Sample Bag



Photo 2 - Diver with Buddy line attached

For safety, the team used a buddy line system. They rotated divers, with two personnel in the water with a third on standby as safety diver. The dive team performed a systematic sweep of the lake bottom. Water visibility was fair, with silts from the bottom being easily suspended in the water due to swimming action.

The water intake was not a typical intake crib. Rather this intake was a "t" pipe rising out of the lakebed with intake ports on either end of the "t" (see photo 3).

August 10, 2000

The dive team demobilized from site, having successfully and safely completed the Underwater UXO investigation and sampling.



Photo 3 - Highwood Intake Pipe

² Please see Dive Master's log at Enclosure B for detailed event listing

Enclosure A – Safety Briefing Log



UXB International, Inc.

Safety Meeting Attendance Log

Date:	8/9/00	Time:	0900	Contract Number:	
Delivery Order Number:		Location:	FT Sheridan		
Weather Conditions:	Temp 78°F T-Storm possible				
I. Safety Meeting Topic (Briefly describe):	DIVE OP Briefing - Boating Safety - Air Decompression schedules, Emergency Procedures.				

II. Attendees: UXB - ESE.

Name (Print)	Signature	Company
STUART EAMES	<i>[Signature]</i>	UXB
MARK SOHA	<i>[Signature]</i>	UXB
TARRIS MANCUSO	<i>[Signature]</i>	UXB
ART JOHNSON	<i>[Signature]</i>	UXB
M. BRENT MCCLAVE	<i>[Signature]</i>	ESE
Chris Tedder	<i>[Signature]</i>	ESE
Greg Delphanti	<i>[Signature]</i>	UXB

DIVE SUP EAVES

DIVERS

SOHA 1700'

JOHNSON 1000'

STD BY

MANCUSO 3000'

SAMPLING

LS 1237

5' 5

RS 1240

SOHA 1600

SAMPLING

MANCUSO 3000

E & W 5'

STD BY JOHNSON

1200

LS 1245

RS 1248

LS 1249

RS 1252

DIVERS EAVES 3000

SAMPLING

DIVE SUP - SOHA

MANCUSO 3000

NE/NW

STD BY JOHNSON 1200

LS 1358

RS 1357

LS 1359

RS 1404

LS 1405

RS 1408

JOHNSON - PHOTO

LS 1352

RS 1357

LS 1359

RS 1402

8/9/00

RECEIVED \$40.00 RENTAL

FEE: 4 ea SCUBA CYLINDERS.

1420 UNDERWAY - ALL DIVERS - OK

1550 AT PIER - OFF LOADING EQUIPMENT

1635 DEPARTED FOR MOTEL

1745 ARRIVE MOTEL

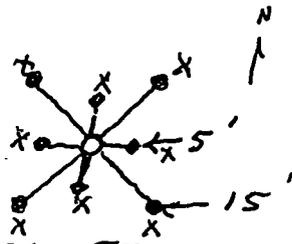
1830 SECURED

NORTH POINT HARBOUR WINTHROP. Hy 41

0700 meet in motel
0900 AT DOCK Held briefing
0905 underway.

NOTE. LAKE IN 550' ABOVE SEA LEVEL < 2,300'
STD AIR DECOMPRESSION TABLES APPLY - DEPTH GAUGE
SET AT ZERO @ PAR ALTITUDE.

Sampling plan



GPS COORDINATES
42 12 29.195 -
87 47 24.098

1035 ON SITE. DIVE SWP - EANES

AIR TEMP 85°F
SURFACE WATER TEMP 73°F MAX DEPTH: 30 FT FW

DIVERS - MANCUSO 2900 PSI
 - SOHA 2900 PSI
STDBY - JOHNSON 3000 PSI

SET MOOR

LS 1105
RS 1115
LS 1117
RS 1127
Depth 30'

DIVER SOHA 1000 PSI
STDBY JOHNSON 3000 PSI
 MANCUSO 3000 PSI

RE SET ANCHOR

LS 1140
RS 1150
Depth 30'

DIVER SOHA 3000
 JOHNSON 2400
 MANCUSO 3000

VIDEO R/
EPA

LS 1212 2500
RS 1217 1500
LS 1223
RS 1230
LS 1232
RS 1235
SAMPLING 15' SW
SAMPLING 15' SE

Enclosure B – Dive Master's Log

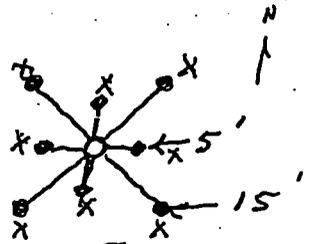
PORT POINT HARBOUR

WINTHROP Hy 41

0700 meet in motel
 0900 AT DOCK Held briefing
 0905 underway.

NOTE. LAKE in 550' above sea level < 2,300'
 STD AIR Decompression tables Apply - Depth gage
 set AT ZERO for altitude.

Sampling plan



GPS COORDINATES
 42.1229.195 -
 874424.098

1035 ON SITE DIVE SWP - EAMES

AIR Temp 85°F
 SURFACE WATER Temp 73°F MAX Depth: 30 ft EW

DIVERS - MANCUSO 2900 PSI set moor

- SOHA 2900 PSI

STDBY - JOHNSON 3000 PSI

LS 1105

RS 1115

LS 1117

RS 1127

Depth 30'

DIVER SOHA 1000 PSI

STDBY - JOHNSON 3000 PSI

MANCUSO 3000 PSI

LS 1140

RS 1150

Depth 30'

Re Set
 Anchor

DIVER SOHA 3000

JOHNSON 2400

MANCUSO 3000

VIDEO &/
 EPA

LS 1212 2500

RS 1217 1500

SAMPLING
 15' SW

LS 1223

RS 1230

SAMPLING
 15' SE

LS 1232

RS 1235

DIVE SUP EARNES

DIVERS SOHA 1700

JOHNSON 1000

STD BY MANCUSO 3000 SAMPLING

LS 1237 5' S

RS 1240

SOHA 1600

SAMPLING E & W 5'

MANCUSO 3000

STD BY JOHNSON 1200

LS 1245

RS 1248

LS 1249

RS 1252

DIVE SUP - SOHA [DIVERS EARNES 3000 SAMPLING NE/NW
MANCUSO 3000]

STD BY JOHNSON 1200

LS 1358

RS 1357

LS 1359

RS 1404

LS 1405

RS 1408

JOHNSON - PHOTO

LS 1352

RS 1357

LS 1359

RS 1402

8/9/00
RECEIVED \$40.00 RENTAL
Fee: 4 ea scuba cylinders.

1420 UNDERWAY - ALL DIVERS - OK

1550 AT PIER - OFF LOADING EQUIPMENT

1635 DEPARTED FOR MOTEL

1745 ARRIVE MOTEL

1830 SECURED

Appendix D

Photographs



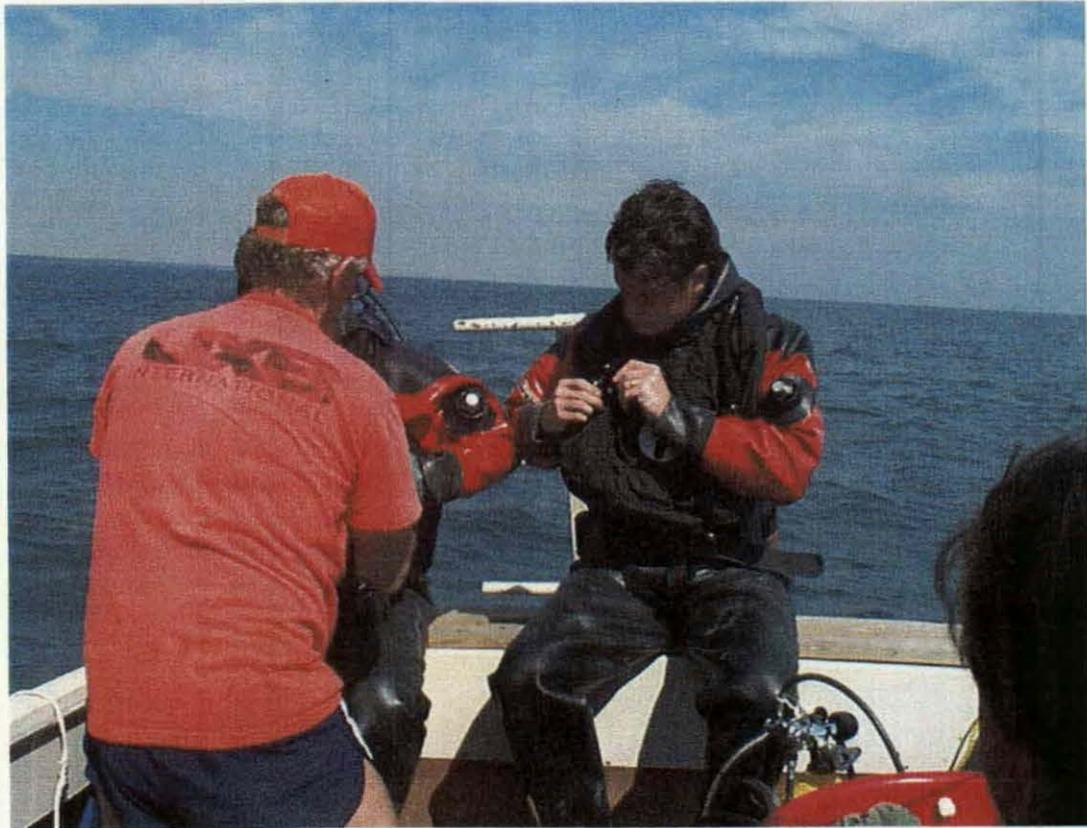
Highland Park Sample Location Buoys



Highland Park Sample Location Buoys



UXO Divers Suiting Up



UXO Divers Suiting Up



Divers Ready to Enter Water



Highland Park Sample Location Buoys



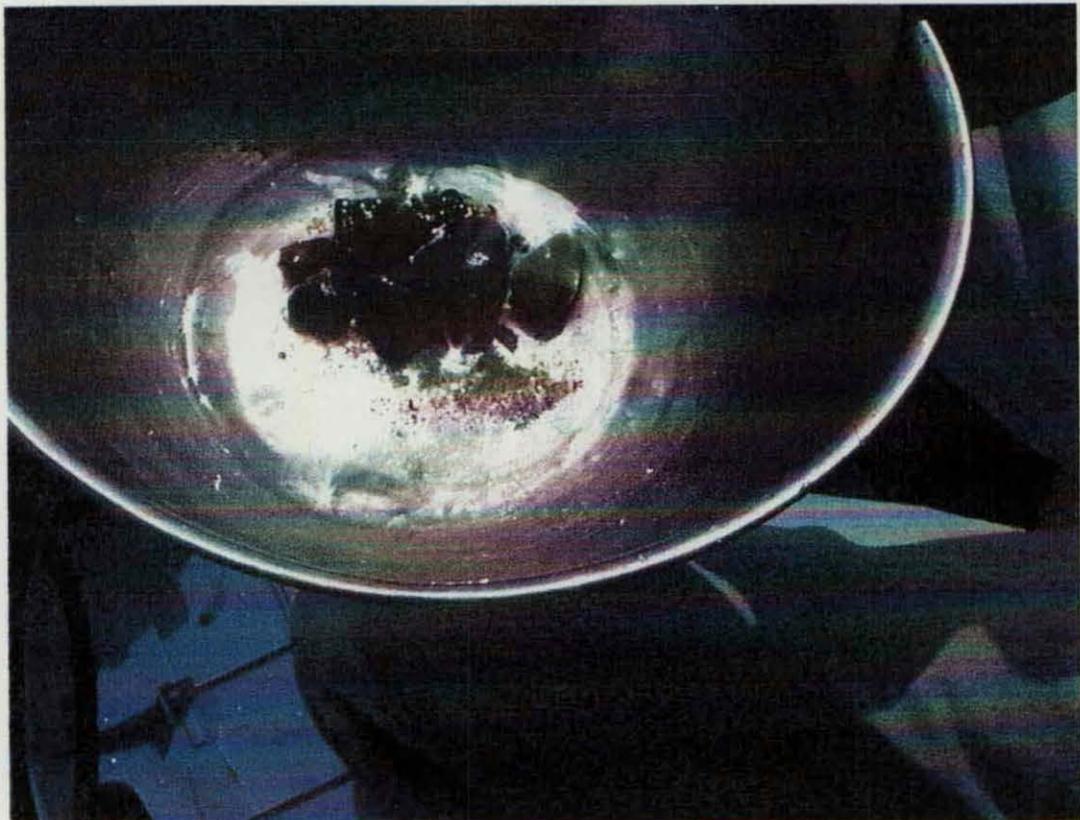
Divers on Surface After Surveying the Sample Location for Possible UXO



Checking Sample Cooler Temperature ($^{\circ}\text{C}$)



Checking Sample Cooler Temperature (°C)



Sediment Sample



Sediment Sample



Amount of Sample Collected from Five Petite Power Grab Samples
for Sample Location #IZSED-4



Zebra Mussels Scraped from Large Cobble Boulder Substrates



Chicago from the Lake



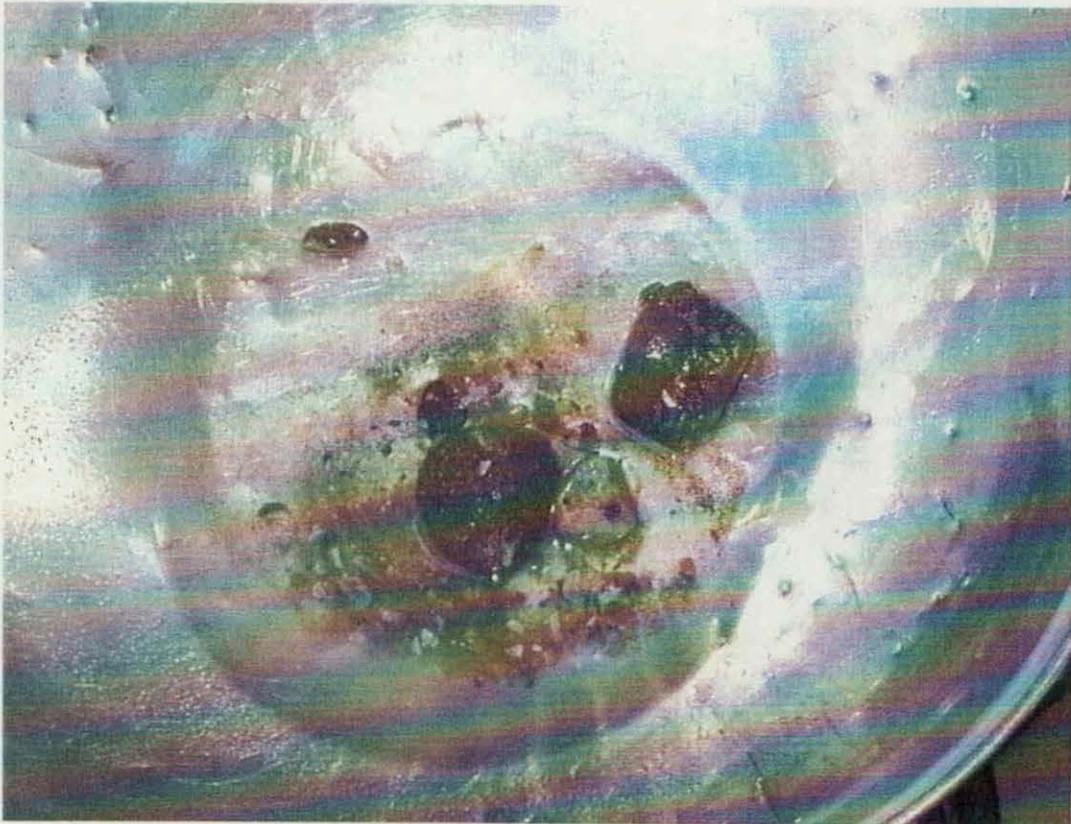
Substrate Sample Collected for IZSED-9 After
Three Petite Power Grab Sample Attempts



Amount of Substrate Collected for IZSED-8 After
Three Petite Power Grab Sample Attempts



Amount of Substrate Collected for IZSED-7 After
Four Petite Power Grab Sample Attempts



Amount of Substrate Collected for IZSED-18 After
Three Petite Power Grab Sample Attempts

Appendix E

Laboratory Data Sheets

0

CASE NARRATIVE – ESE ST. LOUIS

Katalyst Analytical Technologies, Inc. received 10 water samples on September 09, 1999 with custody seals intact, on ice and in good condition. The sample set was designated as one sample delivery batch, 27888, for Explosives by SW-846 Method 8330.

Field	Sample Ids	Date		
		Lab	Collected	Received
HPSW #1	27888*1		09/08/99	09/09/99
HPSW #2	27888*2		09/08/99	09/09/99
HPSW #3	27888*3		09/08/99	09/09/99
HPSW #4	27888*4		09/08/99	09/09/99
HPSW #5	27888*5		09/08/99	09/09/99
HPSW #6	27888*6		09/08/99	09/09/99
HPSW #7	27888*7		09/08/99	09/09/99
HPSW #8	27888*8		09/08/99	09/09/99
HPSW #8 DUP	27888*9		09/08/99	09/09/99

Organic Project Summary

These samples were prepared and analyzed in accordance with the Quality Assurance Project Plan for ESE/St. Louis

Explosive QC Summary

All holding time criteria were met for all samples.

All initial and continuing calibration standards met method acceptance criteria.

All method blanks were free of contamination for target analytes.

All surrogate spike recoveries were within method-specified acceptance limits.

The associated Matrix Spike and Matrix Spike Duplicate was performed on sample 27888*8. All recoveries were within the method specified QC recovery limits.

All associated laboratory control sample recoveries (LCS) were within QC acceptance criteria.

Confirmation analyses were performed on 27888*7, however no target analytes were confirmed.

KATALYST

ANALYTICAL TECHNOLOGIES, INC.

Certification

This data package is in compliance with the technical intent of QST's contract, for other than the conditions detailed above. The Laboratory Manager or designee, as verified by the following signature has authorized release of the data contained in this hard copy data package.

Signature:

Kim Johnson (BIA)

Name: Kim Johnson

Date:

10-19-99

Title: President

CL	SAMPLE ID'S:	HPSW #1	HPSW #2	HPSW #3	HPSW #4	HPSW #5
	FIELD GROUP:	27888	27888	27888	27888	27888
	SEQUENCE #:	1	2	3	4	5
	DATE COLLECTED:	09/08/99	09/08/99	09/08/99	09/08/99	09/08/99
	TIME COLLECTED:	11:46	11:47	12:19	12:20	12:33

PARAMETERS	UNITS	METHOD					
1,3-Dinitrobenzene	UG/L	SW8330	<0.52	<0.42	<0.49	<0.56	<0.55
2,4-Dinitrotoluene	UG/L	SW8330	<0.52	<0.42	<0.49	<0.56	<0.55
2,6-Dinitrotoluene	UG/L	SW8330	<0.52	<0.42	<0.49	<0.56	<0.55
2-amino-4,6-Dinitrotoluene	UG/L	SW8330	<0.52	<0.42	<0.49	<0.56	<0.55
4-amino-2,6-Dinitrotoluene	UG/L	SW8330	<0.52	<0.42	<0.49	<0.56	<0.55
HMX	UG/L	SW8330	<0.78	<0.62	<0.74	<0.83	<0.82
Nitrobenzene	UG/L	SW8330	<0.78	<0.62	<0.74	<0.83	<0.82
2-Nitrotoluene	UG/L	SW8330	<0.78	<0.62	<0.74	<0.83	<0.82
3-Nitrotoluene	UG/L	SW8330	<0.78	<0.62	<0.74	<0.83	<0.82
4-Nitrotoluene	UG/L	SW8330	<0.78	<0.62	<0.74	<0.83	<0.82
RDX	UG/L	SW8330	<0.78	<0.62	<0.74	<0.83	<0.82
Tetryl	UG/L	SW8330	<0.52	<0.42	<0.49	<0.56	<0.55
1,3,5-Trinitrobenzene	UG/L	SW8330	<0.52	<0.42	<0.49	<0.56	<0.55
2,4,6-Trinitrotoluene	UG/L	SW8330	<0.52	<0.42	<0.49	<0.56	<0.55

000005

C	SAMPLE ID'S:	HPSW #6	HPSW #7	HPSW #7RE	HPSW #8	HPSW #8 DUP
FL	GROUP:	27888	27888	27888	27888	27888
	SEQUENCE #:	6	7	7 RE	8	5
	DATE COLLECTED:	09/06/99	09/06/99	09/08/99	09/08/99	09/08/99
	TIME COLLECTED:	12:34	12:46	12:46	12:47	12:47

PARAMETERS	UNITS	METHOD					
1,3-Dinitrobenzene	UG/L	SW8330	<0.66	<0.56	NA	<0.52	<0.40
2,4-Dinitrotoluene	UG/L	SW8330	<0.66	<0.56	NA	<0.52	<0.40
2,6-Dinitrotoluene	UG/L	SW8330	<0.66	<0.56	NA	<0.52	<0.40
2-amino-4,6-Dinitrotoluene	UG/L	SW8330	<0.66	<0.56	NA	<0.52	<0.40
4-amino-2,6-Dinitrotoluene	UG/L	SW8330	<0.66	<0.56	NA	<0.52	<0.40
HMX	UG/L	SW8330	<0.99	2.3NC	<0.21	<0.78	<0.60
Nitrobenzene	UG/L	SW8330	<0.99	<0.83	NA	<0.78	<0.60
2-Nitrotoluene	UG/L	SW8330	<0.99	<0.83	NA	<0.78	<0.60
3-Nitrotoluene	UG/L	SW8330	<0.99	<0.83	NA	<0.78	<0.60
4-Nitrotoluene	UG/L	SW8330	<0.99	<0.63	NA	<0.78	<0.60
RDX	UG/L	SW8330	<0.99	1.8NC	<0.21	<0.78	<0.60
Tetryl	UG/L	SW8330	<0.66	<0.56	NA	<0.52	<0.40
1,3,5-Trinitrobenzene	UG/L	SW8330	<0.66	<0.56	NA	<0.52	<0.40
2,4,6-Trinitrotoluene	UG/L	SW8330	<0.66	<0.56	NA	<0.52	<0.40

NC - Not Confirmed
 RE - Re-analysis/Re-extraction

000006

CASE NARRATIVE – QST ST. LOUIS

Katalyst Analytical Technologies, Inc. received 9 soil samples on September 19, 1999, and 1 soil sample on September 11, 1999, with custody seals intact, on ice and in good condition. The sample set was designated as one sample delivery batch, 27891, for Explosives by method SW-846 8330.

Field	Sample Ids	Date		
		Lab	Collected	Received
IZSED#6	27891*1		09/10/99	09/11/99
HPSED#1	27891*2		09/08/99	09/09/99
HPSED#2	27891*3		09/08/99	09/09/99
HPSED#3	27891*4		09/08/99	09/09/99
HPSED#4	27891*5		09/08/99	09/09/99
HPSED#5	27891*6		09/08/99	09/09/99
HPSED#6	27891*7		09/08/99	09/09/99
HPSED#7	27891*8		09/08/99	09/09/99
HPSED#8	27891*9		09/08/99	09/09/99
DUPHPSED#8	27891*10		09/08/99	09/09/99

Organic Project Summary

These samples were prepared and analyzed in accordance with the Quality Assurance Project Plan for ESE/St. Louis.

Explosive QC Summary

All holding time criteria were met for all samples.

All initial and continuing calibration standards met method acceptance criteria.

All method blanks were free of contamination for target analytes.

All surrogate spike recoveries were within method-specified acceptance limits.

The associated Matrix Spike and Matrix Spike Duplicate was performed on sample 27891*9. All recoveries were within the method specified QC recovery limits, however the Relative Percent Difference (RPD), for Tetryl was 50%, which exceeded the 30% limit.

KATALYST

ANALYTICAL TECHNOLOGIES

All associated laboratory control sample recoveries (LCS) were within QC acceptance criteria except for Tetryl, which exhibited a high-biased recovery of 145%, or above the 134% upper QC limit. As Tetryl was not detected in any of the samples, we believe the date to be valid.

Confirmation analyses were performed on 27891*5, 27891*6, and 27892*8, however no target analytes were confirmed.

Due to a computer malfunction, the date of injection displayed on much of the raw data was incorrect. The date of analysis was corrected on the data.

Certification

This data package is in compliance with the technical intent of ESE's contract, for other than the conditions detailed above. The Laboratory Manager or designee, as verified by the following signature has authorized release of the data contained in this hard copy data package.

Signature: Kim Johnson (LMB)

Name: Kim Johnson

Date: 10-19-99

Title: President

CLIENT SAMPLE ID'S:	I2SED#6	HPSED#1	HPSED#2	HPSED#3	HPSED#4
FIELD GROUP:	27891	27891	27891	27891	27891
SEQUENCE #:	1	2	3	4	5
DATE COLLECTED:	09/10/99	09/08/99	09/08/99	09/08/99	09/08/99
TIME COLLECTED:	16:00	11:50	11:51	12:21	12:22

PARAMETERS	UNITS	METHOD					

1,3-Dinitrobenzene	UG/KG-DRY	SW8330	<440	<440	<430	<470	<480
2,4-Dinitrotoluene	UG/KG-DRY	SW8330	<440	<440	<430	<470	<480
2,6-Dinitrotoluene	UG/KG-DRY	SW8330	<440	<440	<430	<470	<480
2-amino-4,6-Dinitrotoluene	UG/KG-DRY	SW8330	<440	<440	<430	<470	<480
4-amino-2,6-Dinitrotoluene	UG/KG-DRY	SW8330	<440	<440	<430	<470	<480
HMX	UG/KG-DRY	SW8330	<620	<630	<610	<680	<680
Nitrobenzene	UG/KG-DRY	SW8330	<620	<630	<610	<680	<680
2-Nitrotoluene	UG/KG-DRY	SW8330	<440	<440	<430	<470	<480
3-Nitrotoluene	UG/KG-DRY	SW8330	<440	<440	<430	<470	<480
4-Nitrotoluene	UG/KG-DRY	SW8330	<440	<440	<430	<470	<480
RDX	UG/KG-DRY	SW8330	<620	<630	<610	<680	710NC
Tetryl	UG/KG-DRY	SW8330	<440	<440	<430	<470	<480
1,3,5-Trinitrobenzene	UG/KG-DRY	SW8330	<440	<440	<430	<470	<480
2,4,6-Trinitrotoluene	UG/KG-DRY	SW8330	<440	<440	<430	<470	<480
Moisture	%	D2216	20	21	18	26	27

NC - Not Confirmed

000006

CLIENT SAMPLE ID'S:	HPSED#4RE	HPSED#5	HPSED#5RE	HPSED#6	HPSED#7
FIELD GROUP:	27891	27891	27891	27891	27891
SEQUENCE #:	5 RE	6	6 RE	7	8
DATE COLLECTED:	09/08/99	09/08/99	09/08/99	09/08/99	09/08/99
TIME COLLECTED:	12:22	12:35	12:35	12:36	12:49

PARAMETERS	UNITS	METHOD					
1,3-Dinitrobenzene	UG/KG-DRY	SW8330	NA	<450	NA	<510	<470
2,4-Dinitrotoluene	UG/KG-DRY	SW8330	NA	<450	NA	<510	<470
2,6-Dinitrotoluene	UG/KG-DRY	SW8330	NA	<450	NA	<510	<470
2-amino-4,6-Dinitrotoluene	UG/KG-DRY	SW8330	NA	<450	NA	<510	<470
4-amino-2,6-Dinitrotoluene	UG/KG-DRY	SW8330	NA	<450	NA	<510	<470
HMX	UG/KG-DRY	SW8330	NA	790NC	<640	<720	920NC
Nitrobenzene	UG/KG-DRY	SW8330	NA	<640	NA	<720	<670
2-Nitrotoluene	UG/KG-DRY	SW8330	NA	<450	NA	<510	<470
3-Nitrotoluene	UG/KG-DRY	SW8330	NA	<450	NA	<510	<470
4-Nitrotoluene	UG/KG-DRY	SW8330	NA	<450	NA	<510	<470
RDX	UG/KG-DRY	SW8330	<170	<640	NA	<720	<670
Tetryl	UG/KG-DRY	SW8330	NA	<450	NA	<510	<470
1,3,5-Trinitrobenzene	UG/KG-DRY	SW8330	NA	<450	NA	<510	<470
2,4,6-Trinitrotoluene	UG/KG-DRY	SW8330	NA	<450	NA	<510	<470
Moisture	%	D2216	NA	22	NA	31	25

NC - Not Confirmed
 NA - Sample Not Analyzed
 : - Re-analysis/Re-extraction

000007

CLIENT SAMPLE ID'S:	HPSED#7RE	HPSED#8	DUPHPSED#8
FIELD GROUP:	27891	27891	27891
SEQUENCE #:	8 RE	9	10
DATE COLLECTED:	09/08/99	09/08/99	09/08/99
TIME COLLECTED:	12:49	12:49	12:49

PARAMETERS	UNITS	METHOD			
1,3-Dinitrobenzene	UG/KG-DRY	SW8330	NA	<440	<440
2,4-Dinitrotoluene	UG/KG-DRY	SW8330	NA	<440	<440
2,6-Dinitrotoluene	UG/KG-DRY	SW8330	NA	<440	<440
2-amino-4,6-Dinitrotoluene	UG/KG-DRY	SW8330	NA	<440	<440
4-amino-2,6-Dinitrotoluene	UG/KG-DRY	SW8330	NA	<440	<440
HMX	UG/KG-DRY	SW8330	<170	<620	<630
Nitrobenzene	UG/KG-DRY	SW8330	NA	<620	<630
2-Nitrotoluene	UG/KG-DRY	SW8330	NA	<440	<440
3-Nitrotoluene	UG/KG-DRY	SW8330	NA	<440	<440
4-Nitrotoluene	UG/KG-DRY	SW8330	NA	<440	<440
RDX	UG/KG-DRY	SW8330	NA	<620	<630
Tetryl	UG/KG-DRY	SW8330	NA	<440	<440
1,3,5-Trinitrobenzene	UG/KG-DRY	SW8330	NA	<440	<440
2,4,6-Trinitrotoluene	UG/KG-DRY	SW8330	NA	<440	<440
Moisture	%	D2216	NA	20	21

NA - Not Analyzed
 RE - Re-analysis/Re-extraction

000008

CASE NARRATIVE – ESE ST. LOUIS

Katalyst Analytical Technologies, Inc. received 12 soil samples and 1 water sample on September 15, 1999, with custody seals intact, on ice and in good condition. The sample set was designated as one sample delivery batch, 27893, for Explosives by SW-846 Method 8330.

Field	Sample Ids		Date	
	Lab	Collected	Received	
IZSED#20	27893*1	09/11/99	09/15/99	
IZSED#20DUP	27893*2	09/11/99	09/15/99	
IZSED#19	27893*3	09/11/99	09/15/99	
IZSED#19DUP	27893*4	09/11/99	09/15/99	
IZSED#17	27893*5	09/11/99	09/15/99	
IZSED#11	27893*6	09/11/99	09/15/99	
IZSED#10	27893*7	09/11/99	09/15/99	
IZSED#12	27893*8	09/11/99	09/15/99	
IZSED#13	27893*9	09/11/99	09/15/99	
IZSED#14	27893*10	09/11/99	09/15/99	
IZSED#15	27893*11	09/11/99	09/15/99	
IZSED#16	27893*12	09/11/99	09/15/99	
EQUIP BLANK	27893*14	09/11/99	09/09/99	

Organic Project Summary

These samples were prepared and analyzed in accordance with the Quality Assurance Project Plan for ESE/St. Louis

Explosive QC Summary

All holding time criteria were met for all samples.

All initial and continuing calibration standards met method acceptance criteria.

The method blank associated with the soil samples was free of contamination for target analytes. Method Blank MB*247L*1, associated with the Equipment Blank, contained low level concentrations in the primary column analysis of three compounds, 2-Nitrotoluene, 4-Nitrotoluene, and HMX. As these compounds were not detected in the

Equipment Blank sample, confirmation analysis was not performed

KATALYST

ANALYTICAL TECHNOLOGIES, INC.

All surrogate spike recoveries were within method-specified acceptance limits.

The associated Matrix Spike and Matrix Spike Duplicate was performed on sample 27893*1 for the soil samples. All recoveries were within the method specified QC recovery limits, however, the Relative Percent Difference (RPD) for Tetral was 31%. This is slightly above the QC criteria of 30%. A Matrix Spike and Matrix Spike Duplicate were not performed on the Equipment Blank. An LCS and LCS Duplicate were performed.

All associated laboratory control sample recoveries (LCS) were within QC acceptance criteria.

No sample confirmation analyses were necessary.

Certification

This data package is in compliance with the technical intent of ESE's contract, for other than the conditions detailed above. The Laboratory Manager or designee, as verified by the following signature has authorized release of the data contained in this hard copy data package.

Signature:

Kim Johnson (LJB)

Name: Kim Johnson

Date:

10-20-99

Title: President

ENT SAMPLE ID'S:	IZSED#20	IZSED#20DUP	IZSED#19	IZSED#19DUP	IZSED#17
FIELD GROUP:	27893	27893	27893	27893	27893
SEQUENCE #:	1	2	3	4	5
DATE COLLECTED:	09/11/99	09/11/99	09/11/99	09/11/99	09/11/99
TIME COLLECTED:	09:28	09:28	09:44	09:44	10:15

PARAMETERS	UNITS	METHOD	IZSED#20	IZSED#20DUP	IZSED#19	IZSED#19DUP	IZSED#17
1,3-Dinitrobenzene	UG/KG-DRY	SW8330	<490	<510	<450	<460	<480
2,4-Dinitrotoluene	UG/KG-DRY	SW8330	<490	<510	<450	<460	<480
2,6-Dinitrotoluene	UG/KG-DRY	SW8330	<490	<510	<450	<460	<480
2-amino-4,6-Dinitrotoluene	UG/KG-DRY	SW8330	<490	<510	<450	<460	<480
4-amino-2,6-Dinitrotoluene	UG/KG-DRY	SW8330	<490	<510	<450	<460	<480
HMX	UG/KG-DRY	SW8330	<700	<740	<640	<660	<680
Nitrobenzene	UG/KG-DRY	SW8330	<700	<740	<640	<660	<680
2-Nitrotoluene	UG/KG-DRY	SW8330	<490	<510	<450	<460	<480
3-Nitrotoluene	UG/KG-DRY	SW8330	<490	<510	<450	<460	<480
4-Nitrotoluene	UG/KG-DRY	SW8330	<490	<510	<450	<460	<480
RDX	UG/KG-DRY	SW8330	<700	<740	<640	<660	<680
Tetryl	UG/KG-DRY	SW8330	<490	<510	<450	<460	<480
1,3,5-Trinitrobenzene	UG/KG-DRY	SW8330	<490	<510	<450	<460	<480
2,4,6-Trinitrotoluene	UG/KG-DRY	SW8330	<490	<510	<450	<460	<480
Moisture	%	D2216	29	32	22	24	27

000005

IDENT SAMPLE ID'S:	IZSED#11	IZSED#10	IZSED#12	IZSED#13	IZSED#14
WELD GROUP:	27893	27893	27893	27893	27893
SEQUENCE #:	6	7	8	9	10
DATE COLLECTED:	09/11/99	09/11/99	09/11/99	09/11/99	09/11/99
TIME COLLECTED:	10:38	10:54	11:12	12:18	13:51

PARAMETERS	UNITS	METHOD						
1,3-Dinitrobenzene	UG/KG-DRY	SW8330	<480	<970	<460	<420	<470	
2,4-Dinitrotoluene	UG/KG-DRY	SW8330	<480	<970	<460	<420	<470	
2,6-Dinitrotoluene	UG/KG-DRY	SW8330	<480	<970	<460	<420	<470	
2-amino-4,6-Dinitrotoluene	UG/KG-DRY	SW8330	<480	<970	<460	<420	<470	
4-amino-2,6-Dinitrotoluene	UG/KG-DRY	SW8330	<480	<970	<460	<420	<470	
HMX	UG/KG-DRY	SW8330	<680	<1400	<660	<600	<680	
Nitrobenzene	UG/KG-DRY	SW8330	<680	<1400	<660	<600	<680	
2-Nitrotoluene	UG/KG-DRY	SW8330	<480	<970	<460	<420	<470	
3-Nitrotoluene	UG/KG-DRY	SW8330	<480	<970	<460	<420	<470	
4-Nitrotoluene	UG/KG-DRY	SW8330	<480	<970	<460	<420	<470	
RDX	UG/KG-DRY	SW8330	<680	<1400	<660	<600	<680	
Tetryl	UG/KG-DRY	SW8330	<480	<970	<460	<420	<470	
1,3,5-Trinitrobenzene	UG/KG-DRY	SW8330	<480	<970	<460	<420	<470	
2,4,6-Trinitrotoluene	UG/KG-DRY	SW8330	<480	<970	<460	<420	<470	
Moisture	%	D2216	27	64	24	17	26	

CLIENT SAMPLE ID'S:	IZSED#15	IZSED#16
FIELD GROUP:	27893	27893
SEQUENCE #:	11	12
DATE COLLECTED:	09/11/99	09/11/99
TIME COLLECTED:	13:37	14:03

PARAMETERS	UNITS	METHOD		
1,3-Dinitrobenzene	UG/KG-DRY	SW8330	<760	<550
2,4-Dinitrotoluene	UG/KG-DRY	SW8330	<760	<550
2,6-Dinitrotoluene	UG/KG-DRY	SW8330	<760	<550
2-amino-4,6-Dinitrotoluene	UG/KG-DRY	SW8330	<760	<550
4-amino-2,6-Dinitrotoluene	UG/KG-DRY	SW8330	<760	<550
HMX	UG/KG-DRY	SW8330	<1100	<780
Nitrobenzene	UG/KG-DRY	SW8330	<1100	<780
2-Nitrotoluene	UG/KG-DRY	SW8330	<760	<550
3-Nitrotoluene	UG/KG-DRY	SW8330	<760	<550
4-Nitrotoluene	UG/KG-DRY	SW8330	<760	<550
RDX	UG/KG-DRY	SW8330	<1100	<780
Tetryl	UG/KG-DRY	SW8330	<760	<550
1,3,5-Trinitrobenzene	UG/KG-DRY	SW8330	<760	<550
2,4,6-Trinitrotoluene	UG/KG-DRY	SW8330	<760	<550
Moisture	%	D2216	54	36

000007

CLIENT SAMPLE ID'S: EQUIP BLANK
 FIELD GROUP: 27893
 SEQUENCE #: 14
 DATE COLLECTED: 09/11/99
 TIME COLLECTED: 14:52

PARAMETERS	UNITS	METHOD	
1,3-Dinitrobenzene	UG/L	SW8330	<0.41
2,4-Dinitrotoluene	UG/L	SW8330	<0.41
2,6-Dinitrotoluene	UG/L	SW8330	<0.41
2-amino-4,6-Dinitrotoluene	UG/L	SW8330	<0.41
4-amino-2,6-Dinitrotoluene	UG/L	SW8330	<0.41
HMX	UG/L	SW8330	<0.61
Nitrobenzene	UG/L	SW8330	<0.61
2-Nitrotoluene	UG/L	SW8330	<0.61
3-Nitrotoluene	UG/L	SW8330	<0.61
4-Nitrotoluene	UG/L	SW8330	<0.61
RDX	UG/L	SW8330	<0.61
Tetryl	UG/L	SW8330	<0.41
1,3,5-Trinitrobenzene	UG/L	SW8330	<0.41
2,4,6-Trinitrotoluene	UG/L	SW8330	<0.41



PDC Laboratories, Inc.

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CASE NARRATIVE – ESE ST. LOUIS

PDC Laboratories received 3 water samples on April 11, 2000, with custody seals intact, on ice and in good condition. The sample set was designated as one sample delivery batch, 27993, for Explosives.

Field	Sample Ids		Date	
	Lab	Collected	Received	
HP-0408	27993*1	04/08/00	04/11/00	
HW-0408	27993*2	04/08/00	04/11/00	
HP-0408DUP	27993*3	04/08/00	04/11/00	

Project Summary

Explosives (8330) QC Summary

All holding time criteria were met for all samples

All initial and continuing calibration standards met method criteria.

All method blanks are free of contamination for the target analytes.

All surrogate spike recoveries were within method-specified limits.

The associated Matrix Spike and Matrix Spike Duplicate was performed on sample 27993*1. All recoveries were within the method specified QC recovery limits except for 4-amino-2,6-Dinitrotoluene and 2-amino-4,6-Dinitrotoluene which recovered above the upper QC criteria, and for Tetryl and 2,4,6-TNT, where the Relative Percent Difference exceeded the 30% QC acceptance criteria.

The associated laboratory control samples (LCS) were within QC acceptance criteria.

An MDL Check was performed, and the raw data included in this report.



Certification

This data package is in compliance with the technical intent of ESE-St. Louis's contract, for other than the conditions detailed above. The Laboratory Manager or designee, as verified by the following signature has authorized release of the data contained in this hard copy data package.

Signature: Barbara Beard

Name: Barbara Beard

Date: July 12, 2000

Title: Project Manager

CLIENT SAMPLE ID'S:	HP-0408	HW-0408	DUP
FIELD GROUP:	27993	27993	27993
SEQUENCE #:	1	2	3
DATE COLLECTED:	04/08/00	04/08/00	04/08/00
TIME COLLECTED:	08:50	10:25	08:50

PARAMETERS	UNITS	METHOD			
1,3-Dinitrobenzene	UG/L	SW8330	<0.36	<0.31	<0.40
2,4-Dinitrotoluene	UG/L	SW8330	<0.36	<0.31	<0.40
2,6-Dinitrotoluene	UG/L	SW8330	<0.36	<0.31	<0.40
2-amino-4,6-Dinitrotoluene	UG/L	SW8330	<0.36	<0.31	<0.40
4-amino-2,6-Dinitrotoluene	UG/L	SW8330	<0.36	<0.31	<0.40
HMX	UG/L	SW8330	<0.54	<0.46	<0.60
Nitrobenzene	UG/L	SW8330	<0.54	<0.46	<0.60
2-Nitrotoluene	UG/L	SW8330	<0.54	<0.46	<0.60
3-Nitrotoluene	UG/L	SW8330	<0.54	<0.46	<0.60
4-Nitrotoluene	UG/L	SW8330	<0.54	<0.46	<0.60
RDX	UG/L	SW8330	<0.54	<0.46	<0.60
Tetryl	UG/L	SW8330	<0.36	<0.31	<0.40
1,3,5-Trinitrobenzene	UG/L	SW8330	<0.36	<0.31	<0.40
2,4,6-Trinitrotoluene	UG/L	SW8330	<0.36	<0.31	<0.40

NRQ - Analysis not requested.



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CASE NARRATIVE – ESE ST. LOUIS

PDC Laboratories received 3 water samples on May 19, 2000 with custody seals intact, on ice and in good condition. The sample set was designated as one sample delivery batch, 28009, for Explosives.

Field	Sample Ids		Date	
	Lab	Collected	Received	
HP-0519	28009*1	05/19/00	05/23/00	
HW-HP-0519	28009*2	05/19/00	05/23/00	
HP-0519D	28009*3	05/19/00	05/23/00	

Project Summary

Explosives (8330) QC Summary

All holding time criteria were met for all samples.

All initial and continuing calibration standards met method criteria.

All method blanks are free of contamination for the target analytes.

All surrogate spike recoveries were within method-specified limits.

The associated Matrix Spike and Matrix Spike Duplicate was performed on sample 28009*1. All recoveries were within the method specified QC recovery limits.

The associated laboratory control samples (LCS) were within QC acceptance criteria.

An MDL Check was performed, and the raw data included in this report.

All explosives are routinely analyzed at a 1:4 dilution.



Certification

This data package is in compliance with the technical intent of ESE-St. Louis's contract, for other than the conditions detailed above. The Laboratory Manager or designee, as verified by the following signature has authorized release of the data contained in this hard copy data package.

Signature: Barbara Beard

Name: Barbara Beard

Date: July 12, 2000

Title: Project Manager

PDC Laboratories, Inc. 07/11/00
PROJECT NUMBER
FIELD GROUP

STATUS :FINAL PAGE 1
PROJECT NAME ESE-ST LOUIS
LAB COORDINATOR

CLIENT SAMPLE ID'S:	HP-0519	HW-0519	HP-0519D
FIELD GROUP:	28009	28009	28009
SEQUENCE #:	1	2	3
DATE COLLECTED:	05/19/00	05/19/00	05/19/00
TIME COLLECTED:	12:30	14:45	12:30

PARAMETERS	UNITS	METHOD			
1,3-Dinitrobenzene	UG/L	SW8330	<0.24	<0.17	<0.29
2,4-Dinitrotoluene	UG/L	SW8330	<0.24	<0.17	<0.29
2,6-Dinitrotoluene	UG/L	SW8330	<0.24	<0.17	<0.29
2-amino-4,6-Dinitrotoluene	UG/L	SW8330	<0.24	<0.17	<0.29
4-amino-2,6-Dinitrotoluene	UG/L	SW8330	<0.24	<0.17	<0.29
HMX	UG/L	SW8330	<0.36	<0.26	<0.44
Nitrobenzene	UG/L	SW8330	<0.36	<0.26	<0.44
2-Nitrotoluene	UG/L	SW8330	<0.36	<0.26	<0.44
3-Nitrotoluene	UG/L	SW8330	<0.36	<0.26	<0.44
4-Nitrotoluene	UG/L	SW8330	<0.36	<0.26	<0.44
RDX	UG/L	SW8330	<0.36	<0.26	<0.44
Tetryl	UG/L	SW8330	<0.24	<0.17	<0.29
1,3,5-Trinitrobenzene	UG/L	SW8330	<0.24	<0.17	<0.29
2,4,6-Trinitrotoluene	UG/L	SW8330	<0.24	<0.17	<0.29

000003



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CASE NARRATIVE – ESE ST. LOUIS

PDC Laboratories received 9 soil samples and 9 water samples on August 11, 2000 with custody seals intact, on ice and in good condition. The sample set was designated as one sample delivery batch, 28020, for Explosives.

Field	Sample Ids		Date	
	Lab	Collected	Received	
HWSED-E1	28020*1	08/09/00	08/11/00	
HWSED-SE	28020*2	08/09/00	08/11/00	
HWSED-S1	28020*3	08/09/00	08/11/00	
HWSED-NE	28020*4	08/09/00	08/11/00	
HWSED-N1	28020*5	08/09/00	08/11/00	
HWSED-NW	28020*6	08/09/00	08/11/00	
HWSED-W1	28020*7	08/09/00	08/11/00	
HWSED-SW	28020*8	08/09/00	08/11/00	
HWSED-DUP	28020*9	08/09/00	08/11/00	
HWSW-S1	28020*10	08/09/00	08/11/00	
HWSW-SE	28020*11	08/09/00	08/11/00	
HWSW-E1	28020*12	08/09/00	08/11/00	
HWSW-NE	28020*13	08/09/00	08/11/00	
HWSW-N1	28020*14	08/09/00	08/11/00	
HWSW-NW	28020*15	08/09/00	08/11/00	
HWSW-W1	28020*16	08/09/00	08/11/00	
HWSW-SW	28020*17	08/09/00	08/11/00	
HWSW-DUP	28020*18	08/09/00	08/11/00	





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Project Summary -

Explosives QC Summary: Soils

All holding time criteria were met for all samples.

All initial and continuing calibration standards met method criteria.

All method blanks were free of contamination for the target analytes.

All surrogate spike recoveries were within method-specified limits.

The associated Matrix Spike and Matrix Spike Duplicate was performed on sample 28020*5. All recoveries were within the method specified QC recovery limits.

The associated laboratory control samples (LCS) were within QC acceptance criteria.

An MDL Check was performed, and the raw data included in this report.

All explosives are routinely analyzed at a 1:4 dilution.

Explosives QC Summary: Waters

All holding time criteria were met for all samples.

All initial and continuing calibration standards met method criteria.

All method blanks were free of contamination for all target analytes except for 1,3-Dinitrobenzene, which was detected at 0.29ppb, slightly below the report limit, in the Method Blank that was analyzed on the primary column, and at 0.34ppb on the confirmation column. It is the belief of the laboratory that this peak is a laboratory contaminant, although it meets all GC identification criteria. In an attempt to identify this compound, a GCMS analysis was performed on the sample extract with the highest concentration. Unfortunately, the GCMS results were inconclusive.

This peak was present in the Method Blank and in most samples, at levels near the report limits. All the samples except 28020*13 were analyzed on a second column. The peak was confirmed in samples 28020*10, 28020*11, 28020*12, and 28020*14, and in two of the samples, 28028*17 and 28020*18, the peak was confirmed but the recoveries differed by greater than 40%. The results for these samples have been qualified with a B, to reflect the fact that this compound was also detected in the Method Blank

All surrogate spike recoveries were within method-specified limits.

Fos28020

000002

The associated Matrix Spike and Matrix Spike Duplicate was performed on sample 28020*14. All recoveries were within the method specified QC recovery limits.

The associated laboratory control samples (LCS) were within QC acceptance criteria.

An MDL Check was performed, and the raw data included in this report.

All explosives are routinely analyzed at a 1:4 dilution.

Certification

This data package is in compliance with the technical intent of ESE-St. Louis's contract, for other than the conditions detailed above. The Laboratory Manager or designee, as verified by the following signature has authorized release of the data contained in this hard copy data package.

Signature: Barbara Beard

Name: Barbara Beard

Date: October 10, 2000

Title: Project Manager

CLIENT SAMPLE ID'S:					
FIELD GROUP:	HWSED-E1	HWSED-SE	HWSED-SERE	HWSED-S1	HWSED-NE
SEQUENCE #:	28020	28020	28020	28020	28020
DATE COLLECTED:	1	2	2 RE	3	4
TIME COLLECTED:	08/09/00	08/09/00	08/09/00	08/09/00	08/09/00
	12:45	12:25	12:25	12:37	14:05

PARAMETERS	UNITS	METHOD					

1,3-Dinitrobenzene	UG/KG-DRY	SW8330	<440	<430	NA	<560	<570
2,4-Dinitrotoluene	UG/KG-DRY	SW8330	<440	<430	NA	<560	<570
2,6-Dinitrotoluene	UG/KG-DRY	SW8330	<440	<430	NA	<560	<570
2-amino-4,6-Dinitrotoluene	UG/KG-DRY	SW8330	<440	<430	NA	<560	<570
4-amino-2,6-Dinitrotoluene	UG/KG-DRY	SW8330	<440	<430	NA	<560	<570
HMX	UG/KG-DRY	SW8330	<620	<610	NA	<810	<820
Nitrobenzene	UG/KG-DRY	SW8330	<620	<610	NA	<810	<820
2-Nitrotoluene	UG/KG-DRY	SW8330	<440	<430	NA	<560	<570
3-Nitrotoluene	UG/KG-DRY	SW8330	<440	<430	NA	<560	<570
4-Nitrotoluene	UG/KG-DRY	SW8330	<440	<430	NA	<560	<570
RDX	UG/KG-DRY	SW8330	<620	<610	<610	<810	<820
Tetryl	UG/KG-DRY	SW8330	<440	<430	NA	<560	<570
1,3,5-Trinitrobenzene	UG/KG-DRY	SW8330	<440	<430	NA	<560	<570
2,4,6-Trinitrotoluene	UG/KG-DRY	SW8330	<440	<430	NA	<560	<570
Moisture	%	D2216	20	18	NA	38	39

CLIENT SAMPLE ID'S:					
FIELD GROUP:		HWSED-N1	HWSED-NW	HWSED-W1	HWSED-SW
SEQUENCE #:		28020	28020	28020	28020
DATE COLLECTED:		5	6	7	8
TIME COLLECTED:		08/09/00	08/09/00	08/09/00	08/09/00
		13:30	14:08	12:47	12:20
					14:30

PARAMETERS	UNITS	METHOD						
1,3-Dinitrobenzene	UG/KG-DRY	SW8330	<380	<430	<440	<400	<410	
2,4-Dinitrotoluene	UG/KG-DRY	SW8330	<380	<430	<440	<400	<410	
2,6-Dinitrotoluene	UG/KG-DRY	SW8330	<380	<430	<440	<400	<410	
2-amino-4,6-Dinitrotoluene	UG/KG-DRY	SW8330	<380	<430	<440	<400	<410	
4-amino-2,6-Dinitrotoluene	UG/KG-DRY	SW8330	<380	<430	<440	<400	<410	
HMX	UG/KG-DRY	SW8330	<540	<610	<630	<570	<590	
Nitrobenzene	UG/KG-DRY	SW8330	<540	<610	<630	<570	<590	
2-Nitrotoluene	UG/KG-DRY	SW8330	<380	<430	<440	<400	<410	
3-Nitrotoluene	UG/KG-DRY	SW8330	<380	<430	<440	<400	<410	
4-Nitrotoluene	UG/KG-DRY	SW8330	<380	<430	<440	<400	<410	
RDX	UG/KG-DRY	SW8330	<540	<610	<630	<570	<590	
Tetryl	UG/KG-DRY	SW8330	<380	<430	<440	<400	<410	
1,3,5-Trinitrobenzene	UG/KG-DRY	SW8330	<380	<430	<440	<400	<410	
2,4,6-Trinitrotoluene	UG/KG-DRY	SW8330	<380	<430	<440	<400	<410	
Moisture	%	D2216	8	18	21	13	15	

NA - Sample Not Analyzed
 RE - Re-analysis/Re-extraction

CLIENT SAMPLE ID'S:	HWSW-S1	HWSW-S1RE	HWSW-SE	HWSW-SERE	HWSW-E1
FIELD GROUP:	28020	28020	28020	28020	28020
SEQUENCE #:	10	10 RE	11	11 RE	12
DATE COLLECTED:	08/09/00	08/09/00	08/09/00	08/09/00	08/09/00
TIME COLLECTED:	12:37	12:37	12:25	12:25	12:45

PARAMETERS	UNITS	METHOD					
1,3-Dinitrobenzene	UG/L	SW8330	0.33B	0.26B	0.31B	0.33B	0.32B
2,4-Dinitrotoluene	UG/L	SW8330	<0.24	NA	<0.23	NA	<0.23
2,6-Dinitrotoluene	UG/L	SW8330	<0.24	NA	<0.23	NA	<0.23
2-amino-4,6-Dinitrotoluene	UG/L	SW8330	<0.24	NA	<0.23	NA	<0.23
4-amino-2,6-Dinitrotoluene	UG/L	SW8330	<0.24	NA	<0.23	NA	<0.23
HMX	UG/L	SW8330	<0.36	NA	<0.34	NA	<0.34
Nitrobenzene	UG/L	SW8330	<0.36	NA	<0.34	NA	<0.34
2-Nitrotoluene	UG/L	SW8330	<0.36	NA	<0.34	NA	<0.34
3-Nitrotoluene	UG/L	SW8330	<0.36	NA	<0.34	NA	<0.34
4-Nitrotoluene	UG/L	SW8330	<0.36	NA	<0.34	NA	<0.34
RDX	UG/L	SW8330	<0.73	NA	<0.68	NA	<0.68
Tetryl	UG/L	SW8330	<0.24	NA	<0.23	NA	<0.23
1,3,5-Trinitrobenzene	UG/L	SW8330	<0.24	NA	<0.23	NA	<0.23
2,4,6-Trinitrotoluene	UG/L	SW8330	<0.24	NA	<0.23	NA	<0.23

CLIENT SAMPLE ID'S:
 FIELD GROUP:
 SEQUENCE #:
 DATE COLLECTED:
 TIME COLLECTED:

HWSW-E1RE	HWSW-NE	HWSW-N1	HWSW-N1RE	HWSW-NW
28020	28020	28020	28020	28020
12 RE	13	14	14 RE	15
08/09/00	08/09/00	08/09/00	08/09/00	08/09/00
12:45	13:35	12:50	12:50	13:30

PARAMETERS	UNITS	METHOD	HWSW-E1RE	HWSW-NE	HWSW-N1	HWSW-N1RE	HWSW-NW
1,3-Dinitrobenzene	UG/L	SW8330	0.35B	<0.21	0.39B	0.28B	<0.19
2,4-Dinitrotoluene	UG/L	SW8330	NA	<0.21	<0.23	NA	<0.19
2,6-Dinitrotoluene	UG/L	SW8330	NA	<0.21	<0.23	NA	<0.19
2-amino-4,6-Dinitrotoluene	UG/L	SW8330	NA	<0.21	<0.23	NA	<0.19
4-amino-2,6-Dinitrotoluene	UG/L	SW8330	NA	<0.21	<0.23	NA	<0.19
HMX	UG/L	SW8330	NA	<0.31	<0.35	NA	<0.29
Nitrobenzene	UG/L	SW8330	NA	<0.31	<0.35	NA	<0.29
2-Nitrotoluene	UG/L	SW8330	NA	<0.31	<0.35	NA	<0.29
3-Nitrotoluene	UG/L	SW8330	NA	<0.31	<0.35	NA	<0.29
4-Nitrotoluene	UG/L	SW8330	NA	<0.31	<0.35	NA	<0.29
RDX	UG/L	SW8330	NA	<0.62	<0.70	NA	<0.58
Tetryl	UG/L	SW8330	NA	<0.21	<0.23	NA	<0.19
1,3,5-Trinitrobenzene	UG/L	SW8330	NA	<0.21	<0.23	NA	<0.19
2,4,6-Trinitrotoluene	UG/L	SW8330	NA	<0.21	<0.23	NA	<0.19

PDC Laboratories, Inc. 09/29/00
 PROJECT NUMBER
 FIELD GROUP

STATUS :FINAL PAGE 3
 PROJECT NAME ESE-ST LOUIS/HIGHLAND PARK
 LAB COORDINATOR

CLIENT SAMPLE ID'S:	HWSW-W1	HWSW-SW	HWSW-SWRE	HWSW-DUP	HWSW-DUPRE
FIELD GROUP:	28020	28020	28020	28020	28020
SEQUENCE #:	16	17	17 RE	18	18 RE
DATE COLLECTED:	08/09/00	08/09/00	08/09/00	08/09/00	08/09/00
TIME COLLECTED:	12:47	12:20	12:20	14:30	14:30

PARAMETERS	UNITS	METHOD					
1,3-Dinitrobenzene	UG/L	SW8330	<0.21	0.82B	0.40B	0.95B	0.46B
2,4-Dinitrotoluene	UG/L	SW8330	<0.21	<0.19	NA	<0.23	NA
2,6-Dinitrotoluene	UG/L	SW8330	<0.21	<0.19	NA	<0.23	NA
2-amino-4,6-Dinitrotoluene	UG/L	SW8330	<0.21	<0.19	NA	<0.23	NA
4-amino-2,6-Dinitrotoluene	UG/L	SW8330	<0.21	<0.19	NA	<0.23	NA
HMX	UG/L	SW8330	<0.31	<0.28	NA	<0.35	NA
Nitrobenzene	UG/L	SW8330	<0.31	<0.28	NA	<0.35	NA
2-Nitrotoluene	UG/L	SW8330	<0.31	<0.28	NA	<0.35	NA
3-Nitrotoluene	UG/L	SW8330	<0.31	<0.28	NA	<0.35	NA
4-Nitrotoluene	UG/L	SW8330	<0.31	<0.28	NA	<0.35	NA
RDX	UG/L	SW8330	<0.62	<0.56	NA	<0.70	NA
Tetryl	UG/L	SW8330	<0.21	<0.19	NA	<0.23	NA
1,3,5-Trinitrobenzene	UG/L	SW8330	<0.21	<0.19	NA	<0.23	NA
2,4,6-Trinitrotoluene	UG/L	SW8330	<0.21	<0.19	NA	<0.23	NA

RE - Re-analysis/Re-extraction
 B - Confirmed, >40% difference
 C - Confirmed

Appendix F

Data Validation Report

**Data Validation for the Anti-Aircraft
Artillery Ranges Site Investigation Data
Surplus Operable Unit
Fort Sheridan, Illinois**

Prepared for:
U.S. Army Environmental Center
Base Closure Division
Aberdeen Proving Ground, Maryland 21010-5901

Prepared by:
Harding ESE, Inc.
St. Louis, Missouri

March 16, 2001

Harding ESE Project No. 490-2087-0300

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List of Abbreviations and Acronyms

AAA	anti-aircraft artillery
$\mu\text{g/L}$	microgram per liter
HMX	Octahydrotetranitrotetrazocine-High Melting Explosive
HP	Highland Park
HPLC	high performance liquid chromatography
HW	Highwood
IZ	impact zone
Katalyst	Katalyst Analytical Technologies Inc.
LCS	laboratory control samples
MS/MSD	matrix spikes/matrix spike duplicates
MS	matrix spike
MSD	matrix spike duplicate
NFG	National Functional Guidelines
PDC	PDC Laboratories Inc.
QA/QC	quality assurance/quality control
QC	quality control
RPD	relative percent differences
USEPA	U.S. Environmental Protection Agency

1.0 Introduction

1.1 Data Set 1

Data Set 1 contained a total of 22 sediment samples (including 3 duplicates) and 10 surface water samples (including 1 duplicate and 1 equipment blank) collected from around the Highland Park surface water intake (HP) and the anti-aircraft artillery (AAA) ranges impact zone (IZ). The samples were prepared and analyzed by Katalyst Analytical Technologies Inc. (Katalyst) of Peoria, Illinois. The samples were collected September 8 through 11, 1999. The samples were analyzed for nitroaromatics and nitroamines by high performance liquid chromatography (HPLC) using U.S. Environmental Protection Agency (USEPA) SW-846 Method 8330. The data package received from Katalyst for the samples contained a Quality Control (QC) Report and additional quality assurance/quality control (QA/QC) information necessary to complete the data review.

This report presents the results of the analytical data review performed on the sediment and surface water samples in accordance with the National Functional Guidelines (NFG) for Organic and Inorganic Data Review (USEPA, 1994). In accordance with the Final Anti-Aircraft Artillery Ranges Sampling and Analysis Plan, Fort Sheridan, Illinois (ESE, 1999), at least 10 percent of the analytical data set were validated in accordance with the NFG. Five samples, or 23 percent, were randomly selected from the 32 samples. The five selected samples were:

<u>Client ID</u>	<u>Lab ID</u>
HPSW #4	27888*4
HPSED #2	27891*3
HPSED #7	27891*8
IZSED #17	27893*5
IZSED #13	27893*9

These analytical sample data were evaluated using the information obtained regarding the following parameters: chain of custody, sample condition receipt report, extraction holding times, analysis holding times, initial calibrations, continuing calibrations, blanks, system monitoring compounds (surrogates), matrix spikes/matrix spike duplicates (MS/MSDs), laboratory control samples (LCSs), and duplicates (see attached Data Review Checklist). Calculations of the reported results were verified from the raw data. The remaining 77 percent of the data received a modified NFG validation, in which the necessary forms were reviewed to ensure that the QC results fell within the appropriate QC limits for holding times, blank contamination, calibrations, surrogates, MS/MSDs, LCSs, laboratory

duplicates, and any other required QC data. This data validation report discusses areas of concern and any overall issues that affect data quality. Data sample results affected are qualified, as necessary, in accordance with the NFG.

1.2 Data Set 2

Data Set 2 contained a total 24 samples comprised of 9 sediment samples (including 1 duplicate) and 9 surface water samples (including 1 duplicate) collected from around the Highwood (HW) surface water intake, as well as 6 raw (untreated) water samples (including 2 duplicates) from the Highland Park and Highwood water treatment plants. The samples were prepared and analyzed by PDC Laboratories Inc. (PDC) of Peoria, Illinois, formerly Katalyst. The samples were collected by Harding ESE on April 11, 2000, May 19, 2000, and August 11, 2000. The samples were analyzed for nitroaromatics and nitroamines by HPLC using USEPA SW-846 Method 8330. The data package received from PDC for the samples contained a QC Report and additional QA/QC information necessary to complete the data review.

This report presents the results of the data review performed on all 24 sediment and surface water samples in accordance with the NFG for Organic and Inorganic Data Review (USEPA, 1994).

The analytical sample data were evaluated using the information obtained regarding the following parameters: chain of custody, sample condition receipt report, extraction holding times, analysis holding times, initial calibrations, continuing calibrations, blanks, system monitoring compounds (surrogates), MS/MSDs, LCSs, and duplicates (see attached Data Review Checklist). This data validation report discusses areas of concern and any overall issues that affect data quality. Data sample results affected are qualified, as necessary, in accordance with the NFG.

2.0 Data Validation and Results

Sample chain of custodies were completed and signed by appropriate parties. Sample arrival at the laboratory noted no exceptions in sample arrival conditions. Each sample was extracted and analyzed within method holding times. The two data sets with a combined total of 56 samples were analyzed in seven batches (P45854, P45857, P45863, P46721, P46742, P46858, and P46861). The batches contained the samples as listed below.

DATA SET 1					
Batch P27888		Batch P27891		Batch P27893	
Sample ID	Laboratory ID	Sample ID	Laboratory ID	Sample ID	Laboratory ID
HPSW #1	27888*1	IZSED #6	27891*1	IZSED #20	27893*1
HPSW #2	27888*2	HPSED #1	27891*2	IZSED #20DUP	27893*2
HPSW #3	27888*3	HPSED #2	27891*3	IZSED #19	27893*3
HPSW #4	27888*4	HPSED #3	27891*4	IZSED #19DUP	27893*4
HPSW #5	27888*5	HPSED #4	27891*5	IZSED #17	27893*5
HPSW #6	27888*6	HPSED #5	27891*6	IZSED #11	27893*6
HPSW #7	27888*7	HPSED #6	27891*7	IZSED #10	27893*7
HPSW #8	27888*8	HPSED #7	27891*8	IZSED #12	27893*8
HPSW #8 DUP	27888*9	HPSED #8	27891*9	IZSED #13	27893*9
		DUPHPHPSED #8	27891*10	IZSED #14	27893*10
				IZSED #15	27893*11
				IZSED #16	27893*12
				EQUIP BLANK	27893*14
DATA SET 2					
Batch P46721		Batch P46858		Batch P46861	
Sample ID	Laboratory ID	Sample ID	Laboratory ID	Sample ID	Laboratory ID
HP-0408	27993*1	HWSW - S1	28020*10	HWSED - E1	28020*1
HW-0408	27993*2	HWSW - SE	28020*11	HWSED - SE	28020*2
HP-0408DUP	27993*3	HWSW - E1	28020*12	HWSED - S1	28020*3
Batch P46742		HWSW - NE	28020*13	HWSED - NE	28020*4
Sample ID	Laboratory ID	HWSW - N1	28020*14	HWSED - N1	28020*5
HP-0519	28009*1	HWSW - NW	28020*15	HWSED - NW	28020*6
HW-0519	28009*2	HWSW - W1	28020*16	HWSED - W1	28020*7
HP-0519D	28009*3	HWSW - SW	28020*17	HWSED - SW	28020*8
		HWSW - DUP	28020*18	HWSED - DUP	28020*9

2.1 Validation of Batch P27888

The method blank was non-detect for each analyte. The LCS for this batch had all analytes within the QC recovery acceptance limits for the method. Both method blank and LCSs had system monitoring compounds (surrogates) that were within the method QC recovery acceptance criterion (63 to 170 percent).

The MS/MSD results for this batch were within the QC percent recovery limits as set by the method for each analyte. The MS/MSD had RPDs that were within the QC acceptance criterion of 25 percent.

The initial and continuing calibrations for this batch had recoveries that met method acceptance criteria.

The system monitoring compounds (surrogates) for the samples in this batch were within the QC acceptance criterion of 63 to 170 percent.

QC in this batch met the required specifications so no action was taken and no samples associated with this batch were qualified.

2.2 Validation of Batch P27891

The method blank was non-detect for all target analytes. The LCS for this batch had all analytes within the QC recovery acceptance limits for the method with the exception of tetryl. The 145 percent tetryl recovery was above the upper QC limit of 134 percent. Although any positive sample result should be qualified with a J, tetryl was not detected in any sample. Therefore, no data were qualified. Both method blank and LCSs had system monitoring compounds (surrogates) that were within the method QC recovery acceptance criterion (63 to 170 percent).

The MS/MSD results for this batch were within the QC percent recovery limits as set by the method. The MSD sample was also within the QC recovery limits for each analyte. The MS/MSD had RPDs that were within the QC acceptance criterion of 25 percent with the exception of tetryl. The RPD for tetryl was 50 percent, which is greater than the 25 percent limit. No action was taken on the MS/MSD data alone.

Duplicates were within the RPD limit of 20 percent. Also, the initial and continuing calibrations for this batch had recoveries that met method acceptance criteria. The system monitoring compounds (surrogates) for the samples in this batch were within the QC acceptance criterion of 63 to 170 percent.

2.3 Validation of Batch P27893

The method blank associated with the sediment samples was non-detect for target analyte. The method blank associated with the equipment blank sample contained 2-nitrotoluene, 4-nitrotoluene, and Octahydrotetranitrotetrazocine-High Melting Explosive (HMX) at low concentrations. No action was taken since the compounds detected in the method blank were not detected in the equipment blank sample. The LCS for this batch had each analyte within the QC recovery acceptance limits for the method. Both method blank and LCSs had system monitoring compounds (surrogates) that were within the method QC recovery acceptance criterion (63 to 170 percent).

The MS/MSD results for this batch were within the QC percent recovery limits as set by the method. The MSD sample was also within the QC recovery limits for each analyte. The MS/MSD had RPDs that were within the QC acceptance criterion of 25 percent with the exception of tetryl. The RPD for tetryl was 31 percent, which is greater than the 25 percent limit. No action was taken on the MS/MSD data alone.

Duplicates were within the RPD limit of 20 percent. Also, the initial and continuing calibrations for this batch had recoveries that met method acceptance criteria. The system monitoring compounds (surrogates) for the samples in this batch were within the QC acceptance criterion of 63-170 percent.

2.4 Validation of Batch P46721

The method blank was non-detect for each analyte. The LCS for this batch had all analytes within the QC recovery acceptance limits for the method. Both method blank and LCSs had system monitoring compounds (surrogates) that were within the method QC recovery acceptance criterion (63 to 170 percent).

The MS results for this batch were within the QC percent recovery limits as set by the method for each analyte. The MSD had high recoveries for 4-amino-2,6-dinitrotoluene and 2-amino-4,6-dinitrotoluene. Also the RPDs for the MS/MSD had 3 analytes (4-amino-2,6-dinitrotoluene, tetryl, and 2,4,6-trinitrotoluene) which were over the QC acceptance criterion of 25 percent with 40, 67, and 167 percent, respectively.

The initial and continuing calibrations for this batch had recoveries that met method acceptance criteria.

The system monitoring compounds (surrogates) for the samples in this batch were within the QC acceptance criterion of 63 to 170 percent.

Duplicates were within the RPD limit of 20 percent.

While MS/MSD QC items were noted regarding this batch review all remaining QC items reviewed met the required specifications so no action was taken on the MS/MSD data alone and no samples associated with this batch were qualified.

2.5 Validation of Batch P46742

The method blank was non-detect for each target analyte. The LCS for this batch had all analytes within the QC recovery acceptance limits for the method. Both method blank and LCSs had system monitoring compounds (surrogates) that were within the method QC recovery acceptance criterion (63 to 170 percent).

The MS/MSD results for this batch were within the QC percent recovery limits as set by the method for each analyte. The MS/MSD had RPDs that were within the QC acceptance criterion of 25 percent.

The initial and continuing calibrations for this batch had recoveries that met method acceptance criteria.

The system monitoring compounds (surrogates) for the samples in this batch were within the QC acceptance criterion of 63 to 170 percent.

Field duplicates were within the RPD limit of 20 percent.

QC in this batch met the required specifications so no action was taken and no samples associated with this batch were qualified.

2.6 Validation of Batch P46858

The method blank was non-detect for target analytes with the exception of 1,3-dinitrobenzene at 0.29 microgram per liter ($\mu\text{g/L}$) and 0.34 $\mu\text{g/L}$ on the primary and confirmation columns respectively. All the associated samples were qualified as "U" since sample concentrations were greater than the reporting limit but less than 5 times the blank concentration. Samples 28020*10, 28020*11, 28020*12, 28020*14, 28020*17, and 28020*18 associated with this batch had qualifier "U" placed on the results for 1,3-dinitrobenzene. The "U" qualifier represents that the analyte was analyzed for, but was not detected above the reported sample quantitation limit or the sample detection limit.

These samples also had a "B" qualifier which was applied by the analytical laboratory (PDC Laboratories, Inc.). All method blanks were free from contamination for all target analytes except for the 1,3-dinitrobenzene, which was detected at 0.29 ppb, slightly below the report limit in the Method Blank that was analyzed on the primary column, and at 0.34 ppb on the confirmation column. It is the belief of the laboratory that this peak is a laboratory contaminant, although it meets all GC identification criteria. In an attempt to identify this compound, a GCMS analysis was performed on the sample extract with the highest concentration. Unfortunately, the GCMS results were inconclusive. This peak was present in the Method Blank and in most samples, at levels near the report limits. All the samples except 28020*13 were analyzed on a second column. The peak was confirmed in samples 28020*10, 28020*11, 28020*12, and 28020*14, and in two of the samples 28020*17 and 28020*18, 5h3 peak was confirmed, but the recoveries differed by greater than 40 percent. Consequently, the laboratory qualified the results for these samples with a "B" to reflect the fact that this compound was also detected in the Method Blank. See attached qualified data sheets.

The LCS for this batch had all analytes within the QC recovery acceptance limits for the method. The LCS had system monitoring compounds (surrogates) that were within the method QC recovery acceptance criterion (63 to 170 percent).

The MS/MSD results for this batch were within the QC percent recovery limits as set by the method for each analyte. The MS/MSD had RPDs that were within the QC acceptance criterion of 25 percent.

The initial and continuing calibrations for this batch had recoveries that met method acceptance criteria.

The system monitoring compounds (surrogates) for the samples in this batch were within the QC acceptance criterion of 63 to 170 percent.

Field duplicates were within the RPD limit of 20 percent.

2.7 Validation of Batch P46861

The method blank was non-detect for target analytes. The LCS for this batch had all analytes within the QC recovery acceptance limits for the method. Both method blank and LCSs had system monitoring compounds (surrogates) that were within the method QC recovery acceptance criterion (63 to 170 percent).

The MS/MSD) results for this batch were within the QC percent recovery limits as set by the method for each analyte. The MS/MSD had RPDs that were within the QC acceptance criterion of 25 percent.

The initial and continuing calibrations for this batch had recoveries that met method acceptance criteria.

The system monitoring compounds (surrogates) for the samples in this batch were within the QC acceptance criterion of 63 to 170 percent.

Field duplicates were within the RPD limit of 20 percent.

QC in this batch met the required specifications so no action was taken and no samples associated with this batch were qualified.

3.0 Summary and Conclusions

The result of the validation of the 32 sediment and surface water samples in Data Set 1 is that all sample results were qualified with a "U" because the analyte that was analyzed for was not detected above the reported sample quantitation limit.

The result of the validation of the 24 sediment and surface water samples in Data Set 2 is that 6 samples (28020*10, 28020*11, 28020*12, 28020*14, 28020*17, and 28020*18) associated with batch P46858 have been qualified with the U qualifier placed on the results for 1,3-dinitrobenzene. All sample results were qualified with a "U" because the analyte that was analyzed for was not detected above the reported sample quantitation limit.

Data Review Checklist

The data requirements to be checked are listed below:

Holding Times

Initial Calibration

Continuing Calibration

Blanks

System Monitoring Compounds

Matrix Spikes/Matrix Spike Duplicates

Laboratory Control Samples

Duplicates

The specific Criteria, Evaluation, and Action for each requirement listed is per the National Functional Guidelines.

QUALIFIED DATA SHEETS

CL SAMPLE ID'S:
 FIELD GROUP:
 SEQUENCE #:
 DATE COLLECTED:
 TIME COLLECTED:

HPSW #1	HPSW #2	HPSW #3	HPSW #4	HPSW #5
27888	27888	27888	27888	27866
1	2	3	4	5
09/08/99	09/08/99	09/08/99	09/06/99	09/08/99
11:46	11:47	12:19	12:20	12:33

PARAMETERS	UNITS	METHOD	HPSW #1	HPSW #2	HPSW #3	HPSW #4	HPSW #5
1,3-Dinitrobenzene	UG/L	SW8330	<0.52 u	<0.42 u	<0.49 u	<0.56 u	<0.55 u
2,4-Dinitrotoluene	UG/L	SW8330	<0.52 u	<0.42 u	<0.49 u	<0.56 u	<0.55 u
2,6-Dinitrotoluene	UG/L	SW8330	<0.52 u	<0.42 u	<0.49 u	<0.56 u	<0.55 u
2-amino-4,6-Dinitrotoluene	UG/L	SW8330	<0.52 u	<0.42 u	<0.49 u	<0.56 u	<0.55 u
4-amino-2,6-Dinitrotoluene	UG/L	SW8330	<0.52 u	<0.42 u	<0.49 u	<0.56 u	<0.55 u
1,2-DX	UG/L	SW8330	<0.78 u	<0.62 u	<0.74 u	<0.83 u	<0.82 u
Nitrobenzene	UG/L	SW8330	<0.78 u	<0.62 u	<0.74 u	<0.83 u	<0.82 u
2-Nitrotoluene	UG/L	SW8330	<0.78 u	<0.62 u	<0.74 u	<0.83 u	<0.82 u
3-Nitrotoluene	UG/L	SW8330	<0.78 u	<0.62 u	<0.74 u	<0.83 u	<0.82 u
4-Nitrotoluene	UG/L	SW8330	<0.78 u	<0.62 u	<0.74 u	<0.83 u	<0.82 u
1,2-DX	UG/L	SW8330	<0.78 u	<0.62 u	<0.74 u	<0.83 u	<0.82 u
Tetryl	UG/L	SW8330	<0.52 u	<0.42 u	<0.49 u	<0.56 u	<0.55 u
2,4,6-Trinitrobenzene	UG/L	SW8330	<0.52 u	<0.42 u	<0.49 u	<0.56 u	<0.55 u
2,4,6-Trinitrotoluene	UG/L	SW8330	<0.52 u	<0.42 u	<0.49 u	<0.56 u	<0.55 u

000005

C	SAMPLE ID'S:	HPSW #6	HPSW #7	HPSW #7RE	HPSW #8	HPSW #8 DUP
F	GROUP:	27888	27888	27888	27888	27888
	SEQUENCE #:	6	7	7 RE	8	5
	DATE COLLECTED:	09/08/99	09/08/99	09/08/99	09/08/99	09/08/99
	TIME COLLECTED:	12:34	12:46	12:46	12:47	12:47

PARAMETERS	UNITS	METHOD	HPSW #6	HPSW #7	HPSW #7RE	HPSW #8	HPSW #8 DUP
1,3-Dinitrobenzene	UG/L	SW8330	<0.66 u	<0.56 u	NA	<0.52 u	<0.40 u
2,4-Dinitrotoluene	UG/L	SW8330	<0.66 u	<0.56 u	NA	<0.52 u	<0.40 u
2,6-Dinitrotoluene	UG/L	SW8330	<0.66 u	<0.56 u	NA	<0.52 u	<0.40 u
2-amino-4,6-Dinitrotoluene	UG/L	SW8330	<0.56 u	<0.56 u	NA	<0.52 u	<0.40 u
4-amino-2,6-Dinitrotoluene	UG/L	SW8330	<0.66 u	<0.56 u	NA	<0.52 u	<0.40 u
HMX	UG/L	SW8330	<0.99 u	2.3NC	<0.21 u	<0.78 u	<0.60 u
Nitrobenzene	UG/L	SW8330	<0.99 u	<0.83 u	NA	<0.78 u	<0.60 u
2-Nitrotoluene	UG/L	SW8330	<0.99 u	<0.83 u	NA	<0.78 u	<0.60 u
3-Nitrotoluene	UG/L	SW8330	<0.99 u	<0.83 u	NA	<0.78 u	<0.60 u
4-Nitrotoluene	UG/L	SW8330	<0.99 u	<0.83 u	NA	<0.78 u	<0.60 u
RDX	UG/L	SW8330	<0.99 u	1.8NC	<0.21 u	<0.78 u	<0.60 u
Tetryl	UG/L	SW8330	<0.66 u	<0.56 u	NA	<0.52 u	<0.40 u
1,3,5-Trinitrobenzene	UG/L	SW8330	<0.66 u	<0.56 u	NA	<0.52 u	<0.40 u
2,4,6-Trinitrotoluene	UG/L	SW8330	<0.66 u	<0.56 u	NA	<0.52 u	<0.40 u

NC - Not Confirmed
 RE - Re-analysis/Re-extraction

000006

CLIENT SAMPLE ID'S:	HPSED#6	HPSED#1	HPSED#2	HPSED#3	HPSED#4
FIELD GROUP:	27891	27891	27891	27891	27891
SEQUENCE #:	1	2	3	4	5
DATE COLLECTED:	09/10/99	09/06/99	09/06/99	09/06/99	09/06/99
TIME COLLECTED:	16:00	11:50	11:51	12:21	12:22

PARAMETERS	UNITS	METHOD	HPSED#6	HPSED#1	HPSED#2	HPSED#3	HPSED#4
1,3-Dinitrobenzene	UG/KG-DRY	SW8330	<440 u	<440 u	<430 u	<470 u	<480 u
2,4-Dinitrotoluene	UG/KG-DRY	SW8330	<440 u	<440 u	<430 u	<470 u	<480 u
2,6-Dinitrotoluene	UG/KG-DRY	SW8330	<440 u	<440 u	<430 u	<470 u	<480 u
3-amino-4,6-Dinitrotoluene	UG/KG-DRY	SW8330	<440 u	<440 u	<430 u	<470 u	<480 u
4-amino-2,6-Dinitrotoluene	UG/KG-DRY	SW8330	<440 u	<440 u	<430 u	<470 u	<480 u
HMX	UG/KG-DRY	SW8330	<620 u	<630 u	<610 u	<680 u	<680 u
Nitrobenzene	UG/KG-DRY	SW8330	<620 u	<630 u	<610 u	<680 u	<680 u
2-Nitrotoluene	UG/KG-DRY	SW8330	<440 u	<440 u	<430 u	<470 u	<480 u
3-Nitrotoluene	UG/KG-DRY	SW8330	<440 u	<440 u	<430 u	<470 u	<480 u
4-Nitrotoluene	UG/KG-DRY	SW8330	<440 u	<440 u	<430 u	<470 u	<480 u
RDX	UG/KG-DRY	SW8330	<620 u	<630 u	<610 u	<680 u	710NC
Tetryl	UG/KG-DRY	SW8330	<440 u	<440 u	<430 u	<470 u	<480 u
1,3,5-Trinitrobenzene	UG/KG-DRY	SW8330	<440 u	<440 u	<430 u	<470 u	<480 u
2,4,6-Trinitrotoluene	UG/KG-DRY	SW8330	<440 u	<440 u	<430 u	<470 u	<480 u
Moisture	%	D2216	20	21	18	26	27

NC - Not Confirmed

000006

CLIENT SAMPLE ID'S:	HPSED#4RE	HPSED#5	HPSED#5RE	HPSED#6	HPSED#7
FIELD GROUP:	27691	27691	27691	27691	27691
SEQUENCE #:	5 RE	6	6 RE	7	7
DATE COLLECTED:	09/08/99	09/08/99	09/08/99	09/08/99	09/08/99
TIME COLLECTED:	12:22	12:35	12:35	12:36	12:49

PARAMETERS	UNITS	METHOD					
1,3-Dinitrobenzene	UG/KG-DRY	SW8330	NA	<450 u	NA	<510 u	<470 u
2,4-Dinitrotoluene	UG/KG-DRY	SW8330	NA	<450 u	NA	<510 u	<470 u
2,6-Dinitrotoluene	UG/KG-DRY	SW8330	NA	<450 u	NA	<510 u	<470 u
2-amino-4,6-Dinitrotoluene	UG/KG-DRY	SW8330	NA	<450 u	NA	<510 u	<470 u
4-amino-2,6-Dinitrotoluene	UG/KG-DRY	SW8330	NA	<450 u	NA	<510 u	<470 u
HMX	UG/KG-DRY	SW8330	NA	790NC	<640 u	<720 u	920NC
Nitrobenzene	UG/KG-DRY	SW8330	NA	<640 u	NA	<720 u	<670 u
2-Nitrotoluene	UG/KG-DRY	SW8330	NA	<450 u	NA	<510 u	<470 u
3-Nitrotoluene	UG/KG-DRY	SW8330	NA	<450 u	NA	<510 u	<470 u
4-Nitrotoluene	UG/KG-DRY	SW8330	NA	<450 u	NA	<510 u	<470 u
RDX	UG/KG-DRY	SW8330	<170 u	<640 u	NA	<720 u	<670 u
Tetryl	UG/KG-DRY	SW8330	NA	<450 u	NA	<510 u	<470 u
1,3,5-Trinitrobenzene	UG/KG-DRY	SW8330	NA	<450 u	NA	<510 u	<470 u
2,4,6-Trinitrotoluene	UG/KG-DRY	SW8330	NA	<450 u	NA	<510 u	<470 u
Moisture	%	D2216	NA	22	NA	31	25

NC - Not Confirmed
 NA - Sample Not Analyzed
 : - Re-analysis/Re-extraction

CLIENT SAMPLE ID'S:	HPSED#7RE	HPSED#8	DUPHPSED#8
FIELD GROUP:	27891	27891	27891
SEQUENCE #:	8 RE	9	10
DATE COLLECTED:	09/06/99	09/08/99	09/08/99
TIME COLLECTED:	12:49	12:49	12:49

PARAMETERS	UNITS	METHOD			
1,3-Dinitrobenzene	UG/KG-DRY	SW8330	NA	<440 U	<440 U
2,4-Dinitrotoluene	UG/KG-DRY	SW8330	NA	<440 U	<440 U
2,6-Dinitrotoluene	UG/KG-DRY	SW8330	NA	<440 U	<440 U
2-amino-4,6-Dinitrotoluene	UG/KG-DRY	SW8330	NA	<440 U	<440 U
4-amino-2,6-Dinitrotoluene	UG/KG-DRY	SW8330	NA	<440 U	<440 U
HMX	UG/KG-DRY	SW8330	<170 U	<620 U	<630 U
Nitrobenzene	UG/KG-DRY	SW8330	NA	<620 U	<630 U
2-Nitrotoluene	UG/KG-DRY	SW8330	NA	<440 U	<440 U
3-Nitrotoluene	UG/KG-DRY	SW8330	NA	<440 U	<440 U
4-Nitrotoluene	UG/KG-DRY	SW8330	NA	<440 U	<440 U
RDX	UG/KG-DRY	SW8330	NA	<620 U	<630 U
Tetryl	UG/KG-DRY	SW8330	NA	<440 U	<440 U
1,3,5-Trinitrobenzene	UG/KG-DRY	SW8330	NA	<440 U	<440 U
2,4,6-Trinitrotoluene	UG/KG-DRY	SW8330	NA	<440 U	<440 U
Moisture	%	D2216	NA	20	21

NA - Not Analyzed
 RE - Re-analysis/Re-extraction

INT SAMPLE ID'S:	IZSED#20	IZSED#20DUP	IZSED#19	IZSED#19DUP	IZSED#17
LD GROUP:	27893	27893	27893	27893	27893
SEQUENCE #:	1	2	3	4	5
DATE COLLECTED:	09/11/99	09/11/99	09/11/99	09/11/99	09/11/99
TIME COLLECTED:	09:28	09:28	09:44	09:44	10:15

PARAMETERS	UNITS	METHOD	IZSED#20	IZSED#20DUP	IZSED#19	IZSED#19DUP	IZSED#17
1,3-Dinitrobenzene	UG/KG-DRY	SW8330	<490 u	<510 u	<450 u	<460 u	<480 u
2,4-Dinitrotoluene	UG/KG-DRY	SW8330	<490 u	<510 u	<450 u	<460 u	<480 u
2,6-Dinitrotoluene	UG/KG-DRY	SW8330	<490 u	<510 u	<450 u	<460 u	<480 u
2-amino-4,6-Dinitrotoluene	UG/KG-DRY	SW8330	<490 u	<510 u	<450 u	<460 u	<480 u
4-amino-2,6-Dinitrotoluene	UG/KG-DRY	SW8330	<490 u	<510 u	<450 u	<460 u	<480 u
HMX	UG/KG-DRY	SW8330	<700 u	<740 u	<640 u	<660 u	<680 u
Nitrobenzene	UG/KG-DRY	SW8330	<700 u	<740 u	<640 u	<660 u	<680 u
2-Nitrotoluene	UG/KG-DRY	SW8330	<490 u	<510 u	<450 u	<460 u	<480 u
3-Nitrotoluene	UG/KG-DRY	SW8330	<490 u	<510 u	<450 u	<460 u	<480 u
4-Nitrotoluene	UG/KG-DRY	SW8330	<490 u	<510 u	<450 u	<460 u	<480 u
RDX	UG/KG-DRY	SW8330	<700 u	<740 u	<640 u	<660 u	<680 u
Tetryl	UG/KG-DRY	SW8330	<490 u	<510 u	<450 u	<460 u	<480 u
1,3,5-Trinitrobenzene	UG/KG-DRY	SW8330	<490 u	<510 u	<450 u	<460 u	<480 u
2,4,6-Trinitrotoluene	UG/KG-DRY	SW8330	<490 u	<510 u	<450 u	<460 u	<480 u
Moisture	%	D2216	29	32	22	24	27

000005

EXPLOSIVE SAMPLE ID'S:	IZSED#11	IZSED#10	IZSED#12	IZSED#13	IZSED#14
FIELD GROUP:	27893	27893	27893	27893	27893
SEQUENCE #:	6	7	8	9	10
DATE COLLECTED:	09/11/99	09/11/99	09/11/99	09/11/99	09/11/99
TIME COLLECTED:	10:38	10:54	11:12	12:18	13:51

PARAMETERS	UNITS	METHOD					
1,3-Dinitrobenzene	UG/KG-DRY	SW8330	<480 U	<970 U	<460 U	<420 U	<470 U
2,4-Dinitrotoluene	UG/KG-DRY	SW8330	<480 U	<970 U	<460 U	<420 U	<470 U
2,6-Dinitrotoluene	UG/KG-DRY	SW8330	<480 U	<970 U	<460 U	<420 U	<470 U
2-amino-4,6-Dinitrotoluene	UG/KG-DRY	SW8330	<480 U	<970 U	<460 U	<420 U	<470 U
4-amino-2,6-Dinitrotoluene	UG/KG-DRY	SW8330	<480 U	<970 U	<460 U	<420 U	<470 U
HMX	UG/KG-DRY	SW8330	<680 U	<1400 U	<660 U	<600 U	<680 U
Nitrobenzene	UG/KG-DRY	SW8330	<680 U	<1400 U	<660 U	<600 U	<680 U
2-Nitrotoluene	UG/KG-DRY	SW8330	<480 U	<970 U	<460 U	<420 U	<470 U
3-Nitrotoluene	UG/KG-DRY	SW8330	<480 U	<970 U	<460 U	<420 U	<470 U
4-Nitrotoluene	UG/KG-DRY	SW8330	<480 U	<970 U	<460 U	<420 U	<470 U
RDX	UG/KG-DRY	SW8330	<680 U	<1400 U	<660 U	<600 U	<680 U
Tetryl	UG/KG-DRY	SW8330	<480 U	<970 U	<460 U	<420 U	<470 U
1,3,5-Trinitrobenzene	UG/KG-DRY	SW8330	<480 U	<970 U	<460 U	<420 U	<470 U
2,4,6-Trinitrotoluene	UG/KG-DRY	SW8330	<480 U	<970 U	<460 U	<420 U	<470 U
Moisture	%	D2216	27	64	24	17	26

CLIENT SAMPLE ID'S:	IZSED#15	IZSED#16
FIELD GROUP:	27893	27893
SEQUENCE #:	11	12
DATE COLLECTED:	09/11/99	09/11/99
TIME COLLECTED:	13:37	14:03

PARAMETERS	UNITS	METHOD		
1,3-Dinitrobenzene	UG/KG-DRY	SW8330	<760 u	<550 u
2,4-Dinitrotoluene	UG/KG-DRY	SW8330	<760 u	<550 u
2,6-Dinitrotoluene	UG/KG-DRY	SW8330	<760 u	<550 u
2-amino-4,6-Dinitrotoluene	UG/KG-DRY	SW8330	<760 u	<550 u
4-amino-2,6-Dinitrotoluene	UG/KG-DRY	SW8330	<760 u	<550 u
HMX	UG/KG-DRY	SW8330	<1100 u	<780 u
Nitrobenzene	UG/KG-DRY	SW8330	<1100 u	<780 u
2-Nitrotoluene	UG/KG-DRY	SW8330	<760 u	<550 u
3-Nitrotoluene	UG/KG-DRY	SW8330	<760 u	<550 u
4-Nitrotoluene	UG/KG-DRY	SW8330	<760 u	<550 u
RDX	UG/KG-DRY	SW8330	<1100 u	<780 u
Tetryl	UG/KG-DRY	SW8330	<760 u	<550 u
1,3,5-Trinitrobenzene	UG/KG-DRY	SW8330	<760 u	<550 u
2,4,6-Trinitrotoluene	UG/KG-DRY	SW8330	<760 u	<550 u
Moisture	%	D2216	54	36

000007

CLIENT SAMPLE ID'S: EQUIP BLANK
FIELD GROUP: 27893
SEQUENCE #: 14
DATE COLLECTED: 09/11/99
TIME COLLECTED: 14:52

PARAMETERS	UNITS	METHOD	
1,3-Dinitrobenzene	UG/L	SW8330	<0.41 U
2,4-Dinitrotoluene	UG/L	SW8330	<0.41 U
2,6-Dinitrotoluene	UG/L	SW8330	<0.41 U
2-amino-4,6-Dinitrotoluene	UG/L	SW8330	<0.41 U
4-amino-2,6-Dinitrotoluene	UG/L	SW8330	<0.41 U
HMX	UG/L	SW8330	<0.61 U
Nitrobenzene	UG/L	SW8330	<0.61 U
2-Nitrotoluene	UG/L	SW8330	<0.61 U
3-Nitrotoluene	UG/L	SW8330	<0.61 U
4-Nitrotoluene	UG/L	SW8330	<0.61 U
RDX	UG/L	SW8330	<0.61 U
Tetryl	UG/L	SW8330	<0.41 U
1,3,5-Trinitrobenzene	UG/L	SW8330	<0.41 U
2,4,6-Trinitrotoluene	UG/L	SW8330	<0.41 U

000008

CLIENT SAMPLE ID'S:
 FIELD GROUP:
 SEQUENCE #:
 DATE COLLECTED:
 TIME COLLECTED:

HP-0408	HW-0408	DUP
27993	27993	27993
1	2	3
04/08/00 08:50	04/08/00 10:25	04/08/00 08:50

PARAMETERS	UNITS	METHOD			
1,3-Dinitrobenzene	UG/L	SW8330	<0.36 u	<0.31 u	<0.40 u
2,4-Dinitrotoluene	UG/L	SW8330	<0.36 u	<0.31 u	<0.40 u
2,6-Dinitrotoluene	UG/L	SW8330	<0.36 u	<0.31 u	<0.40 u
2-amino-4,6-Dinitrotoluene	UG/L	SW8330	<0.36 u	<0.31 u	<0.40 u
4-amino-2,6-Dinitrotoluene	UG/L	SW8330	<0.36 u	<0.31 u	<0.40 u
HMX	UG/L	SW8330	<0.54 u	<0.46 u	<0.60 u
Nitrobenzene	UG/L	SW8330	<0.54 u	<0.46 u	<0.60 u
2-Nitrotoluene	UG/L	SW8330	<0.54 u	<0.46 u	<0.60 u
3-Nitrotoluene	UG/L	SW8330	<0.54 u	<0.46 u	<0.60 u
4-Nitrotoluene	UG/L	SW8330	<0.54 u	<0.46 u	<0.60 u
RDX	UG/L	SW8330	<0.54 u	<0.46 u	<0.60 u
Tetryl	UG/L	SW8330	<0.36 u	<0.31 u	<0.40 u
1,3,5-Trinitrobenzene	UG/L	SW8330	<0.36 u	<0.31 u	<0.40 u
2,4,6-Trinitrotoluene	UG/L	SW8330	<0.36 u	<0.31 u	<0.40 u

NRQ - Analysis not requested.

CLIENT SAMPLE ID'S:	HP-0519	HW-0519	HP-0519D
FIELD GROUP:	28009	28009	28009
SEQUENCE #:	1	2	3
DATE COLLECTED:	05/19/00	05/19/00	05/19/00
TIME COLLECTED:	12:30	14:45	12:30

PARAMETERS	UNITS	METHOD			

1,3-Dinitrobenzene	UG/L	SW8330	<0.24 u	<0.17 u	<0.29 u
2,4-Dinitrotoluene	UG/L	SW8330	<0.24 u	<0.17 u	<0.29 u
2,6-Dinitrotoluene	UG/L	SW8330	<0.24 u	<0.17 u	<0.29 u
2-amino-4,6-Dinitrotoluene	UG/L	SW8330	<0.24 u	<0.17 u	<0.29 u
4-amino-2,6-Dinitrotoluene	UG/L	SW8330	<0.24 u	<0.17 u	<0.29 u
HMX	UG/L	SW8330	<0.36 u	<0.26 u	<0.44 u
Nitrobenzene	UG/L	SW8330	<0.36 u	<0.26 u	<0.44 u
2-Nitrotoluene	UG/L	SW8330	<0.36 u	<0.26 u	<0.44 u
3-Nitrotoluene	UG/L	SW8330	<0.36 u	<0.26 u	<0.44 u
4-Nitrotoluene	UG/L	SW8330	<0.36 u	<0.26 u	<0.44 u
RDX	UG/L	SW8330	<0.36 u	<0.26 u	<0.44 u
Tetryl	UG/L	SW8330	<0.24 u	<0.17 u	<0.29 u
1,3,5-Trinitrobenzene	UG/L	SW8330	<0.24 u	<0.17 u	<0.29 u
2,4,6-Trinitrotoluene	UG/L	SW8330	<0.24 u	<0.17 u	<0.29 u

CLIENT SAMPLE ID'S:
 FIELD GROUP:
 SEQUENCE #:
 DATE COLLECTED:
 TIME COLLECTED:

HWSED-E1	HWSED-SE	HWSED-SERE	HWSED-S1	HWSED-NE
28020	28020	28020	28020	28020
1	2	2 RE	3	4
08/09/00	08/09/00	08/09/00	08/09/00	08/09/00
12:45	12:25	12:25	12:37	14:05

PARAMETERS	UNITS	METHOD	HWSED-E1	HWSED-SE	HWSED-SERE	HWSED-S1	HWSED-NE
1,3-Dinitrobenzene	UG/KG-DRY	SW8330	<440 u	<430 u	NA	<560 u	<570 u
2,4-Dinitrotoluene	UG/KG-DRY	SW8330	<440 u	<430 u	NA	<560 u	<570 u
2,6-Dinitrotoluene	UG/KG-DRY	SW8330	<440 u	<430 u	NA	<560 u	<570 u
2-amino-4,6-Dinitrotoluene	UG/KG-DRY	SW8330	<440 u	<430 u	NA	<560 u	<570 u
4-amino-2,6-Dinitrotoluene	UG/KG-DRY	SW8330	<440 u	<430 u	NA	<560 u	<570 u
HMX	UG/KG-DRY	SW8330	<620 u	<610 u	NA	<810 u	<820 u
Nitrobenzene	UG/KG-DRY	SW8330	<620 u	<610 u	NA	<810 u	<820 u
2-Nitrotoluene	UG/KG-DRY	SW8330	<440 u	<430 u	NA	<560 u	<570 u
3-Nitrotoluene	UG/KG-DRY	SW8330	<440 u	<430 u	NA	<560 u	<570 u
4-Nitrotoluene	UG/KG-DRY	SW8330	<440 u	<430 u	NA	<560 u	<570 u
RDX	UG/KG-DRY	SW8330	<620 u	<610 u	<610 u	<810 u	<820 u
Tetryl	UG/KG-DRY	SW8330	<440 u	<430 u	NA	<560 u	<570 u
1,3,5-Trinitrobenzene	UG/KG-DRY	SW8330	<440 u	<430 u	NA	<560 u	<570 u
2,4,6-Trinitrotoluene	UG/KG-DRY	SW8330	<440 u	<430 u	NA	<560 u	<570 u
Moisture	%	D2216	20	18	NA	38	39

CLIENT SAMPLE ID'S:	HWSED-N1	HWSED-NW	HWSED-W1	HWSED-SW	HWSED-DUP
FIELD GROUP:	28020	28020	28020	28020	28020
SEQUENCE #:	5	6	7	8	9
DATE COLLECTED:	08/09/00	08/09/00	08/09/00	08/09/00	08/09/00
TIME COLLECTED:	13:30	14:08	12:47	12:20	14:30

PARAMETERS	UNITS	METHOD						
1,3-Dinitrobenzene	UG/KG-DRY	SW8330	<380 U	<430 U	<440 U	<400 U	<410 U	
2,4-Dinitrotoluene	UG/KG-DRY	SW8330	<380 U	<430 U	<440 U	<400 U	<410 U	
2,6-Dinitrotoluene	UG/KG-DRY	SW8330	<380 U	<430 U	<440 U	<400 U	<410 U	
2-amino-4,6-Dinitrotoluene	UG/KG-DRY	SW8330	<380 U	<430 U	<440 U	<400 U	<410 U	
4-amino-2,6-Dinitrotoluene	UG/KG-DRY	SW8330	<380 U	<430 U	<440 U	<400 U	<410 U	
HMX	UG/KG-DRY	SW8330	<540 U	<610 U	<630 U	<570 U	<590 U	
Nitrobenzene	UG/KG-DRY	SW8330	<540 U	<610 U	<630 U	<570 U	<590 U	
2-Nitrotoluene	UG/KG-DRY	SW8330	<380 U	<430 U	<440 U	<400 U	<410 U	
3-Nitrotoluene	UG/KG-DRY	SW8330	<380 U	<430 U	<440 U	<400 U	<410 U	
4-Nitrotoluene	UG/KG-DRY	SW8330	<380 U	<430 U	<440 U	<400 U	<410 U	
RDX	UG/KG-DRY	SW8330	<540 U	<610 U	<630 U	<570 U	<590 U	
Tetryl	UG/KG-DRY	SW8330	<380 U	<430 U	<440 U	<400 U	<410 U	
1,3,5-Trinitrobenzene	UG/KG-DRY	SW8330	<380 U	<430 U	<440 U	<400 U	<410 U	
2,4,6-Trinitrotoluene	UG/KG-DRY	SW8330	<380 U	<430 U	<440 U	<400 U	<410 U	
Moisture	%	D2216	8	18	21	13	15	

NA - Sample Not Analyzed
 RE - Re-analysis/Re-extraction

CLIENT SAMPLE ID'S:
 FIELD GROUP:
 SEQUENCE #:
 DATE COLLECTED:
 TIME COLLECTED:

HWSW-S1	HWSW-S1RE	HWSW-SE	HWSW-SERE	HWSW-E1
28020	28020	28020	28020	28020
10	10 RE	11	11 RE	12
08/09/00	08/09/00	08/09/00	08/09/00	08/09/00
12:37	12:37	12:25	12:25	12:45

PARAMETERS	UNITS	METHOD
1,3-Dinitrobenzene	UG/L	SW8330
2,4-Dinitrotoluene	UG/L	SW8330
2,6-Dinitrotoluene	UG/L	SW8330
2-amino-4,6-Dinitrotoluene	UG/L	SW8330
4-amino-2,6-Dinitrotoluene	UG/L	SW8330
HMX	UG/L	SW8330
Nitrobenzene	UG/L	SW8330
2-Nitrotoluene	UG/L	SW8330
3-Nitrotoluene	UG/L	SW8330
4-Nitrotoluene	UG/L	SW8330
RDX	UG/L	SW8330
Tetryl	UG/L	SW8330
1,3,5-Trinitrobenzene	UG/L	SW8330
2,4,6-Trinitrotoluene	UG/L	SW8330

HWSW-S1	HWSW-S1RE	HWSW-SE	HWSW-SERE	HWSW-E1
0.33B U	0.26B	0.31B U	0.33B	0.32B U
<0.24 U	NA	<0.23 U	NA	<0.23 U
<0.24 U	NA	<0.23 U	NA	<0.23 U
<0.24 U	NA	<0.23 U	NA	<0.23 U
<0.24 U	NA	<0.23 U	NA	<0.23 U
<0.36 U	NA	<0.34 U	NA	<0.34 U
<0.36 U	NA	<0.34 U	NA	<0.34 U
<0.36 U	NA	<0.34 U	NA	<0.34 U
<0.36 U	NA	<0.34 U	NA	<0.34 U
<0.36 U	NA	<0.34 U	NA	<0.34 U
<0.73 U	NA	<0.68 U	NA	<0.68 U
<0.24 U	NA	<0.23 U	NA	<0.23 U
<0.24 U	NA	<0.23 U	NA	<0.23 U
<0.24 U	NA	<0.23 U	NA	<0.23 U

PDC Laboratories, Inc. 09/29/00
 PROJECT NUMBER
 FIELD GROUP

STATUS :FINAL PAGE 2
 PROJECT NAME ESE-ST LOUIS/HIGHLAND PARK
 LAB COORDINATOR

CLIENT SAMPLE ID'S:	HWSW-E1RE	HWSW-NE	HWSW-N1	HWSW-N1RE	HWSW-NW
FIELD GROUP:	28020	28020	28020	28020	28020
SEQUENCE #:	12 RE	13	14	14 RE	15
DATE COLLECTED:	08/09/00	08/09/00	08/09/00	08/09/00	08/09/00
TIME COLLECTED:	12:45	13:35	12:50	12:50	13:30

PARAMETERS	UNITS	METHOD					
1,3-Dinitrobenzene	UG/L	SW8330	0.35B	<0.21u	0.39B u	0.28B	<0.19 u
2,4-Dinitrotoluene	UG/L	SW8330	NA	<0.21 u	<0.23 u	NA	<0.19 u
2,6-Dinitrotoluene	UG/L	SW8330	NA	<0.21 u	<0.23 u	NA	<0.19 u
2-amino-4,6-Dinitrotoluene	UG/L	SW8330	NA	<0.21 u	<0.23 u	NA	<0.19 u
4-amino-2,6-Dinitrotoluene	UG/L	SW8330	NA	<0.21 u	<0.23 u	NA	<0.19 u
HMX	UG/L	SW8330	NA	<0.31 u	<0.35 u	NA	<0.29 u
Nitrobenzene	UG/L	SW8330	NA	<0.31 u	<0.35 u	NA	<0.29 u
2-Nitrotoluene	UG/L	SW8330	NA	<0.31 u	<0.35 u	NA	<0.29 u
3-Nitrotoluene	UG/L	SW8330	NA	<0.31 u	<0.35 u	NA	<0.29 u
4-Nitrotoluene	UG/L	SW8330	NA	<0.31 u	<0.35 u	NA	<0.29 u
RDX	UG/L	SW8330	NA	<0.62 u	<0.70 u	NA	<0.58 u
Tetryl	UG/L	SW8330	NA	<0.21 u	<0.23 u	NA	<0.19 u
1,3,5-Trinitrobenzene	UG/L	SW8330	NA	<0.21 u	<0.23 u	NA	<0.19 u
2,4,6-Trinitrotoluene	UG/L	SW8330	NA	<0.21 u	<0.23 u	NA	<0.19 u

CLIENT SAMPLE ID'S:
 FIELD GROUP:
 SEQUENCE #:
 DATE COLLECTED:
 TIME COLLECTED:

HWSW-W1	HWSW-SW	HWSW-SWRE	HWSW-DUP	HWSW-DUPRE
28020	28020	28020	28020	28020
16	17	17 RE	18	18 RE
08/09/00	08/09/00	08/09/00	08/09/00	08/09/00
12:47	12:20	12:20	14:30	14:30

PARAMETERS	UNITS	METHOD	HWSW-W1	HWSW-SW	HWSW-SWRE	HWSW-DUP	HWSW-DUPRE
1,3-Dinitrobenzene	UG/L	SW8330	<0.21 U	0.82B U	0.40B	0.95B U	0.46B
2,4-Dinitrotoluene	UG/L	SW8330	<0.21 U	<0.19 U	NA	<0.23 U	NA
2,6-Dinitrotoluene	UG/L	SW8330	<0.21 U	<0.19 U	NA	<0.23 U	NA
2-amino-4,6-Dinitrotoluene	UG/L	SW8330	<0.21 U	<0.19 U	NA	<0.23 U	NA
4-amino-2,6-Dinitrotoluene	UG/L	SW8330	<0.21 U	<0.19 U	NA	<0.23 U	NA
HMX	UG/L	SW8330	<0.31 U	<0.28 U	NA	<0.35 U	NA
Nitrobenzene	UG/L	SW8330	<0.31 U	<0.28 U	NA	<0.35 U	NA
2-Nitrotoluene	UG/L	SW8330	<0.31 U	<0.28 U	NA	<0.35 U	NA
3-Nitrotoluene	UG/L	SW8330	<0.31 U	<0.28 U	NA	<0.35 U	NA
4-Nitrotoluene	UG/L	SW8330	<0.31 U	<0.28 U	NA	<0.35 U	NA
RDX	UG/L	SW8330	<0.62 U	<0.56 U	NA	<0.70 U	NA
Tetryl	UG/L	SW8330	<0.21 U	<0.19 U	NA	<0.23 U	NA
1,3,5-Trinitrobenzene	UG/L	SW8330	<0.21 U	<0.19 U	NA	<0.23 U	NA
2,4,6-Trinitrotoluene	UG/L	SW8330	<0.21 U	<0.19 U	NA	<0.23 U	NA

RE - Re-analysis/Re-extraction
 B - Confirmed, >40% difference
 C - Confirmed

PDC Laboratories, Inc. - Federal Services

SAMPLE RECEIPT FORM

All No responses are to be described in the Details/Comments Section.

Delivery Method: Drop Off Commerical Carrier (UPS, FEDEX, etc.) Laboratory Pick-Up

Project ESE Cooler 1 of 1

Shipping Container # (PDC / Other):

Received (date time) 4-11-2000 - 9:45 By: DEB

Opened (If different) By:

Preliminary Examination Checklist

Did the shipping container arrive with an air bill/shipping slip? YES NO NA
If YES, carrier name & air bill #:
(Place any shipping documentation in file folder)

Were custody seals on the outside of the shipping container? YES NO*
If YES, a: Were the custody seals intact upon arrival? YES NO*
b: Enter the Seal Date and Name (enter "NA" if not available):

Was the Chain of Custody (COC) documentation provided with the shipment? YES NO*
If YES, a: Was the COC fully executed in ink by the shipper? YES NO*
b: COC #:

c: Was the project identifiable from the COC? YES NO*
If No, how was this determined?
d: Was the COC properly signed as received by the Laboratory? YES NO*

What was the temperature in the Cooler? 4 Deg C.
Were samples received within criteria of 2-6 Deg C? YES NO*
(Processed Water/Wastewater are excluded from the temperature criteria)

Did the cooler contain Ice? YES NO*

Sample Examination & Check-In Checklist

Were samples packaged in conformance to generally accepted practices? YES NO*

Did all sample containers arrive intact and sealed? YES NO*

Did all sample containers have secure and completed labels? YES NO*

If sample containers possessed tags, circle: Tags only Tags + Labels

Were caps of individual bottles/vials free from tape and/or custody seals? YES NO*

Did all labels and/or tags agree with COC? YES NO*

Were QC samples included? YES NO

Did pH checks confirm indicated preservations? (if applicable) YES NO NA

Did volumes, containers, & preservatives seem appropriate to indicate tests? YES NO*

Were VOA vials (waters) free from bubbles? (if applicable) YES NO* NA

If any NO*, Proceed with Login (YES / NO) Project Manager: Date:

Details/Comments:

ALL SHADED AREAS MUST BE COMPLETED BY CLIENT (PLEASE PRINT)

00052765

1	CLIENT ESE	PROJECT NUMBER 490-2037-0250	P.O. NUMBER	MEANS SHIPPED UPS	3	ANALYSIS REQUESTED					4 (FOR LAB USE ONLY) LOGIN # 28009 LOGGED BY: ARH LAB PROJ. # _____ TEMPLATE: _____ PROJ. MGR: _____		
	ADDRESS 3199 RIVERPORT TECH CENTER DR	PHONE NUMBER 314/209-5100	FAX NUMBER 314/209-5921	DATE SHIPPED 5/22/00		MATRIX TYPES: WW-WASTEWATER DW-DRINKING WATER GW-GROUND WATER WWSL-SLUDGE NAS-SOLID OTHER _____	Exp.-inc Method 2520 X X X X						
	CITY STATE ZIP ST. LOUIS, MO 63043	SAMPLER (PLEASE PRINT)		SAMPLER'S SIGNATURE Jim Kountzman/ERIC POWLEY									
2	SAMPLE DESCRIPTION	DATE COLLECTED	TIME COLLECTED	SAMPLE TYPE GRAB COMP		MATRIX TYPE	TOTAL # OF CONT	REMARKS					
1	→ HP-0519	4 5/19/00	1230	X		DW		X					
2	HW-0519	2 ↓	1445	X		DW		X					
3	HP-0519 D	↓	1230	X		DW		X					
1	MS/MSD (HP0519) as per Eric Powley, AdBenn 5/23/00	↓	1245	X		DW		X					
5	TURNAROUND TIME REQUESTED (PLEASE CIRCLE) (RUSH TAT IS SUBJECT TO PDC LABS APPROVAL AND SURCHARGE)			NORMAL		RUSH		6					
RUSH RESULTS VIA (PLEASE CIRCLE)			FAX		PHONE		The sample temperature will be measured upon receipt at the lab. By initiating this area you request that the lab notify you, before proceeding with analysis, if the sample temperature is outside of the range of 0.1-6.0°C. By not initiating this area you allow the lab to proceed with analytical testing regardless of the sample temperature.						
FAX # IF DIFFERENT FROM ABOVE:			PHONE # IF DIFFERENT FROM ABOVE:					7					
RELINQUISHED BY: (SIGNATURE) E. R. Powley		DATE 5/22/00	TIME 1500	RECEIVED BY: (SIGNATURE)			DATE	TIME	8				
RELINQUISHED BY: (SIGNATURE)		DATE	TIME	RECEIVED AT LAB BY: (SIGNATURE) C. Schunk			DATE 5/23	TIME P:45	COMMENTS: (FOR LAB USE ONLY) SAMPLE TEMPERATURE UPON RECEIPT 4 °C CHILL PROCESS STARTED PRIOR TO RECEIPT <input type="checkbox"/> OR <input checked="" type="checkbox"/> N SAMPLE(S) RECEIVED ON ICE <input type="checkbox"/> OR <input checked="" type="checkbox"/> N BOTTLES RECEIVED IN GOOD CONDITION <input type="checkbox"/> OR <input checked="" type="checkbox"/> N BOTTLES FILLED WITH ADEQUATE VOLUME <input type="checkbox"/> OR <input checked="" type="checkbox"/> N SAMPLES RECEIVED WITHIN HOLD TIME(S) <input type="checkbox"/> OR <input checked="" type="checkbox"/> N				

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PDC Laboratories, Inc. – Federal Services

SAMPLE RECEIPT FORM

All No responses are to be described in the Details/Comments Section.

Delivery Method: Drop Off Commerical Carrier (UPS, FEDEX, etc.) Laboratory Pick-Up

Project ESF 490-2087.0250 Cooler 1 of 1
Shipping Container # (PDC / Other): _____

Received (date time) 5-23-00 By: ARH
Opened (If different) _____ By: _____

Preliminary Examination Checklist

Did the shipping container arrive with an air bill/shipping slip?..... YES NO NA
If YES, carrier name & air bill #: _____
(Place any shipping documentation in file folder)

Were custody seals on the outside of the shipping container?..... YES NO
If YES, a: Were the custody seals intact upon arrival?..... YES NO
b: Enter the Seal Date and Name (enter "NA" if not available): _____

Was the Chain of Custody (COC) documentation provided with the shipment?..... YES NO
If YES, a: Was the COC fully executed in ink by the shipper?..... YES NO
b: COC #: _____
c: Was the project identifiable from the COC?..... YES NO
If No, how was this determined? _____
d: Was the COC properly signed as received by the Laboratory..... YES NO

What was the temperature in the Cooler? 4 ° Deg C.
Were samples received within criteria of 2-6° Deg C?..... YES NO
(Processed Water/Wastewater are excluded from the temperature criteria)
Did the cooler contain Ice?..... YES NO

Sample Examination & Check-In Checklist

Were samples packaged in conformance to generally accepted practices?..... YES NO
Did all sample containers arrive intact and sealed?..... YES NO
Did all sample containers have secure and completed labels?..... YES NO
If sample containers possessed tags, circle: Tags only Tags + Labels
Were caps of individual bottles/vials free from tape and/or custody seals?..... YES NO
Did all labels and/or tags agree with COC?..... YES NO

Were QC samples included?..... YES NO

Did pH checks confirm indicated preservations? (if applicable)..... YES NO NA
Did volumes, containers, & preservatives seem appropriate to indicate tests?..... YES NO
Were VOA vials (waters) free from bubbles? (if applicable)..... YES NO NA

If any NO*, Proceed with Login (YES / NO) Project Manager: _____ Date: _____

Details/Comments:

ALL SHADED AREAS MUST BE COMPLETED BY CLIENT (PLEASE PRINT)

000E2112

1 CLIENT ESE		PROJECT NUMBER	P.O. NUMBER	MEANS SHIPPED		3 ANALYSIS REQUESTED			4 (FOR LAB USE ONLY) LOGIN # 28020 LOGGED BY: LAB PROJ. # TEMPLATE: PROJ. MATL.		
ADDRESS 3199 Riverport Tech Center Dr		PHONE NUMBER (314) 209-5900	FAX NUMBER 314 209-5929	DATE SHIPPED		MATRIX TYPES: WW WASTE WATER DW DRINKING WATER GW GROUND WATER WWSL SLUDGE NAS SOLID OTHER			REMARKS		
CITY STATE ZIP St. Louis, MO 63304		SAMPLER (PLEASE PRINT) Chris Tedder		SAMPLER'S SIGNATURE							
CONTACT PERSON Jim Kountzmann											
2 SAMPLE DESCRIPTION		DATE COLLECTED	TIME COLLECTED	SAMPLE TYPE GRAB COMP		MATRIX TYPE	TOTAL # OF CONT				
-1	HWSED - EL	8-9-00	1245	X		NAS	1	X			
-2	HWSED - SE		1225	X		NAS	1	X			
-3	HWSED - S1		1237	X		NAS	1	X			
-4	HWSED - NE		1405	X		NAS	1	X			
-5	HWSED - N1		1330		X	NAS	3	X	MS/MSD		
-6	HWSED - NW		1408	X		NAS	1	X			
-7	HWSED - W1		1247	X		NAS	1	X			
-8	HWSED - SW		1220	X		NAS	1	X			
-9	HWSED - DUP		1430		X	NAS	1	X			
5 TURNAROUND TIME REQUESTED (PLEASE CIRCLE) (RUSH TAT IS SUBJECT TO PDC LABS APPROVAL AND SURCHARGE) RUSH RESULTS VIA (PLEASE CIRCLE)		<input checked="" type="radio"/> NORMAL <input type="radio"/> RUSH		RUSH PHONE		6 The sample temperature will be measured upon receipt at the lab. By initiating this area you request that the lab notify you, before proceeding with analysis, if the sample temperature is outside of the range of 0.1-6.0°C. By not initiating this area you allow the lab to proceed with analytical testing regardless of the sample temperature.					
FAX # IF DIFFERENT FROM ABOVE:		PHONE # IF DIFFERENT FROM ABOVE:									
7 RELINQUISHED BY: (SIGNATURE) Chris Tedder		DATE 8/10/00	TIME 1545	RECEIVED BY: (SIGNATURE) FedEx		DATE	8 COMMENTS: (FOR LAB USE ONLY)				
RELINQUISHED BY: (SIGNATURE)		DATE	TIME	RECEIVED AT LAB BY: (SIGNATURE) J. Martin		DATE 8/11/00	TIME 9:00	SAMPLE TEMPERATURE UPON RECEIPT CHILL PROCESS STARTED PRIOR TO RECEIPT SAMPLE(S) RECEIVED ON ICE BOTTLES RECEIVED IN GOOD CONDITION BOTTLES FILLED WITH ADEQUATE VOLUME SAMPLES RECEIVED WITHIN HOLD TIME(S)			

Explosives - 6330

0000025

PDC LABORATORIES, INC.
 2231 WEST ALTORFER DRIVE
 PEORIA, IL 61615

PHONE # 309-692-9688
 FAX # 309-692-9689

CHAIN OF CUSTODY RECORD

ALL SHADED AREAS MUST BE COMPLETED BY CLIENT (PLEASE PRINT)

1 CLIENT ESE		PROJECT NUMBER		P.O. NUMBER		MEANS SHIPPED		3 ANALYSIS REQUESTED				4 (FOR LAB USE ONLY)			
ADDRESS 3199 Riverport Tech Center Dr.		PHONE NUMBER 314 209-5900		FAX NUMBER 314 209-5929		DATE SHIPPED		Explosives - 8330				LOGIN # 28020			
CITY STATE ZIP St. Louis, MO 63043		SAMPLER (PLEASE PRINT) Chris Tedder		SAMPLER'S SIGNATURE		MATRIX TYPES: WW-WASTEWATER DW-DRINKING WATER GW-GROUND WATER WWSL-SLUDGE NAS-SOLID OTHER SW Surface Water						LOGGED BY: _____		LAB PROJ. # _____	
CONTACT PERSON Jim Kountzmann		DATE COLLECTED		TIME COLLECTED		SAMPLE TYPE GRAB COMP						MATRIX TYPE		TOTAL # OF CONT	
2 SAMPLE DESCRIPTION		DATE COLLECTED		TIME COLLECTED		SAMPLE TYPE GRAB COMP		MATRIX TYPE		TOTAL # OF CONT		REMARKS			
-10 HWSW-S1		8-9-00		1237		X		SW		1		X			
-11 HWSW- S2 SE				1225		X		SW		1		X			
-12 HWSW-E1				1245		X		SW		1		X			
-13 HWSW- E2 NE				1335		X		SW		1		X			
-14 HWSW-N1				1250		X		SW		3		MS/MSD			
-15 HWSW- N2 NW				1330		X		SW		1		X			
-16 HWSW-W1				1247		X		SW		1		X			
-17 HWSW- W2 SW				1220		X		SW		1		X			
-18 HWSW-DUP				1430		X		SW		1		X			
5 TURNAROUND TIME REQUESTED (PLEASE CIRCLE) (RUSH TAT IS SUBJECT TO PDC LABS APPROVAL AND SURCHARGE)		NORMAL		RUSH		FAX RESULTS VIA (PLEASE CIRCLE)		FAX		PHONE		6 The sample temperature will be measured upon receipt at the lab. By initiating this area you request that the lab notify you, before proceeding with analysis, if the sample temperature is outside of the range of 0.1-6.0°C. By not initiating this area you allow the lab to proceed with analytical testing regardless of the sample temperature.			
7 RELINQUISHED BY: (SIGNATURE) Chris Tedder		DATE 8/9/00		TIME 1545		RECEIVED BY: (SIGNATURE) FedEx		DATE		TIME		8 COMMENTS: (FOR LAB USE ONLY)			
RELINQUISHED BY: (SIGNATURE)		DATE		TIME		RECEIVED AT LAB BY: (SIGNATURE) Alan R. Abaza		DATE 8-11-00		TIME 09:00		SAMPLE TEMPERATURE UPON RECEIPT CHILL PROCESS STARTED PRIOR TO RECEIPT 5 °C SAMPLE(S) RECEIVED ON ICE <input type="checkbox"/> FOR N BOTTLES RECEIVED IN GOOD CONDITION <input type="checkbox"/> FOR N BOTTLES FILLED WITH ADEQUATE VOLUME <input type="checkbox"/> FOR N SAMPLES RECEIVED WITHIN HOLD TIME(S) <input type="checkbox"/> FOR N			

000026

PDC Laboratories, Inc. – Federal Services
SAMPLE RECEIPT FORM

All No responses are to be described in the Details/Comments Section.

Delivery Method: Drop Off Commerical Carrier (UPS, FEDEX, etc.) Laboratory Pick-Up

Project ESE-St. Louis Cooler 1 of 2
Shipping Container # (PDC/ Other): _____

Received (date time) 8-11-00 09:00 By: ARH

Opened (If different) 8-11-00 By: _____

Preliminary Examination Checklist

Did the shipping container arrive with an air bill/shipping slip?..... YES NO NA

If YES, carrier name & air bill #: _____

(Place any shipping documentation in file folder)

Were custody seals on the outside of the shipping container?..... YES NO*

If YES, a: Were the custody seals intact upon arrival?..... YES NO*

b: Enter the Seal Date and Name (enter "NA" if not available): 8-10-00

Was the Chain of Custody (COC) documentation provided with the shipment?..... YES NO*

If YES, a: Was the COC fully executed in ink by the shipper?..... YES NO*

b: COC #: _____

c: Was the project identifiable from the COC?..... YES NO*

If No, how was this determined? _____

d: Was the COC properly signed as received by the Laboratory?..... YES NO*

What was the temperature in the Cooler? 5 ° Deg C.

Were samples received within criteria of 2-6° Deg C?..... YES NO*

(Processed Water/Wastewater are excluded from the temperature criteria)

Did the cooler contain Ice?..... YES NO*

Sample Examination & Check-In Checklist

Were samples packaged in conformance to generally accepted practices?..... YES NO*

Did all sample containers arrive intact and sealed?..... YES NO*

Did all sample containers have secure and completed labels?..... YES NO*

If sample containers possessed tags, circle: Tags only Tags + Labels

Were caps of individual bottles/vials free from tape and/or custody seals?..... YES NO*

Did all labels and/or tags agree with COC?..... YES NO*

Were QC samples included?..... YES NO

Did pH checks confirm indicated preservations? (if applicable)..... YES NO NA

Did volumes, containers, & preservatives seem appropriate to indicate tests?..... YES NO*

Were VOA vials (waters) free from bubbles? (if applicable)..... YES NO* NA

If any NO *, Proceed with Login (YES / NO) Project Manager: _____ Date: _____

Details/Comments:

PDC Laboratories, Inc. – Federal Services
SAMPLE RECEIPT FORM

All No responses are to be described in the Details/Comments Section.

Delivery Method: Drop Off Commerical Carrier (UPS, FEDEX etc.) Laboratory Pick-Up

Project ESE-St. Louis Cooler 2 of 2
Shipping Container # (PDC/Other): _____
Received (date time) 8-11-00 09:00 By: ARH
Opened (If different) _____ By: _____

Preliminary Examination Checklist

Did the shipping container arrive with an air bill/shipping slip?..... YES NO NA
If YES, carrier name & air bill #: _____
(Place any shipping documentation in file folder)

Were custody seals on the outside of the shipping container?..... YES NO*
If YES, a: Were the custody seals intact upon arrival?..... YES NO*
b: Enter the Seal Date and Name (enter "NA" if not available): _____

Was the Chain of Custody (COC) documentation provided with the shipment?..... YES NO*
If YES, a: Was the COC fully executed in ink by the shipper?..... YES NO*
b: COC #: _____
c: Was the project identifiable from the COC?..... YES NO*
If No, how was this determined? _____
d: Was the COC properly signed as received by the Laboratory..... YES NO*

What was the temperature in the Cooler? 5 ° Deg C.
Were samples received within criteria of 2-6° Deg C?..... YES NO*
(Processed Water/Wastewater are excluded from the temperature criteria)
Did the cooler contain Ice?..... YES NO*

Sample Examination & Check-In Checklist

Were samples packaged in conformance to generally accepted practices?..... YES NO*
Did all sample containers arrive intact and sealed?..... YES NO*
Did all sample containers have secure and completed labels?..... YES NO*
If sample containers possessed tags, circle: Tags only Tags + Labels
Were caps of individual bottles/vials free from tape and/or custody seals?..... YES NO*
Did all labels and/or tags agree with COC?..... YES NO*
Were QC samples included?..... YES NO
Did pH checks confirm indicated preservations? (if applicable)..... YES NO NA
Did volumes, containers, & preservatives seem appropriate to indicate tests?..... YES NO*
Were VOA vials (waters) free from bubbles? (if applicable)..... YES NO* NA

If any NO*, Proceed with Login (YES / NO) Project Manager: _____ Date: _____

Details/Comments: