PART B
SUBPART X
PERMIT APPLICATION
BASELINE INVESTIGATION
WORK PLAN

for

ATLANTIC FLEET WEAPONS TRAINING FACILITY
VIEQUES ISLAND, PUERTO RICO

Prepared for:

ATLANTIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
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ACRONYM LIST

AFWTF	Atlantic Fleet Weapons Training Facility
ASTM	American Society for Testing and Materials
AWQC	Ambient Water Quality Criteria
bgs	below ground surface
CDI	Chronic Daily Intake
COC	Chain of Custody
EOD	Explosive Ordnance Disposal
EMA	Eastern Maneuver Area
EPC	Exposure Point Concentration
ERA	Ecological Risk Assessment
HASP	Health and Safety Plan
HEAST	Health Effects Assessment Summary Tables
HHRA	Human Health Risk Assessment
IDW	Investigation-derived waste
IRIS	Integrated Risk Information System
LIA	Live Impact Area
LOAEL	Lowest Observed Adverse Effect Level
mg/L	milligrams per liter
NASD	Naval Ammunition Support Detachment
NCEA	National Center for Environmental Assessment
NEW	net explosive weight
NOAEL	No Observed Adverse
NPDES	National Pollutant Discharge Elimination System
NTV	nepholemetric turbidity unit
OB/OD	open burning/open detonation
PRASA	Puerto Rico Aqueduct and Sewer Authority
QA/QC	quality assurance/quality control
RBC	Risk Based Concentration
RCRA	Resource Conservation and Recovery Act
RFD	Reference Dose

RGO	Remedial Goal Option
RME	Reasonable Maximum Exposure
RPD	relative percent difference
SMDP	Scientific/Management Decision Points
SSL	Soil Screening Level
UCL	Upper Confidence Limit
USCS	United Soil Classification System
USEPA	United States Environmental Protection Agency

1.0 INTRODUCTION

EnSafe Inc. has prepared this work plan for a baseline investigation to assess whether open burning/open detonation (OB/OD) activities at the Navy's Atlantic Fleet Weapons Training Facility (AFWTF) in Vieques, Puerto Rico, presently pose an unacceptable threat to human health or the environment through potential releases to soil, surface water, sediment, or groundwater. The work plan is in response to United States Environmental Protection Agency's (USEPA's) request that the Navy assess the compliance of the OB/OD units with 40 CFR 264.601 standards, specifically that the Navy submit work plans for gathering OB/OD baseline data for the media listed above, plus air. (Air emissions are addressed in a separate work plan).

USEPA requested this work plan as part of an October 1999 notice of deficiency on the Navy's June 1993 Resource Conservation and Recovery Act (RCRA) Part B Hazardous Waste Facility Operations Permit Application for the Naval Station Roosevelt Roads facility in Vieques. (The facility has been operating under interim status since submittal of its Part B permit application in 1988.)

Although open burning has not occurred at the site, the Navy may want to conduct this activity in the future. Therefore, the OB unit will be included in this investigation to establish baseline conditions. This work plan assumes that the site's future use will remain as an OB/OD unit and that current access restrictions will remain in place. Because the units are located in the Live Impact Area (LIA), an active military bombing range, the environmental conditions of the areas under investigation are impacted by the bombing activities. Therefore, the investigation of the OB/OD unit will address impacts from both sources.

This work plan's goals are to outline the rationale and procedures for collecting data to:

- Establish baseline surface and subsurface soil, groundwater, surface water, and sediment conditions at the OB/OD units.

- Establish reference concentrations from locations outside the LIA for use in evaluating impact from the OB/OD units.

- Assess the current potential threat to human health and the environment posed by the OB/OD activities.

This work plan is organized as follows:

Section 1	Summarizes work plan goals, facility background, and environmental setting
Section 2	Presents a schedule for the investigation
Section 3	Presents the investigative strategy
Section 4	Outlines methods to assess risk to human and ecological receptors
Section 5	Concludes with health and safety guidelines for the investigation
Appendix A	Contains the site-specific quality assurance project plan (QAPP) which summarizes methods for sample collection and analysis and discusses quality assurance/quality control (QA/QC) procedures

1.1 Site Location

Vieques Island, approximately seven miles southeast of U.S. Naval Station Roosevelt Roads, Puerto Rico, is 20 miles long east to west and 3 to 4 miles long north to south. It has a total surface area of roughly 33,000 acres; approximately 22,600 are owned by the U.S. Navy. The Navy-owned property is divided into three areas.

U.S. Navy Property

- The Naval Ammunition Support Detachment (NASD), 8,000 acres in the island's westernmost tip

- The Eastern Maneuver Area (EMA), 11,000 acres in the island's east-central portion

- The AFWTF, 3,600 acres on the island's eastern portion

Most of the NASD property will be transferred to the Commonwealth of Puerto Rico by December 31, 2000. The Navy will retain 100 acres for the operation of the Relocatable Over The Horizon Radar and Mount Pirata Sites. At that time, the total Navy-owned property will be approximately 14,700 acres.

Together, the EMA and AFWTF are known as the Inner Range, which extends 3 miles offshore. A portion of the AFTWF, the Live Impact Area or LIA, is used primarily for aerial bombing and gunfire ordnance delivery training. Figure 1-1 shows Vieques relative to Puerto Rico and other nearby islands, while Figure 1-2 shows the AFTWF's location on the island.

Several small towns and villages are scattered throughout the privately owned west-central portion of the island. Outside the towns and villages, cattle grazing is the primary land use. Local ranchers also graze their cattle on leased portions of the EMA.

1.2 Description of Site Operations

The AFWTF functions under the consolidated command of Commander Atlantic Fleet and Commander Navy Region Southeast. It provides facilities to train Atlantic Fleet and NATO ships, air wings, and smaller air units from other allied nations and the Puerto Rican

FIGURE 1-1
VICINITY MAP

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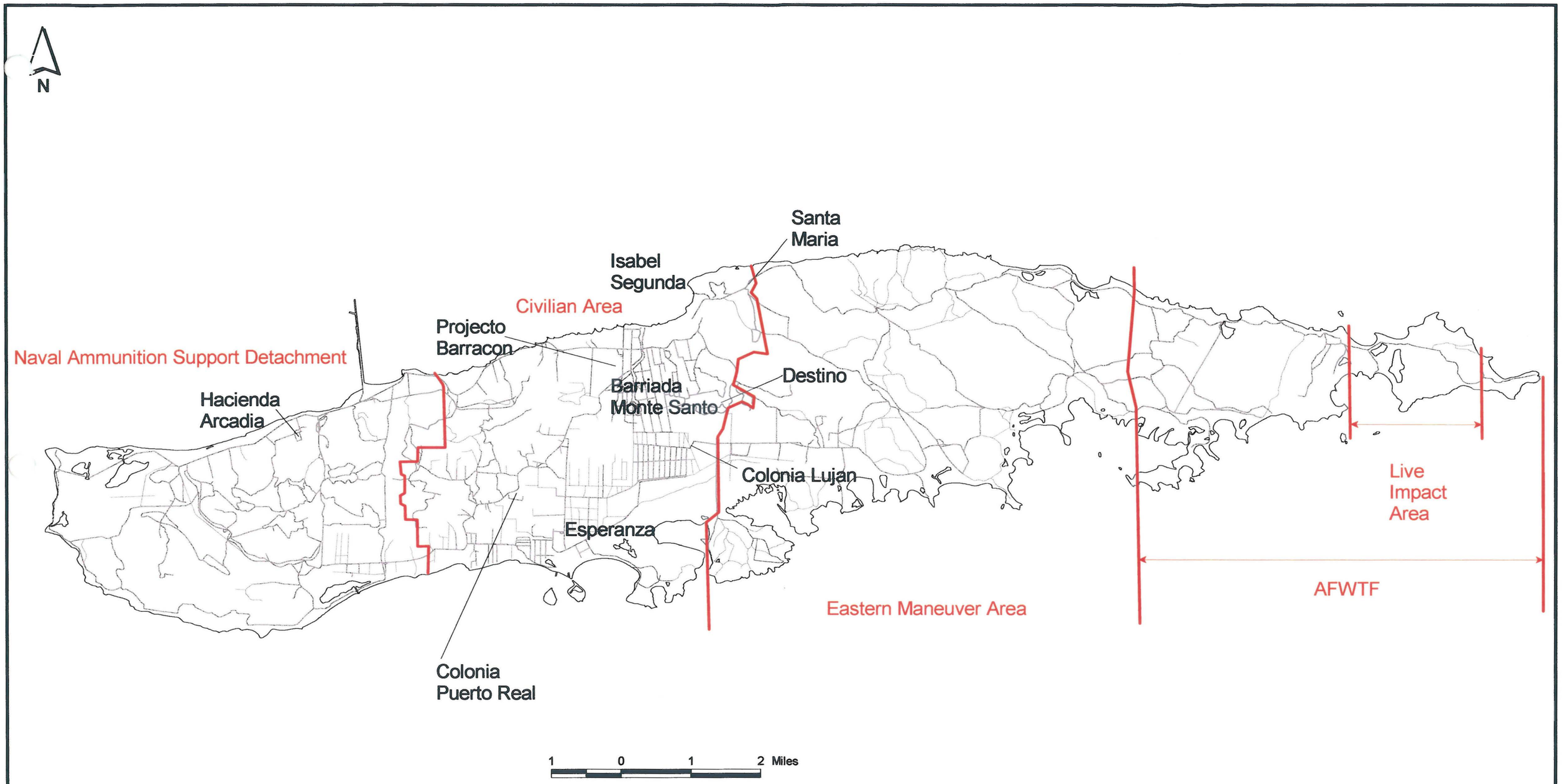
VIEQUES PUERTO RICO



ATLANTIC DIVISION
NAVAL FACILITIES
ENGINEERING COMMAND
VIEQUES PUERTO RICO

Figure 1-2
Island of Vieques
Location Map

2/18/00 //gis1/wd/puerto_rico/data2.apr

Source: Digitized USGS Quadrangle - Isla de Vieques

National Guard in naval gunfire support and air-to-ground ordnance delivery. The Atlantic Fleet's ships, aircraft, and marine forces also conduct training in all aspects of air-to-surface mine delivery, amphibious landings, small arms, artillery and tank fire, and combat engineering within the Inner Range.

Within the AFTWF's Live Impact Area, two separate locations have been designated for treatment of retrograde (unserviceable) ordnance through open burning and open detonation (see Figure 1-3). In the open detonation area, retrograde munitions are detonated with high explosives in excavated earthen pits; a separate area has been designated for open burning of waste propellants and pyrotechnics. Both operations are limited to 3,000 pounds net explosive weight (NEW) per event (50,000 pounds NEW per year), although no open burning has occurred to date at this facility. The military munitions that have been treated onsite are listed below. Chemical constituents of these munitions for which analysis will be performed are given in Section 3.2 of this work plan.

- black powder
- TNT (trinitrotoluene)
- explosive D (ammonium picrate)
- PETN (pentaerythritol tetranitrate)
- tetryl (N-tetranitro-N-methylaniline)
- RDX compositions (cyclotrimethylene trinitramine with other explosives and materials)
- cyclotols (RDX/TNT mixtures)
- HMX (cyclotetramethylene tetranitromine)
- octols (HMX/TNT mixtures)
- HBXs (RDX/TNT/aluminum mixtures)
- H6 (RDX/TNT/aluminum mixtures)
- tritonal (TNT/aluminum mixture)
- DBX (TNT/RDX/ammonium nitrate/aluminum mixture)

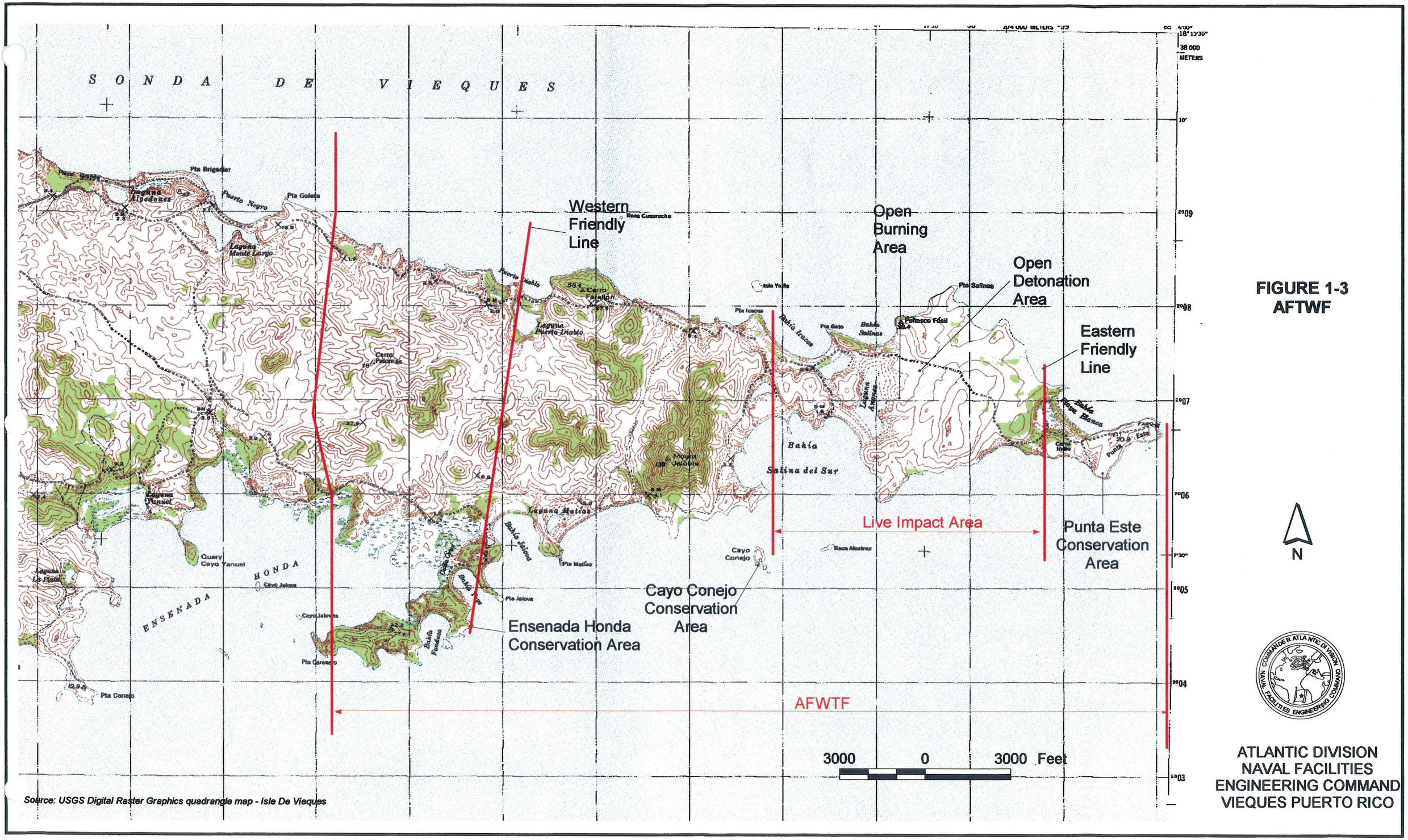


FIGURE 1-3
AFTWF

ATLANTIC DIVISION
NAVAL FACILITIES
ENGINEERING COMMAND
VIEQUES PUERTO RICO

- Torpex (RDX/TNT/aluminum mixture)
- Comp D-2 (desensitizing wax mixture)
- PBX (explosives/plastics mixture)
- lead azide
- lead styphnate
- mercury fulminate
- tetracene
- DDNP (diazodinitrophenol)
- smokeless powder
- solid propellant (including perchlorate)
- pyrotechnics
- picric acid

For more information on the waste ordnance and its composition, see Section C of the RCRA Part B Permit Application.

The OB/OD units are in the LIA range, which the Navy uses for practice with live military ordnance. A Directive issued by President Clinton to the Secretary of Defense and the Director of the Office of Management and Budget *(Resolution Regarding Use of Range Facilities on Vieques, Puerto Rico* (Referendum) January 31, 2000), limits the Navy training to the use of non-explosive ordnance, which may include spotting devices, and to a period of time not to exceed 90 days per year. Quarterly, the Navy Explosive Ordnance Disposal (EOD) clears safe paths to the target area so that the targets can be repaired. While clearing the paths, they locate undetonated ordnance detected at various locations on the range, which is then treated in place.

Although the approximately 100-foot x 100-foot OB unit has never been used, the Navy may want to conduct open burning in the future. Any future burning of reactive materials would be in approved burn trays, equipped with secondary containment to prevent soil and groundwater contamination.

The OD unit is approximately 100 feet x 100 feet. No more than one detonation per day is carried out in a circular earthen pit, approximately 30 to 60 feet in radius and 6 to 8 feet deep. Cover materials are not used because response would be complicated in the event of a misfire. The pit has no specific location because bombing obliterates it between treatment events. However, all OD activities occur within the 100 feet x 100 feet unit, the location of which is determined with the use of a Global Positioning System.

Waste ordnance is transported from the NASD to the inner range via water and, within the range, transported via motor vehicle to the OD unit, where high explosives are placed in direct contact with the waste ordnance to maintain explosive continuity. Although high explosives are used to supplement open detonation, they are not technically a fuel, but an initiating mechanism. No supplemental fuels are used for detonation operations.

Following each detonation, EOD personnel carefully search of the surrounding grounds for unexploded ammunition or explosives. Explosives or unfused ammunition are picked up and prepared for the next detonation. Fused ammunition or items with potentially damaged internal components are generally detonated in-place.

As a security precaution, the LIA, in which the OB/OD units are located, is visually monitored 24 hours a day. During treatment and routine range operations, all roads entering the area are guarded. Warning signs are posted at all facility access roads.

1.3 Environmental Setting

This section was developed from U.S. Geological References and U.S. Navy site-specific environmental studies. Existing information on the environmental setting at the LIA portion of the AFWTF, where the OB/OD is located, is limited. Most geologic and hydrologic attention has been focused on the central and western portions of Vieques; these are the areas where the civilian towns (central) and the only aquifers of significance (central and western) are located. The investigations conducted under this work plan will improve the database of environmental site information.

1.3.1 Topography

Vieques' topography is characterized by low hills and small valleys. The highest elevations, which are generally along the east-west longitudinal axis, exhibit a more angular block structure than the adjacent lower hills lying north and south of the main axis. The hills on the island's western end generally differ in form and character from those on the eastern end. The western hills are gentler, more rolling, and have a deeper soil profile than the angular and rugged eastern hills, which have a greater amount of exposed rock surface. The highest point on the western end of the island, Monte Pirata, has an elevation of 1,000 feet, more than twice the highest point on the eastern end, Cerro Matias, which has an elevation of 420 feet.

The hilly central portion of the island contrasts sharply with the low-lying coastal zones. The three largest of these coastal zones are in the island's northwest corner, in the island's eastern portion just north of Bahia Salina del Sur, and in the island's southern valley between Esperanza and Bahia Tapon. These generally level areas are covered with extensive lagoons and mangrove swamps.

Topography of the OB and OD locations is generally similar. At the OB, the ground surface slopes at a 2 percent grade westward toward Laguna Anones, a distance of approximately

600 feet. Surface rainfall runoff and subsurface rainfall percolation (if any) at the OB would flow to the lagoon. The OD, located approximately 800 feet north northeast of the OB, is situated on a relatively flat terrace which also drains gently and then transitions to a 2 percent slope to the west toward Laguna Anones and to the northwest toward Bahia Salinas, the distance to both being approximately 1200 feet. Surface rainfall runoff and subsurface rainfall percolation (if any) at the OD would flow to the lagoon and bay.

1.3.2 Geology

Vieques's geology is characterized by unconsolidated sedimentary deposits in the lowlands and three major rock types in the upland areas: Upper Cretaceous volcanic rocks, Upper Cretaceous or Lower Tertiary intrusive rocks, and Upper Tertiary and Quaternary sedimentary rocks. The Quaternary age consolidated sedimentary deposits consist of alluvial deposits, beach and dune deposits, and swamp and marsh deposits. The oldest exposed rocks are presumed to be of Upper Cretaceous age and are mostly andesites, tuffs, and conglomerates. It is generally thought that these rocks were deposited in a marine environment, and that they are similar to rocks of this age found on Puerto Rico and the Virgin Islands. The deposit's bedding thickness is thought to vary across the island; total thickness is difficult to determine because of the rocks' metamorphism and generally poor surface exposure. These volcanic rocks are most common on the eastern end of the island.

During the Upper Cretaceous or Lower Tertiary period, a quartz diorite complex pluton deformed and metamorphosed the Cretaceous volcanic rocks. The quartz diorite plutonic rocks outcrop over a large percentage of the island, particularly in the western and central portions. The pluton is divided into two major bodies by a narrow belt of metamorphosed andesites and andesite tuffs running from Isabel Segunda to Bahia de la Chiva. The western pluton is generally coarse-grained and equiangular in texture, while the eastern pluton is generally finer-grained with a microgranitic texture.

There are also well distributed local occurrences of mafic intrusives throughout the island. Dark, fine-grained dike rocks outcrop at various locations throughout the island, while coarse-grained rocks of varying color and texture outcrop at its western end in the quartz diorite complex.

Upper Tertiary-age limestones outcrop at three major areas on the island. Limestone headlands are on the south coast and on the extreme eastern tip of Vieques. A third limestone outcrop, approximately 50 feet thick, covers two acres of Punta Caballo on the north coast. Limestone was once a widespread deposit around the coast of Vieques, but has since been eroded. The limestone, which is locally known as the Puerto Ferro limestone and is of Tertiary-Miocene age, ranges from 125 to 140 feet thick on the south coast and 160 to 175 feet on the eastern tip of the island. On the south coast, the limestone rests on granodiorite basement rock.

Quaternary deposits include beach, swamp, and alluvial deposits. Quaternary-age alluvial deposits blanket most of the valleys of Vieques, including areas on the south coast: the area from Esperanza to Camp Garcia, the area around Ensenada Honda, and the area around Laguna Playa Grande. On the north coast, they include the Valle de Resolucion and Hacienda Arcadia areas. Alluvial deposits are stream-laid silt, clay, and gravel derived from the disintegration of diorite or volcanic rock. Fringing the Vieques shoreline are assorted deposits of Pleistocene to Holocene-age beach and windblown sand and lagoon and salt marsh muds.

Two major types of sand deposits are on Vieques. The first is an alluvial deposit found in valleys filled with the material formed from the weathering of the quartz diorite intrusive. These deposits, which are found primarily on the western end of the island, consist of

coarse siliceous sand. The second type is a marine-deposited calcareous sand located on the fringe beaches.

The geology near the OB/OD units is characterized by sedimentary and volcanic rock. For more on site geology, see Section L of the RCRA Part B Permit Application.

1.3.3 Soils

Most soils on Vieques are residual in nature. Because of the tropical wet and dry type climate and the relatively impermeable intact volcanic rock, soil development has been severely limited on the eastern portion of the island, resulting in a very shallow soil profile. Generally, the soils on the eastern end of the island are fine-grained with a high clay content. The soil profiles on the western end of the island, which are somewhat better developed, have been formed by the weathering of the underlying granite diorite intrusive. These solids are primarily coarse-grained and contain primarily arkosic material with subordinate amounts of clay.

Vieques' larger valleys are blanked and filled by Quaternary-age stream-laid, alluvial deposits of clay, silt, sand, and gravel derived from the parent volcanic or intrusive rock. The larger valleys include Valle de Resolucion on the northwest side of the island and the large valley stretching from Esperanza to Camp Garcia on the south coast. Although the alluvial deposits in these valleys vary in thickness, they are generally thicker than 40 feet. In addition to the major soil areas mentioned above, the areas along the shoreline are covered with beach, alluvial, and windblown sand deposits and lagoon and salt marsh muds.

Because of its small size and relatively uniform climate, the island has a limited range of soils series. Most common are the Descalabrado soils, which cover more than 30% of the total land area. Those moderately steep to steep (5% to 60%), shallow, well-drained soils, which are

found above consolidated volcanic rocks, were formed in a medium to fine-textured residuum derived from this same rock. The surface layer is typically very dark brown to dark grayish-brown, 3 to 7 inches thick and topped with grasses and shrubs. On Vieques, all types or phases of this soil series are severely limited in both agricultural and non-agricultural land uses due to low rainfall, steep slopes, shallow areas, and in some cases, the presence of rocks. All these soils are easily eroded, and virtually all are restricted to grazing, woodland, or wildlife.

The Vieques series is found on another 26% of the island's total land area. Vieques soils occur on moderate to steep slopes (5% to 40%) in the dry uplands. They are formed from partially weathered granitic rocks. They are shallow, and in a typical profile, the dark brown surface layer is 4 to 8 inches thick. Drainage is good, runoff medium, and permeability moderate. Texture ranges from loam to clay loam. Associated series are the Descalabrado, Coamo, and Guayama, which all also form significant portions of the island's surface area.

The Coamo soils, which constitute almost another 16% of the island's total land area, are gently sloped, deep, and fairly rich. Characteristically, they are deep and well-drained, occurring over deep layers of stratified coarse-textured materials. They formed in sediments derived from volcanic and limestone rocks. Usually, the surface layer is very dark brown, and slightly acidic to neutral. Subsoils are mildly to moderately alkaline. Typical natural vegetation consists of xerophytic trees and brush. This soil series is considered good for agriculture.

At least 8% of Vieques' surface is covered by a land type called simply *rock land*, where rock outcrops cover 50% to 70% of the surface area, or where loose stones and boulders are common. The shallow soil between the rocks and around them is insufficient to be classified by soil series. The slope grades from 60% to 70%. Natural vegetative cover is usually brush

and wild grasses, though some of the higher undisturbed peaks are still forested on Vieques. There are two subcategories of the rock land type on Vieques: volcanic rock land and limestone rock land. The remaining 15% of the island's area is distributed in 11 additional series of varying quality: Ametia, Cartgena, Catano, Coastal Beaches, Descalabrado, Fraternidad, Jacana, Pandura, Paso Seco, Pancena and Pozo Blanco.

The soil at the OB/OD units is primarily descalabrado clay loam, with some sandy soil reported present. For more soil information, see Section L of the RCRA Part B permit application. The thickness and hydraulic characteristics of soils are not know with certainty, but are reported to be shallow in depth in the OB/OD areas, with outcroppings of exposed bedrock occurring. The shallow surficial soils are underlain by undivided tertiary marine sedimentary rock and cretaceous volcanic rock. Thus, the bedrock surface is anticipated to be consistent with surface topography.

Soil samples were collected from the OB/OD units in 1998 by Panzardi-ERM, Inc. of San Juan, Puerto Rico and analyzed for hazardous waste parameters. The concentrations of regulated contaminants detected in the soil were below regulatory levels. Explosive analytes were not included in this investigation.

1.3.4 Surface Water

From the island's high points, small, normally dry streambeds or *quebradas* flow either north or south toward the sea, resulting in many small drainage basins. Most are less than a mile long, drain only a fraction of a square mile, and have no well-defined drainage channel.

Vieques has no perennial surface drainage. Rainfall on the island ranges from 25 to 45 inches annually, with 36 inches considered the average annually precipitation for the entire island. Based on figures for the U.S. Virgin Islands, approximately 90% of the rainfall is made up of

water that evaporates and is transpired back into the atmosphere. An additional 5% is infiltrated and recharges groundwater aquifers, leaving only 5% as runoff. In the rainy season, channels in many valleys contain runoff; however, in dry months, the streams tend to pond or dry up entirely. Groundwater discharge sustains several springs in the quebradas during the dry season. One of two streams are said to have flowed continuously at some time in the past, probably before well fields lowered the water table.

The surface water bodies nearest the OB/OD units are the Caribbean Sea and Laguna Anones, which is approximately one eighth-mile from the OB unit and one quarter-mile from the OD unit, and the closest of the two. Runoff from the two units drains into this lagoon. Samples from this lagoon taken under the National Pollutant Discharge Elimination System (NPDES) program revealed no indications of contamination.

1.3.5 Groundwater

Vieques has two major aquifers: the Valle de Resolucion aquifer which is beneath the western portion of the island within the NASD, and the Valle de Esperanza aquifer within a 4-square-mile area between the village of Esperanza and Camp Garcia on the southern portion of the island. Of these, the Valle de Esperanza is more productive. Prior to the installation of the water line from the main island of Puerto Rico in 1978, the Calle de Esperanza aquifer supplied most of the potable water for the island.

To supply the island with potable water before the water pipeline was installed, the Puerto Rico Autoridad de Acueductos y Alcantarillados (Aqueduct and Sewer Authority, or PRASA) maintained a network of 16 wells which collectively pumped 450,000 gallons per day. The PRASA well field, which is located in Esperanza, is currently not in use.

In 1985, the U.S. Geological Survey completed a two-year study of groundwater resources in Vieques, focusing on the Valle de Resolucion and Valle de Esperanza. The study showed

rainfall to be the primary source of local groundwater, recharging aquifers through infiltration and stream incisement.

Analyses of samples from wells near Esperanza showed that groundwater is a sodium-bicarbonate type generally characterized as hard, but suitable for uses other than irrigation. Because of high sodium levels, untreated groundwater used for irrigation on a long-term basis would result in the accumulation of salts in the soils. The relatively high concentrations of chloride recorded in 1977 in groundwater from the Valle de Espernaza aquifer have been attributed to seawater encroachment as a result of excessive groundwater withdrawals, and to the accumulation of salts from infiltration of sea spray, a condition typical of islands with low rainfall. Because withdrawals from the PRASA wells have been discontinued, chloride concentrations in the groundwater have decreased substantially, from 205 milligrams per liter (mg/L) to 94 mg/L.

The quality of any shallow groundwater underlying the OB/OD units has not been investigated. Several groundwater "divides" separate the units from the primary aquifers, making hydraulic connection unlikely. Groundwater is no longer used as a drinking water supply for the civilian or military population of Vieques Island; water is piped from Puerto Rico for this purpose.

In response to the January 20, 2000 3008 (h) order for installation restoration work at the Inner Range at Vieques, the Navy is conducting a western perimeter "baseline" groundwater investigation. The purpose of this investigation is to establish baseline groundwater quality, regional groundwater flow patterns along the western perimeter of the Navy facility, and to assess whether activities at the facility have impacted groundwater at the western perimeter. The investigation is being conducted in accordance with the Navy's letter of November 12, 1998 to Ms. Nicoletta DiForte of USEPA.

1.3.6 Marine Water Quality

The coastal waters of Vieques are subject to the Puerto Rico Water Quality Standards and classified in accordance with them. For the most part, the island's marine waters are of acceptable quality and are classified as suitable for direct human contact and for use in the propagation or preservation of desirable marine species. The only offshore waters classified as limited to indirect human contact or for use in propagation and maintenance of desirable species are those near Isabel Segunda and Puerto Real between Cayo de Tierra and Cayo Real.

In accordance with the provisions of a USEPA NPDES permit issued in November 1984, the Navy has conducted extensive analyses of the quality of the coastal waters off the LIA. These studies, which are summarized in Section L of the Part B Permit Application, indicate that activities in the LIA on Vieques Island have not impacted the surrounding oceanic surface waters.

1.3.7 Climate

Vieques' climate is tropical-marine, with minimal fluctuations in temperature. Easterly trade winds, which blow directly across the island year-round, moderate the tropical heat considerably.

The U.S. Department of Commerce, National Oceanic and Atmospheric Administration, has established two weather stations on Vieques since 1982; one is located near the main gate at Camp Garcia, and the other is in the main area of the camp. However, data from these station have been erratic, with only one station (the one near the main gate) reporting sufficient daily values to warrant publication. This station records only precipitation and temperature.

The mean annual temperature on Vieques is approximately 79°F to 80°F, with little variation in mean monthly temperatures. Historical data show August as the warmest month, at 81.8°F,

and February the coldest, at 76.0°F. The minimal variation in monthly temperature ranges is attributable to two factors. First, the island is surrounded by water, whose the temperature changes little from the warmest to the coolest season; second, the island is near the equator, which accounts for the relatively small differences in energy received from the sun from season to season. Monthly extreme temperatures at Esperanza ranged from 98°F to 60°F for a 14-year period of record. The mean daily temperature range (the difference between the daytime maximum and the nighttime minimum) is estimated to be between 15°F and 25°F.

Little information is available on rainfall patterns on Vieques. The island's rainy season is typically characterized as August to November, although rain showers occur frequently throughout the year. For the most part, these showers are short, usually less than 30 minutes. The island's dry season extends from December through April.

The outstanding feature with regard to wind patterns around Vieques is the steadiness of the trade winds, which almost always come out of the east, varying from north-northwest to south-southwest. The trade winds move inland, where they are lifted over the terrain or pushed aside by the hills and form micro-circulation patterns. Wind speeds tend to change from calmer night winds to stronger day winds at daybreak and change back again at approximately 4 p.m. The day winds generally peak in late morning or early afternoon. Tropical cyclones (hurricanes and tropical storms) are most likely to occur during the summer and early fall.

2.0 SCHEDULE

A summary of actions and time schedule for completing the work plan activities has been established. The summary presented in Figure 2-1 does not include specific dates for milestones because start dates for the tasks are not currently known. The field work for this plan cannot begin until the final work plan has been approved and the contractor has free, unthreatening access to Navy property and civilian areas.

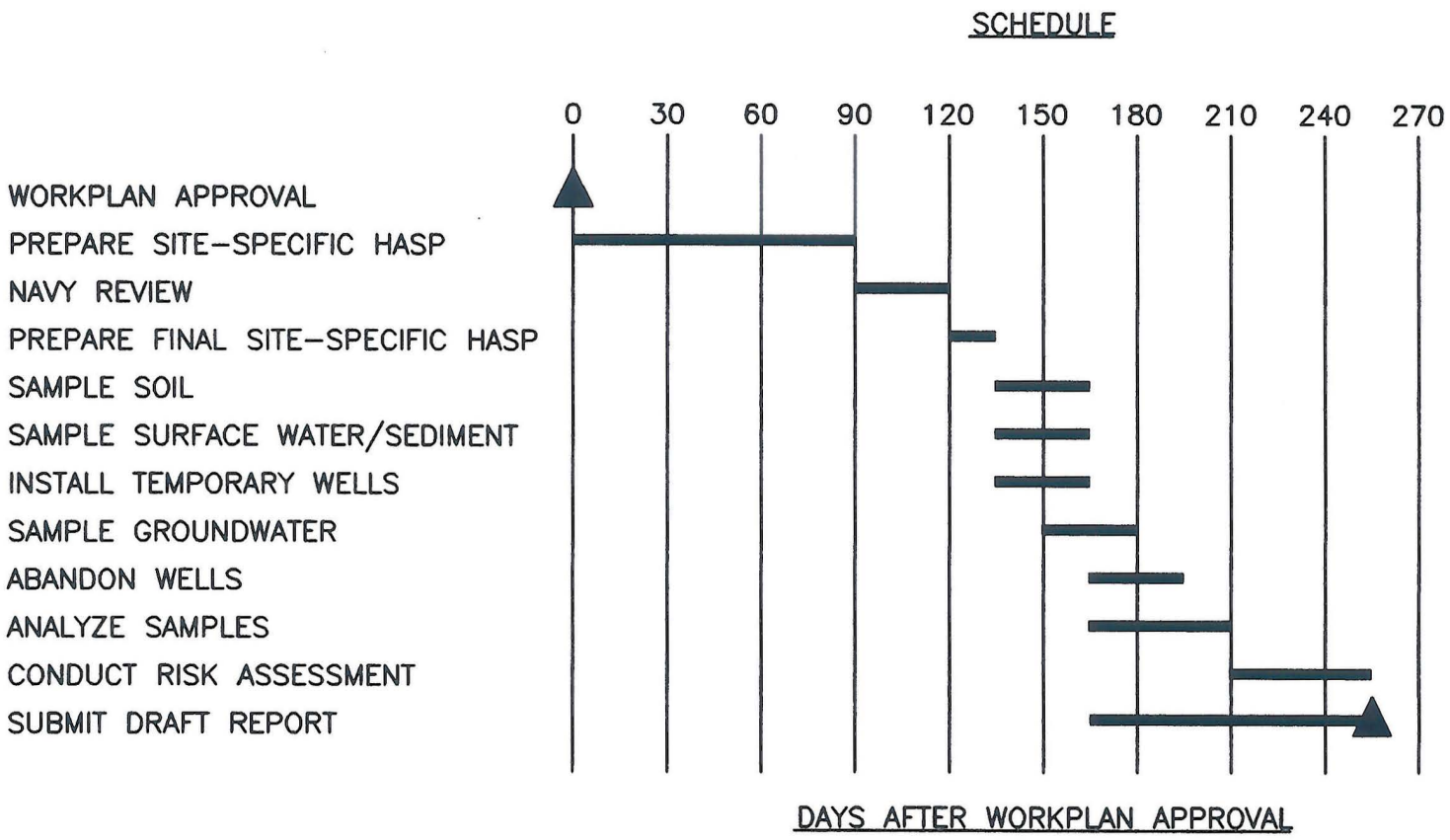


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FIGURE 2-1
AFTWF, VIEQUES, PR
SCHEDULE

DWG DATE: 06/22/00 | DWG NAME: 5901S061

3.0 INVESTIGATIVE STRATEGY

This plan identifies proposed sample locations, sample depths, potential site contaminants, and the rationale for their selection. Sample collection, analytical methods, and QA/QC procedures are discussed in Appendix A of this plan. The data collected using these methods and procedures will be used to evaluate whether existing site conditions pose an unacceptable risk to human health and the environment. Section 4 discusses risk screening procedures for human and ecological receptors.

3.1 Sampling Rationale

To date, the OB unit has never been operated. Therefore, there are currently no releases to human health and the environment from this unit, which has been included in this baseline investigation to establish environmental conditions prior to its possible use as a thermal treatment facility.

Groundwater on the island is not used as a drinking water source and no food-chain crops are grown within several miles of the facility. Because the LIA area is restricted, potential human receptors are site workers and trespassers (adults and children). Potential ecological receptors include nearby terrestrial and aquatic species. Potential receptors and contaminant exposure pathways are discussed further in Section 4 of this work plan.

3.2 Sampling Strategy and Locations

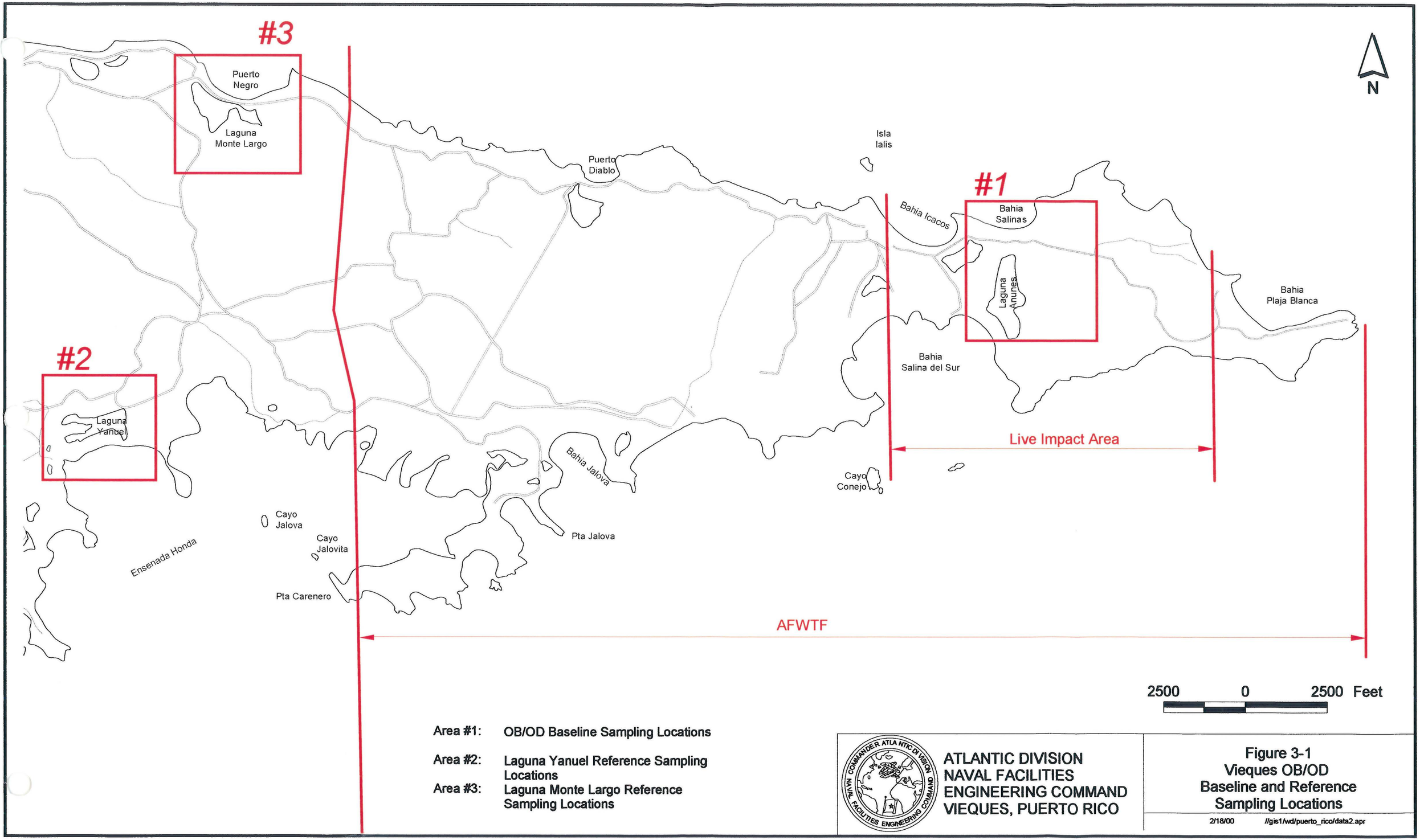
To establish baseline conditions at the OB/OD units and evaluate potential threats to human health and the environment, surface and subsurface soil, groundwater, sediment, and surface water samples are planned at the units and in areas subject to contaminant migration. All samples will be analyzed for target compound list organics, target analyte list metals, and explosives plus nitroglycerin, and pentataerythritol. Groundwater and surface water samples

will also be analyzed for perchlorate, and pecric acid. The target explosive anlaytes are listed below.

cyclotetramethylene tetranitramine (HMX)	1,3,5-trinitrobenzene (TNB)
cyclo-1,3,5-trimethylene-2,4,6-trinitramine (RDX)	1,3-dinitrobenzene (DNB)
tetryl	nitrobenzene (NB)
2,4,6-trinitrotoluene (TNT)	4-amino-2,6-dinitrotoluene
2-amino-4,6-dinitrotoluene	2,6-dinitrotoluene
2,4-dinitrtoluene	2-nitrotoluene
3-nitrotoluene	4-nitrotoluene

Chemical analytical procedures are discussed in Appendix A.

Because many inorganic constituents occur naturally in soil, groundwater, sediment, and surface water, reference samples will also be collected. Reference samples will not be collected from the LIA because of the bombing activities. Therefore, reference samples are planned in areas outside the LIA where soils and surface water conditions are similar to those at the OB/OD units but are unaffected by human activities at the AFWTF. Reference samples will be analyzed for the same parameters as the baseline samples to ensure that the locations are unaffected by activities at the AFWTF. Figure 3-1 locates the OB/OD units and the two areas chosen for reference sampling (Laguna Monte Largo Area and Laguna Yanuel Area). Cobana Negra, a threatened species, can be found in the area. If any clearing is necessary, the Fish and Wildlife Service and the Corp of Engineers will be consulted prior to field activities.



Area #1: OB/OD Baseline Sampling Locations

Area #2: Laguna Yanuel Reference Sampling Locations

Area #3: Laguna Monte Largo Reference Sampling Locations

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Figure 3-1
Vieques OB/OD Baseline and Reference Sampling Locations

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Because unexploded ordnance may be encountered during the sampling activities, the area will be surveyed for unexploded munitions prior to invasive activities in accordance with the procedures in Section 5 of this plan. No samples will be collected from areas containing possible unexploded ordnance. Sampling locations may have to be adjusted in the field based on the results of the unexploded ordnance survey or to accommodate access restraints. The exact sampling locations will be surveyed using a Global Positioning System.

The OB/OD units will be located using a Global Positioning System. Five soil borings are planned for each unit. At each soil boring location, surface soil samples will be collected from 0 to 1 feet below ground surface (bgs) and subsurface samples will be collected from 2 to 4 feet, 4 to 6 feet, 6 to 8 feet, and 8 to 10 feet bgs. The surface interval was chosen for use in evaluating risk to receptors coming in contact with site soil. The detonation pits in the OD unit are constructed at depths of 6 to 8 feet. Therefore, the 8 to 10 foot subsurface sampling interval is intended to evaluate contaminants from the downward thrust of the detonation. Although OB has not occurred, the same sampling scheme will be followed at that unit for establishing baseline conditions prior to waste disposal operations. Figures 3-2 and 3-3 depict the sampling scheme for the OB/OD units.

Two borings at each unit will be converted into temporary monitoring wells to establish baseline groundwater conditions. Soil borings for monitoring wells will be completed in the first shallow groundwater aquifer encountered. Conventional monitoring well technology will be used at the OB/OD units rather than methods such as Hydropunch so that the presence of buried unexploded ordnance can be assessed during subsurface activities. Section 5 contains additional information pertaining to health and safety procedures during drilling. Protective well covers will be used while sampling activities are ongoing. After data collection, the wells will be properly closed in accordance with federal and local regulations using an impermeable material to protect groundwater from surface bombing activities.

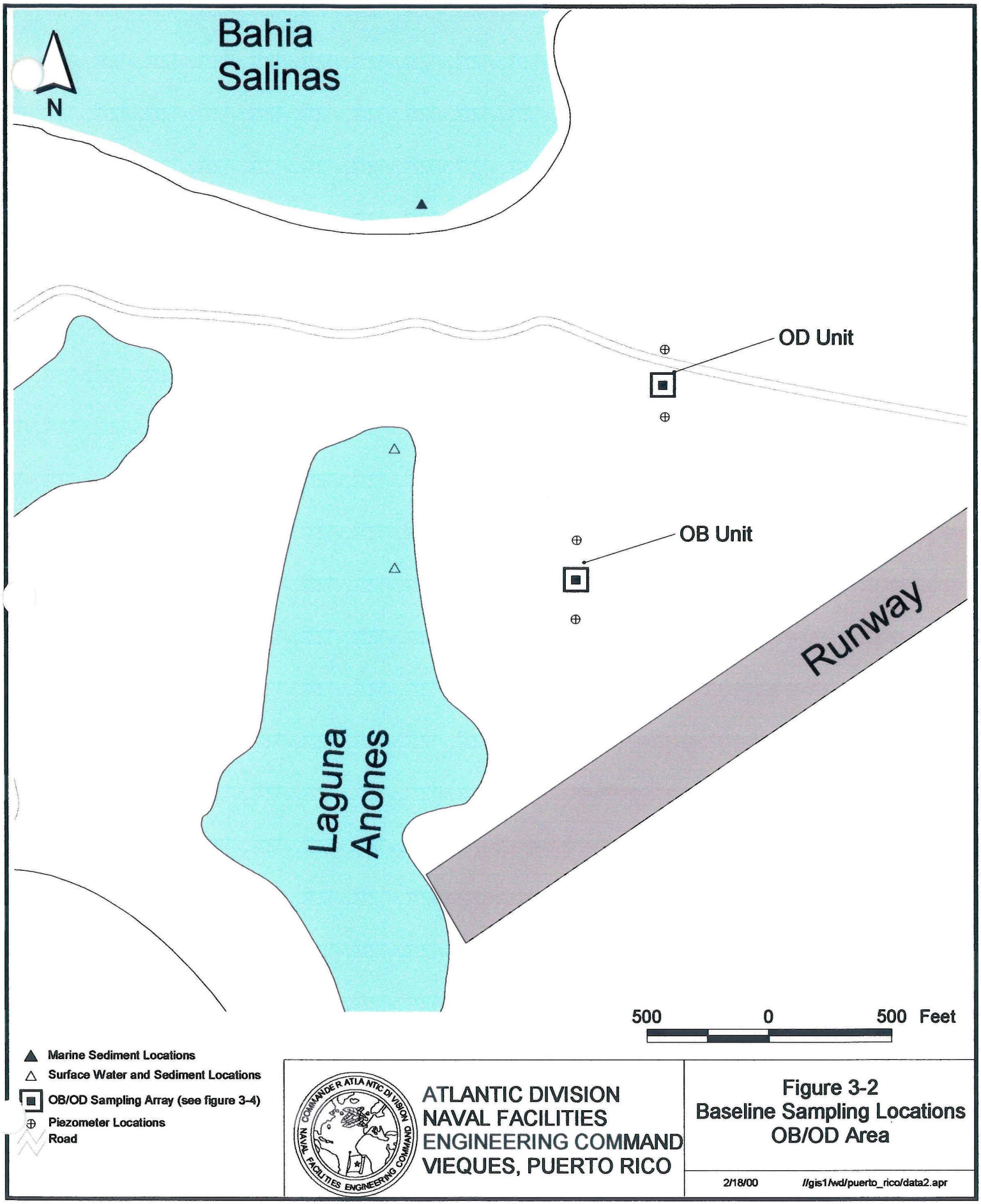
Bahia
Salinas
N
OD Unit
OB Unit
Runway
Laguna
Anones
500
0
500 Feet
Marine Sediment Locations
Surface Water and Sediment Locations
OB/OD Sampling Array (see figure 3-4)
Piezometer Locations
Road
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Figure 3-2
Baseline Sampling Locations
OB/OD Area
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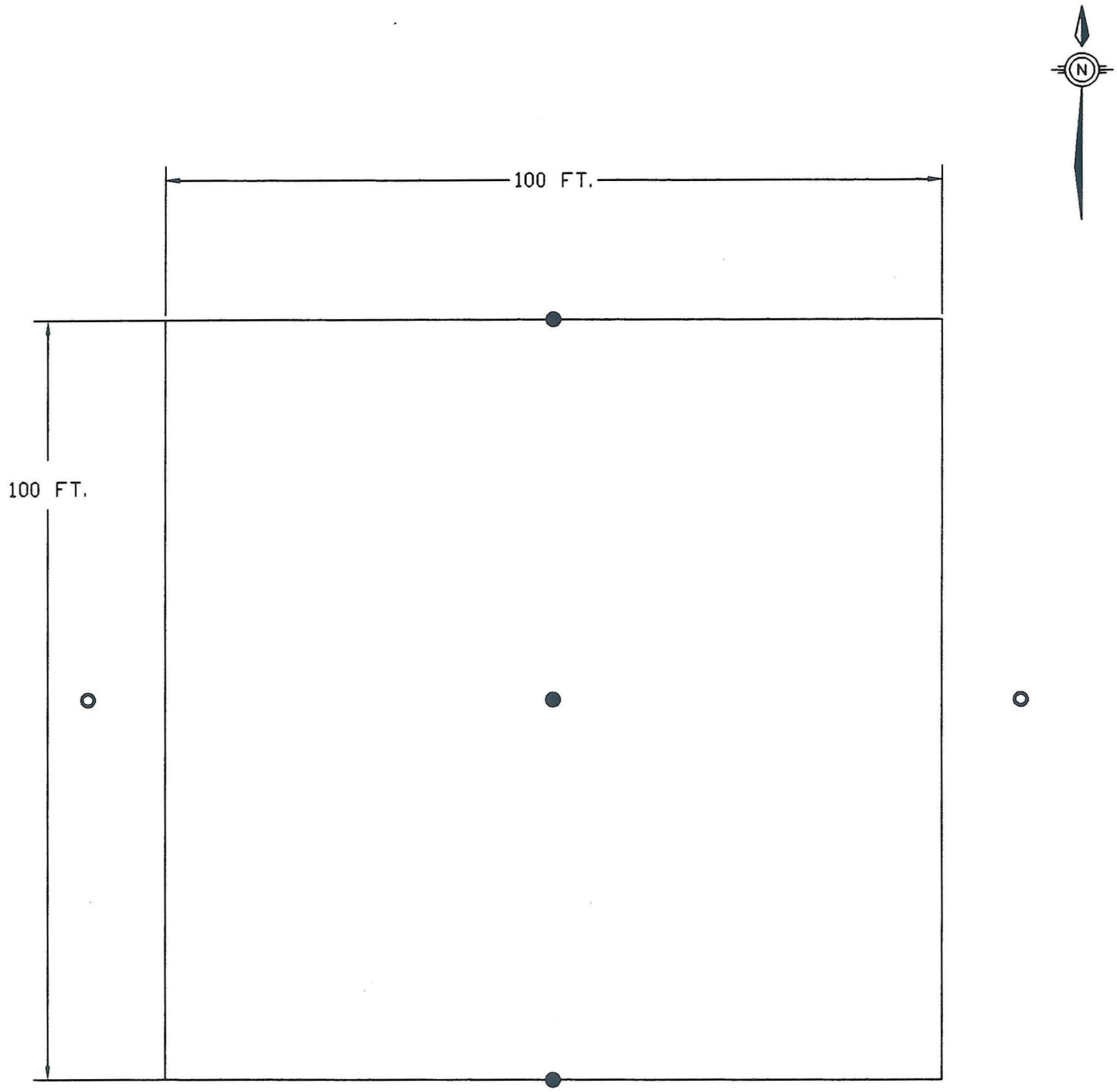

LEGEND

○ – SURFACE AND SUBSURFACE SOIL AND GROUNDWATER SAMPLING LOCATION

● – SURFACE AND SUBSURFACE SOIL SAMPLING LOCATION

20 0 20

SCALE FEET

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FIGURE 3–3
VIEQUES OB/OD BASELINE SAMPLING ARRAY – ONE SAMPLING ARRAY AT OB LOCATION AND ONE SAMPLING ARRAY AT OD LOCATION

DWG DATE: 06/27/00 | DWG NAME: 5901B027

Soil borings will be logged by a professional geologist, who will measure the thickness of the soil units. Selected soil samples will be collected for geotechnical analysis. Tests will include grain-size distribution (American Society for Testing and Material [ASTM] C 117 and 136), Atterberg Limits (ASTM D 4318), moisture content (ASTM D 2216), vertical permeability (ASTM D-2434), and porosity (ASTM D 4645).

Four temporary wells will be installed as shown in Figure 3-2 for use as piezometers in establishing groundwater flow direction. Neither soil nor groundwater will be sampled from these locations. If shallow groundwater is present beneath the OB/OD units, it will be sampled from two wells, believed to be upgradient and downgradient of the unit based on topography and an evaluation of water level measurements taken from the four temporary piezometers.

To evaluate the shallow aquifer, slug tests will be performed on selected wells and a portable groundwater quality meter will be used to measure the following parameters: total dissolved solids, pH, specific conductivity, turbidity, dissolved oxygen, and salinity. The aquifer's flow rate, direction, hydraulic conductivity, and transmissivity will be evaluated for use in assessing whether additional groundwater investigation is necessary.

Sediment and surface water samples are focused in areas where surface runoff from the unit typically flows. Topographical maps indicate that surface water runoff from the OB/OD area flows to Laguna Anones and to the northern coastline. These sampling locations are shown on Figure 3-2. Surface water and sediment samples will be collected from Laguna Anones and a sediment sample will be collected from the coastline at Bahia Salinas to assess impact to surface water bodies.

Reference sample locations were chosen to establish reference assessments of environmental media from uncontaminated settings similar to that found at the OB/OD, noting that the Navy

would not be collecting reference samples from the LIA outside the OB and OD areas. Therefore, each of the two reference location was selected to have features similar to the OB/OD area, i.e. a lagoon, which received surface rainfall runoff as well as subsurface rainfall percolation, with proximity to a marine bay, which also received surface rainfall and subsurface groundwater flow. Similarity of soil and subsurface conditions was also a goal in the selection of the two reference sampling locations; however, the available soils and hydrogeologic information is not adequate to assure, at this stage, that conditions are sufficiently similar. Field observations will be used to adjust sampling locations; any modifications will be documented in the investigation's records and report. Also, initial groundwater collections will be assessed for saltwater intrusion during sample collection. Should high salinity and/or high conductivity readings be obtained during field testing, the situation will be evaluated and alternate locations may be selected, depending on the specific conditions encountered.

Reference sample locations from the Laguna Monte Largo and Laguna Yanuel Areas are shown on Figures 3-4 and 3-5. Five soil borings are planned for each in locations identified as having soil conditions similar to those found at the OB/OD units. Reference soil samples will be collected for the 0 to 1 foot bgs interval and the 8 to 10 feet interval for screening of surface and subsurface soil. Surface water and sediment samples will be collected from the lagoons. Reference groundwater samples will not be collected until the presence or absence of groundwater beneath the OB/OD units has been established, hydrogeologic characteristics of the unit have been evaluated, and groundwater sampled and analyzed. If inorganic compounds are present in the groundwater samples at concentrations exceeding human and ecological screening values, the locations presented in Figures 3-4 and 3-5 will be used as reference groundwater well locations. The sources for human and ecological screening values are discussed in Section 4. Appendix A contains a list of human health screening values for each analytical parameter.

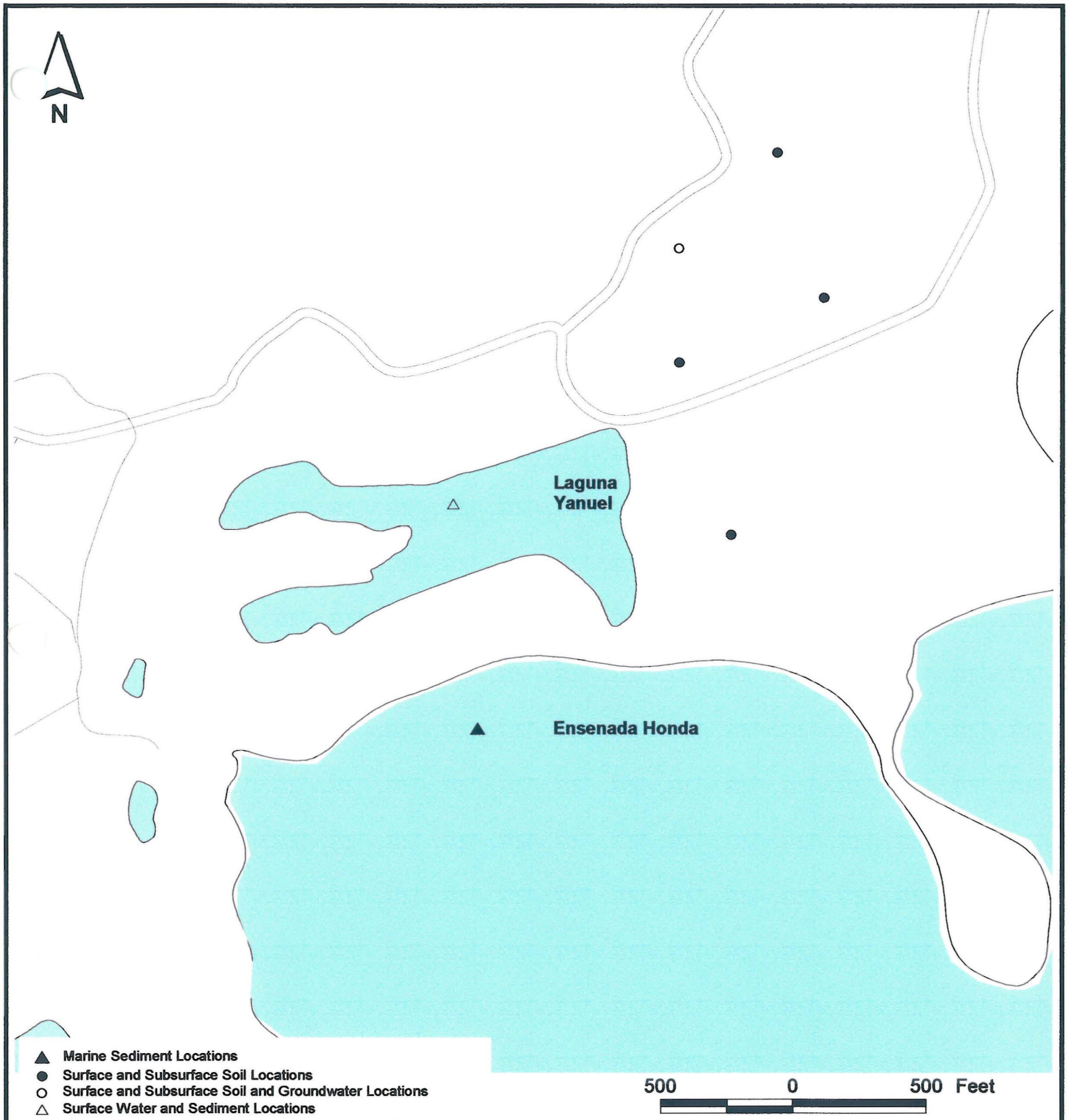

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Figure 3-4
Laguna Yanuel
Reference Sampling Locations

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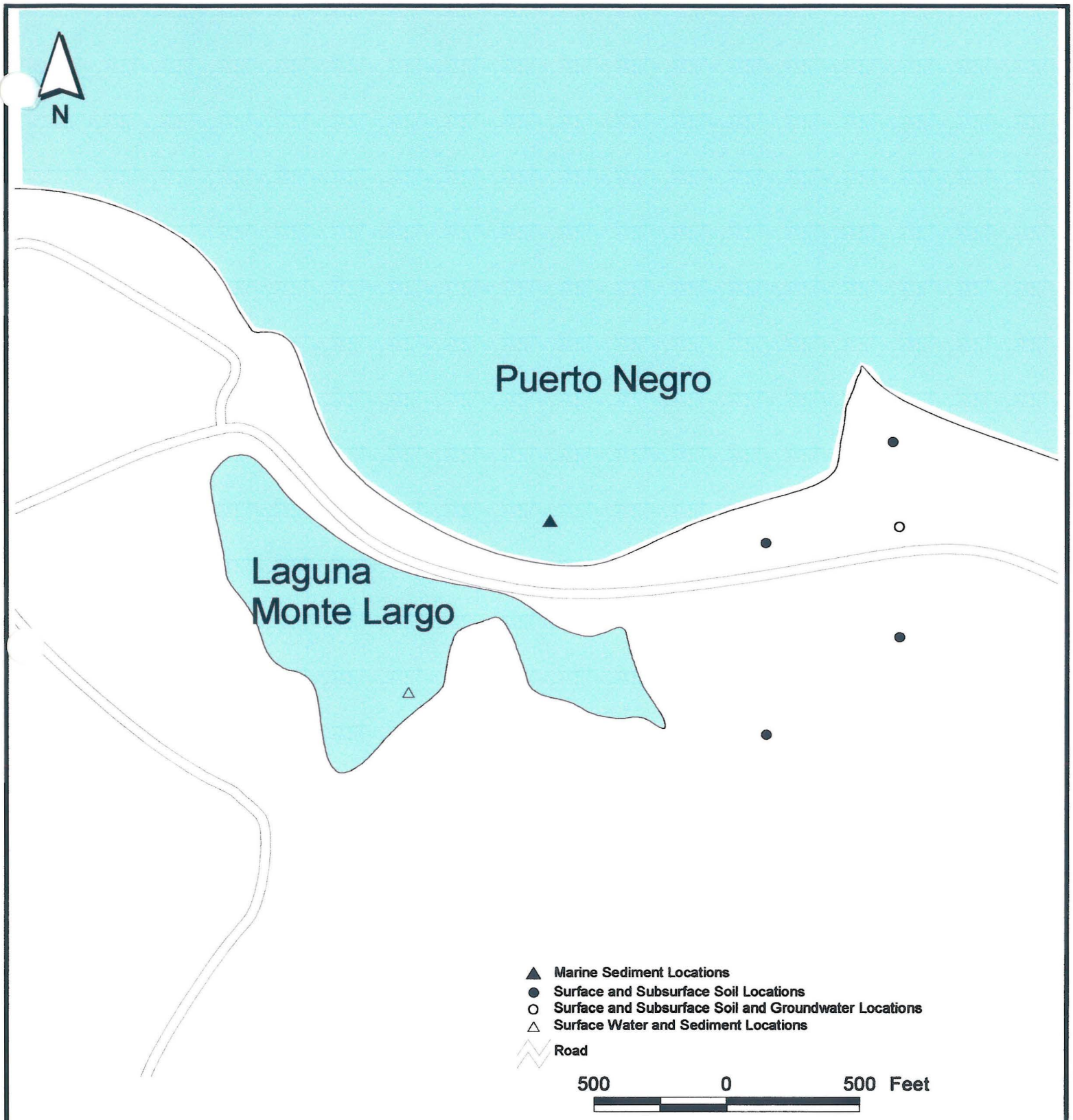

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Figure 3-5
Laguna Monte Largo
Reference Sampling Locations

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4.0 RISK ASSESSMENT

Site-specific data collected as part of this investigation will be used to assess whether potential releases to soil, groundwater, surface water, and sediment from open detonation activities presently pose unacceptable risks to human and ecological receptors. Open burning has not occurred at the site; therefore, no releases have occurred from OB activities which could threaten human health and the environment.

4.1 Risk Screening

Concentrations detected in baseline samples will be compared to reference concentrations for inorganics. Concentrations that exceed the reference concentrations will be retained for further risk screening. Organic and inorganic constituents that are not naturally occurring will be compared to conservative default concentrations protective of human and ecological receptors.

Ten surface and 10 subsurface soil samples from reference locations will be collected. The 95% upper tolerance limit will be calculated for these concentrations using the statistical methods outlined in Section 4.2.1. Two reference groundwater, surface water, and sediment will be collected. Because of the smaller sample set for these matrices, the upper tolerance limit will not be calculated. Rather, the lower of the two concentrations will be used for each.

If this risk screening indicates that the OB/OD treatment results in unacceptable human health or ecological risks, a more detailed risk assessment will be performed. It may require collection of additional site-specific data to refine the screening assessment findings. The type of additional data will depend on what exposure pathways are determined to be the primary contributors to risk at the facility.

A conceptual site model will be constructed as part of the risk assessment. Groundwater, land, and surface water uses will be evaluated to identify human and ecological receptors. Plants

and animals using the area surrounding the OB/OD units and nearby Laguna Anones and Bahia Salinas as habitat will be identified, along any endangered, threatened, or other special status species and their habitat locations on Vieques Island.

4.2 Human Health Assessment

The human health risk assessment (HHRA) considers environmental media and exposure pathways that could result in current or future unacceptable risk.

This assessment will be developed in accordance with the following USEPA documents:

- *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Parts A & B*, U.S. Environmental Protection Agency/Office of Emergency and Remedial Response (OERR), EPA/540/1-89/002, December 1989 and EPA/540/R92/003, December 1991 (Interim). (RAGS, Parts A & B).

- *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Supplemental Guidance-Standard Default Exposure Factors-Interim Final*, USEPA/OERR, Office of Solid Waste and Emergency Response (OSWER) Directive: 9285.6-03, March 25, 1991.

- *Dermal Exposure Assessment: Principles and Applications. Interim Report* (USEPA, 1992).

- *Exposure Factors Handbook*. (USEPA, 1997).

- *Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Volume I (Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessment). INTERIM.* 9285.8-01D (USEPA, 1998).

- *EPA Soil Screening Guidance: Technical Background Document. EPA/540/R-95/128 (USEPA, 1996).*

The objectives of the HHRA are to:

- Characterize source media and determine the chemicals of potential concern (COPCs) for impacted environmental media.

- Identify potential receptors and quantify potential exposures for those receptors under current and future conditions for all impacted environmental media.

- Qualitatively and quantitatively evaluate the adverse effects associated with the site-specific COPCs in each medium.

- Evaluate the uncertainties related to exposure predictions, toxicological data, and resultant carcinogenic risk and noncarcinogenic hazard predictions.

The process of HHRA, as defined by RAGS Part A, can be roughly considered as a series of steps:

- **Site characterization:** Evaluation of site geography, geology, hydrogeology, climate, and demographic data.

- **Data collection:** Analysis of environmental media samples.

- **Data evaluation:** Evaluation of analytical data to establish a preliminary list of COPCs based on risk-based screening and identify nature and extent of contamination.

- **Exposure assessment:** Identification of potential receptors and exposure pathways under current and predicted future conditions and calculation/quantitation of exposure point concentrations (EPCs) and chemical intakes.

- **Toxicity assessment:** Qualitative evaluation of adverse effects of the COPCs and quantitative estimate of the relationship between exposure and severity or probability of effect.

- **Risk characterization:** Combination of exposure assessment and the toxicity assessment results used to quantify the total noncancer and cancer risk to hypothetical receptors.

- **Uncertainty:** Discussion and evaluation of areas of recognized uncertainty in human health risk assessments in addition to medium and exposure pathway-specific influences.

- **Risk/Hazard Summary:** Presentation and discussion of exposure results (risk and hazard) for the potential receptors and their exposure pathways identified under the current and future conditions.

- **Remedial Goal Options (RGO):** Computation of exposure concentrations corresponding to risk projections within the USEPA target risk range of 10^{-6} to 10^{-4} for

carcinogenic compounds of concern (COCs) and hazard quotient goals of 0.1, 1, and 3 for noncarcinogenic COCs.

4.2.1 Identification of COPCs

After the dataset is complete, statistical methods will be used to evaluate the analytical results to identify COPCs and establish exposure point concentrations (EPCs) at potential receptor locations. The statistical methods to be used in data evaluation are discussed below. The rationale used to develop this method and the statistical techniques to implement it are based on the following sources:

- RAGS Part A
- *Statistical Methods for Environmental Pollution Monitoring* (Gilbert, 1987)
- *Supplemental Guidance to RAGS: Calculating the Concentration Term.* (USEPA, 1992)

For each dataset used to describe the concentration of chemicals within the closure area, the following will be calculated: frequency of detection, range of detected values, average of detected concentrations, and the calculated 95th percentile upper confidence limit (UCL) of the mean concentrations. In accordance with guidance presented in RAGS, Part A, the lesser of either the maximum concentration detected or the 95%UCL will be used as the EPC to quantify potential exposure.

Risk-based screening will be performed to reduce the number of parameters addressed in the formal assessment. The chemicals to be addressed in the formal assessment will be selected by comparison with screening concentrations (including risk-based as well as background concentrations) as described below.

Comparison with Risk-Based Concentration

In this screening process, maximum concentrations detected in site samples will be compared to the following risk-based concentrations:

- Surface Soil: The lower of the soil screening levels (SSLs) (USEPA, 1996) for ingestion and inhalation. In the absence of chemical-specific SSLs, the risk-based concentration (RBC) for that has been derived by USEPA Region 3 for residential land use will be adopted as screening criteria. The RBC will be selected based on a carcinogenic risk level of 1E-06 for carcinogenic effects and a Hazard Quotient (HQ) of 0.1 for noncarcinogenic effects.

- Subsurface Soil: The SSL for soil-to-groundwater based on a dilution-attenuation factor (DAF) of 1.

- Groundwater: The RBC that has been derived by USEPA Region 3 for consumption of tapwater. The RBC will be selected based on a carcinogenic risk level of 1E-06 for carcinogenic effects and an HQ of 0.1 for noncarcinogenic effects.

- Surfacewater: The ambient water quality criteria (AWQC) promugated by USEPA.

- Sediment: The same screening criteria as for surface soil.

Comparison with Background Concentrations

According to USEPA guidance, an inorganic compound may be excluded from further evaluation in the risk assessment, if the maximum detected concentration is within the range of naturally occurring background levels. Therefore, an inorganic compound will be selected as a COPC if it exceeds the risk-based concentration as well as the site-specific background level.

4.2.2 Exposure Assessment

The objectives of an exposure assessment are to characterize populations that may be potentially exposed, identify actual or potential exposure pathways, and determine (and quantify, if possible) the extent of exposure. For exposure to occur, four essential elements must exist: (1) a source and mechanism of chemical release to the environment, (2) an environmental transport medium (e.g., air, or groundwater-released chemical), (3) a point of potential contact (exposure point) with the contaminated medium defined in terms of a potential dose or availability, and (4) an exposure route (e.g., inhalation, ingestion) at the contact point. Exposure to each pathway will be quantified as Chronic Daily Intake (CDI), and presented in the Quantification of Exposure section of the HHRA. Exposure concentrations will be modified where appropriate to account for factors such as the fraction of time spent in a contaminated zone or source dissipation over time.

The exposure assessment for the subject site will involve the following tasks:

- Characterize the physical setting and site land use.
- Identify COPC release and migration pathway(s).
- Identify potential receptors under various land use or site condition scenarios, and evaluate potential exposure pathways.
- Quantify intake or contact rates of COPCs for industrial scenario.

4.2.2.1 Calculation of Chronic Daily Intake

The CDI is an estimate of the intake of each COPC used to estimate risk. In this risk assessment, a point estimate of the reasonable maximum exposure (RME) for any

individual will be calculated based on the EPCs of COPCs and exposure parameters that will be selected based on site-specific information.

As stated in Section 4.2.1, the lesser of either the maximum concentration detected or the 95%UCL will be used as the EPC to quantify potential exposure. For sample sets of 10 or more, the 95% UCL will be calculated using the following equation:

$$UCL = \exp\left(\bar{x} + 0.5\,s^2 + \frac{s\,H_{0.95}}{\sqrt{n-1}}\right)$$

where:

n	=	sample size
x	=	concentration data logarithm mean
s	=	sample standard deviation of the transformed data
$H_{0.95}$	=	value for computing the one-95 percent confidence limit on a log-normal mean from standard statistical tables (Gilbert, 1987).

When fewer than 10 samples are collected, the maximum detected concentration for each COPC will be used as the EPC to compute exposure.

The exposure assumptions used to calculate the CDI will be selected based on available USEPA data as well as site-specific exposure information.

A conceptual site model that relates the source(s) of contamination, pathways of migration, transport media, and potentially exposed populations can not be developed presently due to the lack of site-specific information. Information necessary for a conceptual site model

(e.g., current and projected future use of the site and surrounding area, relative locations and activities of human populations both on- and off-site, groundwater use) will be collected during the Baseline Investigation.

4.2.3 Toxicity Assessment

The toxicity assessment evaluates the potential health impacts posed by COPCs for which exposure pathways have been identified. The USEPA has developed toxicological databases that provide information regarding common environmental media contaminants identified at hazardous waste sites. Toxicity values that will be used in this HHRA will be selected based on the following hierarchy:

- The primary information database used for this purpose is the Integrated Risk Information System (IRIS).

- In the event that toxicological information for a particular contaminant is not available in IRIS, USEPA's Heath Effects Assessment Summary Tables (HEAST) will be reviewed as a secondary reference.

- In the absence of IRIS or HEAST information for a particular chemical (not anticipated based on the existing parameter limitations), the risk assessor will pursue other avenues to evaluate the health effects of contaminant concentrations.

- USEPA's National Center for Environmental Assessment (NCEA) in Cincinnati, Ohio, retains information on a myriad of chemical compounds and may be used to supplement primary reference information.

- USEPA publications.

- COPCs that do not have chemical-specific toxicity values can sometimes use a reference value from a structurally related compound as a surrogate.

4.2.4 Risk Characterization

Information from the exposure and toxicity assessments will be integrated in this step in order to characterize the potential risks posed by COPCs. Risks will be calculated separately for carcinogenic and noncarcinogenic effects of concern. The methodology that will be used to characterize risk associated with exposure to COPCs is described below.

Carcinogenic Effects of Chemicals

Carcinogenic exposure risk is estimated as the probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen. In the low-dose range, which would be expected for most environmental exposures, cancer risk is estimated from the following linear equation (USEPA, 1989a):

$$ILCR = (CDI) \times (SF)$$

where:

ILCR = incremental lifetime excess cancer risk, a unitless expression of the probability of developing cancer, adjusted for reference incidence

CDI = chronic daily intake for an industrial worker, averaged over 70 years (mg/kg-day)

SF = cancer slope factor $(mg/kg\text{-}day)^{-1}$

When simultaneously exposed to several carcinogens, the following equation is used to sum cancer risks for one exposure pathway:

$$Risk_p = ILCR(chem_1) + ILCR(chem_2) + \ldots ILCR(chem_i)$$

where:

$Risk_p$	=	total pathway risk of cancer incidence
$ILCR(chem_i)$	=	incremental lifetime excess cancer risk for a specific chemical

Cumulative Cancer risk for a given receptor across multiple pathways and media will be summed in the same manner.

Noncarcinogenic Effects of Chemicals

Noncarcinogenic effects of chemicals are evaluated by comparing an exposure level or intake with a reference dose (RfD).

The HQ, defined as the ratio of intake to RfD, is calculated using the following equation (RAGS, Part A):

$$HQ = CDI/RfD$$

where:

HQ	=	hazard quotient (unitless)
CDI	=	intake of chemical (mg/kg-day)
RfD	=	reference dose (mg/kg-day)

Chemical noncarcinogenic effects are evaluated using chronic RfD values. An HQ of unity or 1 indicates that the estimated intake equals the RfD. If the HQ is greater than unity, there may be a concern for potential adverse health effects.

In the case of simultaneous exposure of a receptor to several chemicals, an HI will be calculated as the sum of the HQs:

$$HI = HQ_1 + HQ_2 + \ldots HQ_i$$

where:

HI	=	Hazard Index (unitless)
HQ	=	Hazard Quotient (unitless)

4.2.4.1 Identification of Chemicals of Concern

The USEPA has set standard limits (or points of departure) for carcinogens and non-carcinogens to evaluate whether significant risk is posed by a contaminant (or combination of contaminants). The outcome of the risk/hazard projections will be utilized to identify COCs for each impacted environmental medium. For carcinogens, the typical point-of-departure range is 10^{-4} to 10^{-6}. These points of departure correlate with one in 10,000 and one in 1,000,000 excess cancer resulting from exposure to environmental contaminants. For non-carcinogens, other toxic effects are generally considered possible if the HQ exceeds unity (1). Although both cancer risk and non-cancer hazard are generally additive (within each group) only if the target organ is common to multiple contaminants, a most conservative estimate of each may be obtained by summing the individual risks or hazards regardless of target organ.

This HHRA will first take the universal summation approach as suggested in RAGS. However, as discussed above, it may be appropriate to use the summation approach only for each toxicant that exhibits the same effect by the same mechanism of action. The presence of competitive inhibition (or inhibition of toxicity via an indirect mechanism) and synergistic effects will not be addressed as no means of accurately predicting these effects has been universally accepted by the regulatory or scientific community.

COCs will include those chemicals contributing an individual ILCR exceeding 10^{-6} to a cumulative risk of 10^{-4} or more, or contributing at least 0.1 to a hazard index of 1.0 or greater. The COC selection method was used to provide a more comprehensive evaluation of chemicals contributing to carcinogenic risk or noncarcinogenic hazard during the remedial development process. All decision-making activities conducted regarding risk-based closure criteria will be based upon the current/future site worker pathways.

4.2.4.2 Uncertainty Analysis

Uncertainty is a factor in each step of the exposure and toxicity assessment process. Uncertainties associated with the initial stages of the risk assessment process become magnified when they are associated with other uncertainties. Uncertainties relative to the data used as the basis of the HHRA as well as the methodology will be discussed in this section.

4.2.5 Remedial Goal Options

After identifying COCs, RGOs will be developed in accordance with USEPA guidance to provide risk managers tools to determine final cleanup goals and to move toward site closure. RGOs are chemical concentrations computed to equate with specific risk goals that may be established for a particular site. As previously discussed, COCs are identified as any COPC that significantly contributes to a pathway of concern. A pathway having an ILCR greater than 10^{-4} or an HI greater than 1 is defined as a pathway of concern, and an individual chemical

which contributes either 10^{-6} ILCR or 0.1 HI is considered to significantly contribute to the pathway ILCR or HI. RGOs will be calculated for all COCs identified. Inclusion in the RGO table does not necessarily indicate that remedial action will be required to address a specific chemical. Instead, RGOs will be provided to facilitate risk management decisions.

4.3 Ecological Risk Assessment

In consultation with the *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (USEPA, 1997), the ecological risk assessment (ERA) will be composed of eight steps and guided by scientific/management decision points in which the risk managers and the risk assessment team evaluate and approve or redirect the assessment. Each step of the assessment is intended to yield specific ecological data about areas at or near the site through source, pathway, and receptor identification. The 8-step ERA process includes:

1. Screening-Level Problem Formulation and Ecological Effects Evaluation
2. Screening-Level Preliminary Exposure Estimate and Risk Calculation
3. BRA Problem Formulation
4. Study Design and DQOs
5. Field Verification of Sampling Design
6. Site Investigation and Analysis of Exposure and Effects
7. Risk Characterization
8. Risk Management

Data collected during the Baseline Investigation will be used to conduct a Screening Level Ecological Risk Assessment. It is anticipated that the Screening Level ERA will be conducted and submitted with the Baseline Investigation Report. Based on the results of the Screening Level Assessment, additional data may be collected to conduct an ERA.

4.3.1 Step 1: Screening-Level Problem Formulation and Ecological Effects Evaluation

The primary task of the screening-level ecological assessment is to evaluate exposure pathways to ecological receptors. For a complete exposure pathway, a contaminant must be able to travel from the source to the ecological receptor and be taken up by one or more exposure routes. Identifying complete exposure pathways prior to a quantitative evaluation of toxicity will allow the assessor to focus only on those site-related contaminants that can reach ecological receptors.

Much of the AFWTF Vieques facility is undeveloped, undisturbed, and natural. Consequently, it is likely to be capable of supporting significant populations of indigenous wildlife. Migration routes will be determined from topographic and site physical information. Exposure routes and habitat types and sensitive resource areas will be evaluated as a cursory review of potential biological receptors. A habitat and biota survey will be performed to identify potential receptors and exposure points.

In consultation with the general survey methods outlined in USEPA's *Ecological Assessment of Hazardous Waste Sites: Field and Laboratory Reference (EPA/600/3-89/013)* the site will be characterized. The appropriate agencies will be contacted to document any federally or state-listed threatened or endangered species have been reported in the area (i.e., National Wetlands Inventory Maps, National Forest List, Commonwealth of Puerto Rico, U.S. Fish and Wildlife Service, etc.).

Vieques is home to 120 species of bird, four species of amphibians, 14 species of terrestrial reptiles, and seven species of terrestrial mammals. The island's coastal areas support diverse marine species, including 350 species of fish, the bottlenose dolphin, the West Indian manatee, and sea turtles.

Vieques is also within range of various terrestrial and marine species listed by the Federal and Commonwealth governments as threatened and/or endangered. These species include sea turtles, brown pelicans, peregrine falcon, Puerto Rican plain pigeon, piping plover, snowy plover, West Indian whistling duck, Caribbean coot, ruddy duck, least tern, West Indian Manatee, and humpback whales. No habitats of threatened or endangered species are known to exist within the area of the AIA containing the OB and OD units.

A screening-level ecological effects evaluation to establish contaminant exposure levels (screening ecotoxicity values) will also be conducted during this step. These values represent conservative thresholds for adverse ecological effects and are based on generic assessment endpoints applicable nationwide. Since the ecological effects of most concern are those that can impact populations or higher levels of biological organization, the standard ecotoxicity values include adverse effects on development, reproduction, and survivorship. For the screening-level ERA, assessment endpoints will be any adverse effect on plant and animal populations, habitats, and sensitive environments.

Adverse effects to potentially exposed populations at the site will be inferred from comparison of detected contaminant concentrations at the site to Region IV Ecological Screening Values reported in *Supplemental Guidance to RAGS: Region IV Bulletins — Ecological Screening Values* (USEPA 1995). Other guidance documents that will be consulted, if available to the public at the time the Screening Level ERA is conducted, are "Protocol for Screening Level Ecological Risk Assessment at Hazardous Waste Combustion Facilities (Region VI, USEPA) and "Final Ecological Criteria Documents" developed for eight explosive constituents by the Chemical Hazard Evaluation Group, Biomedical and Environmental Information Analysis Section, Health Sciences Research Division, Oak Ridge National Laboratory.

The ecological effects evaluation will also consider exposure duration, exposure routes, and the applicability of laboratory data to field conditions. If data is lacking for these parameters, assumptions, biased in the direction of overestimating risk, will be made to minimize the chances of incorrectly concluding that there is no risk. Without this bias, a screening evaluation could not provide a defensible conclusion that negligible ecological risk exists or that certain contaminants and exposure pathways can be eliminated from consideration. Analytical data for site soil, groundwater, surface water, and sediment will be collected and data from previous investigations and will be reviewed as part of Step 1. Results of this step will be used in conjunction with the exposure estimates in the preliminary risk calculation in Step 2.

4.3.2 Step 2: Screening-Level Preliminary Exposure Estimate and Risk Calculation

Step 2 is used to determine if a full ERA is necessary. If the preliminary assessment finds ecological risk to be negligible, the ERA process will be complete. Appropriate documentation, including all analysis and references used in the assessment and a discussion of the uncertainties associated with the risk estimates, must be produced. If the process continues, Step 1 information will be incorporated into the identification of exposure pathways and preliminary contaminants of concern for the baseline risk assessment and may also serve to eliminate those contaminants and exposure pathways that pose negligible risk from further investigation.

In general, information on contaminant concentrations and distribution will be determined through systematic sampling in areas where biological receptors exist or are indicated. Surface soil (0 to 1 foot) concentrations will be used to assess terrestrial risk. Most biota occupy the upper one foot interval in soil or sediment. Physical soil parameters (pH, porosity, grain size, organic content, and total organic carbon) are needed to assess physical stress and

contaminant bioavailability. If necessary, the consideration and potential influence of physical soil parameters will occur in Step 3.

For the Step 2 exposure estimate, ecological risk will be estimated by comparing maximum documented exposure concentrations with the ecotoxicity screening values from Step 1. Based on the general information generated during Step 1 on the types of potential biological receptors, only complete exposure pathways will be evaluated. For these, the highest measured onsite contaminant concentration for each medium (soil, sediment, or surface water) will be used to ensure that potential ecological threats are not omitted. For site-specific exposure parameters which are inadequate or difficult to develop, such as a receptor's ingestion rate or a contaminant's bioavailability, conservative assumptions will be used. If necessary, ingestion exposure will be modeled in Step 3 — Problem Formulation.

Preliminary Risk Calculation

Using exposure estimates and ecotoxicity values from Step 1, quantitative screening-level risk can be calculated. Screening ecotoxicity values will be compared to the maximum constituent of potential ecological concern (COPEC) concentration at the site (the Hazard Quotient approach).

For each COPEC and environmental medium, the hazard quotient will be expressed as the ratio of a potential exposure level to the Ecological Screening Value:

$$HQ = MaxConc / ESV$$

where:

HQ = Hazard Quotient

MaxConc = Maximum COPEC concentration detected at the site (e.g., mg contaminant/kg soil, mg contaminant/L water, mg contaminant/kg food)

ESV = Ecological Screening Value (USEPA Region IV RAGs Bulletin, 1995) in units that match COPEC

An HQ less than one indicates that the contaminant alone is unlikely to cause adverse ecological effects.

The screening-level risk calculation will be a conservative estimate to ensure that potential ecological threats are not overlooked. Based on available information, the calculations will also be used to evaluate whether there is potential for adverse ecological impacts. If there is a potential for adverse ecological impacts, this screening-level calculation may eliminate contaminants and exposure pathways which pose only negligible risk from further consideration.

Initial risk characterization will also include a comparison of observed contaminant values to regulatory applicable or relevant and appropriate requirements (ARARs) or To Be Considered (TBCs) values (e.g., USEPA AWQC, Water Quality Control [WQC], USEPA Sediment and Surface Water Screening Values). However, the Step 2 risk HQ calculations will not establish preliminary cleanup goals. Screening-level ecotoxicity values are derived to avoid underestimating risk and are not intended as cleanup goals.

A scientific/management decision point, which concludes that: (1) ecological threats are negligible, (2) the ERA should continue to evaluate whether a risk exists, or (3) there is a potential for adverse ecological effects, which requires a more detailed ERA incorporating more site-specific information, concludes Step 2. If existing information is inadequate or

adverse ecological effects are indicated, the ERA process will continue to Step 3. A technical memorandum will be produced to document the preliminary risk determination. The memorandum will be provided to all appropriate regulatory personnel.

4.3.3 Step 3: Baseline Risk Assessment Problem Formulation

A conceptual model will be developed to include appropriate assessment endpoints, exposure pathways, and risk questions or hypotheses. Using additional input from site personnel and other involved parties, Step 3 will refine the screening-level problem formulation and expand on the ecological issues of concern. The results of previous steps and any additional information will be used to determine the scope and goals of the baseline ERA. Assessment endpoints, or the specific ecological values to be protected, will also be identified. These endpoints may be broad (protecting aquatic communities) or specific (maintaining terrestrial community composition at structures downgradient of a site similar to that upgradient of the site). For CERCLA ERAs, assessment endpoints are generally groupings of biota which: 1) share a common habitat for those contaminants whose exposure pathway of concern is direct toxicity (e.g., terrestrial invertebrates), and 2) share a common feeding strategy for those contaminants whose exposure pathway of concern is through the food chain (e.g., avian piscivores).

Prior to the scientific/management decision points (SMDP) for this step, six activities will be conducted:

- refine preliminary COPECs
- search ecotoxicological literature for potential ecological effects of the contaminants
- qualitatively evaluate complete exposure pathways and potentially at risk ecosystems
- select assessment endpoints
- develop conceptual model
- establish risk hypotheses

COPEC refinement will eliminate certain contaminants from further consideration. Those contaminants which remain COPECs during risk screening, the assumptions (e.g., 100 percent bioavailability) will be compared against values reported in literature. HQs will be changed to reflect more realistic assumptions (e.g., 60 percent bioavailability).

The screening-level literature search conducted in Step 1 will be expanded to obtain more detailed information. The search should identify no observed adverse effect levels (NOAELs), lowest observed adverse effect levels (LOAELs), exposure-response functions, and the mechanisms of toxic responses for COPECs not included in Step 1.

In Step 3, the exposure pathways and the ecosystems associated with the assessment endpoints will be evaluated in more detail, including contaminant fate and transport, ecological setting, and the magnitude and extent of contamination, including relative spatial and temporal variability. Stakeholders will be notified of any changes to the exposure parameters.

Assessment endpoints for the ERA will be selected based on the ecosystems, communities, and/or species potentially present at the site. The selection process will be influenced by other phases of the problem formulation phase since it depends on COPECs and their concentrations, mechanisms of COPEC toxicity to different groups of organisms, presence of potentially sensitive or highly exposed receptor groups, and potentially complete exposure pathways. Consideration will be given to receptors which will or could be at risk and: 1) how the adverse effects of the contaminants might be expressed, 2) how the chemical and physical form of the contaminants influence bioavailability and 3) the type and magnitude of adverse response.

Step 3 will also evaluate whether the contaminants can adversely affect an organism in direct contact with the contaminated media or if the contaminants accumulate in food chains,

resulting in adverse effects to indirectly or minimally exposed organisms. Then, a decision will be made by the risk managers to focus on toxicity resulting from direct and/or indirect exposures.

An integrated conceptual model will be developed based on the information obtained during previous steps, knowledge of the contaminants present, the exposure pathways, and the assessment endpoints. The model will include a contaminant fate and transport diagram that traces the contaminants from their sources through the ecosystem to receptors that include the assessment endpoints.

Risk questions will then be applied to the baseline ERA. The questions will be based on assessment endpoints and provide a basis for developing the Step 4 study design and evaluating the results of the site investigation and subsequent risk characterization. The basic risk question asks whether site-related contaminants are causing or have the potential to cause adverse effects on the assessment endpoints.

A scientific/management decision point then summarizes the agreement reached between risk managers and risk assessors on four items: 1) COPECs, 2) assessment endpoints, 3) exposure pathways, and 4) risk questions. Upon agreement, measurement endpoints will be selected and a site study is developed.

4.3.4 Step 4: Study Design and Data Quality Objectives

Measurement endpoints, which are measurable ecological characteristics related to specific assessment endpoints, are developed in Step 4. For example, to determine if reproductive impairment in predatory birds (the assessment endpoint) is a result of soil contamination at a site, tissue concentrations in prey species would be measured (measurement endpoint). The complete conceptual model will be used to develop a study design and DQOs based on

statistical considerations for the site assessment. The model also will identify which assumptions in the screening-level ERA (Steps 1 and 2) were the most conservative or significantly increased the risk prediction's overall uncertainty. Field sampling will address risk model parameters that have important effects on risk estimates (e.g., contaminant toxicity and concentrations at exposure points). When possible, ERA field sampling efforts will incorporate data needs of other sampling efforts to reduce sampling costs and prevent redundant sampling.

Once information regarding site reuse is available a separate Work Plan and Sampling and Analysis Plan (WP and SAP) for the ecological component of the field investigation will be developed during this step. Consultation with Commonwealth of Puerto Rico, USEPA, and other stakeholders on the preparation, review, and approval of the proposed WP and SAP will help ensure that the proposed ERA is well-focused, efficient, and technically correct.

The Ecological WP and SAP will specify the site conceptual model developed in Step 3 and the measurement endpoints developed at the beginning of Step 4. The WP will describe assessment endpoints, exposure pathways, questions and test hypotheses, measurement endpoints and their relation to assessment endpoints, and uncertainties and assumptions. The SAP will describe data needs, scientifically valid and sufficient study design and data analysis procedures, data reduction and interpretation methods, and a discussion of the statistical analyses that will be used. The SAP will also discuss the quality assurance procedures and quality control techniques.

4.3.5 Step 5: Field Verification of Sampling Design

Before implementation of final ERA WP and SAP, the appropriateness and implementability of the proposed field sampling plan, including the testable hypotheses, exposure pathway models, and measurement endpoints will be verified. The primary purpose of Step 5 is to ensure that

samples specified by the SAP can actually be collected and DQOs can be met. Species associated with a specified measurement endpoint will include only those that have been observed during the preliminary site characterization or noted during previous site visits. Previously obtained information will be verified and the feasibility of sampling will be checked by a site visit.

The need for reference areas also should be evaluated in this step. Reference areas are sites as similar as possible to the habitat associated with the site in all aspects except contamination. Therefore, stressors or contaminants identified in an appropriate reference area may offer insight into effects from background conditions that may otherwise have been considered site-related. If several onsite habitats or habitat variables are included in the ERA, then several reference areas may be required. For any necessary plan modifications, verification of the field sampling plan prior to conducting the full site investigation will be made to the study design or implementation to ensure that the ERA meets the study objectives.

4.3.6 Step 6: Site Investigation and Analysis of Exposure and Effects

Specific-site sampling and surveys are included as Step 6. They should be a direct implementation of the study designed in Steps 4 and 5 and reflect information gathered during the previous steps. Information collected during Step 6 will be used to characterize exposures and ecological effects. Although much of the information for characterizing ecological effects will have been gathered from the literature review, the site investigation may provide evidence of existing ecological impacts and additional exposure-response information. If unexpected site conditions are encountered, the feasibility or adequacy of the sampling design will be reevaluated.

After information has been collected on contaminants (including general sampling conducted during Steps 1 and 2), a study on the general characteristics of the stressor will be completed.

This study will provide specific information on intensity, chemical alteration, duration, and secondary effects of the stressor chemical. Site-specific information on soil and water chemistry will aid in assessing the potential effects of the stressor.

The analysis phase of the ERA will consist of evaluating all data obtained through Step 6, for existing and potential exposures and ecological effects. Analysis of exposure and effects will be performed interactively, and comply with methods specified in the WP and SAP. Site-specific data obtained during Step 6 will replace many of the assumptions that were made for the screening-level analysis in Steps 1 and 2. Evidence of an exposure-response relationship between contamination and ecological responses near the AFWTF facility will help establish causality. The results of Step 6 are used to characterize ecological risks in Step 7.

4.3.7 Step 7: Risk Characterization

Risk characterization is the final phase of the risk assessment process. Data on exposure and effects on measurement endpoints will be integrated into a statement about risk to the assessment endpoints. A weight-of-evidence approach will be used to interpret the implications of various studies for the assessment endpoints. This risk estimation will consist of integrating the exposure profiles with the exposure-effects information and summarizing the associated uncertainties. Together, this information will help evaluate the ecological significance of risk estimates in the absence of remedial activities. The risk estimate will also identify a threshold for effects on the assessment endpoint as a range between contaminant concentrations identified as posing no ecological risk and the lowest contaminant concentration identified as likely to produce adverse ecological effects. The lower bound may be based on consistent conservative assumptions and NOAEL toxicity values. The upper bound may be based on observed impacts or ecological impacts predictions using consistent assumptions, site-specific data, LOAEL toxicity values or an impact evaluation. Information regarding the strengths and limitations of the assessment will also be identified and described.

4.3.8 Step 8: Risk Management

During risk characterization, the threshold for effects on the assessment endpoint will have been identified. In Step 8, clean-up criteria within acceptable risk levels will be determined based on numerous criteria, such as protection of human health and the environment, long-term effectiveness, implementability, cost, and community acceptance. Other factors may include existing background levels, current and future industrial uses, and local, regional, and national ecological significance of the site. The ecological impacts of remedial options as well as residual risks associated with no action must be considered.

5.0 HEALTH AND SAFETY PLAN

5.1 Introduction

Before starting any field work, the entity performing the field work described in this work plan must submit an unexploded ordnance health and safety plan (HASP) for review, comment and approval by the Officer-In-Charge, Explosive Ordnance Disposal (EOD) Detachment, Naval Station Roosevelt Roads, prior to implementation of the work plan. This work plan will detail the procedures to be used to assure unexploded ordnance safety for access to and from all sample locations and the areas around them, and for all subsurface investigations, shallow hand augering, and any shallow or deep borings. Achieving this goal will require using appropriate procedures for subsurface vertical detection of ordnance at depth, which will be conducted only by appropriately trained, experienced, licensed and certified personnel, in accordance with Navy procedures and as approved by the Navy. The HASP must be administered by a qualified health and safety professional and comply with all applicable federal, state, and local health and safety requirements. All work must be performed in accordance with the accepted plan.

5.2 Applicability

The HASP provisions are mandatory for all contractors involved in corrective action field activities who will be or could be exposed to onsite hazardous substances and physical hazards. Site personnel will operate in accordance with the most current requirements of Title 29 CFR 1910.120, *Standards for Hazardous Waste Operations and Emergency Response*, 29 CFR 1926, *Construction Standards*, and the *U. S. Army Corps of Engineers Safety and Health Requirements Manual*. These regulations include the following provisions for employees exposed to hazardous substances, health hazards, or safety hazards: training as described in §120(e), medical surveillance as described in §120(f), and personal protective equipment as described in §120(g).

Site work will be suspended and the area evacuated if the contractor does not take adequate safety precautions, or it is believed that the contractor is or may be exposed to an immediate health hazard.

Health and safety training certificates will be maintained onsite for all contractor employees who may be exposed to onsite hazardous substances. Current Occupational Safety and Health Administration training or refresher training certificates will be included for employees involved in field activities.

5.3 Site Activities

Extreme caution and adherence to approved safety procedures are mandatory when conducting the field work described in this work plan. Unless specifically designated otherwise by qualified Navy EOD personnel, all areas identified as sampling locations in this work plan will be assumed to potentially contain unexploded military munitions which could detonate and maim or kill personnel if detonated.

Therefore, an EOD team, either provided by the Navy or others utilizing procedures and personnel acceptable to the Navy, will sweep all access routes and areas where field work will be conducted before any field work begins. The EOD team shall demonstrate appropriate skills, experience and credentials which shall, at a minimum, include graduation from the U.S. Naval EOD School in Indian Head, Maryland. In addition, supervisory personnel onsite shall have been awarded the Master EOD Skill Badge. If any suspected ordnance is found, it will be removed or the area around the object will be flagged so that the investigation can proceed without disturbing it. No field personnel will be allowed to enter the site during the EOD sweep. Site communications equipment (two-way radios, cellular phones, etc.) must be approved by the facility safety office before use.

A1.
Quality Assurance Project Plan
for the
Baseline Investigation Work Plan
AFWTF Vieques, Puerto Rico

Prepared by:

EnSafe Inc.
5724 Summer Trees Drive
Memphis, Tennessee 38134

June 29, 2000

_____	_____
LANTNAVFACENGCOM Engineer-In Charge	**Date**
_____	_____
Contractor Project Manager	**Date**
_____	_____
Contractor QA Manager	**Date**
_____	_____
USEPA Project Manager	**Date**

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A. PROJECT MANAGEMENT

A3. Distribution List

Roberto P. Pagtalunan, LANTNAVFACENGCOM (Engineer-in-Charge)

Wilfredo Rivera, Naval Station Roosevelt Roads, (Public Works Department)

Carl A. Soderberg, USEPA Caribbean Division, (Project Manager)

Israel Torres, Director, Puerto Rico Environmental Quality Board, (Land Pollution Regulation)

Contractor, (Project Manager, Quality Assurance Manager, Site Supervisor)

A4. Project/Task Organization

The individuals directly involved with the Baseline Investigation at Atlantic Fleet Weapons Training Facility (AFWTF) Vieques, Puerto Rico, and their specific responsibilities are outlined below. Figure A-1 is an organization chart showing lines of responsibility and reporting responsibilities.

Roberto P. Pagtalunan, LANTNAVFACENGCOM Engineer-in-Charge: Overall coordination of the project and decision maker. Review and approve Quality Assurance Project Plan (QAPP) and subsequent revisions in terms of project scope and objectives.

Carl A. Soderberg, USEPA Caribbean Division Project Manager: Review and approval of QAPP and subsequent revisions. Conduct regulatory assessments of field activities, if necessary.

Contractor Project Manager: Overall coordination of field work. Oversee preparation of QAPP. Implement final, approved version of QAPP.

Contractor Quality Assurance Manager: Review and approval of QAPP. Conduct in-house audits of field operations, when needed.

Contractor Site Supervisor: Direct the sampling operations according to the QAPP.

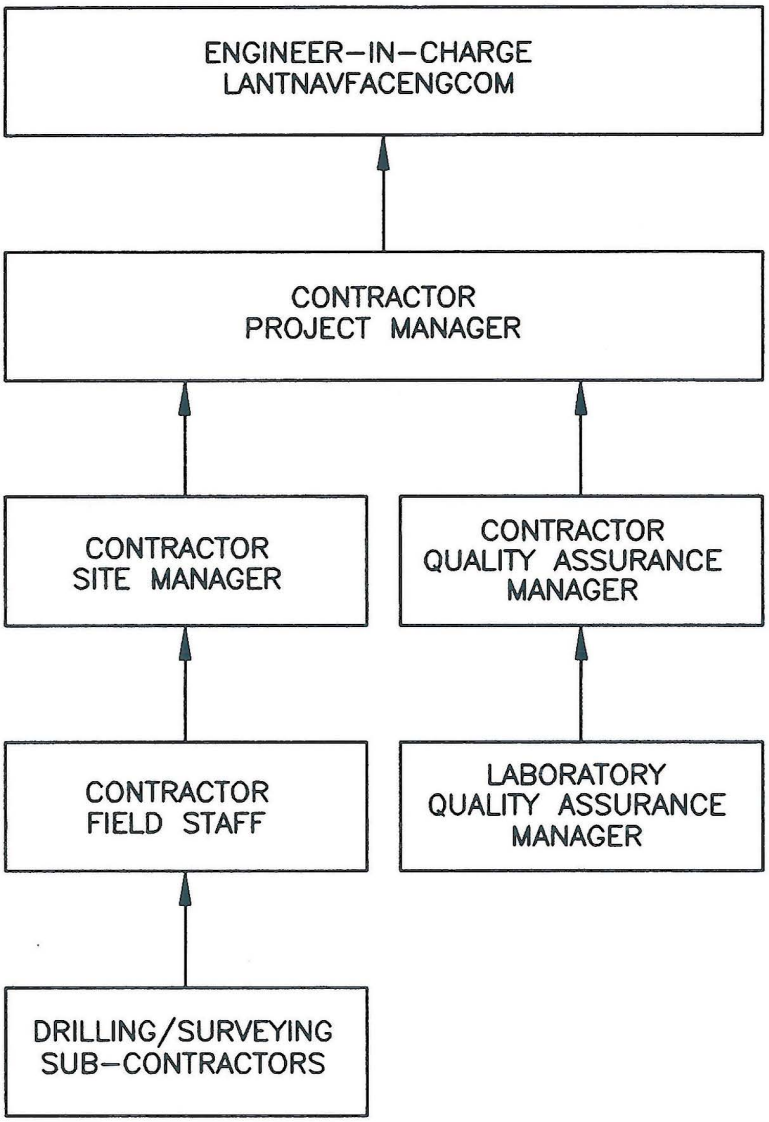

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FIGURE A–1
AFTWF, VIEQUES, PR
PROJECT ORGANIZATION CHART

DWG DATE: 06/27/00 | DWG NAME: 5901G044

A5. Problem Definition/Background

A5.1 Purpose/Background

A detailed discussion of the site background, facility location, and history may be found in Section 1 of the Baseline Investigation Work Plan.

A5.2 Problem Statement and Background

A detailed discussion of the problem statement and objectives may be found in Section 1 of the Baseline Investigation Work Plan.

A6. Project/Task Description and Schedule

A detailed description if the sampling activities may be found in Section 3 of the Baseline Investigation Work Plan. A project schedule is provided in Section 2 of that document. Table A-1 of this QAPP summarizes the sampling program.

A7. Quality Objectives and Criteria for Measurement Data

The project data quality objective is to provide valid data of known and documented quality to determine the concentrations of contaminants at the OB/OD units. Definitive data, as established in Guidance for the Data Quality Objective Process, EPA/600/R-96/055 (September 1994), will be collected for use in evaluating risk to human health and the environment. Sampling, analytical, and data validation procedures will conducted in accordance with USEPA Region 2's CERCLA Quality Assurance Manual (1989).

Precision, accuracy, representativeness, comparability, and completeness will be addressed by collecting, analyzing, and reporting the data as described in this document. Table A-2 presents the analytical parameters, associated detection limits, and human health screening levels.

Table A-1
Summary Table of Sampling and Analysis Program

Location	Sample Matrix	Field Parameters	Laboratory Parameters	Number of Samples	Duplicates	Trip Blanks	Field Blanks	Equipment Rinsate Blanks	MS/MSD	Total Samples
OB/OD Units	Soil	Standard Penetration Test (Blow Counts)	TAL Inorganics, Cyanide, TCL VOCs, SVOCS, Pesticides/PCBs, Explosives + Nitroglycerin and PETN	50	5	1	1	1	3	61
			Geotechnical Analysis	*	0	0	0	0	0	0
	Sediment	none	TAL Inorganics, Cyanide, TCL VOCs, SVOCS, Pesticides/PCBs, Explosives + Nitroglycerin and PETN	3	1	1	0	1	1	7
	Surface Water	none	TAL Inorganics, Cyanide, TCL VOCs, SVOCS, Pesticides/PCBs, Explosives + Nitroglycerin, PETN, perchlorate, and picric acid	2	1	1	0	1	1	6
	Groundwater	water level, total dissolved solids, pH, specific conductivity, turbidity, dissolved oxygen, and salinity	TAL Inorganics, Cyanide, TCL VOCs, SVOCS, Pesticides/PCBs, Explosives + Nitroglycerin, PETN perchlorate, and picric acid	4	1	1	0	1	1	8
Reference Locations	Soil	Standard Penetration Test	TAL Inorganics, Cyanide, TCL VOCs, SVOCS, Pesticides/PCBs, Explosives + Nitroglycerin and PETN	20	2	1	1	1	1	26
	Sediment	none	TAL Inorganics, Cyanide, TCL VOCs, SVOCS, Pesticides/PCBs, Explosives + Nitroglycerin and PETN	4	1	1	0	1	1	8

Table A-1
Summary Table of Sampling and Analysis Program

Location	Sample Matrix	Field Parameters	Laboratory Parameters	Number of Samples	Duplicates	Trip Blanks	Field Blanks	Equipment Rinsate Blanks	MS/MSD	Total Samples
	Surface Water	none	TAL Inorganics, Cyanide, TCL VOCs, SVOCS, Pesticides/PCBs, Explosives + Nitroglycerin, PETN perchlorate, and picric acid	2	1	1	0	1	1	6
	Groundwater	water level, total dissolved solids, pH, specific conductivity, turbidity, dissolved oxygen, and salinity	TAL Inorganics, Cyanide, TCL VOCs, SVOCS, Pesticides/PCBs, Explosives + Nitroglycerin, PETN perchlorate, and picric acid	2	1	1	0	1	1	6

Notes:
VOCs = volatile organic compounds
SVOCs = semivolatile orgnanics compounds
PCBs = polychlorinated biphenyls
PETN = pentataerythritol
TCL = target compound list
TAL = target analyte list
* = analysis for these parameters will be performed on selected soil samples based on geologic conditions encountered during the investigation.
Geotechnical parameters = grain-size distribution , Atterberg Limits, moisture content, vertical permeability, and porosity

Detection limits are described in many different terms depending on the analysis being performed and the capabilities of the instrument. The following terms are important in describing detection limits:

- CLP Organic Contract Required Quantitation Limit (CRQL) and CLP Inorganic Contract Required Detection Limit (CRDL) are stipulated by the CLP method as the nominal levels laboratories are required to report. These levels are not necessarily the lowest *detectable* levels.

- SW-846 Practical Quantitation Limit (PQL) or Method Quantitation Limit (MQL) is used to determine the extent of contaminants in media. The organic PQL/MQL is the lowest non-zero standard concentration in the laboratory's initial calibration curve. Inorganic PQLs will be demonstrated by analyzing a PQL standard during an analytical sequence. These levels are not necessarily the lowest *detectable* levels.

- Organic Method Detection Limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from the analysis of a sample in a given matrix type containing the analyte. It is the lowest concentration of an analyte a method can reliably detect taking into consideration the reagents and preparation steps applied to a sample.

- Inorganic Instrument Detection Limit (IDL) is defined as the lowest amount of an element that can be detected above normal random background noise that can be reliably detected under ideal conditions. It is established by determining three times the standard deviation of seven replicate analyses of the analyte at the lowest concentration level that is statistically different from the blank. Inorganic IDLs are generally performed quarterly and are dependent on instrument sensitivity.

Table A-2
Project Detection Limits and Screening Values

CAS #	Parameter		Groundwater Screening Value (mg/L)[1]	Surface Soil Screening Value (mg/kg)[2]	Subsurface Soil Screening Value (mg/kg)[3]	Low Water Quantitation Limits (mg/L)[4]	Low Soil Quantitation Limit (mg/kg)[5]	Notes
			Semi-volatile Organic Compounds					
111444	bis(2-Chloroethyl)ether	C[6]	0.009590	0.2	0.00002	5	0.33	
108952	Phenol	N[7]	21900	47000	5	5	0.33	
95578	2-Chlorophenol	N	30.42	390	0.2	5	0.33	
541731	1,3-Dichlorobenzene	N	5.475	7.039		5	0.33	A
106467	1,4-Dichlorobenzene	C	0.4727	27	0.1	5	0.33	
95501	1,2-Dichlorobenzene	N	547.5	560	0.9	5	0.33	
108601	2,2'-oxybis(1-Chloropropane)	C	0.2604	9.125		5	0.33	
95487	2-Methylphenol	N	1825	3900	0.8	5	0.33	
67721	Hexachloroethane	C	4.784	46	0.02	5	0.33	
621647	N-Nitroso-di-n-propylamine	C	0.009567	0.09	0.000002	5	0.33	
106445	4-Methylphenol	N	183	39.11		5	0.33	A
98953	Nitrobenzene	N	3.532	39	0.007	5	0.33	
78591	Isophorone	C	70.50	670	0.03	5	0.33	
88755	2-Nitrophenol	N	73	160		5	0.33	B
105679	2,4-Dimethylphenol	N	730	1600	0.4	5	0.33	
111911	bis(2-Chloroethoxy)methane	C	0.00480	0.0029		5	0.33	C
120832	2,4-Dichlorophenol	N	110	230	0.05	5	0.33	

Table A-2
Project Detection Limits and Screening Values

CAS #	Parameter		Groundwater Screening Value (mg/L)[1]	Surface Soil Screening Value (mg/kg)[2]	Subsurface Soil Screening Value (mg/kg)[3]	Low Water Quantitation Limits (mg/L)[4]	Low Soil Quantitation Limit (mg/kg)[5]	Notes
			Semi-volatile Organic Compounds					
120821	1,2,4-Trichlorobenzene	N	194	780	0.3	5	0.33	
91203	Naphthalene	N	6.511	3100	4	5	0.33	
106478	4-Chloroaniline	N	146	31.29		5	0.33	A
87683	Hexachlorobutadiene	C	0.859	8	0.1	5	0.33	
59507	4-Chloro-3-methylphenol	N	30.42	390		5	0.33	D
91576	2-Methylnaphthalene	N	121.7	156.4		5	0.33	A
77474	Hexachlorocyclopentadiene	N	255.5	10	20	5	0.33	
88062	2,4,6-Trichlorophenol	C	6.088	58	0.008	5	0.33	
95954	2,4,5-Trichlorophenol	N	3650	7800	14	20	0.83	
91587	2-Chloronaphthalene	N	486.7	625.7		5	0.33	A
88744	2-Nitroaniline					20	0.83	E
208968	Acenaphthylene	N	365	4700		5	0.33	F
131113	Dimethylphthalate	N	365000	78214		5	0.33	A
606202	2,6-Dinitrotoluene	N	36.5	0.9	0.00003	5	0.33	
83329	Acenaphthene	N	365	4700	29	5	0.33	
99092	3-Nitroaniline					20	0.83	E
51285	2,4-Dinitrophenol	N	73	160	0.01	20	0.83	
132649	Dibenzofuran	N	24.333	31.29		5	0.33	A

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CAS #	Parameter		Groundwater Screening Value (mg/L)[1]	Surface Soil Screening Value (mg/kg)[2]	Subsurface Soil Screening Value (mg/kg)[3]	Low Water Quantitation Limits (mg/L)[4]	Low Soil Quantitation Limit (mg/kg)[5]	Notes
			Semi-volatile Organic Compounds					
121142	2,4-Dinitrotoluene	N	73	0.9	0.00004	5	0.33	
100027	4-Nitrophenol	N	292	62.57		20	0.83	A
86737	Fluorene	N	243.333	3100	28	5	0.33	
7005723	4-Chlorophenylphenyl ether					5	0.33	E
84662	Diethylphthalate	N	29200	2000	23	5	0.33	
100016	4-Nitroaniline					20	0.83	E
534521	2-Methyl-4,6-Dinitrophenol	N	3.65	0.7821		50	0.83	A
86306	N-Nitrosodiphenylamine	C	13.668	130	0.06	5	0.33	
101553	4-Bromophenyl-phenylether					5	0.33	
118741	Hexachlorobenzene	C	0.0419	0.4	0.1	5	0.33	
87865	Pentachlorophenol	C	0.558	3	0.001	20	0.83	
85018	Phenanthrene	N	182.5	2300		5	0.33	G
120127	Anthracene	N	1825	23000	590	5	0.33	
86748	Carbazole	C	3.349	32	0.03	5	0.33	
84742	Di-n-butylphthalate	N	3650	2300	270	5	0.33	
206440	Fluoranthene	N	1460	3100	210	5	0.33	
129000	Pyrene	N	182.5	2300	210	5	0.33	

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CAS #	Parameter		Groundwater Screening Value (mg/L)[1]	Surface Soil Screening Value (mg/kg)[2]	Subsurface Soil Screening Value (mg/kg)[3]	Low Water Quantitation Limits (mg/L)[4]	Low Soil Quantitation Limit (mg/kg)[5]	Notes
				Semi-volatile Organic Compounds				
85687	Butylbenzylphthalate	N	7300	930	810	5	0.33	
91941	3,3'-Dichlorobenzidine	C	0.149	1	0.0003	5	0.33	
56553	Benzo(a)anthracene	C	0.0917	0.9	0.08	5	0.33	
218019	Chrysene	C	9.174	88	8	5	0.33	
117817	bis(2-Ethylhexyl)phthalate	C	4.784	46	180	5	0.33	
117840	Di-n-octylphthalate	N	730	1600	10000	5	0.33	
205992	Benzo(b)fluoranthene	C	0.0917	0.9	0.2	5	0.33	
207089	Benzo(k)fluoranthene	C	0.917	9	2	5	0.33	
50328	Benzo(a)pyrene	C	0.00917	0.09	0.4	5	0.33	
193395	Indeno(1,2,3-cd)pyrene	C	0.0917	0.9	0.7	5	0.33	
53703	Dibenz(a,h)anthracene	C	0.00917	0.09	0.08	5	0.33	
191242	Benzo(g,h,i)perylene	N	182.5	234.6		5	0.33	A
				Volatile Organic Compounds				
74873	Chloromethane	C	2.111	49.13		1	0.01	
75014	Vinyl chloride	C	0.0191	0.03	0.0007	1	0.01	
74839	Bromomethane	N	8.517	10	0.01	1	0.01	
75003	Chloroethane	C	3.638	220.3		1	0.01	
75354	1,1-Dichloroethene	C	0.0436	1.065		1	0.01	

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				Volatile Organic Compounds				
67641	Acetone	N	608.333	7800	0.8	5	0.01	
75150	Carbon disulfide	N	1042.857	720	2	1	0.01	
75092	Methylene chloride	C	4.102	13	0.001	2	0.01	
75343	1,1-Dichloroethane	N	798.438	1300	1	1	0.01	
78933	2-Butanone	N	1906.086	4693		5	0.01	A
67663	Chloroform	C	0.152	0.3	0.03	1	0.01	
71556	1,1,1-Trichloroethane	N	3171.724	1200	0.1	1	0.01	
56235	Carbon tetrachloride	C	0.162	0.3	0.003	1	0.01	
71432	Benzene	C	0.319	0.8	0.002	1	0.01	
107062	1,2-Dichloroethane	C	0.116	0.4	0.001	1	0.01	
79016	Trichloroethene	C	1.554	5	0.003	1	0.01	
78875	1,2-Dichloropropane	C	0.155	9	0.001	1	0.01	
75274	Bromodichloromethane	C	0.170	10	0.03	1	0.01	
10061015	cis-1,3-Dichloropropene	C	0.0765	4	0.0002	1	0.01	H
108101	4-Methyl-2-Pentanone	N	139.048	625.7		5	0.01	A
108883	Toluene	N	747.038	650	0.6	1	0.01	
10061026	trans-1,3-Dichloropropene	C	0.0765	3.548		1	0.01	H

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				Volatile Organic Compounds				
79005	1,1,2-Trichloroethane	C	0.188	1	0.0009	1	0.01	
127184	Tetrachloroethene	C	1.068	11	0.003	1	0.01	
591786	2-Hexanone	N	1460	312.9		5	0.01	A
124481	Dibromochloromethane	C	0.126	8	0.02	1	0.01	
540590	1,2-Dichloroethene (total)	N	54.75	0.07	0.003	1	0.01	
1330207	Xylene (Total)	N	12166.667	15643		1	0.01	A
108907	Chlorobenzene	N	106.068	130	0.07	1	0.01	
100414	Ethylbenzene	N	1339.873	400	0.7	1	0.01	
100425	Styrene	N	1623.484	1500	0.2	1	0.01	
75252	Bromoform	C	8.478	53	0.04	1	0.01	
79345	1,1,2,2-Tetrachloroethane	C	0.0527	0.6	0.0002	1	0.01	
				Inorganics				
7429905	Aluminum	N	36500	7821		200	0.04	IA
7440360	Antimony	N	14.6	31	0.3	60	0.012	I
7440382	Arsenic	C	0.0446	0.4	1	10	0.002	I
7440393	Barium	N	2555	5500	82	200	0.04	I
7440417	Beryllium	N	73	0.1	3	5	0.001	I

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				Inorganics				
7440439	Cadmium-water	N	18.25	78	0.4	5	0.001	
7440702	Calcium					5000	1	IJ
7440473	Chromium (VI)	N	109.5	270	2	10	0.002	I
7440484	Cobalt	N	2190	469.3		50	0.01	IA
7440508	Copper	N	1460	312.9		25	0.005	IA
7439896	Iron	N	10950	2346		100	0.02	IA
7439921	Lead		0.015	400	0	3	0.0006	IK
7439954	Magnesium					5000	1	IJ
7439965	Manganese-nonfood	N	730	156.4		15	0.003	I, A
7439976	Mercury	N	10.95	10	0.1	0.2	0.00004	I, L
7440020	Nickel	N	730	1600	7	40	0.008	I
7440097	Potassium					5000	1	I, J
7782492	Selenium	N	182.5	390	0.3	5	0.001	I
7440224	Silver	N	182.5	390	2	10	0.002	I
7440235	Sodium					5000	1	I, J
7440280	Thallium	N	2.555	0.255	0.04	10	0.002	I
7440622	Vanadium	N	255.5	550	300	50	0.01	I
7440666	Zinc	N	10950	23000	620	20	0.004	I
57125	Cyanide	N	730	1600	2	10	0.002	I

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				Pesticides/PCBs				
319846	alpha-BHC	C	0.0106	0.1	0.00003	0.01	0.0017	
319857	beta-BHC	C	0.0372	0.4	0.0001	0.01	0.0017	
319868	delta-BHC	C	0.0106	0.1		0.01	0.0017	M
58899	gamma-BHC (Lindane)	C	0.0515	0.5	0.0005	0.01	0.0017	
76448	Heptachlor	C	0.0149	0.1	1	0.01	0.0017	
309002	Aldrin	C	0.00394	0.04	0.02	0.01	0.0017	
1024573	Heptachlor epoxide	C	0.00736	0.07	0.03	0.01	0.0017	
959988	Endosulfan I	N	219	470	0.9	0.01	0.0017	N
60571	Dieldrin	C	0.00419	0.04	0.0002	0.02	0.0033	
72559	4,4'-DDE	C	0.197	2	3	0.02	0.0033	
72208	Endrin	N	10.95	23	0.05	0.02	0.0033	
33213659	Endosulfan II	N	219	46.93		0.02	0.0033	A, O
72548	4,4'-DDD	C	0.279	3	0.8	0.02	0.0033	
1031078	Endosulfan sulfate	N	219	46.93		0.02	0.0033	A, O
50293	4,4'-DDT	C	0.197	2	2	0.02	0.0033	
72435	Methoxychlor	N	182.5	390	8	0.1	0.017	
53494705	Endrin ketone	N	18.25	3.911		0.02	0.0033	A, P
7421934	Endrin aldehyde	N	18.25	3.911		0.02	0.0033	A, P
5103719	alpha-Chlordane	C	0.191	1.825		0.01	0.017	Q

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				Pesticides/PCBs				
5103742	gamma-Chlordane	C	0.191	1.825		0.01	0.017	Q
8001352	Toxaphene	C	0.0609	0.6	2	1	0.17	
12674112	Aroclor-1016	C	0.957	1	0	0.2	0.033	
11104282	Aroclor-1221	C	0.0335	1	0	0.4	0.067	
11141165	Aroclor-1232	C	0.0335	1	0	0.2	0.033	
53469219	Aroclor-1242	C	0.0335	1	0	0.2	0.033	
12672296	Aroclor-1248	C	0.0335	1	0	0.2	0.033	
11097691	Aroclor-1254	C	0.0335	1	0	0.2	0.033	
11096825	Aroclor-1260	C	0.0335	1	0	0.2	0.033	
				Explosives				
2691410	Cyclotetramethylenetetranitramine (HMX)	N	1825	391.1		0.5-1.0	250-500	R,S
121824	RDX (Cyclonite)	C	0.609	5.807		0.5-1.0	250-500	R,S
99354	1,3,5-Trinitrobenzene	N	1095	234.6		0.5-1.0	250-500	R,S
479458	Trinitrophenylmethylnitramine(TETRYL)	N	365	78.21		0.5-1.0	250-500	R,S
99650	1,3-Dinitrobenzene	N	3.65	0.782		0.5-1.0	250-500	R,S
118967	Trinitrotoluene, 2,4,6-	N	2.232	2.129		0.5-1.0	250-500	R,S
98953	Nitrobenzene	N	3.532	39	0.007	0.5-1.0	250-500	R,S
606202	2,6-Dinitrotoluene	N	36.5	0.9	0.00003	0.5-1.0	250-500	R,S

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				Explosives				
121142	2,4-Dinitrotoluene	N	73	0.9	0.00004	0.5-1.0	250-500	R,S
88722	o-Nitrotoluene	N	60.833	78.21		0.5-1.0	250-500	R,S
99990	p-Nitrotoluene	N	60.833	78.21		0.5-1.0	250-500	R,S
99081	m-Nitrotoluene	N	121.667	156.4		0.5-1.0	250-500	R,S
3058386	Triaminotrinitrobenzene (TATB)							
55630	Nitroglycerin	C	4.8	46				
14797730	Perchlorate		18					T
88891	Picric Acid		5					

Notes:
[1] Region 3 risk-based concentration (RBC) for tap water (USEPA, 2000
[2] Value presented is the lower of the ingestion and inhalation soil screening levels (SSLs) for each parameter (USEPA, 1996). When a SSL was not available, the Region 3 RBC was used.
[3] Value presented is the SSl for the migration to groundwater pathway assuming a dilution attenuation factor of 1.
[4] Values are the contract required quantitation limits (CRQLs) for VOCs, SVOCs, and Pests/PCBs; contract required detection limits (CRDLs) for inorganics; Estimated Quantitation Limits for Explosives
Organics: USEPA Contract Laboratory Program, *Statement of Work for Organics Analysis*, OLC02.1, February, 1996.
Inorganics: USEPA Contract Laboratory Program, *Statement of Work for Inorganics Analysis: Multi-Media Multi-Concentration*, ILM03.3.
[5] Values are the contract required quantitation limits (CRQLs) for VOCs, SVOCs, and Pests/PCBs; contract required detection limits (CRDLs) for inorganics; Estimated Quantitation Limits for Explosives
Organics: USEPA Contract Laboratory Program, *Statement of Work for Organics Analysis*, OLC02.1, February, 1996.
Inorganics: USEPA Contract Laboratory Program, *Statement of Work for Inorganics Analysis: Multi-Media Multi-Concentration*, ILM03.3.
[6] C indicates RBC based on carcinogenic toxicity value.

[7] N indicates RBC based on noncarcinogenic toxicity value.

A) For noncarinogens, the value presented is the risk-based concentration (RBC) adjusted to a hazard quotient of 0.1

B) Used 2, 4 dinitrophenol as a surrogate
C) Used bis (chloromethyl) ether as a surrogate
D) Used 2 - chlorophenol as a surrogate
E) Toxicity values are not available for 4-bromophenylether and 4-chlorophenyl ether. Because surrogate compounds could not be identified, the laboratory CRQL will be used.
F) Used acenapthene as a surrogate.
G) Used pyrene as a surrogate.
H) Used 1, 3 dichloropropene as a surrogate
I) Water CRDL obtained by multiplying soil CRDL by 0.2.
J) Essential nutrient
K) The groundwater value is the treatment technique action level (USEPA, 1996). The soil value is the residential soil screening concentration (USEPA, 1994).
L) Used mercuric chloride as a surrogate.
M) Used alpha-bhc as a surrogate.
N) Used Endosulfan as a surrogate.
O) See note N.
P) Used Endrin as a surrogate.
Q) Used chlordane as a surrogate
R) DLS
S) Detection limits may change based on detection limits at the time of analysis
T) Perchlorate is not regulated under the Safe Drinking Water Act. Currently the USEPA provisional reference dose si 4-18 (ppb. The State of California has set a provisional action level for perchlorate in drinking water at 18 ppb.

- Sample Quantitation Limit (SQL) is the CRQL/CRDL/PQL/MQL adjusted for sample characteristics, sample preparation, dilutions, and/or laboratory adjustment. All undetected results will be reported at the SQL.

For this project all organic and inorganic values (except metals) observed below the SQL, but above the MDL will be reported as estimated values (flagged "J") by the laboratory. Metals values will be reported down to the IDL adjusted for sample characteristics, sample preparation, dilutions, and/or laboratory adjustment. For metals, observed values below the SQL but above the IDL will be reported and flagged estimated (either "J" or "B")

Since the Navy has not yet selected a laboratory to perform the analyses described in this work plan, specific MDLs and IDLs and similar issues cannot be presented in the work plan. However, the selected laboratory will be required to meet the following performance standard prior to being selected to perform analysis:

When possible, the detection limit (CRQL, CRDL, PQL) concentration for an analyte shall be less than or equal to the corresponding screening level concentration for that analyte, as shown in the screening level concentration table provided. In cases where the detection limit (CRQL CRDL, PQL) for the analysis of a particular analyte is greater than the analyte's screening level concentration, the laboratory shall certify and demonstrate with appropriate documentation that the concentration of its MDL or IDL for the analyte is less than the analyte's screening level concentration. In cases where either of the proceeding performance standards can be met for an analyte, the laboratory must provide documentation clearly establishing the reason(s) that normally available analytical methods cannot attain the analyte's screening level concentrations.

Failure to meet the above performance standard will result in a laboratory not being selected to perform this analytical work.

The completeness goal for this project is 95% for analytical data. Field measurements will have a completeness goal of 90%. To acquire definitive data to meet the project QA objectives, the laboratory will supply QC information so the accuracy and precision of the data may be assessed.

A8. Special Training Requirements/Certification

The 40-hour HAZWOPER class and annual refreshers are required for all field personnel. An Explosive Ordnance Disposal (EOD) team, either provided by the Navy or others utilizing procedures and personnel acceptable to the Navy, will sweep all access routes and areas where field work will be conducted before any field work begins. The EOD team shall demonstrate appropriate skills, experience and credentials, which shall, at a minimum, include graduation from the U.S. Naval EOD School in Indian Head, Maryland. In addition, supervisory personnel onsite shall have been awarded the Master EOD Skill Badge.

A9. Documentation and Records

All individuals and organizations on the distribution list (A.3) will receive a copy of the approved QAPP and all subsequent revisions. The Contractor's Project Manager will be responsible for distribution of the QAPP and associated updates/revisions.

A9.1 Maintenance of Documentation and Records

The following documentation and records will be maintained by the Contractor during the investigation:

- **Sample Collection Records:** (sample tracking, soil borings, well installation, etc.): Records showing that the proper sampling protocol was performed, including the names of persons conducting the activity, sample number, sample collection points, maps and diagrams, and equipment/methods used. General field records will also be maintained in bound field logbooks to record the procedures used in the field to collect data and outline potential areas of difficulty in collecting data.

- **Chain-of-Custody Records:** records that document the progression of sample custody.

- **Quality Control (QC) Sample Records:** records that document the generation of QC samples, including field blanks, trip blanks, equipment rinsate blanks, and duplicate samples. QC records also include laboratory quality control records.

- **Laboratory Records:** Sample data, sample management records, test methods, and quality assurance/quality control (QA/QC) reports.

- **Additional Records:** Records to be maintained in the field including the site activity log daily master, individual activity field logs, soil sampling log, groundwater sampling log, well installation log, sampling log daily master, and internal field audits.

A9.2 Data Reporting Format

All analytical data reporting packages will be generated according to the procedures and formats described in the USEPA Contract Laboratory Program (CLP), *Test Methods for Evaluation of Solid Waste Physical/Chemical Methods*, (SW-846), Third Edition, USEPA, Office of Solid Waste and Emergency Response (OSWER), Update III, December 1996, guidelines established in American Society for Testing Methods (ASTM), and as detailed in Sections B, C, and D of the QAPP. The requested laboratory turnaround time is 28 days. Data will be delivered on hard copy and electronically.

Analytical data deliverables for this project will include the information in Table A-3 through A-7.

Table A-3
Hardcopy Data Deliverables for CLP VOC and SVOC Analysis

Item	CLP Form
Case Narrative should contain: laboratory name; sample delivery group (SDG) number; sample identifications in the SDG including differentiations between initial analyses and re-analyses; analyses performed for each sample; and detailed documentation of all quality control, sample shipment and/or analytical problems encountered in processing the samples reported in the data package. The narrative must also include any problems encountered or deviations from the requested analytical method, both technical and administrative, corrective actions taken, and resolution and explanation for all laboratory flags. In addition, the narrative must contain a signed certification statement.	Case Narrative

Table A-3
Hardcopy Data Deliverables for CLP VOC and SVOC Analysis

Item	CLP Form
Sample, method blank, and matrix spike/matrix spike duplicate (MS/MSD) results must be tabulated or reported on spreadsheet. Results greater than the method detection limit (MDL) and less than the quantitation limit will be reported as estimated.	Form I
Surrogate recoveries (%Rs) for all samples including QA/QC samples must be reported.	Form II
MS/MSD (one spike and one spike duplicate per 20 samples of similar matrix). Spike sample and spike duplicate results will be tabulated. Percent recoveries and relative percent differences will be tabulated and summarized.	Form III
Method Blank summary analyzed per matrix/concentration.	Form IV
GC/MS tuning every 12 hours for VOC and SVOC. Ion abundance criteria reported. Samples associated with each 12-hour tuning period must be reported with analysis dates and times.	Form V
Initial five-Point Calibration data for VOC and SVOC. Relative response factors (RRFs) and % relative standard deviations (%RSD) are to be included. Separate calibrations are needed for low and medium VOC samples per matrix/concentration.	Form VI
Continuing Calibration data with RRFs and % differences (%D). Separate calibrations are needed for low and medium samples per matrix/concentration.	Form VII
Internal Standard Areas and Retention Times are to be reported for every VOC and SVOC sample.	Form VIII

Note:
In addition to all summary forms identified above, deliverables may include all sample chromatograms, data printouts and mass spectra for all samples including QA/QC (blanks, MS/MSD, samples, calibrations).

Table A-4
Hardcopy Data Deliverables for CLP Pesticides/PCB Analysis

Item	CLP Form
Case Narrative (see VOC and SVOC explanation)	
Sample, method blank and MS/MSD results to be tabulated or reported on spreadsheet. Results greater than the MDL and less than the quantitation limit will be reported as estimated.	Form I
Surrogate recoveries for all samples including QA/QC samples for both columns must be reported.	Form II

Table A-4
Hardcopy Data Deliverables for CLP Pesticides/PCB Analysis

Item	CLP Form
MS/MSD (one spike and one spike duplicate per 20 samples of similar matrix). Spike sample and spike duplicate results will be tabulated. Percent recoveries and %RPDs will be tabulated and summarized.	Form III
Method Blank spikes with results and control charts. Run with each batch of samples processed. Analyzed per matrix/concentration.	Form IV
Instrument Blank results. Instrument blanks analyzed every 12-hours.	Report Results
A three-point initial calibration for single-component pesticides, one-point for multicomponent pesticides and aroclors. **Report the following:** RT windows for single-component pesticides; Initial Calibration single component calibration factors and %RSDs; and RT windows for multi-component pesticides.	Form VI - Pest 1 Form VI - Pest 2 Form VI - Pest 3 Form VI - Pest 4
A mid-concentration standard will be analyzed after each group of 10 samples in the analysis sequence. Report mid-concentration results %Ds and % breakdowns of DDT and Endrin.	Form VII - 1 and - 2
Analytical Sequence (including analysis dates and times) reported for each column and for all samples including QA/QC samples.	Form VIII
Cleanup Efficiency recoveries reported for Florisil (and silica gel or gel permeation chromatography (GPC) if performed).	Form IX - 1 Form IX - 2
Pesticide identifications for all samples with pesticide(s) identified. Percent Differences (%D) between columns are to be reported and those results with greater than 25% D are to be flagged "P."	Form X
Any compounds confirmed by two columns should also be confirmed by GC/MS if the concentration is sufficient for detection by GC/MS as determined by the laboratory-generated detection limits. The GC/MS would normally require a minimum concentration of 10 ng/uL in the final extraction for each single-component compound. All GC/MS confirmation QA/QC must be included.	All QA/QC for GC/MS confirmation and Form I

Note:
In addition to all summary forms identified above, deliverables may include all sample chromatograms, data printouts and mass spectra for all samples including QA/QC (blanks, MS/MSD, samples, calibrations).

Table A-5
Hardcopy Data Deliverables CLP Metal Analysis

Item	CLP Form
Case Narrative (see VOC and SVOC explanation)	
Sample results. Results between the Instrument Detection Limit and the quantitation limit are required to be reported and flagged as estimated	Form I

Table A-5
Hardcopy Data Deliverables CLP Metal Analysis

Item	CLP Form
For ICP, an initial 1-point calibration is to be analyzed. For GFAA, an initial 3-point calibration (minimum) is to be analyzed and results are to be reported. After the calibration, the curve must be verified by the use of at least a calibration blank and a calibration check standard at or near mid-range. The calibration must be measured within 10% of its true value to be valid.	Form II
Check or reference standards are to be analyzed and results reported. A check or reference standard should be analyzed after every ten sample injections. This sample must be within 20% of its true value.	Form II
Initial and Continuing Calibration blank results. Calibration blanks analyzed at a 10% frequency.	Form III
Preparation blank results. Preparation blanks are to be taken through digestion (1/20 samples of the same matrix or SDG, whatever is most frequent).	Form III
ICP interference check sample results. True and found results must be reported.	Form IV
Spike sample recoveries (1 per 20 samples of a similar matrix)	Form V (Part 1)
Serial dilution results.	Form IX
Laboratory Duplicate results and %RPDs (1 per 20 samples or analytical batch — whichever is most frequent — will be split and digested as a separate sample).	Form VI
Laboratory control samples will be processed with each sample batch.	Form VII
Instrument Detection Limits.	Form X
Preparation Logs.	Form XIII
Analysis Run Log.	Form XIV
Standard addition results (if performed).	Form VIII
Post digestion spike recoveries for GFAA.	Noted on Analysis Run Log

Note:
In addition to all summary forms identified above, deliverables may include all sample chromatograms, data printouts and mass spectra for all samples including QA/QC (blanks, MS/MSD, samples, calibrations).

Table A-6
Hardcopy Data Deliverables CLP Cyanide Analysis

Item	CLP Form
Case Narrative (see VOC and SVOC explanation)	
Sample results in table or spreadsheet.	Form I
Initial calibration: report "true" and "found" concentration results and %RSDs.	Form II
Continuing calibration or standard check: report "true" and "found" concentrations and %D from the initial calibration.	Form II
Method blank analyzed (one per batch) and results reported.	Form III
Spike sample analysis: report control limits, spiked sample results (SSR), sample results (SR), spike added (SA), and %R.	Form V
Laboratory duplicates: report sample concentration, duplicate concentration, and RPD.	Form VI
Laboratory control sample: report "true" and "found" results, %Rs, and control limits.	Form VII
Preparation log: report EnSafe sample ID, lab sample ID, preparation date, soil weight and/or volume.	Form XIII

Note:
In addition to all summary forms identified above, deliverables may include all sample chromatograms, data printouts and mass spectra for all samples including QA/QC (blanks, MS/MSD, samples, calibrations).

Table A-7
Hardcopy Data Deliverables for SW-846 Explosives

Non-CLP Deliverable Requirements Explosives	CLP Equivalents
Case Narrative (see VOC and SVOC explanation)	Case Narrative
Sample, method blank and MS/MSD results to be tabulated or reported on spreadsheet. Results greater than the MDL and less than the quantitation limit will be reported as estimated.	Form I
Surrogate recoveries for all samples including QA/QC samples. One surrogate standard is added to each sample.	Form II
Matrix Spike/Spike duplicate (1 spike and 1 spike duplicate per 20 samples of similar matrix). Spike sample and spike duplicate results will be tabulated. Percent recoveries and RPDs will be tabulated and summarized.	Form III

Table A-7
Hardcopy Data Deliverables for SW-846 Explosives

Non-CLP Deliverable Requirements Explosives	CLP Equivalents
Method Blank spikes with results and control charts. Run with each batch of samples processed. Analyzed per matrix/concentration.	Form IV
Instrument Blank results. Instrument blanks analyzed every 12 hours.	Report Results
SW-846: A 5-point initial calibration is to be analyzed. **Report the following:** Initial calibration factors and %RSDs.	Form VI
A mid-concentration standard will be analyzed after each group of 10 samples in the analysis sequence.	Form VII - 1 and - 2
Analytical Sequence (including analysis dates and times) reported for each column and for all samples including QA/QC samples.	Form VIII
Cleanup Efficiency recoveries reported for silica gel or GPC.	Form IX - 1 Form IX - 2
All explosives identified in all samples. Percent Differences (%D) between columns are to be reported and those results with %D great than 25% are to be flagged "P."	Form X

Note:
In addition to all summary forms identified above, deliverables may include all sample chromatograms, data printouts and mass spectra for all samples including QA/QC (blanks, MS/MSD, samples, calibrations).

A9.3 Data Reporting, Archiving, and Retrieval

All records which constitute evidence relevant to sampling and analysis activities as described in this QAPP will be maintained by the Navy or its designee. Records will be maintained for a minimum of 7 years after the final report for this investigation is submitted. The final evidence file will be held in a central repository. It will include all relevant records, reports, logs, field books, pictures, subcontractor reports, correspondence, and data reviews. The location will be secured, with limited access.

B. MEASUREMENT/DATA ACQUISITION

B1. Sampling Process Design

Details of the data collection design process for this investigation may be found in Section 3 of the Baseline Investigation Work Plan. Analytical samples are critical for assessing risk to human health and the environment from the OB/OD units. Field measurements and collection of geotechnical samples are needed to provide background information but are considered non-critical.

B2. Sampling Methods Requirements

B2.1 Purpose/Background

See the Baseline Investigation Work Plan for a detailed discussion of site background and sampling objectives.

B2.2 Sample Collection, Preparation, and Decontamination Procedures

B2.2.1 Soil Investigation

Techniques for collecting samples will depend on their depth. Surface soil samples, which are defined as 0 to 1 foot bgs exclusive of rocks, twigs, leaves, and vegetation, will be collected manually with hand augers. Subsurface samples may be collected using power devices such as drill rigs equipped with steel split-barrel samplers with stainless-steel, plastic, or teflon liners; or steel split-barrel samplers without liners.

Unexploded Ordnance Danger

Because unexploded ordnance may be encountered during sampling, the entire area will be surveyed for surface and subsurface unexploded munitions prior to drilling in accordance with the health and safety plan requirements discussed in Section 5. If any material is detected, it will be noted for further investigation and no subsurface soil samples will be collected from the area. Borehole tools will be used to conduct subsurface resistivity or magnetics testing while

drilling in accordance with the health and safety plan in Section 5. If any subsurface obstruction is encountered, the boring/drilling activities at that location will be immediately terminated and the location marked for further evaluation. A plan for conducting the unexploded ordnance survey and special drilling precautions will be prepared before field work begins. Section 5 of this work plan outlines additional health and safety requirements for these activities.

Soil Description

A qualified geologist will describe samples on a soil boring log using the Unified Soil Classification System (USCS). Descriptions will include color, texture, grain size, staining, and odor in accordance with the American Society for Testing and Materials (ASTM) standards for Description and Identification of Soils using the USCS Visual-Manual Procedure (ASTM D2488). Figure B-1 contains a sample boring log.

Soil Samples for Volatile Organic Compound Analysis

To ensure that volatile organic compounds (VOCs) do not volatilize between sample collection and analysis, soil samples for VOC analysis will be collected prior to geologic logging. Following VOCs, the order of sample collection will be semivolatile organic compounds (SVOCs), other organics, and metals.

Soil samples for VOC analysis will be collected according to Method 5035 using an EnCore sampler where possible. For locations where site conditions limit the use of the Encore sampler, unpreserved 2 ounce glass jars will be used and filled as full as possible to minimize headspace.

The EnCore system consists of a T-shaped handle, which holds a disposable sample container attached to the handle and is pushed into the soil core. Simultaneously, a spring-loaded plunger is pushed back, which allows the container to fill with soil while preventing trapped air

FIGURE B-1 SAMPLE BORING LOG

ENSAFE

(800) 588-7962
MEMPHIS, TENNESSEE
CHARLESTON,SC CINCINNATI,OH DALLAS,TX JACKSON,TN KNOXVILLE,TN
LANCASTER,PA NASHVILLE,TN NORFOLK,VA PADUCAH,KY PENSACOLA,FL
LITTLE ROCK,AR JACKSON,MS CLEVELAND,OH

JOB NO.	CLIENT	LOCATION

DRILLING METHOD: | BORING NO.

SAMPLING METHOD: | SHEET OF

LOCATION OF BORING

DRILLING START TIME / FINISH TIME

WATER LEVEL					
TIME					
DATE					
CASING DEPTH					

DATUM ELEVATION

DRILLING CONTR _____

BY _____ CHK BY _____

DATE _____

SAMPLER TYPE	INCHES DRIVEN / INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. / SAMPLE DEPTH	BLOWS/FT SAMPLER	VAPOR CONCENTRATIONS (PPM)	DEPTH IN FEET	SOIL GRAPH	SURFACE CONDITIONS:
						0		
						1		
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		
						1		
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		

5901G045

pockets. Once full, the sampler is sealed with a locking, airtight cap. Finally, the sampler is removed from the handle and managed like any other sample container.

Three EnCore samples will be collected from each interval to be analyzed for VOCs. Two samplers will be used for low level analysis and one sampler will be used for high level analyses, in the event that the low level sample requires dilution. In addition, a bulk soil jar will be collected for the determination of percent moisture. Samples will be shipped overnight to the lab for analysis within 48 hours. If analysis within 48 hours is not possible, the laboratory will preserve the sample allowing for a 14 day holding time. If preservation is required, the laboratory will test a portion of the soil from the bulk jar to assess whether the soil reacts with sodium bisulfate used in preserving soil samples. If the sodium bisulfate does not react with the soil, the laboratory will preserve two Encore volumes in sodium bisulfate and one EnCore volume in methanol. If sodium bisulfate produces a reaction with the soil (i.e., bubbling), the laboratory will place two Encore volumes in water and one EnCore volume in methanol. Unless stated otherwise, other soil sampling procedures will adhere to the traditional techniques described below.

Surface Soil Sample Collection by Hand Auger

Before Augering:

1. Don personal protective clothing and equipment as specified in the site-specific health and safety plan.

2. Stake the location(s) to be sampled.

3. Clear vegetation and other debris from the surface around the boring location.

4. Place clean plastic sheeting on the surface near the sample collection location to hold decontaminated sampling equipment.

5. Set up an area to decontaminate sampling equipment.

During Augering:

1. Hand auger from 0 to 1 foot bgs.

2. Make detailed notes about geologic features in a field book or soil boring log.

3. Empty contents of the sampling device into a decontaminated stainless-steel bowl. Collect enough to fill all sample containers (see Section B4).

4. Mix the interval sample thoroughly and place into the appropriate containers (see Section B4). Samples for VOC analysis should be collected as described above. Label the samples in accordance with Section B3 and preserve them to 4°C.

5. Record the sample identification number, sample collection depth, and the analyses required by Section B4 in the field logbook.

6. Proceed with additional sampling as this plan requires.

After Augering:

1. Cement bentonite grout the boreholes and treat all investigation-derived waste (IDW) as described in Section B2.2.6 of this work plan. Use a cement/bentonite ratio of 95/5. Hydrate the mixture according to manufacturers specifications.

2. Decontaminate all equipment in accordance with Section B2.2.5 of this plan.

3. Place used plastic sheeting and other disposable sampling equipment in the designated drum for disposal.

4. Complete the field logbook entry and soil boring log for the site (see Section B10.1).

Subsurface Sample Collection by Drill Rig

Subsurface sample collection will be completed in accordance with the Navy-approved safety plan (see Section 5). Subsurface soil borings may be advanced by a drill rig using hollow-stem augers, which will be advanced without a center plug to facilitate split-barrel sample collection. An attempt will be made to complete all borings using hollow-stem auger drilling techniques. If geologic conditions (such as bedrock) are encountered that prevent the

use of hollow-stem augers, alternate drilling methods such as rotasonic techniques will be employed.

After soil samples are obtained to the proper depth, the borings will be abandoned with neat cement grout (95/5 ratio of cement to bentonite and hydrated according to manufacturer's specifications) or completed as a temporary monitoring well. Specific sampling procedures are provided below.

Split-Barrel Sampling

Before Split-Barrel Sampling:

1. Don personal protective clothing and equipment as specified in the site-specific health and safety plan (see Section).

2. Stake the location(s) to be sampled.

3. Clear vegetation and debris from the surface.

4. Prepare the site by placing plastic sheeting around the borehole and over the sampling table.

5. Align the derrick of the drill rig at the sampling location.

6. Set up a decontamination area for sampling equipment.

During Sampling:

1. Install a decontaminated steel split-barrel sampler on the center rod(s) and insert it into the hollow-stem auger. Connect the hammer assembly and lightly tap the rods to seat the drive shoe at the ground surface.

2. Push the sampler down into the soil using the drill rig's hydraulics. Cease pushing when the full length of the sampler has been driven or upon sampler refusal. Perform a standard penetration test (ASTM-1586) each time a split-spoon sample is collected and record the results on the boring log.

3. Pull the sampler free with upswings of the hammer, or use the drill rig's winch. Pull out the center rod and sampler.

4. Unscrew the split-barrel assembly from the center rod and place it on a sampling table.

5. Remove the drive shoe and head assembly. If necessary, tap the split-barrel sampler assembly with a decontaminated hammer to loosen threaded couplings.

6. With the drive shoe and head assembly off, split the sampler and expose the contents to process samples. Place the sample material into a stainless-steel bowl for mixing. After homogenizing, containerize the samples (see Section B4). Samples for VOC analysis should be collected using Encore samplers as described earlier in this section.

7. Label the samples in accordance with Section B3 of this plan.

8. Preserve the samples at 4°C.

9. Record the sample identification number, sample collection depth, and the analyses required by Section B2.2.5 in the field logbook.

10. Decontaminate sampling equipment as needed in accordance with Section B2.2.5 of this plan.

11. Attach the hollow-stem auger with the cutting head and center rod(s).

12. Proceed to the next sampling depth.

13. Slightly raise the auger flight(s) to disengage the cutting head and rotate without advancement to clean cuttings from the bottom of the hole.

14. Describe sample lithology on soil boring logs (see Figure B-1) based on observations of the auger cuttings, the bottom end of the sample in the liner, or the sample inside the split-barrel sampler (when liners are not used).

After Split-Barrel Sampling:

1. Backfill the borehole with neat cement grout.

2. Remove the drill rig to the heavy-equipment decontamination area.

3. Place plastic sheeting and other disposable sampling equipment in a drum for disposal.

4. Record all relevant information in the field logbook before leaving the site (see Section B10.1).

B2.2.2 Groundwater Investigation

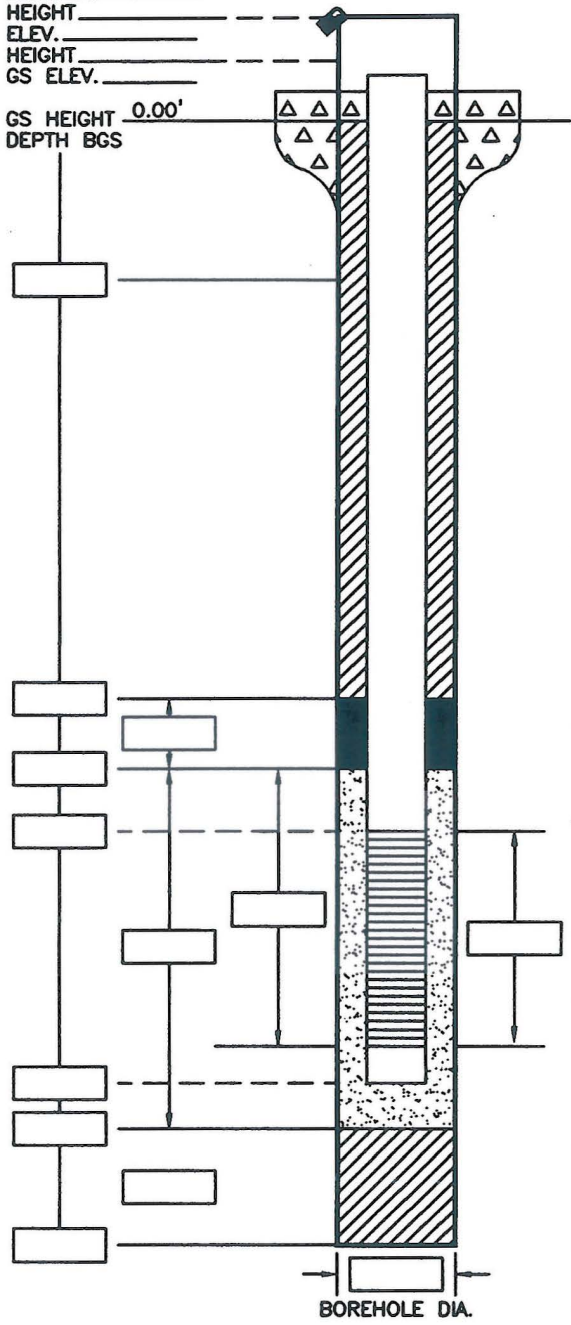
The following sections outline the methods for installing temporary groundwater monitoring wells and collecting groundwater samples.

Monitoring Well Construction

Boreholes will be advanced and sampled using hollow-stem augers or rotasonic drilling methods where site conditions prevent the use of hollow stem augers. A qualified geologist or hydrogeologist will log and describe all drilling, well installation, well development, and well testing operations. Temporary wells will be properly abandoned following the groundwater investigation. A protective well cover will be used while sampling activities are ongoing. Refer to Figures B-2 and B-3 for a typical monitoring well construction diagram and a monitoring well construction log.

The temporary monitoring wells will consist of 2-inch inside diameter, schedule 40 polyvinylchloride well screen and riser pipe with flush joint threaded connections. Well screens will be 10 feet long with continuous 0.10-inch slots and will be set with the top of the screen 2 feet above the water table. Enough 20 to 40 filter sand will be used to ensure the placement of a continuous filter pack around the well screen. The filter pack will extend at least 2 feet above the screen. A 3-foot minimum bentonite plug will be installed after placement of the filter pack. The plug will consist of 3/8-inch diameter bentonite pellets, hydrated for at least one hour. A grout seal will be placed from the top of the bentonite seal to the ground surface through a tremie pipe. The grout seal will consist of portland cement powder (ASTM C-150, Type I or II) and bentonite at a 95/5 ratio. Hydrate mixture according to manufacturer's instructions. Specific monitoring well installation procedures are outlined below.

MONITORING WELL CONSTRUCTION LOG – STANDARD		
WELL NO.:	INSTALLATION:	SITE:
PROJECT NO.:	CLIENT/PROJECT:	
CLEAN CONTRACTOR:	DRIG. CONTRACTOR:	
COMP. START: (_____m)	COMP. END: (_____m)	
BUILT BY:	WELL COORD.:	



PROTECTIVE CASING
MATERIAL/TYPE _____
DIAMETER _____
DEPTH BGS _____ WEEP HOLE(Y/N) _____

GUARD POSTS (Y/N)
NO. _____ TYPE _____

SURFACE PAD
COMPOSITION & SIZE _____

RISER PIPE
TYPE _____
DIAMETER _____
TOTAL LENGTH(TOC to TOS) _____
VENTILATED CAP (Y/N)

GROUT
COMPOSITION & PROPORTIONS _____
TREMIED (Y/N)
INTERVAL BGS _____

CENTRALIZERS (Y/N)
DEPTH(s) _____

SEAL
TYPE _____
SOURCE _____
SETUP/HYDRATION TIME _____
VOL. FLUID ADDED _____
TREMIED (Y/N) _____

FILTER PACK
TYPE _____
AMT. USED _____
TREMIED (Y/N)
SOURCE _____
GR. SIZE DIST. _____

SCREEN
TYPE _____
DIAMETER _____
SLOT SIZE & TYPE _____
INTERVAL BGS _____

SUMP (Y/N)
INTERVAL BGS _____ LENGTH _____
BOTTOM CAP (Y/N)

BACKFILL PLUG
MATERIAL _____
SETUP/HYDRATION TIME _____
TREMIED (Y/N)

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MEMPHIS, TENNESSEE
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LANCASTER,PA NASHVILLE,TN NORFOLK,VA PADUCAH,KY PENSACOLA,FL
LITTLE ROCK,AR JACKSON,MS CLEVELAND,OH

FIGURE B–3
AFTWF, VIEQUES, PR
MONITORING WELL CONSTRUCTION LOG

DWG DATE: 06/27/00 | DWG NAME: 5901G047

Monitoring Well Installation

Subsurface sample collection will be completed in accordance with the Navy-approved unexploded ordnance safety plan (see Section 5).

1. Clear vegetation and debris from monitoring well site.

2. Place plastic sheeting on the ground near the area to hold decontaminated equipment. Stake the location(s) to be sampled.

3. For monitoring well boreholes requiring soil sampling, advance the boring and conduct sampling in accordance with Section 4.1.3. If the boreholes don't require soil sampling, advance the borehole to the required depth using a bit or auger flight with plug. The borehole should be at least 4 inches larger in diameter than the well casing. Drill the hole slightly deeper — approximately 6 inches more than required for the combined length of casing and screen. Sound the final completion depth with a decontaminated, weighted tape before continuing.

4. Condition the borehole by circulating drilling fluids (mud, water, or air) that are free of contamination, or by rotating augers without advancing them until the hole is cleaned of cuttings. Remove cuttings from the area around the auger. Record the type and quantity of drilling fluid used and the amount recovered on the boring log.

5. Prepare the casing and screen for installation. Decontaminate both in accordance with Section B2.2.5. *Do not* clean the casing and screen with hot water or solvent rinse.

6. Withdraw the drill rods. Check the hole's depth with a weighted surveyor's tape. It is not necessary to remove the drill string at this point because the well will be constructed through the center of either the augers or the casing.

7. Hang the casing string, screen down, over or in the borehole top. Lower the casing string down to the bottom of the well.

8. Prepare the dry sand or sand slurry for the filter pack to set the well casing.

9. When the casing string is set to the desired depth, hang the centered casing in place. Leave 2 to 3 feet of stickup once the well has been lowered to its final position.

10. If the well is deeper than 20 feet, install the filter pack through the tremie pipe. Six inches or more of filter pack material must be spotted at the bottom of the hole, under the screen. Withdraw the augers slowly so the filter pack is placed evenly around the screen without bridging. Conditions permitting, install the filter pack to a depth of approximately 2 feet above the top of the screened interval.

11. Check the depth to the top of the filter pack with a weighted tape.

12. To install the bentonite seal, tremie bentonite pellets on top of the filter pack if well is deeper than 20 feet. Slowly withdraw the auger as the bentonite is added to ensure even placement of the seal around the annulus. Check the depth with a weighted tape. If possible, leave at least 2 feet of bentonite above the screen.

13. Hydrate according to manufacturer's specifications or eight hours, whichever is greater.

14. To grout the annular space, mix high solids bentonite and water to make a pumpable slurry. Use a cement/bentonite ratio of 95%/5% in preparing the bentonite slurry. Hydrate the mixture according to manufacturers specifications.

15. If well is deeper than 20 feet, tremie the grout into the annulus using a side discharge tremie pipe. Slowly withdraw the auger as the annulus fills. Grout the well to within 2 to 4 feet of the surface. Note the amount of grout used in the field logbook.

16. After installing grout, dismantle and decontaminate equipment. Allow adequate cure time (24 hours) for the grout before developing the well.

17. Record construction information on the monitoring well construction log, an example of which is provided in Figure B-3.

Rotasonic Drilling Method

Rotasonic drilling will not be used in areas of suspected unexploded munitions. Rotasonic drilling combines rotational and high frequency vibrational forces to advance the drill bit and drill pipe in the borehole. The primary design difference between rotasonic drilling and other types of rotary systems is the incorporation of an oscillator in the drill head to produce vibrational energy. The vibrational frequency generated by the oscillator can be adjusted for different drilling conditions. Rapid drilling rates result from matching the drill pipe's vibrational frequency with the resonant frequency of each 10-foot core barrel or drill pipe

section. The resulting high amplitude waves within the core barrel or drill pipe are transmitted to the drill bit. This vibrational energy, combined with the rotational energy, allows effective operation in both unconsolidated and consolidated material.

Basic equipment associated with a rotasonic drill rig includes the vibratory/oscillatory top-mounted drill head, mast, elevated drill platform, motor, hydraulic pump and lines, drill center, drill pipe, and core barrels. A support truck for holding drill pipe, core barrels, and other drilling materials is located at the rear of the drilling platform. Using a second vehicle to hold drill pipe allows off-location decontamination of these materials without moving the drill rig itself. The drill rig also has the capability to carry 1,000 gallons of potable drilling water.

The rotasonic drill rig can be operated by one driller and a driller's helper. The drill head is lowered down the mast to a working height above the drill platform and mechanically rotated from a vertical to a horizontal orientation. Hydraulic mechanical vises rapidly connect drill pipe or core barrel sections to the drill head, which is then raised and rotated to a vertical orientation prior to drilling.

The borehole is drilled by advancing two lines of drill pipe. A studded drill bit is attached to the base of the core barrel, which has a 4-inch inner diameter (ID) and 4.5-inch outer diameter (OD). The core barrel, which is 10 feet long, is connected to the 4.5-inch drill pipe and is advanced to the desired depth by using high frequency vibration and rotation, forcing an undisturbed, continuous core into the core barrel. When the core barrel reaches the desired depth, a larger outer drill pipe with a 5.875-inch OD is advanced along the outside of the core barrel to the same depth. The larger drill pipe is left in place to hold the borehole open while the inner drill pipe, core barrel, and sample are retrieved. This assembly is removed from the borehole and rotated to a 45-degree orientation relative to the drill mast. The core sample is extruded sonically into a plastic sleeve, which is placed on a core table for lithologic

description and possibly retained for chemical analysis. The outer sample core portions will be shaved away to ensure that soil in contact with the plastic sleeve is not collected for analysis. The core barrel is removed, replaced with a decontaminated barrel, and returned to the borehole. The process is then repeated, with the core barrel always driven ahead of the outer drill pipe to ensure representative sampling. Successive 4-inch diameter cores are laid end-to-end for lithologic description and sampling. In this manner, a complete lithologic core from ground surface to the desired depth can be obtained.

Before Rotasonic Sampling:

1. Don personal protective clothing and equipment as specified in the site-specific health and safety plan (see Section 5).

2. Stake the location(s) to be sampled. Clear vegetation and debris from the monitoring well site.

3. Place plastic sheeting on ground near the area to hold decontaminated equipment.

4. Prepare the site by placing plastic sheeting over the sampling location and a sampling table.

5. Set up the decontaminated drill rig at the sampling location. Decontaminate it in accordance with Section B2.2.5.

6. Set up a drilling fluid containment system over the borehole location. Create a water-tight seal between the ground surface and the bottom of the containment tank using a pure bentonite powder.

During Rotasonic Sampling:

1. Advance the inner drill pipe and core barrel to the desired interval. Disconnect the drill head from the inner drill pipe and rotate the drill head to a horizontal orientation. Attach a length of outer drill pipe casing to the drill head and raise the drill head while rotating the drill head back to the vertical orientation.

2. Advance the outer drill pipe casing to the same depth as the inner drill pipe and core barrel.

3. Retrieve the inner drill pipe, core barrel, and sample.

4. Remove the sample core from the inner barrel sonically and placed it directly into a sample sleeve. Lithology can be determined through the plastic sleeve. Record this information on the boring log.

5. Place the sample material into a stainless-steel bowl for mixing. After homogenizing, containerize the sample in accordance with Section B4. Samples for VOC analysis should be collected using Encore samplers as described earlier.

6. Record the sample identification number, sample collection depth, and the analyses required in the field book.

7. Change out the lead inner core barrel with a decontaminated barrel. Advance the core barrel 10 feet past the outer drill pipe. Disconnect the drill head and rotate the head to a horizontal orientation. Connect another section of outer drill pipe casing. Rotate the drill head back to a vertical orientation and make up the outer drill pipe casing joint.

8. Disconnect the drill head from the outer drill pipe casing and raise the drill head 1 to 2 inches for venting.

9. Pump potable water through the drill head to fill the annulus between the inner and outer drill pipe for lubrication. When water shows at the vent space, reconnect the drill head to the outer drill pipe casing and advance the outer drill pipe casing to the elevation of the lead core barrel.

10. Repeat steps 4 to 8 until the desired depth is reached.

After Rotasonic Sampling:

1. Pump any drilling fluid which has accumulated in the containment system into a clearly marked drum for disposal.

2. Backfill the borehole with neat cement grout, or install a temporary monitoring well according to the methods discussed in this section. A tremie pipe is not needed for wells deeper than 20 feet, which are completed within the annulus of the outer drill pipe casing. As the casing is pulled back, the sand pack is sonically vibrated into place against a smooth borehole wall eliminating the threat of bridging. The bentonite seal should be emplaced in the same manner.

3. Remove the drill rig to the decontamination area.

4. Place used plastic sheeting and other disposable sampling equipment in a clearly marked drum for disposal.

5. Record all relevant information in the field logbook before leaving the site (See Section B10.1).

Developing Monitoring Wells

Monitoring wells will be developed after the bentonite grout in its annular space has cured at least 24 hours. Development restores the normal hydrologic conditions of the geologic formation near the borehole. Monitoring wells can be developed using various techniques such as bailing, surging and bailing, or surging and pumping. Wells with low aquifer recovery will be developed by bailing, or a combination of surging and bailing. Wells with high aquifer recovery will be developed by a combination of surging and pumping. *Before development* and *after development* procedures apply to surging, bailing, and pumping. All monitoring wells must be developed until temperature, specific conductivity and turbidity measurements stabilize and the well produces clear, sediment-free water. A log of these measurements will be maintained during development and submitted with the "as-built" well construction details.

Before Development:

1. Don personal protective clothing and equipment.

2. Cover the surface around the well with clean plastic sheeting to contain any spilled development water.

3. Open the well cover and check the wellhead condition.

4. Measure the depth to static water level with an electronic water-level indicator.

5. Prepare the necessary equipment for well development.

During Development:

Wells may be developed by bailing, surging and bailing, or surging and pumping. These techniques are discussed separately but may be used either separately or in combination. Various pumps that may be used during well development include:

- Brainard Kilman hand pump
- Centrifugal pump
- Peristaltic pump
- Bladder pump
- Grundfos pump

Bailing:

1. Assemble and lower the decontaminated bailer into the monitoring well and begin bailing.

2. Develop the monitoring well until the water column is as free of visible turbidity as possible given the subsurface conditions (between 10 and 30 nepholemetric turbidity units [NTUs]), and until the pH, temperature, and specific conductivity have stabilized to satisfy the following criteria:

Temperature:	within ± 1.0°C
pH:	within ± 0.5 standard unit
Conductivity:	within ± 10% of the duplicate
Turbidity:	relatively stable

Surging:

1. Attach rope or polyvinylchloride rod to a surge block.

2. Lower the surge block into the monitoring well with rope or rods.

3. Raise and lower the surge block so groundwater will be surged in and out of the monitoring well screen. Continue for approximately 10 to 15 minutes.

4. Remove the surge block from the well for decontamination.

Pumping:

1. Prepare the decontaminated pump and tubing, and lower them into the well.

2. Begin pumping the well.

3. If the well's productivity is low, pump it, then leave it idle to recover. The onsite geologist will determine when development is complete based on normal development criteria.

4. Develop the monitoring well until the water column is as free of visible turbidity as possible, given the subsurface conditions (between 10 and 30 NTUs), and until the pH, temperature, and specific conductivity have stabilized to satisfy the following criteria:

Temperature:	within ± 1.0°C
pH:	within ± 0.5 standard unit
Conductivity:	within ± 10 % of the duplicate
Turbidity:	relatively stable

After Development:

1. Place groundwater withdrawn from the monitoring wells during development in 55-gallon drums for disposal in accordance with Section B2.2.6 of this plan.

2. Remove development equipment from the monitoring well and decontaminate in accordance with Section B2.2.5 of this plan.

3. Record all well development data in the field logbook.

Groundwater Sampling

All purging and sampling of monitoring wells will be conducted with a peristaltic, bladder, or Grundfos-type (helical rotor submersible) pump with Teflon vacuum container, depending on the depth of the well. Peristaltic pumps may be used in wells where the depth to groundwater is less than 30 feet. Groundwater depths greater than 30 feet will require either electric (Grundfos type) or bladder pumps. The limitations of these two pumps are not depth-related but rather that an electrical source and an air supply source are needed, respectively. All

pump tubing will be constructed of a Tygon- or Teflon-lined material. If a pump is ineffective or impractical for successful purging and/or sampling, a Teflon bailer with a stainless-steel leader will be used.

Purging Static Water

Field personnel will purge monitoring wells before collecting samples to remove stagnant water from the casing and surrounding borehole space. General purging techniques to remove three to five well casing volumes or micropurge for low-flow sampling will be used. If possible, a pumping flow rate of 0.05 to 0.25 will be maintained during purging and sampling.

General Purging Procedures:

- Purge monitoring wells with a decontaminated pump.

- Purge three to five well casing volumes. In addition, turbidity should be 10 NTUs or less. Measure the indicator parameters temperature, turbidity, specific conductivity, and pH in a groundwater sample prior to purging and after removal of each well casing volume. If these parameters have stabilized after removal of three well casing volumes, sample the well. If not, continue until five well casing volumes have been removed from the well. Even if the indicator parameters have not stabilized after removal of the fifth, proceed with sampling. Contained purge water in a dedicated drum.

- Record well purging data in the field logbook and/or the groundwater sampling form (Figure B-4).

- When purging is complete, allow monitoring wells to recharge before beginning sampling. Wells evacuated while purging will be sampled when sufficient volume has re-entered the well. For this project, low recharge monitoring wells are defined as those with recharge rates not allowing sample collection within 12 hours of initial

Figure B-4
Groundwater Sampling Form

Groundwater Sampling

Sample ID: _____

PROJECT NAME: _____ JOB NO: _____ DATE: _____

WELL NO.: _____ LOCATION: _____

WEATHER CONDITIONS: _____ AMBIENT TEMP: _____

REVIEWED BY: _____ PERSONNEL: _____

PURGING DEVICE

Type device?

How was the device decontaminated? _____
How was the line decontaminated? _____

Which well was previously purged? _____

SAMPLING DEVICE

Type device? _____

How was the device decontaminated? _____

How was the line decontaminated? _____

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) _____

Stickup (ft.) _____

Depth to bottom of well from TOC (ft.) _____

Depth to water surface from TOC (ft.) _____

Length of water (ft.) _____

Volume of water (ft.) _____

(gal.) _____

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) _____

PURGING

Time started _____ Finished _____

Volume purged _____

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start _____

Finish _____

IN-SITU TESTING

Time:							
	1	2	3	4	5	6	7
Well Volume Purged (gal.)							
Turbidity							
Odor							
pH (units)							
Conductivity (mho)							
Water Temperature (C)							
Depth to water (ft.)							

Notes: 1 ft. length of 4" = 0.087 ft^3 or 0.65 gal. 1 ft. length 2" = 0.022 ft^3 or 0.16 gal.
Turbidity choices: clear, turbid, opaque Revision Date: 8/5/92

purging. These wells will be documented as *dry*. Specific procedures for monitoring well purging are provided below.

Before Purging:

1. Don personal protective clothing and equipment in accordance with the site-specific health and safety plan (see Section 5).

2. Cover the surface around the well with clean plastic sheeting to contain any water spilled during purging or sampling.

3. Measure static the total depth of the well and the water level to the nearest 0.01 foot using an electronic water-level indicator. Record the measurement in the field logbook.

4. Calculate static volume using one of the following formulas:

$$V = 0.041\ d^2h$$

where:

V = volume of water in gallons
d = diameter of well in inches
h = depth of water in feet (total well depth — static water level)

The static volume may also be calculated using this formula:

$$V = hr^2(0.163)$$

where:

V = volume of water in gallons
h = depth of water in feet (total well depth — static water level)
r = radius of well in inches

During Purging:

1. Lower the decontaminated pump into the casing.

2. Begin purging the well; purge at least three volumes of water (water column).

3. Withdraw groundwater until temperature, pH, and conductivity have stabilized. A monitoring well is considered stabilized when three readings each of temperature, pH, and specific conductivity have stabilized to satisfy the following criteria:

Temperature:	within ± 1.0°C
pH:	within ± 0.5 standard unit
Conductivity:	within ± 10 % of the duplicate
Turbidity:	relatively stable

4. Purge upgradient and background wells before downgradient wells to reduce the cross-contamination risk.

After Purging:

1. Record purging data in the field logbook.

2. If well is purged dry, allow it to recharge before sampling. However, make every effort to avoid purging the monitoring well dry.

3. Document the well as *dry* if it does not recharge within 12 hours of initial purging.

4. Drum all investigation-derived waste produced while purging for disposal in accordance with Section B2.2.6.

Micropurging/Low Flow Sampling

The following groundwater sampling procedure combines low-flow-rate micropurging and groundwater sampling into one process. The low flow rate micro-purging process eliminates the need for the typical three to five borehole volume purge and thereby generates significantly less purge water IDW. To ensure representative groundwater samples, a controlled low-flow pumping rate is maintained at each well until water level and field parameter stabilization occurs. Well purging and groundwater sample collection will be performed according to the following procedures.

Before Well Purging:

1. Don protective clothing and equipment as specified in the site-specific health and safety plan (see Section 5).

2. Prepare the site by covering the ground surface around the wellhead with plastic sheeting and arrange the required sampling equipment so it is easy to use.

3. Open the well cover and immediately insert a photoionization device into the wellhead to measure ionizable organic vapors for approximately 1 minute. If vapors are detected, use an oil-interface probe to verify the presence of an immiscible layer.

4. Measure static water level and total depth of the monitoring well to the nearest 0.01 foot using an electronic water-level indicator. Record the measurement in the field logbook. Calculate the static water volume in the well.

5. Connect the dedicated air line from the pump to the controller. Direct the dedicated discharge tubing to containerize all IDW.

6. Begin purging the well at approximately 0.05 to 0.25 gpm.

During well purging:

1. Closely monitor the purge rate and water level.

2. Adjust the purge rate until the water level stabilizes, and then monitor temperature, pH, specific conductivity, and turbidity.

3. Record the measurements.

4. Continue purging at the controlled rate until temperature, pH, conductivity, and turbidity have stabilized to satisfy the following criteria:

Temperature:	within $\pm$ 1.0°C
pH:	within $\pm$ 0.5 standard unit
Conductivity:	within $\pm$ 10 % of the duplicate
Turbidity:	relatively stable

5. Once stabilization has been obtained, allow the pump to continue running and prepare for sample collection. However, if field parameter stabilization cannot be achieved or the well's yield is insufficient to reach a stabilized water level, purge three to five borehole volumes.

6. If the well pumps dry before the required purge volume has been obtained or field parameters have stabilized, turn off the pump and allow it to recharge to within 75% of its initial water level before sampling.

7. Arrange the sample containers in the order of sample collection, organics first followed by inorganics.

Groundwater Sample Collection:

1. While the pump is still running, collect the groundwater sample immediately after the purging stabilization (or when water level for wells purged dry recovers 75%) using the same pump to fill all sample containers at the same low controlled flow rate (approximately 0.05 to 0.25 gpm). Collect VOC samples first. Allow the water to flow gently down the inside wall of the sample vial to avoid volatilization. Cap the vial, maintaining zero headspace. Following VOCs, collect SVOCs, other organics, then metals.

2. Turn off the pump when sufficient volume is collected to fill all containers.

2. Disconnect the air line from the controller and remove it from the monitoring well.

3. Add preservative (if needed), cap, seal, and properly label all containers. Place the filled containers in the cooler(s) with ice to begin cooling them to 4°C.

4. Record sample identifications, types and amounts collected, as well as the time, date of collection, and analyses in the field logbook and/or on the groundwater sampling form.

5. Decontaminate or properly dispose of sampling equipment if it is not dedicated to the monitoring well.

General Groundwater Sampling

Monitoring wells will be sampled with either a decontaminated pump or Teflon bailer. To sample monitoring wells, a peristaltic pump, or another similar type of pump which will not chemically or physically alter groundwater samples, must be used.

- Allow newly installed wells to recover for two weeks before sampling them.

- Use peristaltic pumps instead of bailers for purging and sampling when turbidity exceeds 10 NTU.

- Collect samples using a decontaminated pump with a Teflon vacuum container so that groundwater does not touch the pump. If a pump is ineffective or cannot successfully sample the monitoring well, a Teflon bailer may be used.

- Measure temperature, pH, and specific conductance for each sample collected and record these measurements in the field logbook.

- Chemically preserve samples as required (see Section B4). After chemical preservation and labeling, chill the samples to 4°C.

- Record weather at the time of sample collection in the field logbook. Refer to the specific procedures for groundwater sampling below.

Before Groundwater Sampling:

1. Don protective clothing and equipment.

2. Prepare the site by covering the surface around the wellhead with plastic sheeting and arrange the required equipment to make it easy to use.

3. Purge the well according to the procedures outlined above. If bailing, allow the water level to recover enough to completely submerge the bailer without touching the well bottom.

4. If bailing, securely attach the bailer to decontaminated Teflon-coated stainless-steel leader.

5. Arrange the sample containers in the order of sample collection (VOCs first, then SVOCs, other organics, and metals).

During Groundwater Sampling:

1. Slowly lower the pump hose or bailer into the water to prevent aeration.

2. Start pump or retrieve full bailer to the surface. If bailing, do not allow the line to touch the ground.

3. Unless using the same pump or bailer for both purging and sampling, allow initial pump water to discharge into a drum. If using a bailer, use the first bailer of water to rinse out the bailer; then discard the water.

4. If using a bailer, repeat Steps 2 and 3.

5. Fill all sample containers to capacity. Add preservative (if needed), cap, seal, and properly label all containers. Place the filled containers in the cooler(s) immediately and preserve them to 4°C. Collect VOC samples first. Allow the water to flow gently down the inside wall of the sample vial to avoid volatilization. Cap the vial, maintaining zero headspace. Following VOCs, collect SVOCs, other organics, then metals.

After Groundwater Sampling:

1. Record sample identifications, types, amounts collected, analyses, as well as the time and date of sample collection in the field logbook. Prepare chain-of-custody forms and analytical request documents.

2. Decontaminate sampling equipment if it is not dedicated to the monitoring well.

3. Clean up the area and place disposable materials (plastic sheeting, gloves, and rope) in the drum designated for disposal.

Water Level Measurements

A measuring point will be established at the top of each well casing. A point will be marked and the elevation established (to the nearest 0.01 foot) with respect to a permanent bench mark. Static groundwater levels will be measured in each monitoring well 24 hours following

development. All wells will be gauged on the same day as quickly as possible. The measurements will be made to an accuracy of 0.01 foot. The well depth will be measured using a decontaminated, electronic water level indicator with an accuracy of at least 0.01 foot. All readings will be made at a clearly marked reference point at the top of each well casing. The barometric pressure, date, and time will be recorded in the field logbook at the time of measurement.

B2.2.3 Sediment Sampling

Sediment samples will generally be collected to a maximum depth of 6 inches. Several general precautions must be followed to provide a representative sediment sample and to minimize disturbance:

- Avoid sediment plumes and density currents.
- If sediment and surface water samples are to be collected at the same location, collect the surface water first.
- Sediment sampling locations may be reached by wading or by boat, depending upon water depth and the substrate's nature. If wading to the sample location, approach from downstream to minimize disturbance.

A Ponar grab sampler will used to collect underwater sediment samples. The Ponar sampler is a steel, clam-shell type scoop activated by a cantilevered system. Procedures for operating the Ponar grab sampler are provided below.

Before Dredge Sampling:

1. Don personal protective clothing and equipment.

2. Lock open the jaws of the decontaminated sampler.

During Dredge Sampling:

1. Lower the sampler into the sediment.

2. Release tension on the rope and close sampler jaws.

3. Retrieve the sampler and open the jaws to collect the sediment sample.

4. To collect the VOC sample, either push a stainless-steel sleeve into the dredge sampler and cap, or release the sediment sample into a stainless-steel bowl and immediately collect the VOC samples. Fill the sample containers to capacity to achieve zero headspace.

5. Repeat the sample collection process (Steps 1 to 3) until enough volume has been collected. Homogenize the material in the stainless-steel bowl and place in appropriate sample containers (see Section B4), using stainless-steel implements.

6. Describe the lithology of the sample collected, sample collection depth, sample identification numbers, and analyses in the field logbook.

7. After samples have been collected, decontaminate all equipment in accordance with Section B2.2.5 of this plan.

B2.2.4 Surface Water Sampling

Surface water will be sampled in accordance with the procedures outlined below. The samples will be collected by placing the sample bottle in the surface water.

General Surface Water Sampling Procedures

- Collect samples first from the areas of suspected least contamination, proceeding to areas of suspected greatest contamination. Note wind direction and record whether the

Before Sampling with Laboratory Bottle:

1. Locate the sample collection location on a site map and describe it in the field logbook.

2. Don personal protective clothing and equipment in accordance with the site-specific health and safety plan.

During Sampling with Laboratory Bottle:

1. Point the open end of the vials upstream. Slowly submerge unpreserved VOC vials and fill. Do not disturb bottom sediments. If the sample is to be collected at depth, uncap the bottle at the required sampling depth. Recap containers before returning bottle to the surface.

2. Cap the VOC vial underwater. Be sure to have zero headspace before sealing it.

3. If VOC vials are pre-preserved, collect surface water samples with a decontaminated glass or stainless-steel device and carefully decant into vials.

4. Slowly submerge other unpreserved bottles into the surface water and fill in the following order: VOCs, SVOCs, other organics, and metals. If the sample is to be collected at depth, uncap containers at the required depth and allow to fill. Recap the containers before returning the sample to the surface.

5. Chemically preserve the samples as needed and seal with Teflon-lined caps.

6. Collect additional surface water in the sample collection device for field measurement of pH, temperature, and conductivity. If the sample interval is at depth, use probes to measure these parameters.

After Sampling with Laboratory Bottle:

1. Place bottles in cooler and preserve to 4°C.

2. Note sample identification number, sample collection depth, analyses required, and the tidal phase in the field logbook.

3. Decontaminate all sampling equipment in accordance with Section B2.2.5 of this plan.

B2.2.5 Decontamination Procedures

Decontamination will be performed in accordance with USEPA Region 2's CERCAL Quality Assurance Manual (1989), with the following exceptions. When available, hot water will be used for field decontamination. A stainless-steel bowl, sink, or bucket will be used to contain the clean water wash solution. PVC well construction materials will not be solvent-rinsed or washed with hot water. The steam cleaner and/or high-pressure hot water washer will be capable of generating adequate pressure and producing hot water and/or steam. All wastes generated during decontamination will be containerized in designated drums or tanks for disposal in accordance with Section B2.2.5.

Decontamination Area Setup

Decontamination generally occurs at a designated area downgradient and downwind of the clean equipment storage area. Liquids contained within the decontamination area will be pumped regularly into designated drums or tanks. All large equipment (i.e., augers, rods) will be cleaned on saw horses or auger racks above the ground surface. Smaller equipment (i.e., spoons, bowls, etc.) will be cleaned on plastic sheeting to contain any spills and to prevent cross contamination. If field cleaning is necessary, place plastic sheeting on the ground designated as the decontamination area to contain any spills. To prevent cross-contamination of samples, all equipment will be thoroughly cleaned both before and after sampling.

Cross-Contamination Prevention Procedures

1. Don a new pair of disposable outer gloves before handling sampling equipment.

2. Use only Teflon, glass, or plastic spray bottles/pressurized containers to apply decontamination rinsates. Keep each solution in a separate container.

3. Transport all necessary decontaminated field equipment to each designated location to minimize the need for field cleaning.

Sampling Equipment

Sampling equipment, including hand augers, split spoons, dredges, and sampling utensils (spoons, spatulas, bowls, etc.), will be decontaminated according to the following procedures:

1. Don protective gloves before decontaminating equipment.

2. Wash and scrub small, hand-held equipment (i.e., hand augers, bowls, spoons, etc.), with laboratory-grade detergent and clean-water wash solution. Decontaminate large equipment (i.e., drill rigs, hollow stem augers, etc.) with high-pressure steam.

3. Rinse with clean tap water.

4. Rinse with 10% HNO3, ultra pure

5. Rinse with clean, tap water.

6. Rinse with acetone only or methanol followed by hexane (solvents must be pesticide grade or better).

7. Rinse with ASTM Type III water.

8. Air dry.

9. If equipment is visibly contaminated, return to Step 2.

10. Wrap in aluminum foil or plastic for storage if the equipment will be stored or transported.

Pump Decontamination

Pump decontamination differs from decontaminating most sampling equipment. The pump exterior and interior both require decontamination. The procedures for decontaminating the interior and exterior of the pump are outlined below:

1. Don protective gloves before decontaminating the equipment.

2. Immerse the pump head in a detergent solution with the effluent hose prepared to discharge into a liquid IDW drum. A stainless-steel bucket or closed 4-inch pipe can be

used to contain the pump head and pump solutions. All pump effluent will be containerized as IDW.

3. Using a brush, scrub the exterior of the pump and hose with the detergent solution. Rinse the exterior of the hose with a clean water rinse solution followed by a ASTM Type III water rinse. Roll the hose back onto the spool.

4. Each decontamination fluid will be pumped through submersible sampling pumps.

5. Rinse the outside of the pump housing and hose with ASTM Type III water.

6. Wrap the pump in plastic sheeting for transport to the field or for storage to prevent cross-contamination.

B2.2.6 Investigation-Derived Waste

IDW from the investigation will likely include soil cuttings from boring installation, disposable personal protective equipment, sampling utensils, and decontamination fluids from the cleaning of PPE, sampling equipment, and drilling equipment, and purge water from groundwater sampling. These wastes will be containerized, as appropriate, in U.S. DOT-approved drums or other collection receptacles, and labeled with the site, date of generation, and waste category. After IDW is characterized, the waste will be managed in a manner consistent with all applicable local, state, and federal regulations and laws. Table B-1 presents the sampling requirements for IDW. One composite soil sample and decontamination/purge water sample will be collected from each of the four sampling areas listed below.

Table B-1
Quantity of Composite IDW Samples

Analysis	OB Unit	OD Unit	Laguna Monte Largo Area	Laguna Yanuel Area
Soil				
TCLP VOCs 1311/8260B	1	1	1	1
TCLP SVOCs 1311/8270C	1	1	1	1
TCLP Pesticides 1311/8081A	1	1	1	1
TCLP Metals 1311/6010B	1	1	1	1
Reactivity: Reactive Cyanide SW-846 7.3.3.2/9014 Reactive Sulfide SW-846 7.3.4.1/9030B	1	1	1	1
Ignitability: 1010	1	1	1	1
Corrosivity: 9045C	1	1	1	1
Water				
VOCs 8260B	1	1	1	1
SVOCs 8270C	1	1	1	1
Pesticides 8081A	1	1	1	1
Metals 6010B	1	1	1	1
Reactivity: Reactive Cyanide SW-846 7.3.3.2/9014 Reactive Sulfide SW-846 7.3.4.1/9034	1	1	1	1
Corrosivity: 9040B	1	1	1	1

Note:
All methods are from SW-846.

B2.3 Support Facilities

When the contractor has been selected, all support offices will be identified.

B2.4 Sampling Measurement System Failure Response and Corrective Action Process

The contractor's Site Manager and Quality Assurance Manager will oversee the implementation of the QAPP, address problems identified by field personnel, and implement

corrective measures, as needed. Field change request forms (see Section B10.3) will be submitted when any deviation from the work plan is required. Generally, these include changes that will (1) harm data quality, (2) change the cost field activities, (3) alter the scope of field activities, or (4) significantly delay the schedule.

Specific changes include:

- Number of wells.
- Number of sampling points.
- Decontamination procedures.
- Drilling method or well construction design.
- Sampling methodology.

Information should include the nature of the change, appropriate rationale, and date it will be implemented. These forms will be submitted to all parties on the QAPP distribution list.

B2.5 Sampling Equipment, Preservation, and Holding Time Requirements

Requirements to prevent sampling contamination are discussed in B2.2.5. The physical volume of the material to be collected and preservation and holding time requirements are discussed in Section B4.

B3. Sampling Handling and Custody Requirements

B3.1 Sample Identification and Labeling

Labels will be affixed to each sample container that identify the site, sample number, collection time and date, method of preservation, signatures of persons collecting samples, and analyses requested. A sample label is shown in Figure B-5. The selected contractor must use a form that meets these minimum requirements.

Sample Numbering

Assign the sample identification number according to the following format and guidelines:

ENSAFE

Ensafe, Inc.

SITE NAME	DATE
ANALYSIS	TIME
	PRESERVATIVE
SAMPLE IDENTIFICATION	
PROJECT NUMBER	

ENSAFE

(800) 588-7962
MEMPHIS, TENNESSEE
CHARLESTON,SC CINCINNATI,OH DALLAS,TX JACKSON,TN KNOXVILLE,TN
LANCASTER,PA NASHVILLE,TN NORFOLK,VA PADUCAH,KY PENSACOLA,FL
LITTLE ROCK,AR JACKSON,MS CLEVELAND,OH

FIGURE B-5
AFTWF, VIEQUES, PR
ENSAFE SAMPLE LABEL

DWG DATE: 06/27/00 | DWG NAME: 5901G048

Format: — *1 2 3 4 5 6 7 8 9 0*

1 2 3 — The first three digits designate whether the sample is from the OB area, the OD area, or from a reference location.

4 — This digit will represent the sample matrix. To keep the data consistent and facilitate data management, use the following:

S — soil
C — soil duplicate sample
M — sediment
N — sediment duplicate sample
G — groundwater sample
H — groundwater duplicate sample
W — surface water
R — surface water duplicate sample

5 6 7 8 — These four digits designate the sampling location: boring or well number, etc.

9 0 — The final two digits represent the sample-specific identification: depth to the nearest foot, depth interval, serial number for water samples, etc.

Quality Control Samples:

1 2 3 — The first three digits designate whether the sample is from the OB area, the OD area, or from a reference location.

4 — This digit will represent the type of QC sample. To keep the data consistent and facilitate data management, the master list of abbreviations below will be used for commonly collected QC samples when applicable:

T — trip blank

E — equipment rinsate blank
D — deionized water system blank
P — potable water blank
F — field blank
L — filter blank
2 — cement blank
3 — drilling mud
4 — grout blank
5 — bentonite blank
6 — sand blank

5 6 7 8 — These four digits correlate the QC sample with its associated field samples. A simple method is to use the location of the sample collected on the same day as the QC sample. This also will keep the QC samples blind to the laboratory.

9 0 — The final two digits are the QC sample serial number. For example, the first rinsate blank collected at a particular site will have the serial number "01," the second rinsate will be "02," etc.

B3.2 Sample Packaging and Shipment

Samples will be packaged and shipped in accordance with the following procedures.

1. Select a cooler in good condition. Seal the drain plug on the inside and outside of the cooler with tape to prevent leaks.

2. Line the cooler with a large plastic bag.

3. Place one sample container in one sealable plastic bag.

4. To prevent breakage, either:

— Place bubble-wrap packing material around the containers and then seal with tape. Bubble wrap is not required for plastic containers, but take care when packing the coolers so containers do not directly touch each other.

or

— Place 2 to 4 inches of inert packing material (e.g., vermiculite or cellulose insulation) on bottom of the cooler. Place the bagged containers inside the cooler so the bottles do not touch. Completely fill any remaining space with inert packing material.

5. Include a temperature blank or strip in each sample cooler.

6. Fasten the top of the large plastic bag with tape.

7. Place double-bagged ice inside cooler to preserve the samples at 4°C (±2°C).

8. Place a chain-of-custody form describing the contents of each cooler in a sealable plastic bag inside the cooler.

9. Seal the cooler with tape and custody seals so it cannot be opened without breaking the seal.

10. Clearly print "This End Up" or "This Side Up" on top of the cooler, and place upward-pointing arrows on sides of the cooler.

11. Mark cooler with the addresses of both shipper and receiver.

12. If more than one cooler is to be shipped, mark with the sequential cooler number and the total number of coolers (e.g., 1 of 3, 2 of 3, and 3 of 3).

Coolers will be shipped overnight to the laboratory. Transportation and custody procedures will meet U.S. Department of Transportation and USEPA requirements.

B3.3 Chain-of-Custody Procedures

Chain-of-custody (COC) forms are used to record sample transfers between handlers and throughout the laboratory analysis process. Sample custody or possession will be traceable

from the time of collection to receipt at the laboratory. Chain-of-custody forms must be signed as received and relinquished by each person that has custody of the samples, from sample collection to receipt at the laboratory and throughout the laboratory analysis process.

To Maintain Field Custody:

1. After sample collection, seal and label the jar.

2. Affix the custody seal (see Figure B-6) so that samples cannot be opened without breaking the seal.

3. The sampler must sign and date the seal.

Record sample custody on the COC as follows:

- Write clearly in non-erasable, waterproof black ink.

- Slash through zeros and sevens to avoid confusion with the letters O and I.

- Mark through errors with a single line, initial them, then record the correct information.

- Record the following information in the appropriate spaces on the form (see Figure B-7):

ENSAFE	ENVIRONMENTAL AND SAFETY DESIGNS, INC. 5724 Summer Tree Dr. Memphis, TN 38134 OFFICIAL SAMPLE SEAL	SAMPLE #	DATE	SEAL BROKEN BY:
		SIGNATURE		DATE:
		PRINT NAME & TITLE:		

ENSAFE

(800) 588-7962
MEMPHIS, TENNESSEE
CHARLESTON,SC CINCINNATI,OH DALLAS,TX JACKSON,TN KNOXVILLE,TN
LANCASTER,PA NASHVILLE,TN NORFOLK,VA PADUCAH,KY PENSACOLA,FL
LITTLE ROCK,AR JACKSON,MS CLEVELAND,OH

FIGURE B-6
AFTWF, VIEQUES, PR
ENSAFE CUSTODY SEAL

DWG DATE: 06/27/00 | DWG NAME: 5901G049

ENSAFE

(800) 588-7962
MEMPHIS, TENNESSEE
CHARLESTON,SC CINCINNATI,OH DALLAS,TX JACKSON,TN KNOXVILLE,TN
LANCASTER,PA NASHVILLE,TN NORFOLK,VA PADUCAH,KY PENSACOLA,FL
LITTLE ROCK,AR JACKSON,MS CLEVELAND,OH

CHAIN OF CUSTODY RECORD

PAGE _____ OF _____

PROJECT/JOB NO: _____
COC NO: _____
PO NO: _____
REL NO: _____
LAB NAME: _____

CLIENT _____ PROJECT MANAGER _____

LOCATION _____ TELE/FAX NO. _____

SAMPLERS: (SIGNATURE) _____

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	ANALYSIS REQUIRED											REMARKS

RELINQUISHER:	DATE	RECEIVER:	DATE	RELINQUISHER:	DATE	RECEIVER:	DATE
PRINTED:	TIME	PRINTED:	TIME	PRINTED:	TIME	PRINTED:	TIME
COMPANY:		COMPANY:		COMPANY:		COMPANY:	

METHOD OF SHIPMENT: _____
SHIPMENT NO. _____
SEND RESULTS TO: _____

COMMENTS: _____

ANALYTICAL DATA RECEIVED BY (INITIALS/DATE) _____

ENSCOC2
REV. 05/90

ENSAFE

(800) 588-7962
MEMPHIS, TENNESSEE
CHARLESTON,SC CINCINNATI,OH DALLAS,TX JACKSON,TN KNOXVILLE,TN
LANCASTER,PA NASHVILLE,TN NORFOLK,VA PADUCAH,KY PENSACOLA,FL
LITTLE ROCK,AR JACKSON,MS CLEVELAND,OH

FIGURE B-7
AFTWF, VIEQUES, PR
ENSAFE CHAIN-OF-CUSTODY FORM

DWG DATE: 06/27/00

DWG NAME: 5901G050

Client/project information:

- Client name and address
- Project name/number
- Project manager's name
- Signature of sampler(s)

Sample information:

- Field sample identification
- Date and time of collection (24-hour clock)
- Type of sample
- Type and size of sample containers
- Preservation temperature and chemical
- Number of samples per container
- Type of laboratory analysis required
- Remarks: descriptive comments (e.g., "strong odor")

Transfer, shipment, and disposal information:

- Document sample custody transfer in the appropriate section of the form.

- The person relinquishing custody must print his or her name, company name, and reason for the transfer, date, time, and signature on the form.

- Note special instructions or comments (e.g., priority turnaround) in the appropriate section of the form (these instructions should have been discussed with the laboratory prior to sample collection).

- Note post-analysis sample disposal or storage instructions.

Follow these guidelines for custody transfer and sample shipment:

1. Record the air-bill number in the appropriate section on the COC record and the field notebook. Seal the COC form in a plastic bag and place it inside the shipping cooler.

2. Secure cooler with tape and place a custody seal on each exterior side to prevent opening without breaking the seal.

3. Ship samples overnight to the selected analytical laboratory.

4. When relinquishing custody to a shipper, advise the laboratory of any time constraints on analysis.

5. Notify the laboratory as early in the week as possible regarding samples intended for Saturday delivery.

Laboratory receipt procedures are listed below.

1. A laboratory sample custodian accepts custody of the samples from the carrier and enters data about the package in a receipt log, including the status of the cooler's custody seals.

2. The sample custodian opens the coolers, checks the contents, logs in the samples, and verifies that the information on the COC agrees with samples received.

3. The custodian records information such as method of shipment, pickup, and courier in the "Remarks" section. The custodian also documents cooler temperature by checking the temperature blank or strip, as well as the general condition of sample containers.

4. The analyst records pH and verifies sample preservation before extraction, digestion, or analysis.

5. If samples are improperly preserved, the Laboratory Quality Assurance Coordinator documents this fact, along with the sample identification and other pertinent information, and notifies the project manager and site manager. All other QA/QC discrepancies are handled similarly and must be documented as an out-of-control event with appropriate corrective action.

B4. Analytical Method Requirements

Tables B-2 and B-3 provide information on sample container type and size, preservation requirements, holding times, preparation methods, and analytical methods. The appropriate number of precleaned and pre-preserved (if required by the method) sample containers will be provided by the approved laboratory. The laboratory turnaround time for analytical results will be 30 days from sample collection. The contractor's QA Manager will maintain coordination and communication between the analytical laboratory and the project management team members, assess laboratory data, and direct corrective action if problems arise.

Table B-2
Analytical Methods, Sample Containers, Preservation, and Holding Times

Parameter	Analytical Method	Sample Matrix	Container Type	Sample Preservation	Holding Times
TAL Inorganics	CLP SOW ILM04.0	Water	1-liter HDPE Bottle	Chill, 4°C, HNO_3 pH < 2	6 months until analysis (mercury 28 days)
		Soil	(1) 4-oz Glass Jar	Chill, 4°C	6 months until analysis (mercury 28 days)
Cyanide	CLP SOW ILM04.0	Water	500 ml HDPE Bottle	Chill, 4°C, NaOH pH > 1 2	14 days until analysis
		Soil	(1) 4-oz Glass jar	Chill, 4°C	14 days until analysis
TCL Volatile Organic Compounds (VOC)	CLP SOW OLM04.2	Water	(3) 40-ml vials with Teflon-lined septa	Chill, 4°C, HCl pH < 2, Store in dark	14 days
		Soil	(3) EnCore samplers or equivalent [a]	Chill, 4°C, Store in dark	Laboratory preservation within 48 hours. Analysis within 14 days for frozen sample vial. [b]
TCL Semivolatile Organic Compounds (SVOC)	CLP SOW OLM04.2	Water	(2) 1-liter Amber Glass Jars with Teflon-lined septa	Chill, 4°C	Extract within 7 days, analyze within 40 days after extraction

Table B-2
Analytical Methods, Sample Containers, Preservation, and Holding Times

Parameter	Analytical Method	Sample Matrix	Container Type	Sample Preservation	Holding Times
		Soil	(1) 4-oz Glass Jar with Teflon-lined septa	Chill, 4°C	Extract within 14 days, analyze within 40 days after extraction
TCL Chlorinated Pesticides/ PCBs	CLP SOW OLM04.2	Water	(2) 1-liter Amber Glass Jar with Teflon-lined septum	Chill, 4°C	Extract within 7 days, analyze within 40 days after extraction
		Soil	(1) 4-oz Glass Jar with Teflon-lined septum	Chill, 4°C	Extract within 14 days, analyze within 40 days after extraction
Perchlorate	USEPA Method 314.0	water	(1) 500 mL glass or HDPE Bottle	Chill, 4°C	28 days
Explosives + Nitroglycerin, Pentataerythrito l tetranitrate (PETN), and picric acid	SW-846 (8330 – modified)	Water	(2) 1-liter Amber Glass Jar with Teflon-lined septum	Chill, 4°C	Extract within 7 days, analyze within 40 days after extraction
		Soil	(1) 4-oz Glass Jar with Teflon-lined septum	Chill, 4°C	Extract within 14 days, analyze within 40 days after extraction

Notes:

TAL	=	Target Analyte List	CLP	=	Contract Laboratory Program
SOW	=	Statement of Work	TCL	=	Target Compound List
HDPE	=	High-density Polyethylene	PCBs	=	Polychlorinated biphenol
A	=	VOC soil preparation method SW-846 5035. A bulk soil jar will also be collected for moisture content.			
B	=	The holding time for method 5035 us currently under evaluation by several regulatory agencies and may be extended during the course of the investigation.			

Table B-3
Geotechnical Soil Parameters

Parameter	Sample Container Type and Materials	Sample Preservation	Holding Time	Analytical Method[a]
Atterberg Limits	Shelby Tube	none required	None	ASTM D 4318
Porosity	Shelby Tube	none required	None	ASTM D 4645
Permeability	Shelby Tube	none required	None	ASTM D-5084 or 2434
Grain Size Analysis	Shelby Tube	none required	None	ASTM C 117 and 136
Moisture Content	Shelby Tube	none required	None	ASTM D-2216

Note:

ASTM = American Society for Testing and Materials (ASTM), *Annual Manuals*.

Samples will be chemically preserved in accordance with the guidelines presented in USEPA Region 2's CERCLA Quality Assurance Manual. If required, samples will be collected in pre-preserved containers.

The laboratory contracted by the Navy will be required to produce data deliverables of the quality and format provided in Section A9.2.

B4.1 Chemical Parameters

Analytical samples will be analyzed in accordance with the applicable methods shown in Table B-2 and as outlined in

- USEPA Contract Laboratory Program (CLP) *Statement of Work (SOW) for Organic Analysis*, OLM04.2, USEPA Office of Solid Waste and Emergency Response (OSWER)
- *USEPA CLP Statement of Work for Inorganic Analyses*, ILM04.0, USEPA OSWER.
- *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (SW-846), USEPA Office of Solid Waste and Emergency Response (OSWER), Third Edition, revised December 1996.
- USEPA Environmental Monitoring and Support Laboratory, *Methods for Chemical Analysis of Water and Wastes* (EPA-600/4-79-020), most recent revision. (MCAWW)
- USEPA CLP, *Test Methods for Evaluation of Solid Waste Physical/Chemical Methods*, (SW-846)

B4.2 Geotechnical Parameters

Samples will be analyzed in accordance with guidelines established in American Society for Testing Methods (ASTM). Engineering and geochemical parameters and their associated methods are listed in Tables B-3.

B5. Quality Control Requirements

Analytical data quality will meet definitive data quality objectives that apply to sites with characterization, environmental monitoring, engineering, risk assessment, and/or confirmation of field-produced data objectives. In general, quality assurance objectives assess and document the precision, accuracy, representativeness, completeness, and comparability of all sampling and analyses performed. Quality criteria are outlined here to assure that data obtained during projects are suitable for their intended use and to meet goals established in *Guidance for the Data Quality Objectives Process*, EPA/600/R-96/055 (EPA QA/G4, September 1994). Quality control samples will be collected at the frequency presented in Table B-4 to assess the data's precision and accuracy. QA/QC goals for each parameter to be analyzed are shown in Tables B-5 and B-6.

Table B-4
Quality Control Sample Collection Frequencies

Duplicates	One per 10 samples collected.
Field Blank	One per sampling event (week) per source (Potable Water and Reagent Grade Water —ASTM Type III).
Equipment Rinsate Blank	One per sampling event (week) per sampling method (i.e., hand-auger or split-barrel sampling).
MS/MSD	One per 20 samples collected per matrix; MS/MSD are to be the same sample used for duplicate analysis.
Temperature Blank	One per sample shipping cooler, when required by the lab.
Trip Blank	One per cooler containing samples for VOC analysis

The QA/QC goals specified in this table are defined in the analytical methods (CLP methods) or are developed statistically in accordance with the method guidelines (non-CLP methods). These goals are highly matrix dependant and may not be achieved in all circumstances. QC limits not met will be assessed during the data validation process to determine the cause of the deficiency.

If a laboratory error is found, the data validator will request that the laboratory initiate correct action and correct the error. If no laboratory error was found and the QC deficiency is determined to be the result of matrix-interference, the validator will flag the data according to algorithms set forth in USEPA data validation guidelines.

Table B-5
CLP Metals Analyses Data QA Objectives
Matrix Spikes/Duplicate Analyses

Compound (Metal)	Water Precision (RPD) (a)	Soil Precision (RPD) (a)	Accuracy (% Spike Recovery) (b)
Aluminum	± 20	± 35	75-125
Antimony	± 20	± 35	75-125
Arsenic	± 20	± 35	75-125
Barium	± 20	± 35	75-125
Beryllium	± 20	± 35	75-125
Cadmium	± 20	± 35	75-125
Calcium	± 20	± 35	75-125
Chromium	± 20	± 35	75-125
Cobalt	± 20	± 35	75-125
Copper	± 20	± 35	75-125
Iron	± 20	± 35	75-125
Lead	± 20	± 35	75-125
Magnesium	± 20	± 35	75-125
Manganese	± 20	± 35	75-125
Mercury	± 20	± 35	75-125
Nickel	± 20	± 35	75-125
Potassium	± 20	± 35	75-125
Selenium	± 20	± 35	75-125
Silver	± 20	± 35	75-125
Sodium	± 20	± 35	75-125
Thallium	± 20	± 35	75-125
Vanadium	± 20	± 35	75-125

Table B-5
CLP Metals Analyses Data QA Objectives
Matrix Spikes/Duplicate Analyses

Compound (Metal)	Water Precision (RPD) (a)	Soil Precision (RPD) (a)	Accuracy (% Spike Recovery) (b)
Zinc	± 20	± 35	75-125
Cyanide	± 20	± 35	75-125

Notes:
RPD = Relative Percent Difference
(a) = Precision limits apply when the metal is present at 5 times the contract required detection limit (CRDL).
(b) = Accuracy limits do not apply when sample concentration exceeds spike concentration by a factor of 4 or greater.

Table B-6
Organic Analyses Data QA Objectives
Matrix Spikes/Laboratory Control Samples/Surrogate Spikes

Fraction	Compound	Soil Precision (RPD)	Soil Accuracy (% Recovery)	Water Precision (RPD)	Water Accuracy (% Recovery)
Matrix Spikes (Applicable to CLP Soil Samples Only)					
CLP VOC	1,1-Dichloroethene	22	59-172	—	—
	Trichloroethene	24	62-137	—	—
	Chlorobenzene	21	60-133	—	—
	Toluene	21	59-139	—	—
	Benzene	21	66-142	—	—
Laboratory Control Samples (Applicable to Low Concentration CLP Water Only)					
CLP VOC	Vinyl Chloride	—	—	—	60-140
	1,2-Dichloroethane	—	—	—	60-140
	Carbon Tetrachloride	—	—	—	60-140
	1,2-Dichloropropane	—	—	—	60-140
	Trichloroethene	—	—	—	60-140
	1,1,2-Trichloroethane	—	—	—	60-140
	Benzene	—	—	—	60-140
	cis-1,3-Dichloropropene	—	—	—	60-140
	Bromoform	—	—	—	60-140

Table B-6
Organic Analyses Data QA Objectives
Matrix Spikes/Laboratory Control Samples/Surrogate Spikes

Fraction	Compound	Soil Precision (RPD)	Soil Accuracy (% Recovery)	Water Precision (RPD)	Water Accuracy (% Recovery)
	Tetrachloroethene	—	—	—	60-140
	1,2-Dibromoethane	—	—	—	60-140
	1,4-Dichlorobenzene	—	—	—	60-140
Surrogate Spikes					
	Toluene-d_8	—	84-138	—	—
CLP VOC	4-Bromofluorobenzene	—	59-113	—	80-120
	1,2-Dichloroethane-d_4	—	70-121	—	—
Matrix Spikes (Applicable to CLP Soil Samples Only)					
	Phenol	35	26-90	—	—
	2-Chlorophenol	50	25-102	—	—
	N-Nitroso-di-n-propylamine	38	41-126	—	—
	4-Chloro-3-methylphenol	33	26-103	—	—
CLP SVOC	Acenaphthene	19	31-137	—	—
	4-Nitrophenol	50	11-114	—	—
	2,4-Dinitrotoluene	47	28-89	—	—
	Pentachlorophenol	47	17-109	—	—
	Pyrene	36	35-142	—	—
Laboratory Control Samples (Applicable to Low Concentration CLP Water Only)					
	Phenol	—	—	—	40-120
	2-Chlorophenol	—	—	—	50-110
	4-Chloroaniline	—	—	—	10-120
	2,4,6-Trichlorophenol	—	—	—	40-120
	bis(2-Chloroethyl)ether	—	—	—	50-110
CLP SVOC	N-Nitroso-di-n-propylamine	—	—	—	30-110
	Hexachloroethane	—	—	—	20-110
	Isophorone	—	—	—	50-110
	Naphthalene	—	—	—	30-110
	2,4-Dinitrotoluene	—	—		30-120
	Diethylphthalate	—	—	—	50-120

Table B-6
Organic Analyses Data QA Objectives
Matrix Spikes/Laboratory Control Samples/Surrogate Spikes

Fraction	Compound	Soil Precision (RPD)	Soil Accuracy (% Recovery)	Water Precision (RPD)	Water Accuracy (% Recovery)
	N-Nitrosodiphenylamine	—	—	—	30-110
	Hexachlorobenzene	—	—	—	40-120
	Benzo(a)pyrene	—	—	—	50-120
Surrogate Spikes					
	Nitrobenzene-d_5	—	23-120	—	23-120
	2-Fluorobiphenyl	—	30-115	—	30-115
CLP SVOC	p-Terphenyl-d_{14}	—	18-137	—	18-140
	Phenol-d_5	—	24-113	—	15-115
	2-Fluorophenol	—	25-121	—	15-121
	2,4,6-Tribromophenol	—	19-122	—	15-130
Matrix Spikes (Applicable to CLP Soil Samples Only)					
	Lindane (gamma-BHC)	50	46-127	15	56-123
	Heptachlor	31	35-130	20	40-131
CLP Pesticides/ PCBs	Aldrin	43	34-132	22	40-120
	Dieldrin	38	31-134	18	52-126
	Endrin	45	42-139	21	56-121
	4,4'-DDT	50	23-134	27	38-127
Laboratory Control Samples (Applicable to Low Concentration CLP Water Only)					
	gamma-BHC	—	—	—	50-120
	Heptachlor epoxide	—	—	—	50-120
CLP Pesticides/ PCBs	Dieldrin	—	—	—	30-120
	4,4'-DDE	—	—	—	50-120
	Endrin	—	—	—	50-120
	Endosulfan sulfate	—	—	—	50-120
	gamma-Chlordane	—	—	—	30-120
Surrogate Spikes					
CLP Pesticides/ PCBs	Decachlorobiphenyl	—	30-150	—	30-150
	2,4,5,6-Tetrachloro-m-xylene	—	30-150	—	30-150

Table B-6
Organic Analyses Data QA Objectives
Matrix Spikes/Laboratory Control Samples/Surrogate Spikes

Fraction	Compound	Soil Precision (RPD)	Soil Accuracy (% Recovery)	Water Precision (RPD)	Water Accuracy (% Recovery)
Matrix Spikes (a)					
SW-846 8330 Explosives	1,3-Dinitrobenzene	25	50-150	25	50-150
	2,4-Dinitrotoluene	25	50-150	25	50-150
Surrogate Spikes (a)					
SW-846 8330 Explosives	3,4-Dinitrotoluene	—	20-130	—	25-150

Notes:
VOC = Volatile Organic Analyses
SVOC = Semivolatile Organic Analyses
PCBs = Polychlorinated Biphenyls
— = Not applicable to the analytical method.
(a) = Compounds spiked and accuracy and precision may change based on laboratory statistical calculations at the time of sampling and analysis.

Precision

Precision is a measure of the reproducibility of measurements and methods, defined for qualitative data as the variability of a group of values compared with its average value. To assess the precision of this project's measurement systems, duplicates will be obtained and analyzed with the samples collected. Precision, to be used as a criterion for data classification, is calculated as a relative percent difference (RPD) in analytical outcome between a given sample and corresponding duplicate:

$$\%RPD = \frac{(A-B)}{(\frac{A+B}{2})} \; x \; 100\%$$

where:

A = sample concentration

B = sample duplicate concentration

The type of duplicates used will depend on which part of the measurement system is to be evaluated. Field-duplicated samples analyzed by the same laboratory will yield information about sampling method precision and matrix homogeneity. Laboratory-duplicated samples give an indication of sample preparation and analytical method precision.

Precision is a measure of the degree to which two or more measurements are in agreement. Field precision is assessed through the collection and measurement of field duplicates at a rate of 1 duplicate per 10 analytical samples.

Accuracy

Accuracy is the degree of agreement of a measurement or the average of several measurements with an accepted reference or true value; it is a measure of bias in a system. Accuracy in the field is assessed through the use of field and trip blanks and through the adherence to all sample handling, preservation and holding times. Laboratory accuracy is assessed through the analysis of matrix spikes or standard reference materials and the determination of percent recoveries. If recoveries do not meet the required criteria, the analytical data are considered to be potentially inaccurate. This is normally expressed as the difference between measured and reference or true value or the difference as a percentage of the reference or true value. It may also be expressed as a ratio of the measurement to the true value.

$$\%R = \{(A-B) / (C)\} \times 100\%$$

where:

A = spiked sample concentration

B = unspiked sample concentration

C = spike standard concentration

Accuracy will vary from analysis to analysis because of individual sample and matrix effects. In an individual analysis, accuracy can be measured and expressed in terms of the recovery of surrogate compounds (organic analyses) or recovery of spiked compounds (inorganic compounds). This gives and indication of expected recovery for analytes tending to behave chemically like the spiked or surrogate compounds.

A *field blank* consists of sample containers filled in the field with water from each source used for decontamination. Field blanks are prepared, preserved, and stored in the same manner as the samples. The field blank is analyzed along with the field samples for constituents of interest to check for sample contamination from the water source. Samples of the ASTM Type III water and tap water will be collected weekly. Field blanks may also be collected to determine if any contaminants in the area, such as dust from a source other than that being sampled, may affect sample integrity.

An *equipment rinsate blank* is made by placing water in contact with the field sampling apparatus (e.g., stainless-steel hand auger, split barrel, bowls, etc.), after decontaminating the equipment. Equipment blanks for submersible pumps will be prepared by pumping water through the pump. The water will be collected in the same type of containers as the other samples, preserved in the same manner, and analyzed for the same parameters. One equipment rinsate blank will be collected each week. If different equipment is used in the same week

(e.g., if soil samples are collected with a split-barrel sampler and hand auger), a separate rinsate blank will be collected for each piece of sampling apparatus.

MS/MSD samples prepared by the laboratory are useful in assessing the accuracy of the analytical methods, and can detect matrix effects where other sample components interfere with analyzing the chemical(s) of interest. The method of measuring analytical accuracy is percent recovery.

Analytical MS and MSD samples will be prepared by the laboratory, typically at a frequency of one MS/MSD pair per 20 samples per matrix. An additional sample volume will be collected to provide sufficient volume for the lab's MS and MSD analysis.

Representativeness

Representativeness expresses the degree to which data accurately and precisely represent a population characteristic, parameter variations at a sampling point, a process condition, or an environmental condition. Soil samples will be properly collected in accordance with USEPA protocol to ensure they are representative.

Completeness

Completeness goals for this project are set at 95% for laboratory analyses. Data completeness is calculated as the percentage of valid tests versus the total number of tests required in the project scope.

Comparability

Comparability expresses the confidence with which one data set can be compared to another. Comparability is assured by using established methods of field sampling by experienced field personnel and laboratory analyses.

B6. Instrument/Equipment Testing, Inspection, and Maintenance Requirements

Field equipment will be tested, inspected, and maintained according to the manufacturers' specifications. The contractor's site manager will conduct/oversee these procedures at frequencies required by the equipment manufacturer. Spare parts for field equipment will be obtained from the Contractor's supply office or from the equipment manufacturer, as needed. Field instruments will be checked and calibrated daily before use. Calibration checks will be documented in the field logbook. Critical spare parts such as tape, pH probes, and batteries will be kept on-site to reduce downtime. Backup instruments and equipment will be available on-site or within 1 day shipment to avoid delays in the field schedule.

All laboratory equipment will be tested through a contract analytical laboratory or the rental equipment supplier. Testing, inspection, and maintenance will be according to the laboratory's QAP, which will be reviewed by the Navy and the Contractor's QA manager during contracting process. Preventive maintenance for laboratory equipment is outlined in the laboratory's QAPP.

B7. Instrument Calibration and Frequency

Equipment used to gather, generate, or measure environmental data will be calibrated within the frequency stipulated by the manufacturer's instructions and/or analytical method in such a manner that accuracy and reproducibility of results are consistent.

Equipment to be used doing the field sampling will be examined to certify that it is in operating condition. This includes checking the manufacturer's operating manual and the instructions for each instrument to ensure that maintenance requirements are being observed. Field notes from previous sampling trips will be reviewed so that the notation on any prior equipment problems are not overlooked, and all necessary repairs to equipment have been carried out. Preventative measures should be employed so that field equipment is useable. Such preventative measures

include procedures such as sending two thermometers or a spare electrode with each pH meter to be used for field measurements.

B7.1 Field Instrument/Equipment

Calibration of field instruments is governed by the Standard Operating Procedure (SOP) for the applicable field analysis method, and such procedures take precedence over the following general discussion.

Calibration of field instruments will be performed at the intervals specified by the manufacturer or more frequently as conditions dictate. Field instruments will include a pH meter, thermometer, specific conductivity meter, nephelometer/turbidimeter, organic vapor photoionization detector. In the event that an internally calibrated field instrument fails to meet calibration/checkout procedures, it will be returned to the manufacturer for service or replacement. As a rule, instruments will be calibrated daily prior to use.

The linearity of the instrument will be checked by using a 2-point calibration, when applicable, with reference standards bracketing the expected measurement. All the calibration procedures performed will be documented in the field logbook and will include the date/time of calibration, name of person performing the calibration, reference standard used, temperature at which readings were taken and the readings. Multiple readings on one sample or standard, as well as readings on replicate samples, will likewise be documented.

The following paragraphs detail some specific calibration requirements for field instruments.

pH Meter Calibration: The pH meter will be calibrated with standard buffer solutions before being taken to the field. In the field, the meter will be calibrated daily with two buffer solutions before use. The range of the buffer solutions will be at least three or more pH units apart and will bracket the expected pH of the sample being measured.

- Ensure that the temperature of sample and buffer are the same.
- Connect pH electrode into pH meter and turn on pH meter.
- Set temperature setting based on the temperature of buffer; place electrode in first buffer solution.
- After reading has stabilized, adjust "CALIB" knob to display correct value.
- Repeat procedure for second buffer solution.
- Place pH electrode in the sample and record the pH as displayed.
- Remove pH electrode from sample and rinse off with distilled water.
- Recalibrate the pH meter every time it is turned off and turned back on, or if it starts giving erratic results.

The calibrations performed, standard used, and sample pH values are to be recorded in the field notebook. Appropriate new batteries will be purchased and kept with the meters to facilitate immediate replacement in the field as necessary.

Thermometer Calibration: Temperature readings will be taken using thermometers which have been compared to NIST traceable thermometer. Prior to use, the thermometers will be inspected to ensure that there is no mercury separation and will be periodically checked in the field. The thermometers used will be calibrated at least semiannually against a NIST traceable reference thermometer by immersing both thermometers in a bath of an expected known

temperature such as freezing (0 degrees C) or boiling (100 degrees C) and comparing the reading.

Conductivity Meter Calibration: The conductivity cells of the specific conductivity meter will be cleaned and checked against known conductivity standards before being taken to the field. In the field, the instrument will be checked daily with to National Institute of Standards and Technology or manufacturer traceable reference standards. The calibration procedure is described below.

- Place the probe in the conductivity calibration standard solution.
- Set temperature knob for temperature of standard solution.
- Turn to appropriate scale and set the instrument for the value of calibration standard.
- Rinse off the electrode with distilled water.
- Measure the conductivity for distilled water to be used for a field blank, making sure temperature is set correctly for temperature of solution to be tested.
- If the conductivity of blank (distilled water) is high, it must be discarded and a new blank sample obtained.

All readings and calibrations should be recorded in the field notebook.

Turbidity: A turbidimeter is used in comparing the turbidity of liquids by viewing light through them and how much light is eliminated. The specific calibration procedures are as follows:

- The sample cell is rinsed at least three times with organic free or distilled water.
- The cell is filled with organic free or distilled water and capped. This serves as a blank.
- Excess water and streaks are wiped off the cell with a non-abrasive lint-free paper or cloth.
- The cell is inserted in the instrument (arrow of cell to the front).
- Record the result of the "blank."
- Using manufacturer standards, repeat steps to complete calibration. Record all findings.

Organic Vapor PID: The PID will be calibrated daily with isobutylene span gas of known concentration. All calibrations will consist of introducing gas of known concentration into the monitor at atmospheric pressure. The calibration gases shall be certified by their supplier to be of a specified and known concentration. PIDs should be calibrated each time they are turned on. More frequent calibrations may be conducted based on whether field conditions warrant.

Sample Calibration Forms

Calibration Log — pH Meter:

Model: _____ Date/Time: _____

Serial Number: _____ Checked by: _____

Instrument Checklist:

	YES	NO
Is the instrument clean and in good condition?	____	____
Is the battery charge acceptable?	____	____
Is the liquid crystal display (LCD) functioning properly?	____	____
Is the probe filled with proper solution?	____	____
Are there any visible cracks or problems with the probe?	____	____

Two- or Three-point Calibration

	Reading	**Lot #**	**Expiration Date**
Buffer 4.0:	_____	_____	_____
Buffer 7.0:	_____	_____	_____
Buffer 10.0:	_____	_____	_____
Initial Slope:	_____		

Remarks:

Calibration Log — Conductivity Meter

Model: _____ Date/Time: _____

Serial Number: _____ Checked by: _____

Instrument Checklist:

	YES	NO
Is the instrument clean and in good condition?	____	____
Is the battery charge acceptable?	____	____
Is the liquid crystal display (LCD) functioning properly?	____	____
Is the conductivity cell clean?	____	____
Are there any visible cracks or problems with the probe?	____	____

Conductivity Calibration Standards:

Source:_____ Date of Receipt:_____ Lot #/Expiration: _____

Two-point Calibration

		NIST Lot #
100 mhos/cm Solution:	_____	_____
1000 mhos/cm Solution:	_____	_____

Temperature: _____ Instrument internal calibration: _____

Remarks:

Laboratory Instruments

The analytical laboratory will perform instrument calibrations and QC operations as stipulated in the USEPA analytical methods. Calibration procedures for a specific laboratory instrument will consist of initial calibration (3 or 5-points), initial calibration verification and continuing calibration verification. Specific calibration procedure and frequencies are specified in the USEPA analytical methods.

Calibration of laboratory equipment will be based on approved written procedures. Records of calibration, repairs, or replacement will be filed and maintained by the designated laboratory personnel performing quality control activities. These records will be filed at the location where the work is performed and may be subject to QA audit. For all instruments, the laboratory will maintain a factory-trained repair staff with in-house spare parts or will maintain service contracts with vendors.

The records of calibration will be kept as follows:

- If possible, each instrument will have record of calibration permanently affixed with an assigned record number.

- A label will be affixed to each instrument showing description, manufacturer, model numbers, date of last calibration, by whom calibrated (signature), and due date of next calibration reports and compensation or correction figures will be maintained with instrument.

- A written stepwise calibration procedure will be available for each piece of test and measurement equipment.

- Any instrument that is not calibrated to within the manufacturer's original specification will display a warning tag to alert that analyst that the device carrier only a "Limited Calibration".

In all cases where analyses are conducted according to CLP and SW-846 protocols, the calibration procedures and frequencies specified in methods will be followed exactly. Adherence to proper calibration procedures may be determined by the project QA Manager during data review.

B8. Inspection/Acceptance Requirements for Supplies and Consumables

No special inspection or acceptance requirements are needed for the sampling outlined in this QAPP. The Contractor's Quality Assurance Manager will ensure that all sample containers have been provided by the contract laboratory. If available, all quality assurance documentation for sample containers provided by the manufacturer will be collected and placed

in the project files. The Contractor's Site Manager will inspect and accept project supplies and consumables. The identification number, data received, data opened, date tested (if performed), data to be retested (if applicable), and the expiration date will be recorded in the field log book.

B9. Data Acquisition Requirements

No data is anticipated be used from other sources.

B10. Data Management

Data will be managed in accordance with USEPA Region 2's CERCLA Quality Assurance Manual. This section describes the methods to be used throughout the investigation to document field work and manage collected data. Data will be managed by using the standard forms presented in this QAPP.

B10.1 Field Documentation

The Site Supervisor will be thoroughly familiar with appropriate documentation procedures. The manager will perform or directly oversee investigation documentation. Documentation tasks will be performed on a sample-by-sample or item-by-item basis throughout the day. Sample container labels and chain-of-custody forms will be prepared as completely as possible in advance.

General Field Documentation Procedures

- Complete all documentation in waterproof black or blue ink.
- Mark through corrections with a single line, then date and initial the correction.
- Do not destroy or discard serialized documents, even if they are illegible or inaccurate.
- Maintain voided entries within project files.

Field documentation includes a master site logbook, one or more site-specific field logbooks, field forms, photographs, sample labels, and chain-of-custody records. Detailed data can be recorded in various field logbooks and/or forms and cross-referenced in the site logbook.

Logbooks: Master site and field logbooks provide a daily handwritten record of all field activities at an investigation site. All logbooks must be permanently bound and have a hard cover. The master site logbook is a record of all site activities, and entries are usually made at the end of each work day. Field logbooks contain detailed daily records kept in real time. A field logbook will be assigned to each field activity conducted during the investigation. In addition, a sample logbook will detail sample collection each day.

Master Site Logbooks: The master site logbook chronicles each day's field investigation activities in less detail than the field logbook. Site conditions and activities are referenced to field logbooks and forms for specific information.

The field project manager completes the master site logbook and signs and dates the end of each page. Pages should not be removed and, in addition, partially used pages should be lined through to prevent data entry at a later date. The front of the master site logbook should include project name and number, subcontractor name, service client, contract number, and dates of use. The logbook should also contain the following:

- List of all field logbooks and brief outline of content requirements.
- Daily temperature, weather conditions, and names and titles of personnel present.
- Levels of PPE and any changes if required.
- Name, title, organization, and purpose of any site visitors.
- Brief outline of site activities and references to appropriate logbook.
- Specific comments on problems, their resolutions, and their impact on the investigation.

- Any changes and supporting rationale.
- Brief record of all telephone calls and their effect on the investigation.
- Instrument calibration; name(s) of personnel who performed daily calibration.

Field Logbook: The cover of each field logbook must include the information provided on the cover of the site logbook. In addition, the cover must list the assigned specific area. Entries in the field logbook must be made using military time and signed by the responsible person at the bottom of each page. Unused pages or portions of pages not used must be lined out to prevent entry of additional information at a later date. Backup copies of field logbooks will be made regularly. Field logbooks will also include the following information:

- Task beginning and end time.
- Weather conditions.
- Names, titles, and organizations of personnel performing specific tasks.
- Description of level of PPE and any changes.
- Detailed descriptions of site activities and forms used in the process.
- Description of specific field tests and results.
- Detailed description of samples and any associated QC measures.
- List of equipment type and decontamination procedures (including time allotted).
- Record of instrument calibration; explain failures and briefly describe repairs and/or replacements.

Sample Logbook: A record of samples collected and shipped (including QA/QC samples), analyses requested, the airbill number of the shipment, and any pertinent information concerning sample status will be compiled in a sample logbook.

Field Data Record Forms: Subsurface boring logs, monitoring well construction diagrams, monitoring well development forms, sample records, and other forms will be used during the investigation. Blank spaces will not be left on completed forms. If information on a form does not apply, the space will be marked "N/A." Forms will completed in the field as the task is performed. Forms will be copied regularly for backup. Field forms are discussed below:

Sample Labels
Cross-reference information in a field logbook (see Section B3.1).

COC Records
(See Section B3.3)

Subsurface Boring Logs
Soil boring logs will be maintained by a qualified geologist. Subsurface boring logs will be completed as the boring is advanced. Materials encountered, depth to water, obvious contamination, and any other necessary information will be recorded on the boring logs.

Monitoring Well Construction Diagrams
A monitoring well construction diagram will summarize the monitoring well construction. Well location, date drilled, drilling method, well depth, screen location, and general construction data will be included on the diagram. A general log will also be recorded in the field logbook as a cross-reference.

Photographs
Photographs will be taken of pertinent field activities as directed by the Site Supervisor. Information to be recorded in the field logbook will include:

- Date, time, location, and name of photographer.
- Description of photograph and orientation.
- Number of photographs on film roll.

After the film is developed, this information will be written on the back of each photograph.

B10.2 Laboratory Data Deliverables

The laboratory shall perform definitive analysis in support of this project. Data will be submitted to assess precision and accuracy of the laboratory tests. The information to be provided by the laboratory is discussed in Section A9.2

B10.3 Other Related Data

Other related data will include illustrations, graphs, meeting summaries, audit reports, and laboratory results. This information will be compiled and reviewed for report presentation.

Meeting Summaries, Telephone Conversations, and Notes: These items will be recorded in the field logbooks along with the dates, time, and names of people involved. If requested, this information will be available for photocopying. Meetings and conversations with substantial impacts on the project will be described in a memorandum to the project manager.

Illustrations, Computations, and Engineering Data: Original illustrations and graphics will be initialed and dated by the person originating the document. A second person will check for completeness and accuracy. All maps, calculations, and data will be reported or prepared to accepted standards and confidence levels.

Field Change Request Forms: Field change request forms (see Figure B-8) will be submitted when any deviation from the work plan is required. Generally, these include changes that will

FIELD CHANGE REQUEST

ENSAFE PROJECT NO. FIELD CHANGE NO.

TO _____ LOCATION _____ DATE _____

DESCRIPTION:

REASON FOR CHANGE:

RECOMMENDED DISPOSITION:

FIELD MANAGER(SIGNATURE) DATE

DISPOSITION:

SITE MANAGER DATE

DISTRIBUTION:

ENSAFE PROJECT MANAGER

ENSAFE SITE MANAGER

ENSAFE QUALITY ASSURANCE MANAGER

EPA RPM

OTHERS AS REQUIRED _____

ENSAFE

(800) 588-7962
MEMPHIS, TENNESSEE
CHARLESTON,SC CINCINNATI,OH DALLAS,TX JACKSON,TN KNOXVILLE,TN
LANCASTER,PA NASHVILLE,TN NORFOLK,VA PADUCAH,KY PENSACOLA,FL
LITTLE ROCK,AR JACKSON,MS CLEVELAND,OH

FIGURE B-8
AFTWF, VIEQUES, PR
FIELD CHANGE REQUEST FORM

DWG DATE: 06/27/00 | DWG NAME: 5901G051

(1) harm data quality, (2) change the cost field activities, (3) alter the scope of field activities, or (4) significantly delay the schedule.

Specific changes include:

- Number of wells.
- Number of sampling points.
- Decontamination procedures.
- Drilling method or well construction design.
- Sampling methodology.

Information should include the nature of the change, appropriate rationale, and date it will be implemented. These forms will be submitted to all parties on the QAPP distribution list.

B10.4 Data Handling

The Contractor must employ a systematic approach to data management which saves time, money, reduces transcription errors, and decreases hard copy analytical data to a more manageable level in accordance with the Paper Reduction Act and applicable Office of Information and Resource Management requirements.

During sample collection, chain-of custodies may be produced electronically and printed out for insertion into sample coolers. Electronic chain-of-custodies produced in the field reduce transcription errors and are easier to read than hand-written forms. In addition, sample information may be simultaneously loaded into a database which may be accessed to keep track of sample delivery dates.

After the samples are analyzed, the laboratory may produce electronic analytical data files. The electronic files may be submitted with the hardcopy data and loaded into a database. The database should be checked for completeness/correctness against the hardcopy data. During validation, qualifiers may be applied directly into the database by data reviewers. The database should have menu-driven data searching capabilities which allows users to query for various functions including chemicals found above site-specific action levels. In addition, the data may be directly downloaded into other application programs such as GIS, GIS/KEY, Excel, QuattroPro, Lotus, etc. for subsequent interpretation, map preparation, risk assessment, and report preparation. After project-completion, the database can also serves as an archive for analytical data for future reference.

B10.5 Record Storage and Retrieval

All records which constitute evidence relevant to sampling and analysis activities as described in this QAPP will be maintained by the Navy or its designee. Records will be maintained for a minimum of 7 years after the final report for this investigation is submitted. The final evidence file will be held in a central repository. It will include all relevant records, reports, logs, field books, pictures, subcontractor reports, correspondence, and data reviews. The location will be secured, with limited access.

C. Assessment/Oversight

C1. Assessments and Response Actions

Audits may be conducted by the QA Manager or his designee during field activities to evaluate the performance of the entire measurement and reporting system. Parameters included in the system are well installation, sampling (data collection), laboratory analysis, and attendant QC activities.

C1.1 Technical Systems and Surveillance Audit

The QA manager or his designee will routinely evaluate the performance of field personnel and general field operations. The QA manager will document whether field personnel perform procedures in compliance with QAPP protocols; he will have the authority to issue of stop work orders until deficiencies are corrected. Results of field audits will be submitted to the Contractor Project Manger.

C1.2 Laboratory Systems Audit

Laboratories routinely undergo two types of audits: internal and external. The internal audit is performed by the laboratory's QA officer. External audits are carried out throughout the year by various federal and state certifying agencies. Audits are conducted to ensure that systems and operational capability are maintained. They also verify that quality control measures are being followed as specified in the analytical methods, laboratory written standard operating procedures, and laboratory quality assurance plan.

C1.3 Performance Evaluation Audit

A performance evaluation (PE) audit is performed to evaluate a laboratory's ability to obtain accurate and precise results by a specific analytical method for samples containing known analyte concentrations. These PE audits may include submission of blind spiked check or PE samples for analysis of the parameters in question. Blind PE samples are submitted to the laboratory as field samples to ensure that they are treated the same as field samples. PE

samples may also be submitted as obvious (known) check samples, which are USEPA or National Bureau of Standards (NBS) traceable. USEPA, the Navy, or their designees, may conduct a performance evaluation audit.

C1.4 Regulatory Audits

It is understood that field personnel and subcontract laboratories are also subject to quality assurance audits by USEPA regulatory agencies. The Contractor will incorporate the results of regulatory QA/QC evaluation, and may consider action based solely on those results.

C1.5 Corrective Actions

During the sampling, field personnel are responsible for seeing that field instruments are functioning properly and that work progresses satisfactorily. Field personnel are also responsible for performing routine preventive maintenance and quality control procedures, thereby helping ensure collection of valid field data.

If a problem is detected by field personnel, the Quality Assurance Manager shall be notified immediately, at which time corrective action will begin. Similarly, if a problem is identified during an audit by the project or regulatory Quality Assurance Manager, an immediate investigation will be undertaken and whatever corrective action deemed necessary will be taken as early as possible. Samples or analyses that do not meet quality control or quality assurance criteria may be resampled, re-analyzed, or the analysis reviewed by the Navy or its designee. The site manager is responsible for initiating field investigation rework. The Quality Assurance Manager will document cases of noncompliance with criteria, and assure that the corrective action is implemented and recorded.

If corrective action is required by the analytical laboratory, the action should be conducted in accordance with the laboratory's quality assurance program and the corrective action process

outlined in the laboratory's QAP, following the guidelines provided in the laboratory's analytical methods. The necessity for corrective action is determined after the data have been evaluated.

If data completeness and representativeness have met project objectives, no corrective action will be taken. For data considered grossly deficient compared to project objectives, corrective action may include re-evaluation for limited exclusion or resampling.

C2. Reports to Management

Once the project is complete and the resulting data obtained, a final project report will be prepared. The report will include a summary of the activities performed during the investigation and the resulting data (along with any statements about problems concerning data quality). The results will be screened against human health and ecological benchmarks, and a risk assessment will be performed, if needed. The report will be forwarded to the Navy, USEPA, the Puerto Rico Environmental Quality Board.

D. DATA VALIDATION AND USABILITY

The laboratory procedures for data reduction and reporting are included in the laboratory QAP and Standard Operating Procedures. Data reduction and reporting by the laboratory will meet the criteria needed for data validation. The following sections describe the data review, validation and verification requirements and reconciliation of anomalous data

D1. Data Review, Validation, and Verification Requirements

Data validation is the systematic and independent verification of data quality. It is performed independent of the laboratory. The purpose of data validation is to verify that the QC requirements of the data set have been met.

The laboratory QA/QC data necessary for validation must be submitted with analytical data packages. Sampling and analytical documentation is required of data packages to validate data quality. It should include an organized summary of the final results, a copy of the signed chain-of-custody for each sample, and all quality control documentation, including a report case narrative that explains any QA/QC or analysis problems encountered and any corrective actions taken. Section A9.2 describes specific data deliverables that will be submitted for validation.

D1.1 Analytical Data

The analytical data package will be validated by the project QA officer or designee. The validation steps will be performed by applying, where applicable, the USEPA Contract Laboratory Program, *National Functional Guidelines for Organic and Inorganics Data Review,* February, 1994 and Region 2 CLP Worksheets for data review, which are attached to this QAPP. For the non-CLP methods being performed for explosives and perchlorate, EPA precision and accuracy statements for the analytical methods employed will be used in conjunction with the data validation guidelines. Data validation will be accomplished through a

series of checks and reviews that are intended to assure that the reported results are of a verifiable and acceptable quality.

D1.2 Field Data

All fieldwork will be conducted or supervised by EnSafe personnel to ensure that proper procedures are followed. Field records will be kept of all activities that take place during the sampling program and these records will be maintained by the contractor. These records will document any obstacles encountered during the sampling program.

Procedures to evaluate field data for this project primarily include checking for transcription errors and review of field log books, on the part of field crew members. This task will be the responsibility of the Project Manager or designee, who will otherwise not participate in making any of the field measurements, or in adding notes, data or other information to the log book.

The field data package, including all field records and measurements obtained at the site by EnSafe sampling personnel, will be reviewed for completeness and accuracy by reviewing field logbooks and forms for completeness.

All fieldwork will be conducted to ensure that proper procedures are followed. Field records will be kept of all activities that take place during the sampling program and these records will be maintained by the Contractor. These records will document any obstacles encountered during the sampling program.

Procedures to evaluate field data for this project primarily include checking for transcription errors and review of field log books and forms, on the part of field crew members. This task will be the responsibility of the Project Manager or designee, who will otherwise not participate in making any of the field measurements, or in adding notes, data or other information to the log book or forms.

The field data package, including all field records and measurements obtained at the site by sampling personnel, will be reviewed for completeness and accuracy by conducting the following:

- A review of field logbooks for completeness.
- A review of field data on water and soil/sediment sampling logs for completeness.
- A verification that rinsate blanks and trip blanks were properly prepared, identified, and analyzed.
- A check on field analyses for equipment calibration and condition.
- A review of chain-of-custody forms for proper completion, signatures of field personnel and the laboratory sample custodian, and dates. A review of field data on water and soil/sediment sampling logs for completeness.
- A verification that rinsate blanks and trip blanks were properly prepared, identified, and analyzed.
- A check on field analyses for equipment calibration and condition.
- A review of chain-of-custody forms for proper completion, signatures of field personnel and the laboratory sample custodian, and dates.

D2. Validation and Verification Methods

The analytical data deliverables, defined earlier in the QAPP, will be validated by the project QA manager or his designee. The validator will conduct a systematic review of the data for compliance with the established QC criteria based on the spike, duplicate and blank results provided by the laboratory. Essentially, all technical holding times shall be reviewed, results of all blanks (laboratory, field, rinsate, trip), surrogate spikes, and batch matrix spikes/matrix spike duplicates.

The data review will identify any out-of-control data points and data omissions and interact with the laboratory to correct data deficiencies. Decisions to repeat sample collection and analyses may be made by the Project Manager based on the extent of the deficiencies and their importance in the overall context of the project.

The laboratory will provide data in a computerized in a format organized to facilitate data review and evaluation. The computerized data set will include the data flags provided by the laboratory. Upon validation, additional flags will be added to represent comments of the data reviewer. The laboratory-provided data flags will include such items as: 1) concentration below required detection limit, 2) estimated concentration due to poor spike recovery, and 3) concentration of chemical also found in laboratory bank. The data reviewer flags will indicate that the data are: 1) usable as a quantitative concentration, 2) usable with caution as an estimated concentration, or 3) unusable due to out-of-control QC results.

All QC summary forms summarizing this information will be checked as well. The overall completeness of the data package will also be evaluated by the data validator. Completeness checks will be administered on all data to determine whether deliverables specified in the RI/FS Work Plan and QAPP are present.

Analytical Data Quality

Analytical data quality is assured through the use of the USEPA guidelines for QA/QC as set forth in the specific analytical methods. The laboratory will perform checks to verify that results are generated according to the method protocols. The laboratory checks will include verification that all results and QC elements are properly measured, documented, and reported. The project QA manager will validate the quality of the laboratory deliverables.

The analytical data package will be evaluated by the QA Manager or designee. The evaluation will be performed, where applicable, according to the USEPA Contract Laboratory Program,

National Functional Guidelines for Organic and Inorganic Data Review (Functional Guidelines; February 1994) and Region 2 data evaluation guidelines and worksheets, where applicable for the analytical method. Data validation guidelines will be used as a guide for data evaluation because estimated data qualifiers indicating bias will not be assigned to analytical results. Data evaluation is accomplished through a series of checks and reviews intended to assure that the reported results are of verifiable and acceptable quality. The analytical data package evaluation procedure includes, but is not limited to:

- Comparison of sampling, sample extraction, and analysis dates to check that samples were extracted and/or analyzed within the proper holding times.
- Review of analytical methods and required detection limits to verify that they agree with the project data quality objectives.
- Evaluation of all blanks (rinsate, field, trip, reagent, method, and extraction blanks) to assess potential cross-contamination.
- Evaluation of surrogate spike, MS/MSD, and LCS recoveries to assess accuracy.
- Evaluation of duplicate relative percent difference from field and MS/MSDs to assess precision.
- Assessment of data usability.

The possible data flags are:

- R/UR flag: One or more QC parameters grossly exceed control limits; unusable data may not be used for any purpose.
- J flag: Estimated value; one or more QC parameters were outside control limits or the value was detected below the laboratory's quantitation limit.
- U flag: Undetected; the analyte was analyzed but not detected or the analyte was found in an associated blank but at a concentration less than five times (10 times for common laboratory contaminants).

- UJ flag: Undetected and estimated; the analyte was analyzed but not detected and the quantitation limit is estimated because at least one QC parameters was outside control limits.

- D flag: Diluted result; the compound was re-analyzed at a secondary dilution factor. The "D" flag will remain on the value to alert the data user that the value from a secondary dilution was used.

The QA manager (or designee) will resolve problems that arise during data validation and implement corrective measures as needed.

D3. Reconciliation with User Requirements

Completeness will be evaluated to determine if the completeness goal for this project has been met. If data quality indicators do not meet the project's data quality objectives as outlined in this QAPP, the data may be discarded and resampling may occur. The Quality Assurance Manager will evaluate the cause of the failure (if possible) and decide whether to discard the data and resample. If the failure is tied to the analysis, calibration, and maintenance techniques will be reassessed as identified by the appropriate lab personnel. If the failure is associated with the sample collection and resampling is needed, the samplers will be retrained.

Data Review Worksheets
CLP Organics Data Review and Preliminary Review
USEPA Region 2 SOP HW-6, Revision 11, June 1996
(Applicable to CLP Organic Soil Analysis)

JUL - 6 1998

SOP NO. HW-6

Revision #11

May 1996

CLP ORGANICS DATA REVIEW AND PRELIMINARY REVIEW (CLP/SOW OLMO 3.2)

By: George Karras Date: 6/12/96
George Karras, Work Assignment Manager/Chemist
Toxic and Hazardous Waste Section

By: Karen Taylor Date: 6/17/96
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Toxic and Hazardous Waste Section

CONCURRED BY: Kevin W. Kubik Date: 6/18/96
Kevin Kubik, Chief
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APPROVED BY: Robert H. Runyon Date: 6/18/96
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Data Rejection Summary Form . . . . . Attachment 3

INTRODUCTION

Scope and Applicability

This SOP offers detailed guidance in evaluating laboratory data generated according to the methods in the "USEPA Contract Laboratory Program Statement of Work for Organics Analysis OLM03.2," August 1994. The validation methods and actions discussed in this document are based on the requirements set forth in the "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review," February 1994. This document attempts to cover technical as well as contractual problems specific to each fraction and sample matrix; however, situations may arise where data limitations must be assessed based on the reviewer's professional judgement.

In addition to technical requirements, contractual requirements are also covered in this document. While it is important that instances of contract non-compliance be addressed in the Data Assessment, the technical criteria are always used to qualify the analytical data.

Summary of Method

To ensure a thorough evaluation of each result in a data case, the reviewer must complete the checklist within this SOP, answering specific questions while performing the prescribed "ACTIONS" in each section. Qualifiers (or flags) are applied to questionable or unusable results as instructed. The data qualifiers discussed in this document are defined on page 4 of the National Functional Guidelines mentioned above.

The reviewer must prepare a detailed data assessment to be submitted along with the completed SOP checklist. The Data Assessment must list all data qualifications, reasons for qualifications, instances of missing data and contract non-compliance. This information is further summarized on the Organic Regional Data Assessment Summary and Data Rejection Summary forms (see attached).

Reviewer Qualifications

This SOP is intended for use by organic data validators who have successfully completed the USEPA Region II data validation training program. Data reviewers must possess a working knowledge of the USEPA Statement of Work and National Functional Guidelines mentioned above.

DEFINITIONS

Acronyms

BFB - bromofluorobenzene
BHC - benzene hexachloride
BNA - base neutral acid
CCS - contract compliance screening
CLASS - Contract Laboratory Analytical Services Support
CLP - Contract Laboratory Program
CRQL - Contract Required Quantitation Limit
%D - percent difference
DCB -decachlorobiphenyl
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenylethane
DDT - dichlorodiphenyltrichloroethane
GC - gas chromatography
GC/EC - gas chromatograph/electron capture detector
GC/MS - gas chromatograph/mass spectrometer
GPC - gel permeation chromatography
IS - internal standard
kg - kilogram
µg - microgram
MAGIC - Mainframe Access Graphical Interface with CARD
MS - matrix spike
MSD - matrix spike duplicate
ℓ - liter
mℓ - mililiter
PCB - polychlorinated biphenyl
PE - performance evaluation
PEM - Performance Evaluation Mixture
QC - quality control
RAS - Routine Analytical Services
RIC - reconstructed ion chromatogram
RPD - relative percent difference
RRF - relative response factor
$\overline{RRF}$ - average relative response factor (from initial calibration)
RRT - relative retention time
RSD - relative standard deviation
RT - retention time
RSCC - Regional Sample Control Center
SDG - sample delivery group
SMC - system monitoring compound
SOP - standard operating procedure
SOW - Statement of Work
SVOA - semivolatile organic analysis
TCL - Target Compound List
TCLP - Toxicity Characteristics Leachate Procedure
TCX -tetrachloro-m-xylene
TIC - tentatively identified compound

Acronyms (cont'd.)

TPO - technical project officer
VOA - volatile organic analysis
VTSR - validated time of sample receipt

Data Qualifiers

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

J - The analyte was positively dienrified; the associated numerical value is the approximate concentration of the analyte in the sample.

N - The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."

NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality contrrol criteria. The presence or absence of the analyte cannot be verified.

YES NO N/A

PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: _____ LABORATORY: _____

SITE NAME: _____ SDG Number(s): _____

1.0 Chain of Custody and Sampling Trip Reports

1.1 Are the Traffic Reports/Chain-of-Custody Records present for all samples? [ ] ___ ___

ACTION: If no, contact RSCC or the lab to obtain replacement of missing or illegible copies.

1.2 Is the Sampling Trip Report present for all samples and all fractions? [ ] ___ ___

ACTION: If no, contact either RSCC or ask the prime contractor to provide this information.

2.0 Data Completeness and Deliverables

2.1 Have any missing deliverables been received and added to the data package? ___ ___

NOTE: The lab is required to submit data for only two analyses, for each fraction. (i.e., the original sample and one dilution, or the most concentrated dilution analyzed and one further dilution.)

ACTION: Contact the lab to obtain an explanation or resubmittal of any missing deliverables. If lab cannot provide them, note the effect on the review of the package in the Contract Problems/Non-compliance section of the Data Assessment and the Organic Regional Data Assessment Summary form.

2.2 Was CLASS CCS checklist included with package? [ ] ___ ___

2.3 Are there any discrepancies between the Traffic Reports/Chain-of-Custody Records, Sampling Report and Sample Tags? ___ [ ] ___

ACTION: If yes, contact the lab to obtain an explanation or resubmittal of any missing deliverables.

	YES	NO	N/A
3.0 Cover Letter SDG Narrative			
3.1 Is the Narrative or Cover Letter Present?	[ ]	___	___
3.2 Are case number, SDG number and contract number contained in the SDG Narrative or cover letter (see SOW, Exhibit B, section 2.6.1)?	[ ]	___	___
3.3 Does the narrative contain the following information:			
VOA: description of trap and columns used during sample analyses?	[ ]	___	___
BNA: description of columns used during sample analyses?	[ ]	___	___
Pest: description of columns used during sample analyses?	[ ]	___	___

NOTE: As per section 6.23.3.1 SOW/p. D-11/Pest, Packed columns are not permitted.

3.4 Does the narrative, VOA and BNA sections, contain a list of all TICs identified as alkanes and their estimated concentrations?	[ ]	___	___
3.5 Does the narrative contain a record of all cooler temperatures? If the temperature of a cooler was exceeded, > 10° C, the lab must list by fraction and sample number, all affected samples.	[ ]	___	___
3.6 Does the narrative contain a list of the pH values determined for each water sample submitted for volatile analysis (SOW Exhibit B, section 2.6.1.2)?	[ ]	___	___
3.7 Does the Case Narrative contain the statement, "verbatim", as required in Section B of the SOW?	[ ]	___	___

ACTION: If "No", to any question in this section, contact the lab to obtain all necessary resubmittals. If information is not available, document in the Data Assessment under Contract Problems/Non-Compliance section.

	YES	NO	N/A

4.0 Data Validation Checklist

4.1 Check the package for the following discrepancies:

a. Is the package paginated in ascending order starting from the SDG narrative?	[ ]	___	___
b. Are all forms and copies legible?	[ ]	___	___
c. Is each fraction assembled in the order set forth in the SOW?	[ ]	___	___
d. Is a Sample Data Summary Package submitted immediately preceding the Sample Data Package?	[ ]	___	___

The following checklist is divided into three parts. Part A is for any VOA analyses, Part B is for BNAs and Part C is Pesticide/PCBs.

Does this package contain:

VOA Data?	___	___
BNA Data?	___	___
Pesticide/PCB data?	___	___

ACTION: Complete corresponding parts of checklist.

YES NO N/A

PART A: VOA ANALYSES

1.0 Sample Conditions/Problems

1.1 Do the Traffic Reports/Chain-of-Custody Records, Sampling Report or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data? ___ [ ] ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50% - 90% water, all data should be flagged as estimated (J). If a soil sample other than TCLP contains more than 90% water, all data should be qualified as unusable (R).

ACTION: If samples were not iced or the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (> 10° C), then flag all positive results with a "J" and all non-detects "UJ".

ACTION: If both VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: The smallest soil size permitted is 0.5g. If any soil sample is smaller than 0.5g, document in the Data Assessment under Contract Problems/Non-Compliance.

2.0 Holding Times

2.1 Have any VOA technical holding times, determined from date of collection to date of analysis, been exceeded? ___ [ ] ___

Technical Holding Times: If unpreserved, aqueous samples, maintained at 4° C for aromatic hydrocarbons analysis must be analyzed within 7 days of collection. If preserved with HCl (pH < 2) and stored at 4° C, then aqueous samples must be analyzed within 14 days of collection. If uncertain about preservation, contact sampler to determine whether or not samples were preserved. The holding time for soils is 10 days from date of collection.

YES NO N/A

Table of Holding Time Violations
(See Chain-of-Custody Records)

Sample ID	Sample Matrix	Was Sample Preserved?	Date Sampled	Date Lab Received	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated "J" and sample quantitation limits as estimated "UJ", and document in the Data Assessment that holding times were exceeded. If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re-analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results must be qualified "J", but the reviewer may determine that non-detect data are unusable "R". If holding times are exceeded by more than 28 days, all non detect data are unusable "R".

NOTE: Contractual Holding Times: Analysis of water and soil/sediment samples must be completed within 10 days of Validated Time of Sample Receipt (VTSR). This requirement does not apply to Performance Evaluation (PE) samples.

ACTION: If contractual holding times are exceeded, document in the Data Assessment and on the Organic Regional Data Assessment Summary form.

NOTE: The data reviewer must note in the Data Assessment whether or not technical and contractual holding times were met.

	YES	NO	N/A
3.0 System Monitoring Compound (SMC) Recovery (Form II)			
3.1 Are the VOA SMC Recovery Summaries (Form II) present for each of the following matrices:			
a. Low Water?	[ ]	___	___
b. Low Soil?	[ ]	___	___
c. Med Soil?	[ ]	___	___
3.2 Are all the VOA samples listed on the appropriate System Monitoring Compound Recovery Summary for each of the following matrices:			
a. Low Water?	[ ]	___	___
b. Low Soil?	[ ]	___	___
c. Med Soil?	[ ]	___	___

ACTION: Contact the lab to obtain an explanation or resubmittal of any missing deliverables. If missing deliverables are unavailable, document the effect in the Data Assessment.

3.3 Were outliers marked correctly with an asterisk?	[ ]	___	___

ACTION: Circle all outliers with red pencil.

3.4 Was one or more VOA system monitoring compound recovery outside of contract specifications for any sample or method blank?	___	[ ]	___
If yes, were samples re-analyzed?	[ ]	___	___
Were method blanks re-analyzed?	[ ]	___	___

ACTION: If recoveries are ≥ 10%, but 1 or more compounds fail to meet SOW specifications:

1. All positive results are qualified as estimated "J".

2. Flag all non-detects as estimated detection limits "UJ" where recovery is less than the lower acceptance limit.

YES NO N/A

3. If SMC recoveries are above allowable levels, do not qualify non-detects.

If any system monitoring compound recovery is < 10%:

1. Flag all positive results as estimated "J".

2. Flag all non-detects as unusable "R".

Professional judgement should be used to qualify data that only have method blank SMC recoveries out of specification in both original and re-analyses. Check the internal standard areas.

NOTE: Contractual requirements state that if any SMC fails the acceptance criteria, the sample must be re-analyzed. If the affected sample was not re-analyzed, document in the Data Assessment under Contract Problems/Non-Compliance and in the Organic Regional Data Assessment Summary.

NOTE: The laboratory must submit the following data:

1. If SMC recoveries and internal standard responses meet the acceptance criteria in the re-analyzed sample, then the laboratory must submit only the re-analysis.

2. If an SMC recovery and/or internal standard response fails to meet the acceptance criteria upon re-analysis, then submit data from both analyses.

(Refer to section 11.4.3.2, page D-46/VOA of the SOW for more information.)

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ [ ] ___

ACTION: If large errors exist, contact the lab to obtain an explanation or resubmittal of corrected deliverables. Make any necessary corrections and note the effect in the Data Assessment.

	YES	NO	N/A

4.0 Matrix Spikes (Form III)

4.1 Is the Matrix Spike/Matrix Spike Duplicate Recovery Form (Form III) present? [ ] ___ ___

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water? [ ] ___ ___

b. Low Soil? [ ] ___ ___

c. Med Soil? [ ] ___ ___

ACTION: If any matrix spike data are missing, take the action specified in section 3.2 above.

4.3 How many VOA spike recoveries are outside QC limits?

Water	Soils
_____ out of 10	_____ out of 10

4.4 How many RPDs for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Soils
_____ out of 5	_____ out of 5

ACTION: No action is taken based upon MS/MSD data alone. However, using informed professional judgement, the MS/MSD results may be used in conjunction with other QC criteria to determine the need for qualification of the data.

ACTION: Circle all outliers with red pencil.

5.0 Blanks (Form IV)

5.1 Is the Method Blank Summary (Form IV) present? [ ] ___ ___

5.2 Frequency of Analysis: for the analysis of VOA TCL compounds, has a reagent/method blank been analyzed for each SDG or every 20 samples of similar matrix (low water, low soil or medium soil), whichever is more frequent? [ ] ___ ___

	YES	NO	N/A
5.3 Has a VOA method blank been analyzed at least once every twelve hours for each concentration level and GC/MS system used?	[ ]	___	___
5.4 Was a VOA instrument blank analyzed after each sample/dilution which contained a target compound that exceeded the initial calibration range?	[ ]	___	___
5.5 Was a VOA storage blank analyzed at the end of all samples for each SDG in a case?	[ ]	___	___

ACTION: If any method/instrument blank data are missing, contact the lab to obtain any missing deliverables. If method blank data are not available, reject "R" all associated positive data. However, using professional judgement, the data reviewer may substitute field blank or trip blank data for missing method blank data.

If any instrument blank analyzed after a sample with high concentration is missing, contact the lab to obtain any missing deliverables. If the instrument blank was not analyzed or not available, inspect the chromatogram of the sample analyzed immediately after this analysis for possible carryover. Use professional judgement to determine if any contamination occurred and qualify analyte(s) accordingly.

If storage blank data is missing, contact the lab to obtain any missing deliverables. If unavailable, note in the Contract Problems/Non-Compliance section of the Data Assessment.

5.6 The validator should verify that the correct identification scheme for the EPA Blank samples were used. See page B-33, section 3.3.7.3 of the SOW for further information.

	YES	NO	N/A
Was the correct identification scheme used for all VOA blanks?	[ ]	___	___

ACTION: Contact the lab to obtain missing deliverables, or make the required corrections on the forms. Document in the Data Assessment under Contract Problems/Non-compliance if corrections were made by the validator.

	YES	NO	N/A
5.7 Chromatography: review the blank raw data-chromatograms (RICs), quant. reports or data system printouts and spectra. Is the chromatographic performance (baseline stability) for each instrument acceptable for VOAs?	[ ]	___	___

ACTION: Use professional judgement to determine the effect on the data.

5.8 Are all detected hits for target compounds in method, instrument and storage blanks less than the CRQL for that analyte?	[ ]	___	___

Exception: Acetone and 2-butanone must be less than 5 times the CRQL, and methylene chloride must be less than 2.5 times its CRQL.

ACTION: If no, an explanation and laboratory's corrective actions must be addressed in the case narrative. If the narrative contains no explanation, then make a note in the Contract Problems/Non-Compliance section of the Data Assessment.

6.0 Contamination

NOTE: "Water blanks", "drill blanks", and "distilled water blanks" are validated like any other sample, and are not used to qualify data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent/storage blanks have positive results (TCL and/or TIC) for VOAs?	___	[ ]	___

NOTE: When applied as directed in the table below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for %moisture when necessary.

NOTE: A contaminated instrument blank is not allowable under this SOW. See page D-48/VOA, section 12.1.2.4 for additional information. Document in the Data Assessment under Contract Problems/Non-Compliance if contaminated instrument blank was submitted.

6.2 Do any field/trip/rinse blanks have positive VOA results (TCL and/or TIC)?	___	[ ]	___

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated with a particular group of samples (may exceed one per case) must be used to qualify data. Trip blanks are used to qualify only those samples with which they were shipped and are not required for non-aqueous matrices. Blanks may not be qualified because of contamination in another blank. Field Blanks & Trip Blanks must be qualified for system monitoring compound, instrument performance criteria, spectral or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks. If any blanks are grossly contaminated, all associated data should be qualified as unusable "R".

For:	Flag sample result with a "U" when:	Report CRQL & qualify "U" when:	No qualification is needed when:
Methylene Chloride Acetone Toluene 2-Butanone	Sample conc. is > CRQL, but ≤ 10× blank value.	Sample conc. is < CRQL and ≤ 10× blank value.	Sample conc. is > CRQL and > 10× blank value.
Other Conta-minants	Sample conc. is > CRQL, but ≤ 5× blank value.	Sample conc. is < CRQL and ≤ 5× blank value.	Sample conc. is > CRQL and > 5× blank value.

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

ACTION: For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R".

	YES	NO	N/A
6.3 Are there field/rinse/equipment blanks associated with every sample?	[ ]	___	___

ACTION: For low level samples, note in the Data Assessment that there is no associated field/rinse/equipment blank. For samples with high concentrations of suspected blank contaminants, use professional judgement to qualify these values and make a note in the Data Assessment.

Exception: samples taken from a drinking water tap do not have associated field blanks.

7.0 GC/MS Instrument Performance Check (Form V)

7.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for Bromofluorobenzene (BFB)?	[ ]	___	___
7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift?	[ ]	___	___
7.3 Has an instrument performance check been analyzed for every analytical sequence on each instrument?	[ ]	___	___

ACTION: List date, time, instrument ID, and sample numbers for which associated GC/MS tuning data are unavailable.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

ACTION: Notify the lab to obtain missing data, if possible. If the lab cannot provide the missing data, reject, "R", all data generated outside an acceptable twelve hour calibration interval.

7.4 Have the ion abundances been normalized to m/z 95 as specified in Exhibit D, page D-56/VOA?	[ ]	___	___

NOTE: All ion abundance ratios must be normalized to m/z 96, the nominal base peak, even though the

	YES	NO	N/A
ion abundance of m/z 174 may be up to 120% that of m/z 95.			
ACTION: If mass assignment is in error, qualify all associated data as unusable "R".			
7.5 Have the ion abundance criteria been met for each instrument used?	[ ]	___	___
ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).			
ACTION: If ion abundance criteria are not met, the Region II TPO must be notified.			
7.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values, but if errors are found check more.)	___	[ ]	___
7.7 Is the number of significant figures for the reported relative abundances consistent with the number given for each ion in the ion abundance criteria column?	[ ]	___	___
ACTION: If large errors exist, take action as specified in section 3.5 above.			
7.8 Are the spectra of the mass calibration compound acceptable?	[ ]	___	___
ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.			
8.0 <u>Target Compound List (TCL) Analytes (FORM I VOA)</u>			
8.1 Are the Organic Analysis Data Sheets (Form I VOA) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate?	[ ]	___	___
b. Matrix spikes and matrix spike duplicates?	[ ]	___	___
c. Blanks?	[ ]	___	___
8.2 Are the VOA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (quant. reports) included in the sample package for each of the			

	YES	NO	N/A
following:			
a. Samples and/or fractions as appropriate?	[ ]	___	___
b. Matrix spikes and matrix spike duplicates (mass spectra not required)?	[ ]	___	___
c. Blanks?	[ ]	___	___
ACTION: If any data are missing, take action specified in 3.2 above.			
8.3 Are the response factors shown in the quant. report?	[ ]	___	___
8.4 Is chromatographic performance acceptable with respect to:			
a. Baseline stability?	[ ]	___	___
b. Resolution?	[ ]	___	___
c. Peak shape?	[ ]	___	___
d. Full-scale graph (attenuation)?	[ ]	___	___
e. Other: _____?	[ ]	___	___
ACTION: Use professional judgement to determine the acceptability of the data.			
8.5 Are the lab-generated standard mass spectra of the identified VOA compounds present for each sample?	[ ]	___	___
ACTION: If any mass spectra are missing, take action as specified in 3.2 above. If the lab does not generate its own standard spectra, document in the Contract Problems/Non-compliance section of the Data Assessment and the Organic Regional Data Assessment Summary.			
8.6 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	[ ]	___	___
8.7 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	[ ]	___	___

	YES	NO	N/A
8.8 Do sample and standard relative ion intensities agree within ±20%?	[ ]	___	___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected "R", flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected "U" at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 8.6, 8.7, and 8.8.

ACTION: When sample carry-over is suspected, use professional judgement determine if instrument cross-contamination has affected positive compound identifications.

9.0 Tentatively Identified Compounds (TIC)

	YES	NO	N/A
9.1 Are all Tentatively Identified Compound Forms (Form I Part B) present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier?	[ ]	___	___
9.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate?	[ ]	___	___
b. Blanks?	[ ]	___	___
c. Alkanes listed for each sample?	[ ]	___	___

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier to all chemically named TICs, if missing.

	YES	NO	N/A
9.3 Are any TCL compounds (from any fraction) listed as TIC compounds? (Example: 1,2- dimethylbenzene is xylene, a VOA TCL analyte, and should not be reported as a TIC.)	___	[ ]	___

ACTION: Flag with "R" any TCL compound listed as a TIC.

	YES	NO	N/A
9.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum?	[ ]	___	___
9.5 Do TIC and "best match" standard relative ion intensities agree within ±20%?	[ ]	___	___

ACTION: Use professional judgement to determine the acceptability of TIC identifications. If it is determined an incorrect identification was made, change the identification to "unknown," or to some less specific identification as appropriate. (Example: "C3 substituted benzene.")

Also, when a compound is not found in any blank, but is detected in a sample and is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable "R". (E.g., Common Lab Contaminants: CO_2 (M/E 44), siloxanes (M/E 73) hexane, aldol condensation products, solvent preservatives, and related by-products - see the National Functional Guidelines for further guidance.)

	YES	NO	N/A
9.6 Are TICs with responses < 10% of the internal standard (as determined by inspection of the peak areas or height) reported?	___	[ ]	___

ACTION: If yes, cross out questionable TIC(s).

10.0 Compound Quantitation and Reported Detection Limits

	YES	NO	N/A
10.1 Are there any transcription/calculation errors in Form I results? (Check at least two positive values. Verify that the correct internal standards, quantitation ions, and RRF were used to calculate Form I results.)	___	[ ]	___
10.2 Are the CRQLs adjusted to reflect sample dilutions and, for soils, sample moisture?	[ ]	___	___

ACTION: If errors are large, take action as specified in section 3.5 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQL data from the diluted sample). Replace

	YES	NO	N/A
concentrations that exceeded the calibration range in the original analysis by crossing out the "E" and its corresponding value on the original Form I and substituting the data from the diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form Is not to be used, including any in the data summary package.			
11.0 Standards Data (GC/MS)			
11.1 Are the Reconstructed Ion Chromatograms, and data system printouts (quant. reports) present for each initial and continuing calibration?	[ ]	___	___
ACTION: If any calibration standard data are missing, take action specified in 3.2 above.			
12.0 GC/MS Initial Calibration (Form VI)			
12.1 Are the Initial Calibration Forms (Form VI) present and complete at concentrations of 10, 20, 50, 100, 200ng for separate calibrations of low water/med soils (unheated purge) and low soils (heated purge)?	[ ]	___	___
ACTION: If any calibration standard forms are missing, take action specified in 3.2 above.			
12.2 Were all low level soil standards, blanks and samples analyzed by heated purge?	[ ]	___	___
ACTION: If low level soil samples were not heated during purge, qualify positive hits "J" (estimated) and non-detects "R".			
12.3 Are the % relative standard deviation (%RSD) values for VOAs ≤ 30% over the concentration range of the calibration?	[ ]	___	___
NOTE: Although 11 VOA compounds have a contractual minimum RRF and no maximum %RSD, the technical acceptance criteria are the same for all analytes.			
ACTION: Circle all outliers with red pencil.			
ACTION: If %RSD is > 30.0%, qualify associated positive results for that analyte "J" (estimated) and non-detects using professional judgement. When			

YES NO N/A

%RSD is > 90%, flag all non-detects for that analyte "R" (unusable) and positive hits "J".

NOTE: Analytes previously qualified "U" for blank contamination are still considered as "hits" when qualifying for initial calibration criteria.

12.4 Are any average RRFs < 0.05? ___ [ ] ___

ACTION: Circle all outliers with red pencil.

ACTION: If the average RRF is < 0.05, then qualify associated non-detects with an "R" and flag associated positive data as estimated "J".

NOTE: Contract Requirement: The SOW allows up to two of the required analytes to fail contractual %RSD or RRF criteria, provided the %RSD is ≤ 40% and RRF is ≥ 0.010. (See Table 5, page D-59/VOA and analytes marked with a "*" on Form VI for required analytes and contractual criteria.) Technical criteria, however, are the same for all analytes.

ACTION: If more than two analytes failed %RSD or RRF criteria, document in the Data Assessment under Contract Problems/Non-Compliance and the Organic Regional Data Assessment Summary.

12.5 Are there any transcription/calculation errors in the reporting of average relative response factors (RRF) or %RSD? (Check at least 2 values, but if errors are found, check more.) ___ [ ] ___

ACTION: Circle errors with red pencil.

ACTION: If errors are large, contact the lab to obtain an explanation/resubmittal, document in the Data Assessment under Contract Problems/Non-Compliance and in the Organic Regional Data Assessment Summary.

13.0 GC/MS Continuing Calibration (Form VII)

13.1 Are the Continuing Calibration Forms (Form VII) present and complete for separate calibration of low water/med soil and low soil samples? [ ] ___ ___

13.2 Has a continuing calibration standard been analyzed for every twelve hours of sample

	YES	NO	N/A
analysis per instrument?	[ ]	___	___

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, contact the lab to request an explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable "R".

ACTION: List below all sample(s) that were not analyzed within twelve hours of the previous continuing calibration.

_____

_____

_____

13.3 Do any volatile compounds have a percent difference (%D) between the initial and continuing RRF which exceeds the ±25% criteria?	___	[ ]	___

NOTE: Although 11 VOA compounds have a contractual minimum RRF and no maximum %D, the technical acceptance criteria are the same for all analytes.

ACTION: Circle all outliers with red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated. When %D is > 90%, qualify all non-detects for that analyte unusable (R) and positive results estimated (J).

13.4 Are any continuing calibration RRFs < 0.05?	___	[ ]	___

ACTION: Circle all outliers with red pencil.

ACTION: If the RRF is < 0.05, qualify the associated non-detects as unusable "R" and the associated positive values "J".

NOTE: Contract Requirement: The SOW allows up to two of the required analytes to fail contractual %D and RRF criteria, provided that the %D is ≤ 40% and the RRF is ≥ 0.010. (See Table 5 pg. D-59/VOA or

YES NO N/A

analytes marked with a "*" on Form VI for required analytes.) Technical criteria, however, are the same for all analytes.

ACTION: If more than two analytes failed %D and RRF, criteria document in the Data Assessment under contract Problems/Non-Compliance and on the Organic Regional Data Assessment Summary form.

13.5 Are there any transcription/calculation errors in the reporting of RRF or %D between initial and continuing RRFs? (Check at least two values, but if errors are found, check more.) ___ [ ] ___

ACTION: Circle errors with red pencil.

ACTION: If errors are large, contact the lab to obtain an explanation/resubmittal, document in the Data Assessment under Contract Problems/Non-Compliance.

14.0 Internal Standard (Form VIII)

14.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to +100%) for each continuing calibration? [ ] ___ ___

If no, was the sample re-analyzed? [ ] ___ ___

ACTION: 1. Circle all outliers with red pencil.

2. List all the outliers below.

Sample #	Internal Std.	Area	Lower/Upper Limit
_____	_____	_____	_____/_____
_____	_____	_____	_____/_____
_____	_____	_____	_____/_____
_____	_____	_____	_____/_____

(Attach additional sheets if necessary, or attach copies of Form VIIIs.)

ACTION: If any sample was not re-analyzed, document in the Data Assessment under Contract Problems/Non-Compliance.

YES NO N/A

ACTION: 1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.

2. Do not qualify non-detects when associated IS area counts are > 100%.

3. If the IS area in the sample is below the "lower limit," < 50%, qualify all analytes associated with that IS estimated, "J". If the area counts are extremely low, < 25% of the area in the 12 hour standard, or if performance exhibits a major abrupt drop- off, flag all associated non-detects as unusable, "R", and positive hits estimated, "J".

14.2 Are the retention times of the internal standards within 30 seconds of the associated calibration standard? [ ] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

NOTE: Contractual requirements state that if any internal standard fails the acceptance criteria, the sample must be re-analyzed. If the affected sample was not re-analyzed, document in the Data Assessment under Contract Problems/Non-Compliance.

NOTE: See Notes in section 3.4, page 7 for a description of sample data the laboratory must submit.

15.0 Field Duplicates

15.1 Were any field duplicates submitted for VOA analysis? [ ] ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

YES NO N/A

PART B: BNA ANALYSES

1.0 Sample Conditions/Problems

1.1 Do the Traffic Reports/Chain-of-Custody records or laboratory SDG Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ [ ] ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50% - 90% water, all data should be flagged as estimated "J". If a soil sample, other than TCLP, contains more than 90% water, all data should be qualified as unusable "R".

ACTION: If samples were not iced or if the ice was melted upon arrival at the laboratory and the temperature of the cooler was elevated (> 10° C), flag all positive results "J" and all non-detects "UJ".

2.0 Holding Times

2.1 Have any BNA technical holding times, determined from date of collection to date of extraction, been exceeded? ___ [ ] ___

Technical Holding Time: Continuous extraction of water samples for BNA analysis must be started within seven days of the date of collection. Soil/sediment samples must be extracted within 7 days of collection. Extracts must be analyzed within 40 days of the date of extraction.

Table of Holding Time Violations
(See Chain-of-Custody Records)

Sample Analyzed	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed

YES NO N/A

ACTION: If technical holding times were exceeded, flag all positive results as estimated (J) and sample quantitation limits as estimated (UJ), and document in the narrative that holding times were exceeded. If analyses were done more than 14 days beyond holding time, either on the first analysis or upon reanalysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable "R". If holding times were exceeded by more than 28 days, all non-detect data must be qualified "R", unusable.

NOTE: Contractual Holding Times: Extraction of water samples must be started within 5 days VTSR. Soil/sediment samples must be extracted within 10 days of VTSR. This requirement does not apply to Performance Evaluation (PE) samples. Water and soil/sediment extracts must be analyzed within 40 days following extraction.

ACTION: If contractual holding times are exceeded, document in the Data Assessment and on the Organic Regional Data Assessment Summary form.

NOTE: The data reviewer must note in the Data Assessment whether or not technical and contractual holding times were met.

3.0 Surrogate Recovery (Form II)

3.1 Are BNA Surrogate Recovery Summaries (Form II) present for each of the following matrices:

a. Low Water? [ ] ___ ___

b. Low Soil? [ ] ___ ___

c. Med Soil? [ ] ___ ___

3.2 Are all the BNA samples listed on the appropriate Surrogate Recovery Summaries for each of the following matrices:

a. Low Water? [ ] ___ ___

b. Low Soil? [ ] ___ ___

	YES	NO	N/A
c. Med Soil?	[ ]	___	___

ACTION: Contact the lab for an explanation or resubmittal of any missing deliverables. If missing deliverables are unavailable, document the effect in the Data Assessment.

3.3 Were outliers marked correctly with an asterisk?	[ ]	___	___

ACTION: Circle all outliers with red pencil.

3.4 Were two or more base-neutral OR acid surrogate recoveries out of specification for any sample or method blank?	___	[ ]	___
If yes, were samples reanalyzed?	[ ]	___	___
Were method blanks reanalyzed?	[ ]	___	___

ACTION: If all BNA surrogate recoveries are ≥ 10%, but two within the base-neutral or acid fraction do not meet SOW specifications, for the affected fraction only (i.e. acid or base-neutral compounds):

1. Flag all positive results as estimated (J).

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. Do not qualify non-detects if recoveries are greater than the upper acceptance limit.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Qualify positive results for that fraction as estimated (J).

2. Qualify non-detects for that fraction as unusable (R).

Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

	YES	NO	N/A

NOTE: Contractual requirements state that if any surrogate fails acceptance criteria, the sample must be re-analyzed. If sample was not re-analyzed, document in the Data Assessment under Contract Problems/Non-Compliance.

NOTE: The laboratory must submit the following data:

1. If surrogate recoveries and internal standard responses meet the acceptance criteria in the re-analyzed sample, then the laboratory must submit only the re-analysis.

2. If surrogate recoveries and/or internal standard responses fail to meet the acceptance criteria upon re-analysis, then submit data from both analyses.

3.5 Are there any transcription/calculation errors between raw data and Form II?	___	[ ]	___

ACTION: If large errors exist, contact the lab for an explanation or resubmittal of corrected deliverables. Make necessary corrections and note errors in the Data Assessment.

4.0 Matrix Spikes (Form III)

4.1 Is the Matrix Spike/Matrix Spike Duplicate Recovery Form (Form III) present?	[ ]	___	___
4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:			
a. Low Water?	[ ]	___	___
b. Low Soil?	[ ]	___	___
c. Med Soil?	[ ]	___	___

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.

4.3 How many BNA spike recoveries are outside QC limits?

Water	Soils
_____ out of 22	_____ out of 22

	YES	NO	N/A

4.4 How many RPDs for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Soils
_____ out of 11	_____ out of 11

ACTION: No action is taken based upon MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria and determine the need for some qualification of the data.

ACTION: Circle all outliers with red pencil.

5.0 Blanks (Form IV)

5.1 Is the Method Blank Summary (Form IV) present? [ ] ___ ___

5.2 Frequency of Analysis: Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? [ ] ___ ___

5.3 Has a BNA method blank been analyzed for each GC/MS system used? (See SOW pg. D-54/SVOA, Section 12.1.2.) [ ] ___ ___

ACTION: If any method blank data are missing, contact the lab to obtain an explanation/resubmittal. If resubmittals are unavailable, use professional judgement to determine if the associated sample data should be qualified.

5.4 The validator should verify that the correct identification scheme for the EPA Blank samples were used. See page B-33, sec. 3.3.7.3 of the SOW for further information.

Was the correct identification scheme used for all BNA blanks? [ ] ___ ___

ACTION: Contact the lab to obtain resubmittals, or make the required corrections on the forms. Document all corrections made by the validator in the Data Assessment under Contract Problems/Non-Compliance.

	YES	NO	N/A
5.5 Chromatography: review the blank raw data - chromatograms (RICs), quant. reports or data system printouts and spectra. Is the chromatographic performance (baseline stability) acceptable for each instrument?	[ ]	___	___

ACTION: Use professional judgement to determine the effect on the data.

5.6 Are all detected hits for target compounds less than the CRQL for that analyte in all method blanks?	[ ]	___	___

Exception: Phthalate esters must be less than five times (5x) the CRQL.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/reagent blanks have positive results (TCL and/or TIC)?	___	[ ]	___

NOTE: Water: When applied as directed in the table below (page 29), the contaminant concentration in method/instrument/reagent blanks is multiplied by the sample dilution factor, where necessary.

Soil: If the lab has not already done so, the contaminant concentration in soil blanks is multiplied by 33 times the sample dilution factor and corrected for %moisture (fraction of solid) where necessary. 30 grams of sodium sulfate (1 gram for medium level soils) are used to prepare the soil reagent/method blank as instructed on page D-54/SVOA, section 12.1.3. Contact the lab to obtain resubmittals if the soil blanks are not reported in soil units (µg/kg).

6.2 Do any field/rinse blanks have positive BNA results (TCL and/or TIC)?	___	[ ]	___

ACTION: Prepare a list of samples associated with each contaminated blank. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be

YES NO N/A

used to qualify sample data. Do not convert field blank results to account for the difference in soil CRQLs. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, spectral, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable "R".

For:	Flag sample result with a "U" when:	Report CRQL & qualify "U" when:	No qualification is needed when:
Common Phthalate-Esters	Sample conc. is > CRQL, but ≤ 10× blank value.	Sample conc. is < CRQL and ≤ 10× blank value.	Sample conc. is > CRQL and > 10× blank value.
Other Contaminants	Sample conc. is > CRQL, but ≤ 5× blank value.	Sample conc. is < CRQL and ≤ 5× blank value.	Sample conc. is > CRQL and > 5× blank value.

NOTE: Analytes qualified "U" for blank contamination are still treated as "hits" when qualifying for calibration criteria.

ACTION: For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R" (unusable).

6.3 Are there field/rinse/equipment blanks associated with every sample? [ ] ___ ___

ACTION: For low level samples, note in the Data Assessment that there is no associated field/rinse/equipment blank. For analytes with high concentration, use professional judgement on qualification of these values and make a note in the Data Assessment.

Exception: samples taken from a drinking water tap do not have associated field blanks.

	YES	NO	N/A

7.0 GC/MS Instrument Performance Check

7.1	Are the GC/MS Instrument Performance Check Forms (Form V) present for Decafluorotriphenylphosphine (DFTPP)?	[ ]	___	___
7.2	Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift?	[ ]	___	___
7.3	Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument?	[ ]	___	___

ACTION: List date, time, instrument ID, and sample number for which no associated GC/MS tuning data are valid.

SAMPLE NUMBERS	DATE	TIME	INSTRUMENT ID
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

ACTION: If the lab cannot provide the missing data, reject "R" all data generated outside an acceptable twelve hour calibration interval.

7.4	Have the ion abundances been normalized to m/z 198 (see SOW, page D-61/SVOA)?	[ ]	___	___

NOTE: All ion abundance ratios must be normalized to m/z 198, the nominal base peak, even though the ion abundance of m/z 442 may up to 110% that of m/z 198.

ACTION: If mass assignment is in error, flag all associated sample data as unusable "R".

7.5	Have the ion abundance criteria been met for each instrument used?	[ ]	___	___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

	YES	NO	N/A
ACTION: If ion abundance criteria are not met, the Region II TPO must be notified.			
7.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values, but if errors are found check more.)	___	[ ]	___
7.7 Is the number of significant figures for the reported relative abundances consistent with the number given for each ion in the ion abundance criteria column?	[ ]	___	___
ACTION: If large errors exist, take action as specified in section 3.5 above.			
7.8 Are the spectra of the mass calibration compound acceptable?	[ ]	___	___
ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.			
8.0 <u>Target Compound List (TCL) Analytes (FORM I SV)</u>			
8.1 Are the Organic Analysis Data Sheets (Form I SV) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate?	[ ]	___	___
b. Matrix spikes and matrix spike duplicates?	[ ]	___	___
c. Blanks?	[ ]	___	___
8.2 Has GPC cleanup been performed on all soil/ sediment sample extracts?	[ ]	___	___
ACTION: If data suggests that GPC was not performed, use professional judgement. Make note in Contract Problems/Non-Compliance section of the Data Assessment and the Organic Regional Data Assessment Summary.			
8.3 Are the BNA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (quant. reports) included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate?	[ ]	___	___

	YES	NO	N/A
b. Matrix spikes and matrix spike duplicates (mass spectra not required)?	[ ]	___	___
c. Blanks?	[ ]	___	___

ACTION: If any data are missing, take action specified in 3.2 above.

8.4 Are the response factors shown in the quant. report?	[ ]	___	___
8.5 Is chromatographic performance acceptable with respect to:			
Baseline stability?	[ ]	___	___
Resolution?	[ ]	___	___
Peak shape?	[ ]	___	___
Full-scale graph (attenuation)?	[ ]	___	___
Other:_____?	[ ]	___	___

ACTION: Use professional judgement to determine the acceptability of the data.

8.6 Are lab-generated standard mass spectra of identified BNA compounds present for each sample?	[ ]	___	___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. Note under Contract Non-compliance if lab does not generate their own standard spectra. If spectra are missing, reject all positive data.

8.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	[ ]	___	___
8.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	[ ]	___	___
8.9 Do sample and standard relative ion intensities agree within ±20%?	[ ]	___	___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all

	YES	NO	N/A
such data should be rejected "R", flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected "U" at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 8.7, 8.8, and 8.9.			
ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.			
9.0 Tentatively Identified Compounds (TIC)			
9.1 Are all Tentatively Identified Compound Forms (Form I, Part B) present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier?	[ ]	___	___
9.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate?	[ ]	___	___
b. Blanks?	[ ]	___	___
c. Alkanes listed for each sample?	[ ]	___	___
ACTION: If any TIC data are missing, take action specified in 3.2 above.			
ACTION: Add "N" qualifier to all chemically named TICs, if missing.			
9.3 Are any TCL compounds (from any fraction) listed as TIC compounds? (Example: 1,2-dimethylbenzene is xylene - a VOA TCL - and should not be reported as a TIC.)	___	[ ]	___
ACTION: Flag with "R" any TCL compound listed as a TIC.			
9.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum?	[ ]	___	___
9.5 Do TIC and "best match" standard relative ion intensities agree within ±20%?	[ ]	___	___

	YES	NO	N/A
ACTION: Use professional judgement to determine the acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown," or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R".			
9.6 Are any TICs with responses < 10% of the internal standard (as determined by inspection of the peak areas or height) reported?	___	[ ]	___
ACTION: If yes, cross out questionable TIC(s).			
10.0 Compound Quantitation and Reported Detection Limits			
10.1 Are there any transcription/calculation errors in Form I results? (Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result.)	___	[ ]	___
10.2 Are the CRQLs adjusted to reflect sample dilutions and, for soils, sample moisture?	[ ]	___	___
ACTION: If errors are large, take action as specified in section 3.5 above.			
ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQL data from the diluted sample analysis). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and its associated value on the original Form I and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form Is that should not be used, including any in the summary package.			
11.0 Standards Data (GC/MS)			
11.1 Are the Reconstructed Ion Chromatograms, and data system printouts (quant. reports) present for initial and continuing calibration?	[ ]	___	___

	YES	NO	N/A

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

12.0 GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI) present and complete for the BNA fraction?	[ ]	___	___

ACTION: If any calibration standard forms are missing, take action specified in 3.2 above.

12.2 Are the % relative standard deviation (%RSD) values for BNAs ≤ 30% over the concentration range of the calibration?	[ ]	___	___

ACTION: Circle all outliers with red pencil.

NOTE: Although 21 BNA compounds have a contractual minimum RRF and no maximum %RSD, the technical criteria are the same for all analytes.

NOTE: Eight BNA compounds do not require a 20ng standard. Refer to SOW section 7.2.4.5.1, page D-15/SVOA for a list of required compounds and contractual criteria.

ACTION: If the %RSD is > 30.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When %RSD is > 90%, flag all non-detect results for that analyte "R" (unusable) and all positive results "J" (estimated).

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

12.3 Are any average RRFs < 0.05?	___	[ ]	___

ACTION: Circle all outliers with red pencil.

ACTION: If the average RRF is < 0.05 then:

1. "R" all non-detects.

2. "J" all positive results.

12.4 Are there any transcription/calculation errors in the reporting of RRFs and/or %RSDs? (Check at least two values; if errors are found check more.)	___	[ ]	___

	YES	NO	N/A

ACTION: Circle errors with red pencil.

ACTION: If errors are large, take action as specified in section 3.5 above.

NOTE: Contract Requirement: The SOW allows up to four of the required analytes to fail contractual %RSD or RRF criteria provided the %RSD is ≤ 40% or RRF is ≥ 0.010. (See Table 5, page D-66/SVOA and analytes marked with a "*" on Form VI for a list of required analytes and contractual criteria.) Technical criteria, however, are the same for all analytes.

ACTION: If more than four analytes fail %RSD or RRF criteria, document in the Data Assessment under Contract Problems/Non-Compliance and on the Organic Regional Data Assessment Summary form.

13.0 GC/MS Continuing Calibration (Form VII)

13.1 Are the Continuing Calibration Forms (Form VII) present and complete for the BNA fraction? [ ] ___ ___

13.2 Has a continuing calibration standard been analyzed for every twelve hours of sample analysis per instrument? [ ] ___ ___

ACTION: List below all sample analyses that were not analyzed within twelve hours of a continuing calibration standard for each instrument used.

_____

_____

_____

ACTION: If any forms are missing, or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, contact the lab to obtain an explanation/resubmittal. If continuing calibration data are unavailable, flag all associated sample data as unusable "R".

13.3 Does any BNA compound have a percent difference (%D) between the initial and continuing calibration RRFs which exceeds the ±25.0% criteria? ___ [ ] ___

YES NO N/A

ACTION: Circle all outliers with red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated "J". When %D is > 90%, reject all non-detects for that analyte, "R", and qualify positive results "J" (estimated).

13.4 Are any continuing RRFs < 0.05? ___ [ ] ___

ACTION: Circle all outliers with red pencil.

ACTION: If the RRF is < 0.05, qualify as unusable (R) associated non-detects and "J" associated positive values.

NOTE: Contract Requirement: The SOW allows up to four of the required analytes to fail contractual %D and RRF criteria, provided that the %D is ≤ 40% and the RRF is ≥ 0.010. (See Table 5 page D-66/SVOA or analytes marked with a "*" on Form VI for a list of the required analytes.) Technical criteria, however, are the same for all analytes.

ACTION: If more than four analytes failed %D and RRF criteria, document in the Data Assessment under Contract Problems/Non-Compliance and on the Organic Regional Data Summary Form.

13.5 Are there any transcription/calculation errors in the reporting of average relative response factors (RRF) or %difference (%D) between initial and continuing RRFs? (Check at least two values, but if errors are found, check more.) ___ [ ] ___

ACTION: Circle errors with red pencil.

ACTION: If errors are large, take action as specified in section 3.5 above.

14.0 Internal Standards (Form VIII)

14.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to +100%) for each continuing calibration? [ ] ___ ___

If no, was sample re-analyzed? [ ] ___ ___

YES NO N/A

ACTION: 1. Circle all outliers with red pencil.

2. List all the outliers below.

ACTION: If sample was not reanalyzed, document in Data Assessment in Contract Problems/Non-Compliance.

Sample #	Internal Std.	Area	Lower/Upper Limit
_____	_____	_____	_____/_____
_____	_____	_____	_____/_____
_____	_____	_____	_____/_____
_____	_____	_____	_____/_____

(Attach additional sheets if necessary.)
(or attach copies of Form VIIIs)

ACTION: 1. If the internal standard area count is outside the "upper" or "lower" limit, flag with "J" all positive results and non-detects quantitated with this internal standard.

2. Do not qualify non-detects associated with IS area > 100%.

3. If the IS area in the sample is < 50%, qualify all analytes associated with that IS estimated (J). If area counts are extremely low (< 25% of the area in the 12 hour standard), or if performance exhibits a major abrupt drop-off, flag all associated non-detects as unusable (R) and positive hits estimated (J).

14.2 Are the retention times of the internal standards within 30 seconds of the associated calibration standard? [ ] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

NOTE: Contractual requirements state that if any internal standard fails the acceptance criteria, the sample must be re-analyzed. If the affected sample was not re-analyzed, document in the Data Assessment under Contract Problems/Non-Compliance.

YES NO N/A

NOTE: See Notes in section 3.4, page 24 for a description of sample data the laboratory must submit.

15.0 Field Duplicates

15.1 Were any field duplicates submitted for BNA analysis? [ ] ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

YES NO N/A

PART C: PESTICIDE/PCB ANALYSIS

1.0 Sample Conditions/Problems

1.1 Do the Traffic Reports/Chain-of-Custody Records or SDG Narrative indicate any problems with sample receipt, condition of the samples, analytical problems or special circumstances affecting the quality of the data? ___ [ ] ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50% - 90% water, all data should be qualified as estimated "J". If a soil sample, other than TCLP, contains more than 90% water, all data should be qualified as unusable "R".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory, and the temperature of the cooler was elevated > 10^0 C, flag all positive results "J" and all non-detects "UJ".

ACTION: Check aqueous extraction log for sample pH, if adjustment was needed, it should have been noted in the SDG Narrative. If more information is needed, contact the lab.

2.0 Holding Times

2.1 Have any PEST/PCB technical holding times, determined from date of collection to date of extraction, been exceeded? ___ [ ] ___

NOTE: Technical Holding Times: Water and soil samples for PEST/PCB analysis must be extracted within 7 days of the date of collection. Extracts must be analyzed within 40 days of the date extraction.

ACTION: If technical holding times are exceeded, flag all positive results as estimated "J" and sample quantitation limits "UJ" and document in the narrative that holding times were exceeded. If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re-analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of

YES NO N/A

additional storage on the sample results. At a minimum, all the data should at least be qualified "J", but the reviewer may determine that non-detects are unusable "R".

Table of Holding Time Violations
(See Chain-of-Custody Records)

Sample Analyzed	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed

NOTE: Contractual Holding Times: Extraction of water samples must be completed within 5 days VTSR. Soil/sediment samples must be extracted within 10 days of VTSR. This requirement does not apply to Performance Evaluation (PE) samples. Extracts of water and soil/sediment samples must be analyzed within 40 days following start of extraction.

ACTION: If contractual holding times are exceeded, document in the Data Assessment and Organic Regional Data Assessment Summary form.

NOTE: The data reviewer must note in the Data Assessment whether or not technical and contractual holding times were met.

3.0 **Surrogate Recovery (Form II)**

3.1 Are the PEST/PCB Surrogate Recovery Summaries (Form II) present for each of the following matrices:

a. Low Water? [ ] ___ ___

b. Soil? [ ] ___ ___

3.2 Are all the PEST/PCB samples listed on the appropriate Surrogate Recovery Summary for each of the following matrices:

	YES	NO	N/A
a. Low Water?	[ ]	___	___
b. Soil?	[ ]	___	___

ACTION: Contact the lab to obtain an explanation or resubmittal of any missing deliverables. If missing deliverables are unavailable, document the effect in the Data Assessment.

3.3 Were outliers marked correctly with an asterisk?	[ ]	___	___

ACTION: Circle all outliers with red pencil.

3.4 Were surrogate recoveries of TCX or DCB outside of the contract specification for any sample, method blank or sulfur clean-up blank (30-150%)?	___	[ ]	___

ACTION: In the absence of matrix interference, qualification of the data is not required in the following three situations:

1. When surrogates on both columns are diluted out.

2. When one surrogate on one column was outside (either above or below) the contract limits but above 10%.

3. When the same surrogate on both columns is above the contract limit.

If the same surrogate on both columns is below the contract limit but above 10%, check chromatograms for interference. The reviewer may use professional judgement, and qualify only those analytes which elute in the region of the GC chromatogram where interference was observed.

If the same surrogate on both columns is below the contract limit but above 10% (with no interference), qualify non-detects and positive hits "J" (estimated).

If recoveries for both surrogates on both columns are below the contract limit but above 10%, flag positive results and non-detects for that sample "J".

	YES	NO	N/A

If recoveries are above the contract limit for both surrogates on both columns, then qualify positive values "J".

If both surrogates on one column are below the contract limit but above 10%, then use the data from the other column, providing both surrogates on that column are within contract limits. The validator must check from which column the concentration is reported for each analyte. If the value is reported from the failed column, then cross it out and use the value from the other column. Document this change in the Data Assessment.

If recovery is below 10% for either surrogate on any column, qualify positive results "J" and flag non-detects "R".

3.5 Were surrogate retention times (RT) within the windows established during the initial 3-point analysis of Individual Standard Mixture A (see Form VI Pest-1)? [ ] ___ ___

ACTION: If the RT limits are not met, positive results and non-detects for that sample may be qualified unusable, "R", based on professional judgement.

3.6 Are there any transcription/calculation errors between raw data and Form II? ___ [ ] ___

ACTION: If large errors exist, contact the lab to obtain an explanation or resubmittal of corrected deliverables. Make any necessary corrections and document the effect in the Data Assessment.

4.0 Matrix Spikes (Form III)

4.1 Is the Matrix Spike/Matrix Spike Duplicate Recovery Form (Form III) present? [ ] ___ ___

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices (one MS/MSD must be performed for every 20 samples of similar matrix or concentration level):

a. Low Water? [ ] ___ ___

	YES	NO	N/A
b. Soil?	[ ]	___	___

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.

ACTION: Circle all outliers with red pencil.

4.3 How many PEST/PCB spike recoveries are outside QC limits?

Water	Soil
_____ out of 12	_____ out of 12

4.4 How many RPDs for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Soil
_____ out of 6	_____ out of 6

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria and determine the need for some qualification of the data.

5.0 Blanks (Form IV)

	YES	NO	N/A
5.1 Is the Method Blank Summary (Form IV) present?	[ ]	___	___
5.2 Frequency of Analysis: Has a reagent/method blank been analyzed for each SDG, every 20 samples of similar matrix and concentration level or each extraction batch, whichever is more frequent?	[ ]	___	___

ACTION: If any blank data are missing, take action as specified above in section 3.2. If blank data is not available, reject "R" all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

5.3 A separate Form IV should be present if part of an extraction batch required sulfur removal. In such cases some samples will be listed on two blank summary forms - once under the method

	YES	NO	N/A
blank, and once under the sulfur clean-up blank (PCBLK). Was this additional blank raw data and Form IV submitted when required?	[ ]	___	___
ACTION: If sulfur clean-up blank data and Form IV are missing, take action as specified in 3.2 above.			
5.4 Has a PEST/PCB instrument blank been analyzed at the beginning of every 12 hr. period following the initial calibration sequence (minimum contract requirement)?	[ ]	___	___
ACTION: If any blank data are missing, take action as specified in section 3.2 above.			
5.5 Was the correct identification scheme used for all Pest/PCB blanks? (See page B-33, sec. 3.3.7.3 of the SOW for further information.)	[ ]	___	___
ACTION: Contact the lab to obtain resubmittals or make the required corrections on the forms. Document in the Data Assessment under Contract Problems/Non-Compliance all corrections made by the validator.			
5.6 <u>Chromatography</u>: review the blank raw data - chromatograms, quant. reports and data system printouts. Is the chromatographic performance (baseline stability) for each instrument acceptable?	[ ]	___	___
ACTION: Use professional judgement to determine the effect on the data.			

6.0 Contamination

NOTE: "Water blanks", "distilled water blanks" and "drilling water blanks" are validated like any other sample and are <u>not</u> used to qualify the data. Do not confuse them with the other QC blanks discussed below.			
6.1 Do any method/reagent, instrument, or cleanup blanks show positive hits for pest/PCBs?	___	[ ]	___
6.2 If any method blanks and/or sulfur clean-up blanks contain "hits" for target compounds, are these hits greater than the CRQL for that			

	YES	NO	N/A
analyte?	___	[ ]	___
6.3 In any instrument blanks, is the concentration of any target hit > 0.5 times CRQL for that analyte (see SOW, section 12.1.4.4.2, page D-77/PEST)?	___	[ ]	___

NOTE: Most labs will report 0.5 times CRQLs on the instrument blank Form I instead of the actual method CRQLs. If the lab reported the actual CRQLs, then check if any detected hits are above 0.5 times the CRQLs reported on the Form I.

ACTION: If yes to any of the above questions: note in the Data Assessment under Contract Problems/Non-Compliance if any method or clean-up blanks contain hits > the CRQL, or of instrument blank contained hits > 0.5 times CRQL for that analyte.

6.4 Do any field/rinse blanks have positive pest/PCB results?	___	[ ]	___

ACTION: Prepare a list of the samples associated with each contaminated blank. (Attach a separate sheet)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Do not convert field blank results to account for the difference in soil CRQLs. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, and/or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks.

NOTE: When applied as directed in the table below, the contaminant concentration in method/instrument/reagent/cleanup blanks is multiplied by the sample dilution factor, where necessary.

If the laboratory has not already done so, the contaminant concentration in soil blanks is multiplied by 33 times the sample dilution factor and corrected for %moisture (fraction of solid) where necessary. 30 grams of sodium sulfate are used to prepare each soil reagent/method blank as instructed on page D-72/PEST, section 12.1.2.3.1. Contact the

YES NO N/A

laboratory if the soil blanks are not reported in soil units (µg/kg).

Flag sample result with a "U":	Report CRQL & qualify "U":	No qualification is needed:
Sample conc. > CRQL, but ≤ 5× blank.	Sample conc. < CRQL & is ≤ 5× blank value.	Sample conc. > CRQL & > 5× blank value.

NOTE: If gross blank contamination exists, all data in the associated samples should be qualified as "R", unusable.

6.5 Are there field/rinse/equipment blanks associated with every sample? [ ] ___ ___

ACTION: For low level samples, note in the Data Assessment that there is no associated field/rinse/equipment blank. For analytes with high concentrations, use professional judgement to qualify these values and document in the Data Assessment.

<u>Exception</u>: samples taken from a drinking water tap do not have associated field blanks.

7.0 Calibration and GC Performance

7.1 Are the following Gas Chromatograms and Data Systems Printouts for both columns present for all samples, blanks and MS/MSD:

a. Peak resolution check? [ ] ___ ___

b. Performance evaluation mixtures? [ ] ___ ___

c. Aroclor 1016/1260? [ ] ___ ___

d. Aroclors 1221, 1232, 1242, 1248, 1254? [ ] ___ ___

e. Toxaphene? [ ] ___ ___

f. Low points individual mixtures A & B? [ ] ___ ___

g. Med points individual mixtures A & B? [ ] ___ ___

h. High points individual mixtures A & B? [ ] ___ ___

	YES	NO	N/A
i. Instrument blanks?	[ ]	___	___
j. Were the appropriate GC columns used as specified on pg. D-11/PEST, sections 6.23.3.1 to 6.23.3.7, in the SOW?	[ ]	___	___
7.2 Do the chromatograms for all Individual Standard Mixtures and PEM analyses display single component analytes at > 10% but < 100% of full scale (see sections 9.3.5.8.1 thru 9.3.5.8.4, pages D-32 & 33/PEST)?	[ ]	___	___
Have chromatograms for Individual Standard Mixtures and PEM analyses been replotted, showing scaling factor(s), to meet the above requirements when necessary?	[ ]	___	___

NOTE: All standard chromatograms must clearly display all peaks at > 10% but < 100% of full scale, and replotted if necessary to accommodate peaks not properly scaled in the initial chromatogram(s). Both the initial and replotted chromatograms must be submitted with the data package.

ACTION: If all single component peaks are not clearly displayed on chromatograms for all Individual Standard Mixtures and PEM analyses, contact the lab to obtain resubmittal of the necessary data.

	YES	NO	N/A
7.3 Are Forms VI PEST 1-7 present and complete for each column and each analytical sequence?	[ ]	___	___

ACTION: If no, take action as specified in 3.2 above.

	YES	NO	N/A
7.4 Are there any transcription/ calculation errors between raw data and Forms VI?	___	[ ]	___

ACTION: If large errors exist, take action as specified in section 3.6 above.

	YES	NO	N/A
7.5 Do all standard retention times, including each pesticide in each level of Individual Mixtures A & B, fall within the windows established during the Initial Calibration (see Form VI PEST-1)?	[ ]	___	___

ACTION: If no, all samples in the entire analytical sequence are potentially affected. Check to see if the chromatograms contain peaks within an expanded window surrounding the expected

	YES	NO	N/A

retention times. If no peaks are found and the surrogates are visible, non-detects are valid. If peaks are present and cannot be identified through pattern recognition or using a revised RT window, qualify all positive results "JN" and non-detects as unusable (R). For aroclors, the RT may be outside the window, but the aroclor may still be identified from its distinctive pattern.

7.6 Are the linearity criteria for the initial analyses of Individual Standards A & B within limits for both columns? (%RSD must be ≤ 25.0 for alpha and delta BHC, ≤ 30.0 for the two surrogates and ≤ 20% for all other analytes.) [ ] ___ ___

NOTE: Contractual requirements allow up to two single component TCL compounds, but not surrogates, on each column to exceed the criteria provided the %RSD is ≤ 30%. (See page D-28/Pest, sec. 9.2.5.7 in the SOW.) Technical criteria, however, are the same for all analytes.

ACTION: If technical criteria were not met, qualify all associated positive results generated during the entire analytical sequence "J" and all non-detects "UJ". When %RSD > 90%, flag all non-detect results for that analyte "R" (unusable).

ACTION: If more than two analytes failed %RSD, document in the Data Assessment Contract Problems/Non-Compliance section and Organic Regional Data Assessment Summary form.

7.7 Is the resolution between each pair of adjacent peaks in the Resolution Check Mixture ≥ 60.0% for both columns? (See Form VI PEST-4.) [ ] ___ ___

ACTION: If no, qualify positive results for compounds that were not adequately resolved "J". Use professional judgement to determine if non-detects which elute in areas affected by co-eluting peaks should be qualified "N" as presumptive evidence of presence or unusable (R).

7.8 Is Form VI PEST-5 present and complete for each Performance Evaluation Mixture (PEM) standard used for <u>both initial and continuing</u> calibrations (see SOW section 3.12.4.4, page B-52)? [ ] ___ ___

	YES	NO	N/A
ACTION: If no, take action as specified in section 3.2 above.			
7.9 For each PEM standard, was the resolution between each pair of adjacent peaks ≥ 90.0% on both columns?	[ ]	___	___
ACTION: Qualify positive results for compounds not adequately resolved estimated (J). Qualify non-detects based on professional judgement.			
7.10 Have Forms VI PEST-6 & PEST-7 been completed for all midpoint Individual Standards A and B used for initial calibration?	[ ]	___	___
For each standard, was the resolution between each pair of adjacent peaks ≥ 90.0% on both columns?	[ ]	___	___
ACTION: If no, qualify positive results for compounds that were not adequately resolved estimated (J). Use professional judgement to determine if non-detects which elute in areas affected by co-eluting peaks should be qualified "N" as presumptive evidence of presence or unusable "R".			
7.11 Is Form VII Pest-1 present and complete for each PEM standard analyzed during the analytical sequence for both columns?	[ ]	___	___
Was the %Breakdown of DDT and Endrin calculated using the equations given on page D-26/PEST, sec. 9.2.4.8 in the SOW?	[ ]	___	___
Were all pesticides and surrogates in each PEM standard within the RT windows established during the Initial Calibration?	[ ]	___	___
ACTION: If no, take action as specified in 3.2 above.			
7.12 Has the individual percent breakdown for DDT/Endrin exceeded 20.0% in any PEM on either column? (See Form VII PEST-1.)			
- for 4,4'-DDT?	___	[ ]	___
- for Endrin?	___	[ ]	___
Has the combined percent breakdown for DDT/Endrin			

	YES	NO	N/A
exceeded 30.0% in any PEM on either column (required for all PEM analyses)?	___	[ ]	___

ACTION: 1. If any percent breakdown has failed the QC criteria in either PEM in steps 2 and 17 in the initial calibration sequence (page D-28/Pest, sec. 9.2.5.6 in the SOW), qualify all samples in the entire analytical sequence as described in sections 2.a, b and c below.

2. If any percent breakdown failed the QC criteria in a PEM calibration verification analysis, review data beginning with the samples which followed the last in-control standard until the next acceptable PEM and qualify the data as described below.

a. 4,4'-DDT Breakdown: If DDT breakdown was > 20.0%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE are positive, then qualify the quantitation limit for DDT unusable, "R".

ii. Qualify positive results for DDD and/or DDE as presumptively present at an approximated quantity "JN".

b. Endrin Breakdown: If endrin breakdown was > 20.0%:

i. Qualify all positive results for endrin with "J". If endrin was not detected, but endrin aldehyde and endrin ketone are positive, then qualify the quantitation limit for Endrin as unusable "R".

ii. Qualify positive results for endrin ketone and endrin aldehyde as presumptively present at an approximated quantity "JN".

c. Combined Breakdown: If the combined 4,4'-DDT and endrin breakdown is greater than 30.0%:

i. Qualify all positive results for DDT and Endrin with "J". If endrin was not detected, but endrin aldehyde and endrin ketone are positive, then qualify the quantitation limit for endrin as unusable

	YES	NO	N/A
"R". If DDT was not detected, but DDD and DDE are positive, then qualify the quantitation limit for DDT as unusable "R".			
ii. Qualify positive results for endrin ketone and endrin aldehyde as presumptively present at an approximated quantity "JN". Qualify positive results for DDD and/or DDE as presumptively present at an approximated quantity "JN".			
7.13 Are all percent difference (%D) values for PEM analytes and surrogates on both columns ≥ -25% and ≤ +25.0%? (See Form VII PEST-1.)	[ ]	___	___
ACTION: If no, qualify all associated positive results generated during the analytical sequence "J" and sample quantitation limits "UJ".			
NOTE: If the failing PEM is part of the initial calibration, all samples are potentially affected. If the offending standard is a calibration verification, the associated samples are those which followed the last in-control standard until the next passing standard.			
7.14 Is Form VII Pest-2 present and complete for each INDA and INDB calibration verification analyzed?	[ ]	___	___
ACTION: If no, take action specified in 3.2 above.			
7.15 Are there any transcription/calculation errors between raw data and Form VII Pest-2?	___	[ ]	___
ACTION: If large errors exists, take action as specified in section 3.6 above.			
7.16 Do all standard retention times for each INDA and INDB calibration verification fall within the RT windows established during the initial calibration sequence? (See Form VII PEST-2.)	[ ]	___	___
ACTION: If no, beginning with the samples which followed the <u>last in-control standard</u>, check to see if the chromatograms contain peaks within an expanded window surrounding the expected retention times. If no peaks are found and the surrogates are visible, non-detects are valid. If peaks are present and cannot be identified through pattern recognition or using a revised			

	YES	NO	N/A

RT window, qualify all positive results and non-detects as unusable (R).

7.17 Are all %D values for INDA and INDB calibration verification compounds ≥ -25.0% and ≤ +25.0%? [ ] ___ ___

ACTION: If the %D is outside the ±25.0% range for any compound(s), qualify associated positive results for that compound "J" and non-detects "UJ". The "associated samples" are those which followed the <u>last in-control standard</u> up to the next passing standard containing the analyte(s) in question. If the %D is > 90%, flag all non-detects for that analyte "R" (unusable).

8.0 Analytical Sequence Check (Form VIII-PEST)

8.1 Is Form VIII present and complete for each column and each period of analyses? [ ] ___ ___

ACTION: If no, take action specified in 3.2 above.

8.2 Was the proper analytical sequence followed for each initial calibration and subsequent analyses, and all standards analyzed at the required frequency for each GC/EC instrument used.? (See SOW pages D-23 & D-58/PEST.) [ ] ___ ___

ACTION: If no, use professional judgement to determine the severity of the effect on the data and qualify accordingly. Generally, the effect is negligible unless the sequence was grossly altered and/or the calibration was out of QC limits.

8.3 Were all samples analyzed within a 12 hour time period beginning with the injection of an instrument blank and bracketed by acceptable analyses of the proper standards? [ ] ___ ___

ACTION: If no, use professional judgement to determine the severity of the effect on the data and qualify accordingly. Document in the Data Assessment under Contract Problems/Non-Compliance and Organic Regional Data Assessment Summary.

8.4 If a multi-component analyte was detected in a sample, was a matching multi-component standard analyzed within 72 hours of the injection of the

	YES	NO	N/A
sample and within a valid 12 hour sequence?	[ ]	___	___

NOTE: This additional standard is for identification purposes only. Positive results for Aroclors and Toxaphene are quantitated from the initial calibration.

ACTION: If no, document in the Data Assessment under Contract Problems/Non-Compliance and on the Organic Regional Data Assessment Summary form.

9.0 Cleanup Efficiency Verification (Form IX)

	YES	NO	N/A
9.1 Is Form IX PEST-1 present and complete for each lot of Florisil Cartridges used? (Florisil Cleanup is required for all Pest/PCB extracts.)	[ ]	___	___
Are all samples listed on the Pesticide Florisil Cartridge Check Form?	[ ]	___	___

ACTION: If no, take action specified in 3.2 above. If data suggests florisil clean-up was not performed, document in the Data Assessment under the Contract Non-compliance section.

	YES	NO	N/A
9.2 Are percent recoveries (%REC) of the pesticide and surrogate compounds used to check the efficiency of the florisil clean-up procedure within QC limits of 80 - 120%?	[ ]	___	___

ACTION: Qualify only the analyte(s) which failed the recovery criteria as follows:

If %REC is < 80%, qualify positive results "J" and non-detects "UJ".

If any pesticide %REC was zero, flag non-detects "R" for that compound.

Use professional judgement to qualify positive results if any recoveries are > 120%.

NOTE: Sample data should be evaluated for potential interferences if recovery of 2,4,5-trichlorophenol was > 5% in the Florisil Cartridge Performance Check analysis. Document any problems found in the Data Assessment under the Contract Problems/Non-Compliance section.

	YES	NO	N/A
9.3 If GPC Cleanup was performed (mandatory for all soil sample extracts), is Form IX Pest-2 present?	[ ]	___	___
Are all soil samples listed on Form IX Pest-2?	[ ]	___	___

ACTION: If no, take action specified in 3.2 above. If data suggests GPC clean-up was not performed when required, document in the Data Assessment under the Contract Problems/Non-Compliance section and Organic Regional Data Assessment Summary.

Are the %REC values for all pesticides in the GPC calibration solution between 80 - 110%?	[ ]	___	___

ACTION: Qualify only those analytes which failed the recovery criteria as follows:

If %REC are < 80%, qualify positive results "J" and non-detects "UJ".

If any pesticide %REC was zero, flag non-detects "R" for that compound.

Use professional judgement to qualify positive results if any recoveries are > 110%.

NOTE: An Aroclor mixture containing Aroclors 1016 and 1260 is also analyzed during GPC calibration; however, Aroclor data is not listed on Form IX PEST-2. The raw GPC data for Aroclors 1016/1260 must be evaluated for pattern similarity with previously analyzed Aroclor standards.

9.4 The validator should verify that the correct identification scheme for the EPA Blank samples were used. See page B-35, sec. 3.3.7.8 and 3.3.7.9 of the SOW for further information.

Was the correct identification scheme used for GPC and Florisil blanks?	[ ]	___	___

10.0 Pesticide/PCB Identification

10.1 Is Form X complete for every sample in which a pesticide or PCB was detected?	[ ]	___	___

ACTION: If no, take action specified in 3.2 above.

	YES	NO	N/A
10.2 Are all sample chromatograms properly scaled, attenuated, etc. as required for proper identification of single and multi-component analytes? (Refer to SOW sections 11.3.7.1 thru 11.3.7.8, page D-70/Pest for specific details.)	[ ]	___	___

NOTE: Proper verification of Pest/PCB results depends on clear, legible presentation of the raw data. Single component pesticides and all peaks chosen for quantitation of multi-component analytes must appear at less than full scale. Toxaphene and PCB patterns must be clearly visible to enable comparison with standard chromatograms.

ACTION: If retention times or apex of peaks cannot be verified, or if multi-component peak patterns cannot be discerned, contact the lab to obtain rescaled chromatograms.

10.3 Are there any transcription/calculation errors between raw data and Forms 10A and 10B?	___	[ ]	___

ACTION: If large errors exist, take action as specified in section 3.6 above.

10.4 Are RTs of sample compounds within the established RT windows for analyses on both columns?	[ ]	___	___
Was GC/MS confirmation provided when required (when compound concentration is > 10 ug/mℓ in the final extract)?	[ ]	___	___

ACTION: Use professional judgement to qualify positive results which were not confirmed by GC/MS analysis. Qualify as unusable (R) all positive results which were not confirmed on a second GC column. Also qualify as unusable (R) all positive results which do not meet RT window criteria, unless associated standard compounds are similarly biased. Use professional judgement to assign an appropriate quantitation limit.

10.5 Is the percent difference (%D) calculated for the positive sample results on both columns > 25.0%?	___	[ ]	___

ACTION: If the reviewer finds neither column shows interference for the positive hits, the data should be flagged as follows:

YES NO N/A

% Difference	Qualifier
0 - 25%	None
25 - 70%	"J"
70 - 100%	"JN"
> 100%	"R"
100 - 200% (Interference detected)*	"JN"
> 50% (Pesticide value is < CRQL)**	"U"

* When the reported %D is 100 - 200%, but interference is detected on either column, qualify the data with "J".

** When the reported pesticide value is lower than the CRQL, and the %D is > 50%, raise the value to the CRQL and qualify "U", undetected.

NOTE: For Aroclors, if the %D is > 50%, but the pattern of GC peaks on both columns indicates a specific Aroclor is present, qualify that Aroclor "J".

NOTE: The lower of the two values is reported on Form I. If using professional judgement, the reviewer determines that the higher result was more acceptable, the reviewer should replace the value and indicate the reason for the change in the Data Assessment.

10.6 Check chromatograms for false negatives, especially the multiple-peak compounds (Toxaphene and the PCBs). Were there any false negatives? ___ [ ] ___

ACTION: Use professional judgement to decide if the compound should be reported. If the appropriate PCP standards were not analyzed within 72 hrs. of the sample(s) in question, qualify the data unusable "R".

Also note in Data Assessment under Contract Problems/Non-Compliance if the lab failed to analyze Aroclor standards when required.

11.0 Target Compound List (TCL) Analytes

11.1 Are the Organic Analysis Data Sheets (Form I Pest) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate? [ ] ___ ___

b. Matrix spikes and matrix spike duplicates? [ ] ___ ___

	YES	NO	N/A
c. Blanks?	[ ]	___	___
d. Instrument Blanks (per column & analysis)?	[ ]	___	___
11.2 Are the Pest chromatograms and quant. reports included in the sample data package for each of the following:			
a. Samples and/or fractions as appropriate?	[ ]	___	___
b. Matrix spikes and matrix spike duplicates?	[ ]	___	___
c. Blanks?	[ ]	___	___
d. Instrument Blanks (per column & analysis)?	[ ]	___	___

ACTION: If any data are missing, take action specified in 3.2 above.

11.3 Are the calibration factors shown in the quant. reports?	[ ]	___	___
11.4 Is chromatographic performance acceptable with respect to:			
a. Baseline stability?	[ ]	___	___
b. Resolution?	[ ]	___	___
c. Peak shape?	[ ]	___	___
d. Full-scale graph attenuation?	[ ]	___	___
e. Other: _____?	[ ]	___	___
11.5 Were any electropositive displacement (negative peaks) or unusual peaks seen?	___	[ ]	___

ACTION: Use professional judgement to determine the acceptability of the data. Address comments under System Performance section of the Data Assessment.

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in Form I results? Check at least two positive results. Were any errors found?	___	[ ]	___

YES NO N/A

NOTE: Single-peak pesticide results can be checked for rough agreement between quantitative results obtained on the two GC columns. Use professional judgement to decide whether a large discrepancy indicates the presence of an interfering compound. If an interfering compound is visible on the chromatogram, the lower of the two values should be reported and qualified as presumptively present at an approximated quantity "JN". This necessitates a determination of an estimated concentration on the confirmation column. The narrative should indicate that the presence of interferences has interfered with the evaluation of the second column confirmation.

12.2 Are the CRQLs adjusted to reflect sample dilutions? [ ] ___ ___

ACTION: If large errors exist, take action as specified in section 3.6 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQLs from the diluted sample). Replace concentrations which exceed the calibration range in the original analysis by crossing out the "E" value on the original Form I and substituting it with the result from the diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including those in the data summary package.

ACTION: Quantitation limits affected by large, off-scale peaks should be qualified as unusable (R). If the interference is on-scale, the reviewer may offer an approximated quantitation limit (UJ) for each affected compound.

NOTE: If a sample required greater than a 10 times dilution, then a 10 times more concentrated analysis must also be performed and submitted (see SOW, page D-60/PEST, section 10.2.3.5).

ACTION: If a more concentrated analysis is unavailable, document in the Contract Problems/Non-Compliance section of the Data Assessment. Use professional judgement to qualify non-detects and positive hits below the CRQL.

	YES	NO	N/A

13.0 Field Duplicates

13.1 Were any field duplicates submitted?	[ ]	___	___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

ATTACHMENT 1

CLP Data Assessment

CLP DATA ASSESSMENT

Functional Guidelines for Evaluating Organic Analysis

CASE No.: _____ SDG No.: _____ LABORATORY: _____

SITE: _____

DATA ASSESSMENT

The current SOP No. HW-6 (Revision 11), June 1996 for CLP Organics Review and Preliminary Review has been applied.

All data were found to be valid and acceptable except those analytes which have been rejected, "R" (unusable). Due to various QC problems some analytes may have been qualified with a "J" (estimated), "N" (presumptive evidence for the presence of the material), "U" (non-detect), or "JN" (presumptive evidence for the presence of the material at an estimated value) flag. All action is detailed on the attached sheets.

The "R" flag means that the associated value is unusable. In other words, significant data bias is evident and the reported analyte concentration is unreliable.

Reviewer's
Signature: _____ Date: _____

Verified By: _____ Date: _____

CLP DATA ASSESSMENT

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.

The following action was taken in the samples and analytes shown due to excessive holding time.

2. SURROGATES:

All samples are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

CLP DATA ASSESSMENT

3. MATRIX SPIKE/SPIKE DUPLICATE, MS/MSD:

The MS/MSD data are generated to determine the long term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for additional qualification of data.

4. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, trip, field, or rinse blanks are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Trip blanks measure cross-contamination of samples during shipment. Field and rinse blanks measure cross-contamination of samples during field operations. If the concentration of the analyte is less than 5 times the blank contaminant level (10 times for common contaminants), the analytes are qualified as non-detects, "U". The following analytes in the sample shown were qualified with "U" for these reasons:

A) Method blank contamination:

B) Field or rinse blank contamination:

C) Trip blank contamination:

CLP DATA ASSESSMENT

5. MASS SPECTROMETER TUNING:

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organics is (BFB) Bromofluorobenzene and for semi-volatiles Decafluorotriphenylphosphine (DFTPP).

If the mass calibration is in error, all associated data will be classified as unusable "R".

6. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

A) Response Factor GC/MS:

The response factor measures the instrument's response to specific chemical compounds. The response factor for the Target Compound List (TCL) must be $\geq$ 0.05 in both initial and continuing calibrations. A value $<$ 0.05 indicates a serious detection and quantitation problem (poor sensitivity). Analytes detected in the sample will be qualified as estimated, "J". All non-detects for that compound will be rejected "R".

CLP DATA ASSESSMENT

7. CALIBRATION:

B) Percent Relative Standard Deviation (%RSD) and Percent Difference (%D):

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be < 30% and %D must be < 25%. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J" and non-detects are flagged "UJ". If %RSD and %D grossly exceed QC criteria, non-detects data may be qualified "R".

For the PEST/PCB fraction, if %RSD exceeds 20% for all analytes except for the two surrogates (which must not exceed 30% RSD), qualify all associated positive results "J" and non-detects "UJ".

The following analytes in the sample shown were qualified for %RSD and %D:

8. INTERNAL STANDARDS PERFORMANCE GC/MS:

Internal standards (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than a factor of 2 (-50% to +100%) from the associated continuing calibration standard. The retention time of the internal standard must not vary more than ±30 seconds from the associated continuing calibration standard. If the area count is outside the (-50% to +100%) range of the associated standard, all of the positive results for compounds quantitated using that IS are qualified as estimated, "J", and all non-detects as "UJ", or "R" if there is a severe loss of sensitivity.

CLP DATA ASSESSMENT

If an internal standard retention time varies by more than 30 seconds, the reviewer will use professional judgement to determine either partial or total rejection of the data for that sample fraction.

9. COMPOUND IDENTIFICATION:

A) Volatile and Semi-Volatile Fractions:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within ± 0.06 RRT units of the standard compound and have an ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the tentatively identified compounds (TIC) the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

B) Pesticide Fraction:

The retention times of reported compounds must fall within the calculated retention time windows for the two chromatographic columns and a GC/MS confirmation is required if the concentration exceeds 10ng/ml in the final sample extract.

CLP DATA ASSESSMENT

10. CONTRACT PROBLEMS NON-COMPLIANCE:

11. FIELD DOCUMENTATION:

12. OTHER PROBLEMS:

13. This package contains reextractions, reanalyses or dilutions. Upon reviewing the QA results, the following Form 1(s) are identified to be used.

ATTACHMENT 2

Organic Regional Data Assessment Summary

DATA REJECTION SUMMARY

Type of Review: _____ Date: _____ Case No.: _____

Site Name: _____ Lab Name: _____

Reviewer's Initials: _____ Number of Samples: _____

Analytes Rejected Due to Exceeding Review Criteria For:

No. of Compounds/No. of Fractions (Samples)

	Surrogates	Holding Time	Calibra-tion	Contamina-tion	ID	Internal Standards	Other	Total # of Samples	Total # Rejected/Total # in All Samples
VOA(33)									/ = %
ACID(14)									/ = %
B/N(50)									/ = %
PEST(21)									/ = %
PCB(7)									/ = %

NOTE: ASTERISK (*) INDICATES ADDITIONAL EXCEEDANCES OF REVIEW CRITERIA.

Analytes Estimated Due to Exceeding Review Criteria For:

No. of Compounds/No. of Fractions (Samples)

	Surrogates	Holding Time	Calibra-tion	Contamina-tion	ID	Internal Standards	Other	Total # of Samples	Total # Estimated/Total # in All Samples
VOA(33)									/ = %
ACID(14)									/ = %
B/N(50)									/ = %
PEST(21)									/ = %
PCB(7)									/ = %

NOTE: ASTERISK (*) INDICATES ADDITIONAL EXCEEDANCES OF REVIEW CRITERIA.

Data Review Worksheets

Organics Data Review for Low Concentration Water

USEPA Region 2 SOP HW-13, Revision 2, October 1996

(Applicable to CLP Low Concentration Organic Water Analysis)

YES NO N/A

CASE NUMBER:_____ LAB:_____
SITE:_____

1.0 Data Completeness and Deliverables

1.1 Have any missing deliverables been received and added to the data package? [ ] ___ ___

ACTION: Call lab for explanation/resubmittal of any missing deliverables. If lab cannot provide them, note the effect on review of the package under the "Contract Problems/Non-Compliance" section of reviewer narrative.

1.2 Was SAS-request included with package? [ ] ___ ___

If no, a SAS-request can be retrieved from RSCC.

2.0 Cover Letter SDG Narrative

2.1 Is the Narrative or Cover Letter Present? [ ] ___ ___

2.2 Are Case Number and/or SAS number contained in the Narrative or Cover letter? [ ] ___ ___

3.0 Data Validation Checklist

The following checklist is divided into three parts. Part A is filled out if the data package contains any Low Concentration Volatile analyses, Part B for any Low Concentration Semivolatile analyses and Part C for Low Concentration Pesticide/Aroclors.

Does this package contain:

Low Concentration Volatile Data? ___ ___

Low Concentration Semivolatile Data? ___ ___

Low Concentration Pesticide/Aroclor data? ___ ___

Action: Complete corresponding parts of checklist.

YES NO N/A

PART A: VOA ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are Traffic Report Forms present for all samples? [ ] ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data? ___ [ ] ___

ACTION: If samples were not iced upon receipt at the laboratory, flag all positive results "J" and all non-detects "UJ".

ACTION: If both VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and non-detects using professional judgement.

1.3 Does Lab narrative contain a list of pH determinations for all samples? [ ] ___ ___

ACTION: If Lab narrative does not contain a list of sample pH determinations, contact the lab for explanation/resubmittals.

2.0 Holding Times

2.1 Have any VOA technical holding times, determined from date of collection to date of analysis, been exceeded? ___ [ ] ___

If unpreserved, samples maintained at 4°C and are to be analyzed for aromatic hydrocarbons must be analyzed within 7 days of collection. If preserved with HCl (pH<2) and stored at 4°C, then samples must be analyzed within 14 days of collection. If uncertain about preservation, contact sampler to determine whether or not samples were preserved.

YES NO N/A

Table of Holding Time Violations

Sample ID	Preserved?	Date Sampled	(See Traffic Report) Date Lab Received	Date Analyzed
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded. If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re-analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results must be qualified "J", but the reviewer may determine that non-detect data are unusable (R). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

3.0 Surrogate Recovery (Form II LCV)

3.1 Are the VOA Surrogate Recovery Summaries (Form II LCV) present? [ ] ___ ___

ACTION: Call lab for explanation/resubmittals. If missing deliverables are unavailable, document effect in data assessments.

3.2 Were outliers marked correctly with an asterisk? [ ] ___ ___

ACTION: Circle all outliers in red.

3.3 Was the surrogate (p-bromofluorobenzene) recovery outside of contract specifications for any sample or method blank? ___ [ ] ___

	YES	NO	N/A
If yes, were samples re-analyzed?	[ ]	___	___
Were method blanks re-analyzed?	[ ]	___	___

ACTION: If bromofluorobenzene recovery is >10%, but fails to meet SOW specifications:

1. All positive results are qualified as estimated (J).

2. Flag all non-detects as estimated detection limits ("UJ") where recovery is less than the lower acceptance limit.

3. If surrogate recovery is above allowable levels, do not qualify non-detects.

If surrogate recovery is < 10% :

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as unusable ("R").

Professional judgement should be used to qualify data that only have the method blank's surrogate recovery out of specification in both original and reanalyses. Check the internal standard areas.

3.4 Are there any transcription/calculation errors between raw data and Form II?	___	[ ]	___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and note errors in the data assessment.

4.0 Laboratory Control Sample (Form III LCV)

4.1 Is the Laboratory Control Sample Recovery Form (Form III LCV) present?	[ ]	___	___

YES NO N/A

4.2 Was the Laboratory Control Sample (LCS) analyzed at the required frequency (once per SDG or every 20 samples, whichever is more frequent) for the Low Concentration VOA method? [ ] ___ ___

ACTION: If any LCS data are missing, take the action specified in 3.2 above.

4.3 How many VOA LCS recoveries are outside QC limits of 60-140%?

Low Conc. Water

_____ out of 12

ACTION: If the LCS recovery is greater than 140%,positive results should be flagged "J" forthe affected compound.

If the mass spectral criteria are met but the LCS recovery is less than 60%, then the associated detected target compounds should be flagged "J". Associated non-detected target compounds should be flagged "R".

If 25 % of the analyte recoveries are below QC-limits qualify all associated positive sample data as "J" and non-detects "R".

If two or more analytes show recoveries of < 10% all associated positive sample data as "J" non-detects "R".

It should be noted for TPO action if a laboratory fails to analyze an LCS with each SDG, or if a laboratory consistently fails to generate acceptable LCS recoveries.

5.0 Method Blanks (Form IV-LCV)

5.1 Is the Method Blank Summary (Form IV LCV) present? [ ] ___ ___

YES NO N/A

5.2 Frequency of Analysis:

For the analysis of Low Concentration VOA TCL compounds, has a method blank been analyzed for each SDG or every 20 samples, whichever is more frequent? [ ] ___ ___

5.3 Has a VOA method blank been analyzed at least once every twelve hours for each GC/MS system used? [ ] ___ ___

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If method blank data are not available, reject (R) all associated positive data. However, using professional judgement, the data reviewer may substitute field blank or trip blank data for missing method blank data.

5.4 Chromatography: review the method blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for Low Concentration VOAs? [ ] ___ ___

ACTION: Use professional judgement to determine the effect on the data.

5.0.1 Storage Blank

5.0.1a Has a storage blank been analyzed at the required frequency (once per SDG) for VOAs? [ ] ___ ___

5.0.1b Chromatography: Compare the storage blank raw data with the associated method blank data in order to determine if the contamination is also present in the method blank.

ACTION: If the storage blank contains target compounds at a concentration greater than the CRQL, positive results for that compound(s) should be flagged "J". If gross contamination occurred positive sample results may require rejection for that compound.

	YES	NO	N/A
5.0.1c Is the chromatographic performance (baseline stability) for the storage blank acceptable for Low Conc. VOAs?	[ ]	___	___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks", and distilled water blanks" are validated like any other sample, and are not used to qualify data. Do not confuse them with the other QC blanks discussed below.

6.1 Has an instrument blank been analyzed following a sample analysis which contained an analyte(s) at high concentration(s).	___	[ ]	___

ACTION: Sample analysis results after the high concentration sample must be evaluated for carryover. Instrument cross contamination should be noted for TPO action if an effect on the data is suspected.

6.2 Do any method/storage blanks have positive results (TCL and/or TIC) for Low Conc. VOAs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor.	___	[ ]	___
6.3 Do any field/trip/rinse blanks have positive Low Conc. VOA results (TCL and/or TIC)?	___	[ ]	___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

YES NO N/A

NOTE: All field blank results associated with a particular group of samples (may exceed one per case) must be used to qualify data. Trip blanks are used to qualify only those samples with which they were shipped. Blanks may not be qualified because of contamination in another blank. Field blanks & trip blanks must be qualified for system monitoring compound, instrument performance criteria, spectral or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks. If any blanks are grossly contaminated, all associated data should be qualified as unusable (R).

	Sample conc > CRQL but < 10x blank	Sample conc < CRQL & <10x blank value	Sample conc > CRQL & >10x blank value value
Methylene Chloride Acetone 2-Butanone	Flag sample result with a "U"	Report CRQL & qualify "U"	No qualification is needed

	Sample conc > CRQL but < 5x blank	Sample conc < CRQL & is < 5x blank value	Sample conc > CRQL value & > 5x blank value
Other Contaminants	Flag sample result with a "U"	Report CRQL & qualify "U"	No qualification is needed

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

YES NO N/A

ACTION: For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R" (unusable).

6.3 Are there field/rinse/equipment blanks associated with every sample? [ ] ___ ___

ACTION: Note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

7.0 GC/MS Instrument Performance Check (Form V-LCV)

7.1 Are the GC/MS Instrument Performance Check Forms (Form V-LCV) present for Bromofluorobenzene (BFB)? [ ] ___ ___

7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? [ ] ___ ___

7.3 Has an instrument performance compound been analyzed for every twelve hours of sample analysis per instrument? [ ] ___ ___

ACTION: List date, time, instrument ID, and sample analysis for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

	YES	NO	N/A
7.4 Have the ion abundances been normalized to m/z 95?	[ ]	___	___

ACTION: If mass assignment is in error, qualify all associated data as unusable (R).

7.5 Have the ion abundance criteria been met for each instrument used?	[ ]	___	___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, the Region II TPO must be notified.

7.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.)	___	[ ]	___
7.7 Have the appropriate number of significant figures (two) been reported?	[ ]	___	___

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

7.8 Is the spectrum of the mass calibration compound acceptable?	[ ]	___	___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

8.0 <u>Target Compound List (TCL) Analytes (Form I LCV)</u>

8.1 Are the Organic Analysis Data Sheets (Form I LCV) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate?	[ ]	___	___
b. Laboratory Control Samples?	[ ]	___	___
c. Blanks?	[ ]	___	___

	YES	NO	N/A
8.2 Are the VOA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate?	[ ]	___	___
b. Laboratory Control Samples?	[ ]	___	___
c. Blanks?	[ ]	___	___

ACTION: If any data are missing, take action specified in 3.2 above.

8.3 Are the response factors shown in the Quant Report?	[ ]	___	___
8.4 Is chromatographic performance acceptable with respect to:			
Baseline stability?	[ ]	___	___
Resolution?	[ ]	___	___
Peak shape?	[ ]	___	___
Full-scale graph (attenuation)?	[ ]	___	___
Other: _____	[ ]	___	___

ACTION: Use professional judgement to determine the acceptability of the data.

8.5 Are the lab-generated standard mass spectra of the identified VOA compounds present for each sample?	[ ]	___	___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If lab does not generate their own standard spectra, make note in data assessment - "Contract Problems/Non-Compliance".

	YES	NO	N/A
8.6 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	[ ]	___	___
8.7 Are all ions present in the standard mass spectrum at a relative intensity greater than 25% also present in the sample mass spectrum?	[ ]	___	___
8.8 Do sample and standard relative ion intensities agree within 20%?	[ ]	___	___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in the SOW page VOA D-32, section 21.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

9.0 Tentatively Identified Compounds (TIC)

	YES	NO	N/A
9.1 Are all Tentatively Identified Compound Forms (Form I LCV-TIC) present? Do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier?	[ ]	___	___
9.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate?	[ ]	___	___
b. Blanks?	[ ]	___	___

ACTION: If any TIC data are missing, take action specified in 3.2 above.

YES NO N/A

ACTION: Add "JN" qualifier if missing.

9.3 Are any TCL compounds (from any fraction) listed as TIC compounds (example: 1,2-dimethylbenzene is xylene- a VOA TCL analyte - and should not be reported as a TIC)? ___ [ ] ___

ACTION: Flag with "R" any TCL compound listed as a TIC.

9.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 25% also present in the sample mass spectrum? [ ] ___ ___

9.5 Do TIC and "best match" standard relative ion intensities agree within 20%? [ ] ___ ___

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change its identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is detected in a sample and is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable (R). (i.e. Common Lab Contaminants: CO_2 (M/E 44), Siloxanes (M/E 73) Hexane, Aldol Condensation Products, Solvent Preservatives, and related by products - see Functional Guidelines for more guidance).

10.0 Compound Quantitation and Reported Detection Limits

10.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found? ___ [ ] ___

	YES	NO	N/A
10.2 Are the CRQLs adjusted to reflect sample dilutions?	[ ]	___	___

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors under "Conclusions".

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQL data from the diluted sample analysis). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and its associated value on the original Form I and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including any in the summary package.

11.0 Standards Data (GC/MS)

11.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant. Reports) present for initial and continuing calibration?	[ ]	___	___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

12.0 GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI LCV) present and complete for the volatile fraction at concentrations of 1, 2, 5, 10, and 25 ug/l?	[ ]	___	___

ACTION: If any calibration standard forms are missing, take action specified in 3.2 above.

YES NO N/A

12.2 Are response factors stable for VOA's over the concentration range of the calibration (%Relative Standard Deviation (%RSD) <30.0%)? [ ] ___ ___

ACTION: Circle all outliers in red.

NOTE: Although 12 Low Conc. VOA compounds have a minimum RRF and no maximum %RSD, the technical criteria are the same for all analytes.

ACTION: If %RSD > 30.0%, qualify associated positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non-detects for that analyte R (unusable).

NOTE: Analytes previously qualified "U" for blank contamination are still considered as "hits" when qualifying for initial calibration criteria.

12.3 Are the $\overline{RRF}$s above 0.05? [ ] ___ ___

Action: Circle all outliers in red.

Action: If any $\overline{RRF}$ values are < 0.05, qualify associated non-detects (R) and flag associated positive data as estimated (J).

12.4 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or %RSD? (Check at least 2 values, but if errors are found, check more.) ___ [ ] ___

13.0 GC/MS Continuing Calibration (Form VII LCV)

13.1 Are the Continuing Calibration Forms (Form VII LCV) present and complete for the volatile fraction? [ ] ___ ___

13.2 Has a continuing calibration standard been analyzed for every twelve hours of sample analysis per instrument? [ ] ___ ___

YES NO N/A

ACTION: List below all sample analyses that were not within twelve hours of the previous continuing calibration analysis.

_____

_____

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, call lab for explanation/ resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

13.3 Do any volatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds the ± 30% criteria? ___ [ ] ___

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated "J". When % D is above 90%, reject all non-detects for that analyte (R) as unusable.

13.4 Do any volatile compounds have a RRF <0.05? [ ] ___ ___

ACTION:Circle all outliers in red.

ACTION: If the RRF <0.05, qualify associated non-detects as unusable (R) and associated positive values as estimated "J".

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or %difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more.) ___ [ ] ___

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors under "Conclusions".

YES NO N/A

14.0 Internal Standard (Form VIII LCV)

14.1 Are the internal standard areas (Form VIII LCV) of every sample and blank within the upper and lower limits (±40%) for each continuing calibration? [ ] ___ ___

ACTION: List all the outliers below.

Sample #	Internal Std	Area	Lower Limit	Upper Limit

ACTION: 1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.

2. Non-detects associated with IS area counts > 40% should not be qualified.

3. If IS area is below the lower limit (< 40%), qualify all associated non-detects (U values) "J". If extremely low area counts are reported, (< 20%) or if performance exhibits a major, abrupt drop off, flag all associated non-detects as unusable ("R").

14.2 Are the retention times of the internal standards within 20 seconds of the associated calibration standard? [ ] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 20 seconds.

YES NO N/A

15.0 Field Duplicates

15.1 Were any field duplicates submitted for Low Conc. VOA analysis? [ ] ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

YES NO N/A

PART B: BNA ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? [ ] ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ [ ] ___

ACTION: If samples were not iced upon receipt at the laboratory, flag all positive results "J" and all non-detects "UJ".

2.0 Holding Times

2.1 Have any BNA technical holding times, determined from date of collection to date of extraction, been exceeded? ___ [ ] ___

Continuous liquid-liquid extraction of samples for BNA analysis must be started within seven days of the date of collection. Extracts must be analyzed within 40 days of the date of extraction.

Table of Holding Time Violations

Sample ID	Date Sampled	(See Traffic Report) Date Lab Received	Date Extracted	Date Analyzed
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

YES NO N/A

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded. If analyses were done more than 14 days beyond holding time, either on the first analysis or upon reanalysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

3.0 Surrogate Recovery (Form II LCSV)

3.1 Are the Low Conc. Semivolatile Surrogate Recovery Summaries (Form II LCSV) present? [ ] ___ ___

3.2 Are all the semivolatile samples in each SDG listed on the proper Surrogate Recovery Form(s)? [ ] ___ ___

ACTION: Call lab for explanation/resubmittals. If missing deliverables are unavailable, document effect in data assessments.

3.3 Were outliers marked correctly with an asterisk? [ ] ___ ___

ACTION: Circle all outliers in red.

3.4 Were two or more base-neutral OR acid surrogate recoveries out of specification for any sample or method blank? ___ [ ] ___

If yes, were samples reanalyzed? [ ] ___ ___

Were method blanks reanalyzed? [ ] ___ ___

YES NO N/A

ACTION: If all BNA surrogate recoveries are >10% but two within the base-neutral or acid fraction do not meet SOW specifications <u>for the affected fraction only (i.e. base-neutral or acid compounds)</u>:

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral <u>or</u> acid surrogate has a recovery of <10%:

1. Positive results for the fraction with <10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R) .

Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ [ ] ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

4.0 <u>Laboratory Control Sample (Form III LCSV)</u>

4.1 Is the Semivolatile Laboratory Control Sample (LCS) Recovery Form (Form III LCSV) present? [ ] ___ ___

YES NO N/A

4.2 Was the LCS analyzed at the required frequency (once per SDG, or every 20 samples)? [ ] ___ ___

ACTION: If any LCS data are missing, take the action specified in 3.2 above.

4.3 How many Low Conc. Semivolatile LCS recoveries are outside QC limits?

Low Conc. Water

_____ out of 15

ACTION: If the LCS recovery is greater than the QC-limit, provided on Form III LCSV (140%), positive results should be flagged "J" for the affected compound(s).

If the mass spectral criteria are met but the LCS recovery is less than 60%, then the associated detected target compounds should be flagged "J". Associated non-detected target compounds should be flagged "R".

If 25 % of the analyte recoveries are below QC-limits qualify all associated positive sample data as "J" and non-detects "R".

If two or more analytes show recoveries of < 10% all associated positive sample data as "J" and non-detects "R".

It should be noted for TPO action if a laboratory fails to analyze an LCS with each SDG, or if a laboratory consistently fails to generate acceptable LCS recoveries.

5.0 Blanks (Form IV LCSV)

5.1 Is the Method Blank Summary Form (Form IV LCSV) present? [ ] ___ ___

YES NO N/A

5.2 Frequency of Analysis:

For the analysis of Low Conc. Semivolatile TCL compounds, has a method blank been reported per 20 samples and for each extraction batch? [ ] ___ ___

5.3 Has a Low Conc. Semivolatile method blank been analyzed for each GC/MS system used? (See SOW page SV D-34, section 26.2.2) [ ] ___ ___

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If method blank data are not available, reject (R) all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for BNAs? [ ] ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

Note: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method blanks have positive results (TCL and/or TIC) for Low Conc. semivolatiles? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor. ___ [ ] ___

YES NO N/A

6.2 Do any field/rinse blanks have positive Low Conc. Semivolatile results (TCL and/or TIC)? ___ [ ] ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

Note: All field blank results associated with a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, spectral, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

Sample conc > CRQL but < 10x blank	Sample conc <CRQL & is < 10x blank value	Sample conc > CRQL value & > 10x blank
Common Phthalate Esters		
Flag sample result with a "U";	Report CRQL & qualify "U"	No qualification is needed
Sample conc > CRQL but < 5x blank	Sample conc < CRQL & is < 5x blank value	Sample conc > CRQL value & >5 blank value
Other Contaminants		
Flag sample result with a "U";	Report CRQL & qualify "U"	No qualification is needed

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

YES NO N/A

ACTION: For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R" (unusable).

6.3 Are there field/rinse/equipment blanks associated with every sample? [ ] ___ ___

ACTION: Note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

7.0 GC/MS Instrument Performance Check (Form V LCSV)

7.1 Are the GC/MS Instrument Performance Check Forms (Form V LCSV) present for Decafluorotriphenylphosphine (DFTPP)? [ ] ___ ___

7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? [ ] ___ ___

7.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument? [ ] ___ ___

ACTION: List date, time, instrument ID and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS
_____	_____	_____	_____
_____	_____	_____	_____

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

	YES	NO	N/A
7.4 Have the ion abundances been normalized to m/z 198?	[ ]	___	___

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

7.5 Have the ion abundance criteria been met for each instrument used?	[ ]	___	___

ACTION: If ion abundance criteria are not met, the Region II TPO must be notified.

7.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.)	___	[ ]	___
7.7 Have the appropriate number of significant figures (two) been reported?	[ ]	___	___

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

7.8 Is the spectrum of the mass calibration compound acceptable?	[ ]	___	___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

8.0 Target Compound List (TCL) Analytes (Form I LCSV)

8.1 Are the Organic Analysis Data Sheets (Form I LCSV-1,2) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate?	[ ]	___	___
b. Laboratory Control Sample(s)?	[ ]	___	___
c. Blanks?	[ ]	___	___

	YES	NO	N/A
8.2 Are the Low Conc. Semivolatile Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate?	[ ]	___	___
b. Laboratory Control Sample(s)?	[ ]	___	___
c. Blanks	[ ]	___	___

ACTION: If any data are missing, take action specified in 3.2 above.

8.3 Are the response factors shown in the Quant Report?	[ ]	___	___
8.4 Is chromatographic performance acceptable with respect to:			
Baseline stability?	[ ]	___	___
Resolution?	[ ]	___	___
Peak shape?	[ ]	___	___
Full-scale graph (attenuation)?	[ ]	___	___
Other:_____	[ ]	___	___

ACTION: Use professional judgement to determine the acceptability of the data.

8.5 Are the lab-generated standard mass spectra of identified Low Conc. Semivolatile compounds present for each sample?	[ ]	___	___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If lab does not generate their own standard spectra, make note in "Contract Problems/ Non-Compliance". If spectra are missing, reject all positive data.

	YES	NO	N/A
8.6 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	[ ]	___	___
8.7 Are all ions present in the standard mass spectrum at a relative intensity greater than 25% also present in the sample mass spectrum?	[ ]	___	___
8.8 Do sample and standard relative ion intensities agree within 20%?	[ ]	___	___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in SOW page SV D-27, section 20.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

9.0 Tentatively Identified Compounds (TIC)

	YES	NO	N/A
9.1 Are all Tentatively Identified Compound Forms (Form I, Part B) present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier?	[ ]	___	___
9.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate?	[ ]	___	___
b. Blanks?	[ ]	___	___

YES NO N/A

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier if missing.

9.3 Are any TCL compounds (from any fraction) listed as TIC compounds (example: 1,2-dimethylbenzene is xylene a VOA TCL and should not be reported as a TIC)? ___ [ ] ___

ACTION: Flag with "R" any TCL compound listed as a TIC.

9.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 25% also present in the sample mass spectrum? [ ] ___ ___

9.5 Do TIC and "best match" standard relative ion intensities agree within 20%? [ ] ___ ___

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate.

Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable (R).

10.0 Compound Quantitation and Reported Detection Limits

10.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found? ___ [ ] ___

YES NO N/A

10.2 Are the CRQLs adjusted to reflect sample dilutions? [ ] ___ ___

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQL data from the diluted sample analysis). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

11.0 Standards Data (GC/MS)

11.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? [ ] ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

12.0 GC/MS Initial Calibration (Form VI LCSV)

12.1 Are the Initial Calibration Forms (Form VI LCSV-1,2) present and complete for the Low Conc. Semivolatile fraction at concentrations of 5, 10, 20, 50 and 80 ug/l? [ ] ___ ___

ACTION: If any calibration standard forms are missing, take action specified in 3.2 above.

YES NO N/A

12.2 Are response factors stable for semivolatiles over the concentration range of the calibration (% Relative standard deviation (%RSD) < 30.0%)? [ ] ___ ___

ACTION: Circle all outliers in red.

NOTE: Although 22 Low Conc. Semivolatile compounds have a minimum RRF and no maximum %RSD, the technical criteria are the same for all analytes.

ACTION: If the % RSD is > 30.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non-detect results for that analyte R (unusable).

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

12.3 Are all Semivolatile compound $\overline{RRF}$s > 0.05? [ ] ___ ___

ACTION: Circle all outliers in red.

ACTION: If any $\overline{RRF}$ < 0.05:

1. "R" all non-detects.

2. "J" all positive results.

12.4 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ [ ] ___

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

YES NO N/A

13.0 GC/MS Continuing Calibration (Form VII LCSV)

13.1 Are the Continuing Calibration Forms (Form VII LCSV-1,2) present and complete for the semivolatile fraction? [ ] ___ ___

13.2 Has a continuing calibration standard been analyzed for every twelve hours of sample analysis per instrument? [ ] ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a continuing calibration analysis for each instrument used.

_____

_____

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, call lab for explanation/ resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

13.3 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds the ± 25.0% criteria? ___ [ ] ___

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is > 90%, reject all non-detects for that analyte (R) unusable.

13.4 Do any semivolatile compounds have a RRF <0.05? ___ [ ] ___

ACTION: Circle all outliers in red.

YES NO N/A

ACTION: If RRF <0.05, qualify as unusable (R) associated non-detects and "J" associated positive values.

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more). ___ [ ] ___

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document the effect in data assessments.

14.0 Internal Standards (Form VIII LCSV)

14.1 Are the Internal Standard Area and RT Summary Forms (Form VIII LCSV-1,2) present and complete for the semivolatile fraction? [ ] ___ ___

14.2 Are the internal standard areas for every sample and blank within the upper and lower limits (-50% to +100%) for each continuing calibration? [ ] ___ ___

ACTION: List all the outliers below.

Sample #	Internal Std	Area	Lower Limit	Upper Limit

ACTION: 1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

2. Non-detects associated with IS areas > 100% should not be qualified.

YES NO N/A

3. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

14.3 Are the retention times of the internal standards within 20 seconds of the associated calibration standard? [ ] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 20 seconds.

15.0 Field Duplicates

15.1 Were any field duplicates submitted for Low Conc. Semivolatile analysis? [ ] ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

YES NO N/A

PART C: PESTICIDE/AROCLOR ANALYSIS

1.0 Traffic Reports and Laboratory Narrative

1.1 Are Traffic Report Forms present for all samples? [ ] ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or SDG Narrative indicate any problems with sample receipt, condition of the samples, analytical problems or special circumstances affecting the quality of the data? ___ [ ] ___

ACTION: If samples were not iced upon receipt at the laboratory, flag all positive results "J" and all non-detects "UJ".

1.3 Were the sample pHs measured and recorded ? If the sample had to be neutralized, then the initial and final pH must be noted in SDG narrative (Pest-D29, LCW SOW).

ACTION: Check extraction log for pH, if adjustment was needed, it should be noted in narrative. If information is not available, ask lab for information\resubmittals.

2.0 Holding Times

2.1 Have any PEST/PCB technical holding times, determined from date of collection to date of extraction, been exceeded? ___ [ ] ___

Continuous liquid-liquid extraction of samples for Pesticide/Aroclor analysis must be started within 7 days of collection.
Extracts must be analyzed within 40 days of extraction.

YES NO N/A

ACTION: If technical holding times are exceeded, flag all positive results as estimated (J) and sample quantitation limits (UJ) and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re-analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all the data should at least be qualified "J", but the reviewer may determine that non-detects are unusable (R).

3.0 Surrogate Recovery (Form II LCP)

3.1 Are the Pest/Aroclor Surrogate Recovery Summaries (Form II LCP) present? [ ] ___ ___

ACTION: Call lab for explanation/resubmittals. If missing deliverables are unavailable, document effect in data assessments.

3.2 Were outliers marked correctly with an asterisk? [ ] ___ ___

ACTION: Circle all outliers in red.

3.3 Were surrogate recoveries of TCX or DCB outside of the contract specification for any sample or blank? (60-150%)? ___ [ ] ___

ACTION: No qualification is done if surrogates are diluted out. If recovery for both surrogates is below the contract limit, but above 10%, flag all results for that sample 'J". If recovery is < 10% for either surrogate, qualify positive results 'J" and flag non-detects "R". If recovery is above the contract advisory limits for both surrogates qualify positive values "J".

	YES	NO	N/A
3.4 Were surrogate retention times (RT) within the windows established during the initial 3-point analysis of Individual Standard Mixture A?	[ ]	___	___

ACTION: If the RT limits are not met, the analysis may be qualified unusable (R) for that sample on the basis of professional judgement.

3.5 Are there any transcription/calculation errors between raw data and Form II?	___	[ ]	___

ACTION: If large errors exist, call lab for explanation/resubmittal. Make any necessary corrections and document effect in data assessments.

4.0 Laboratory Control Sample (LCS)

4.1 Is the Laboratory Control Sample (LCS) Recovery Form (Form III) present?	[ ]	___	___
4.2 Was the LCS analyzed at the required frequency (once per SDG, or every 20 samples) for the Low Conc. Pest/Aroclor method?	[ ]	___	___

ACTION: If any LCS data are missing, take the action specified in 3.1 above.

4.3 How many PEST spike recoveries are outside QC limits?

Water

_____ out of 14 Total

ACTION: Check calculations, surrogates, LCS solutions and instrument performance.
ACTION: If the LCS recovery is greater than the QC-limit, provided on Form III LCP (140%), positive results should be flagged "J" for the affected compound.

YES NO N/A

ACTION: If LCS recovery is less than 60%, then the associated detected target compounds should be flagged "J". Associated non-detected target compounds should be flagged "R".

ACTION: If 25 % of the analyte recoveries are below QC-limits qualify all associated positive sample data as "J" and non-detects "R".

ACTION: If two or more analytes show recoveries of < 10% all associated positive sample data as "J" and non-detects "R".

It should be noted for TPO action if a laboratory fails to analyze an LCS with each SDG, or if a laboratory consistently fails to generate acceptable LCS recoveries. The affected samples are those prepared and analyzed in SDG that correspond to LCS.

5.0 Blanks (Form IV LCP)

5.1 Is the Method Blank Summary (Form IV LCP) present? [ ] ___ ___

5.2 Frequency of Analysis: For the analysis of Pesticide/Aroclor TCL compounds, has a method blank been analyzed concurrently for each SDG or every 20 samples or each extraction batch, whichever is more frequent? [ ] ___ ___

ACTION: If any blank data are missing, take the action specified above in 3.1. If blank data is not available, reject (R) all associated positive data.

However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

YES NO N/A

5.3 A separate blank and Form IV should be present if sulfur clean-up was not performed on all of the samples in an extraction batch. Therefore some samples will be listed on two blank summary forms, once under method blank and once under sulfur clean-up blank (PCBLK). Is this additional blank and Form IV present? [ ] ___ ___

ACTION: If sulfur blank data and Form IV are missing, take the action specified in 3.1 above.

5.4 Has a Pest/Aroclor instrument blank been analyzed at the beginning of every 12 hr. period following the initial calibration sequence (minimum contract requirement)? [ ] ___ ___

ACTION: If any blank data are missing, call lab for explanation/resubmittals. If missing deliverables are unavailable, document the effect in data assessments.

5.5 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for Pest/Aroclors? [ ] ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "distilled water blanks" and "drilling water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/cleanup blanks have positive results for Pest/Aroclors? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor. ___ [ ] ___

YES NO N/A

6.2 Do any field/rinse blanks have positive Pest/Aroclor results? ___ [ ] ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks.

Sample conc > CRQL but < 5x blank	Sample conc < CRQL & is < 5x blank value	Sample conc > CRQL & > 5x blank value
Flag sample result with a "U";	Report CRQL & qualify "U"	No qualification is needed

NOTE: If gross blank contamination exists, all data in the associated samples should be qualified as unusable (R).

6.3 Are there field/rinse/equipment blanks associated with every sample? [ ] ___ ___

ACTION: Note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

	YES	NO	N/A
7.0 Calibration and GC Performance			
7.1 Are the following gas chromatograms and data systems printouts for both columns present for all samples, blanks?			
a. peak resolution check	[ ]	___	___
b. performance evaluation mixtures	[ ]	___	___
c. aroclor 1016/1260	[ ]	___	___
d. aroclors 1221, 1232, 1242, 1248, 1254	[ ]	___	___
e. toxaphene	[ ]	___	___
f. low points individual mixtures A & B	[ ]	___	___
g. med points individual mixtures A & B	[ ]	___	___
h. high points individual mixtures A & B	[ ]	___	___
i. instrument blanks	[ ]	___	___
ACTION: If no, take action specified in 3.1 above.			
7.2 Are Forms VI LCP-1 - 3 present and complete for each column and each analytical sequence?	[ ]	___	___
ACTION: If no, take action specified in 3.1 above.			
7.3 Are there any transcription/calculation errors between raw data and Forms VI?	___	[ ]	___
ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.			
7.4 Do all standard retention times, including each pesticide in each level of Individual Mixtures A & B, fall within the windows established during the initial calibration analytical sequence? (For Initial Calibration Standards, (Form VI LCP-1 - 3).)	[ ]	___	___

YES NO N/A

ACTION: If no, all samples in the entire analytical sequence are potentially affected. Check to see if the chromatograms contain peaks within an expanded window surrounding the expected retention times. If no peaks are found and the surrogates are visible, non-detects are valid. If peaks are present and cannot be identified through pattern recognition or using a revised RT window, qualify all positive results and non-detects as unusable (R).

For Aroclors, RT may be outside the RT window, but the Aroclor may still be identified from the individual pattern.

7.5 Are the linearity criteria for the initial analyses of Individual Standards A & B within limits for both columns? (% RSD must be < 20.0% for all analytes except for the 2 surrogates, which must not exceed 30.0 % RSD). See Form VI LCP-2. [ ] ___ ___

ACTION: If no, qualify all associated positive results generated during the entire analytical sequence "J" and all non-detects "UJ". When RSD >90%, flag all non-detect results for that analyte unusable (R).

7.6 Is the resolution between any two adjacent peaks in the Resolution Check Mixture > 60.0% for both columns? (Form VI LCP-4) [ ] ___ ___

ACTION: If no, positive results for compounds that were not adequately resolved should be qualified "J". Use professional judgement to determine if non-detects which elute in areas affected by co-eluting peaks should be qualified "N" as presumptive evidence of presence or unusable (R).

7.7 Is Form VII LCP-4 filled out correctly? Elution order of compounds is different on each column. Was the percent resolution calculated correctly? [ ] ___ ___

	YES	NO	N/A
7.8 Is Form VII - LCP-1 present and complete for each Performance Evaluation Mixture analyzed during the analytical sequence for both columns?	[ ]	___	___

ACTION: If no, take action as specified in 3.1 above.

7.9 Has the individual % breakdown exceeded 20.0% on either column:	___	[ ]	___
for 4,4' - DDT?	___	[ ]	___
for Endrin?	___	[ ]	___
Has the combined % breakdown for 4,4'- DDT/ Endrin exceeded 30.0% on either column (required in all instances)	___	[ ]	___

ACTION: 1. If any % breakdown has failed the QC criteria in either PEM in steps 2 and 17 in the initial calibration sequence (p. D-25/Pest SOW LCW, 10.55) qualify all sample analyses in the entire analytical sequence as described below.

2. If any % breakdown has failed the QC criteria in a PEM Verification calibration, review data beginning with the samples which followed the last <u>in-control</u> standard until the next acceptable PEM & qualify the data as described below.

a. 4,4'-DDT Breakdown: If 4,4'-DDT breakdown is greater than 20.%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE are positive, then qualify the quantitation limit for DDT as unusable (R).

ii. Qualify positive results for DDD and/or DDE as presumptively present at an approximated quantity (NJ).

YES NO N/A

b. Endrin Breakdown: If Endrin breakdown is greater than 20.0%:

i. Qualify all positive results for Endrin with "J". If Endrin was not detected, but Endrin aldehyde and Endrin ketone are positive, then qualify the quantitation limit for Endrin as unusable (R).

ii. Qualify positive results for Endrin ketone and Endrin aldehyde as presumptively present at an approximated quantity (NJ).

c. Combined Breakdown: If the combined 4,4'-DDT and Endrin breakdown is greater than 30.0%:

i. Qualify all positive results for DDT and Endrin with "J". If Endrin was not detected, but Endrin aldehyde and Endrin ketone are positive, then qualify the quantitation limit for Endrin as unusable (R). If DDT was not detected, but DDD and DDE are positive, the qualify the quantitation limit for DDT as unusable (R).

ii. Qualify positive results for Endrin ketone and Endrin aldehyde as presumptively present at an approximated quantity (NJ). Qualify positive results for DDD and/or DDE as presumptively present at an approximated quantity ("NJ").

7.10 Are the relative percent difference (RPD) values for all PEM analytes < 25.0% (Form VII LCP-1)? [ ] ___ ___

ACTION: If no, qualify all associated positive results generated during the analytical sequence "J" and sample quantitation limits "UJ".

YES NO N/A

NOTE: If the failing PEM is part of the initial calibration, all samples are potentially affected. If the offending standard is a verification calibration, the associated samples are those which followed the last in-control standard until the next passing standard.

7.11 Have all samples been injected within a 12 hr period beginning with the injection of an Instrument Blank? [ ] ___ ___

ACTION: If no, use professional judgement to determine the severity to the effect on data reliability.

7.12 Is Form VII LCP-2 present and complete for each INDA and INDB Verification Calibration analyzed? [ ] ___ ___

ACTION: If no, take action specified in 3.1 above.

7.13 Are there any transcription/calculation errors between raw data and Form VII LCP-2? ___ [ ] ___

ACTION: If large errors exists, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments under "Conclusions".

7.14 Do all standard retention times for each INDA and INDB Verification Calibration fall within the windows established by the initial calibration sequence? [ ] ___ ___

ACTION: If no, beginning with the samples which followed the last in-control standard, check to see if the chromatograms contain peaks within an expanded window surrounding the expected retention times. If no peaks are found and the surrogates are visible, non-detects are valid. If peaks are present and cannot be identified through pattern recognition or using a revised RT window, qualify all positive results and non-detects as unusable (R).

7.15 Are RPD values for all verification calibration standard compounds < 25.0%? [ ] ___ ___

YES NO N/A

ACTION: If the RPD is >25.0% for the compound being quantitated, qualify all associated positive results "J" and non-detects "UJ". The "associated samples" are those which followed the last in-control standard up to the next passing standard containing the analyte which failed the criteria. If the RPD is >90%, flag all non-detects for that analyte R (unusable).

8.0 Analytical Sequence Check (Form VIII LCP)

8.1 Is Form VIII LCP present and complete for each column and each period of analyses? [ ] ___ ___

ACTION: If no, take action specified in 3.1 above.

8.2 Was the proper analytical sequence followed for each initial calibration and subsequent analyses (see LCW SOW Pest pg. D-16 & D-24)? [ ] ___ ___

ACTION: If no, use professional judgement to determine the severity of the effect on the data and qualify it accordingly. Generally, the effect is negligible unless the sequence was grossly altered or the calibration was also out of limits.

8.3 Was a multi-component standard (Toxaphene or Aroclors) analyzed within 72 hours of a detected hit in a sample? [ ] ___ ___

This standard is for identification only. Quantitation for the Aroclors and Toxaphene is from the initial calibration.

ACTION: Take action specified in 8.2 above.

YES NO N/A

9.0 Cleanup Efficiency Verification (Form IX LCP)

9.1 Is Form IX LCP present and complete for each lot of Florisil Cartridges used? (Florisil Cleanup is required for all Pest/Aroclor extracts.) [ ] ___ ___

ACTION: If no, take action specified in 3.1 above. If data suggests that florisil cleanup was not performed, make note in "Contract Problems/Non-Compliance".

9.2 Are all samples listed on the Pesticide Florisil Cartridge Check Form? [ ] ___ ___

ACTION: If no, take action specified in 3.2 above.

9.3 Are percent recoveries (% REC) of the pesticide and surrogate compounds used to check the efficiency of the cleanup procedures within QC limits ?

80-120% for florisil cartridge check? [ ] ___ ___

ACTION: If %REC of one or two TCL compounds is below < 80%, qualify positive results "J" and quantitation limits "UJ" for these compounds.

If more than two compounds are below 80% recovery qualify all associated data, positive and negative with a "J".

If two or more have recovery of less than 10% all positive data should be qualified "J" and non-detects should be qualified "R". Use professional judgement to qualify positive results if recoveries are greater than the upper limit.

NOTE: Sample data should be evaluated for potential interferences if recovery of 2,4,5-trichlorophenol was > 5% in the Florisil Cartridge Performance Check analysis. Make note in Contract Problems/Non-Compliance section of reviewer narrative.

YES NO N/A

10.0 Pesticide/Aroclor Identification

10.1 Is Form X complete for every sample in which a pesticide or PCB was detected? [ ] ___ ___

ACTION: If no, take action specified in 3.1 above.

10.2 Are there any transcription/calculation errors between raw data and Forms 6D, 6E, 6F, 6G, 7D, 7E, 8D, 9A, 10A, 10B? ___ [ ] ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and note error under "Conclusions".

10.3 Are retention times (RT) of sample compounds within the established RT windows for both analyses? [ ] ___ ___

ACTION: Use professional judgement to qualify positive results. Qualify as unusable (R) all positive results which were not confirmed by second GC column analysis. Also qualify as unusable (R) all positive results not meeting RT window unless associated standard compounds are similarly biased (see Functional Guidelines). The reviewer should use professional judgement to assign an appropriate quantitation limit.

10.4 Is the percent difference (% D) calculated for the positive sample results on the two GC columns < 25.0%? [ ] ___ ___

If %D is >25%, lab must flag reported results with the qualifier P.

ACTION: If the reviewer finds neither column shows interference for the positive hits, the data should be flagged as follows:

% Difference	Qualifier
25-50 %	J
50-90 %	JN
> 90 %	R

YES NO N/A

NOTE: The lower of the two values is reported on Form I. If using professional judgement, the reviewer determines that the higher result was more acceptable, the reviewer should replace the value and indicate the reason for the change in the data assessment.

10.5 Check chromatograms for false negatives, especially the multiple peak compounds toxaphene and PCBs. Were there any false negatives? ___ [ ] ___

ACTION: Use professional judgement to decide if the compound should be reported. If the appropriate PCB standards were not analyzed, qualify the data unusable (R).

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are the Organic Analysis Data Sheets (Form 1 Pest) present with required header information for each of the following:

a. samples? [ ] ___ ___

b. Method Blanks? [ ] ___ ___

c. Instrument Blanks? [ ] ___ ___

11.2 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Were any errors found? ___ [ ] ___

NOTE: Single-peak pesticide results can be checked for rough agreement between quantitative results obtained on the two GC columns. The reviewer should use professional judgement to decide whether a much larger concentration obtained on one column versus the other indicates the presence of an interfering compound.

YES NO N/A

If an interfering compound is indicated, the lower of the two values should be reported and qualified as presumptively present at an approximated quantity (NJ). This necessitates a determination of an estimated concentration on the confirmation column. The narrative should indicate that the presence of interferences has interfered with the evaluation of the second column confirmation.

11.3 Are the CRQLs adjusted to reflect sample dilutions? [ ] ___ ___

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQL data from the diluted sample analysis). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" value on the original Form I and substituting it with data from the analysis of diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including any in the summary package.

ACTION: Quantitation limits affected by large, off-scale peaks should be qualified as unusable (R). If the interference is on-scale, the reviewer can provide an approximated quantitation limit (UJ) for each affected compound.

	YES	NO	N/A
12.0 Chromatogram Quality			
12.1 Were baselines stable?	[ ]	___	___
12.2 Were any electropositive displacement (negative peaks) or unusual peaks seen?	___	[ ]	___

NOTE: Pesticide and Aroclor peaks, for standard and sample chromatograms must be visible (>10% of full scale) and well defined. If not the lab must be asked to resubmit expanded chromatograms. However the surrogate peaks should be always within the 100% range.

ACTION: Address comments under "System Performance" of data assessment

13.0 Field Duplicates			
13.1 Were any field duplicates submitted for Pest/Aroclor analysis?	[ ]	___	___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

Data Review Worksheets
Evaluation of Metals Data for the CLP Program
USEPA Region 2 SOP HW-2, Revision 11, January 1992
(Applicable to CLP Inorganic Analysis)

Evaluation of Metals Data for the Contract Laboratory Program (CLP)

based on

JUL - 6 1998

SOW. 3/90

(SOP Revision XI)

PREPARED BY: Hanif Sheikh DATE: 1-30-92
Hanif Sheikh, Quality Assurance Chemist
Toxic and Hazardous Waste Section

APPROVED BY: Kevin W. Kubik DATE: 1-30-92
Kevin Kubik, Chief
Toxic and Hazardous Waste Section

APPROVED BY: Robert Runyon DATE: 1/30/92
Robert Runyon, Chief
Monitoring Management Branch

Title: Evaluation of Metals Data for the Contract Laboratory Program

Date: Jan. 1992
Number: HW-2
Revision: 11

1.0 **Scope**

1.1 This procedure is applicable to inorganic data obtained from contractor laboratories working for Hazardous Waste Site Contract Laboratory Program (CLP).

1.2 The data validation is based upon analytical and quality assurance requirements specified in Statement of Work (SOW) 3/90 .

2.0 **Responsibilities** - Data reviewers will complete the following tasks as assigned by the Data Review Coordinator:

2.1. For a **total review**:

2.1.1 **Data Assessment** - **"Total Review-Inorganics" Checklist Appendix (A.1).**
The reviewer must answer every question on the checklist.

2.1.2 **Data Assessment** - **Data Assessment Narrative (Appendix A.2)**
The answer on the checklist must match the action in the narrative (appendix A.2) and on Form I's. Do not use pencil to write the narrative.

2.1.3 **Contract Non-Compliance** - **SMO Report (Appendix A.3)**
This report is to be completed only when a serious contract violation is encountered, or upon the request of the Data Validation Task Monitor, or Technical Project Officer (TPO). Forward 5 copies: one each for internal files, appropriate Regional TPO, Sample Management Office (SMO) and last two addresses of Mailing List for Data Reviewers (Appendix A.4). In other cases, all contract violations should be appended to the end of the Data Assessment Narrative (Sec. A.2.2).

2.1.4 **CLP Data Assessment Summary Forms**

2.1.4.1 Appendix A.5
Fill in the total number of analytes analyzed by different analyses and the number of analytes rejected or flagged as estimated due to corresponding quality control criteria. Place an "X" in boxes where analyses were not performed, or criteria do not apply.

2.1.4.2 Appendix A.6
Data reviewer is also required to fill out Inorganic Regional Data Assessment form (Appendix A.7) provided by EPA Headquarters. Codes listed on the form will be used to describe the Data Assessment Summary.

2.1.5 Data Review Log: It is recommended that each data reviewer should maintain a log of the reviews completed to include: a. date of start of case review

b. date of completion of case review
c. site
d. case number
e. contract laboratory
f. number of samples
g. matrix
h. hours worked
i. reviewer's initials

2.1.6 Telephone Record Log - the data reviewer should enter the bare facts of inquiry, before initiating any phone conversation with CLP laboratory. After the case review has been completed, mail white copy of Telephone Record Log to the laboratory and pink copy to SMO. File yellow copy in the Telephone Record Log folder, and attach a xerox copy of the Telephone Record Log to the completed Data Assessment Narrative (Appendix A.2).

2.1.7 Forwarded Paperwork

2.1.7.1 Upon completion of review, the following are to be forwarded to the Regional Sample Control Center (RSCC) located in the Surveillance and Monitoring Branch:
a. data package
b. completed data assessment checklist (Appendix A.1,original)
c. SMO Contract Compliance Screening (CCS)
d. Record of Communication (copy)
e. CLP Reanalysis Request/Approval Record (original + 3 copies)
f. Appendix A.6 (original).

2.1.7.2 Forward 2 copies of completed Data Assessment Narrative (Appendix A.2) along with 2 copies of the Inorganic Data Assessment Form (Appendix A.6) and Telephone Record Log , if any,: one each for appropriate Regional TPO, and the other one to EPA EMSL office in Las Vegas. The addresses of TPOs and EPA office in Las Vegas are given in Appendix A-4.

2.1.8 Filed Paperwork - Upon completion of review, the following are to be filed within MMB files:
a. Two copies of completed Data Assessment Narrative (Appendix A.2) each carrying Appendix A.6.
b. Telephone Record Log (copy)
c. SMO Report (copy Appendix A-3)
d. CLP Reanalysis Request/Approval Record (copy)

3.0 **Data Completeness**
Each data package is checked by a Regional Sample Control Coordinator (RSSC) for completeness. A data package is assumed to be complete when all the deliverables required under the contract are present. If a data package is incomplete,the RSSC would call the laboratory for missing document(s). If the laboratory does not respond within a week, SMO and MMB coordinator of Region II will be notified.

4.0 **Rejection of Data** - All values determined to be unacceptable on the Inorganic Analysis Data Sheet (Form I) must be lined over with a red pencil. As soon as any review criteria causes data to be rejected, that data can be eliminated from any further review or consideration.

5.0 **Acceptance Criteria** - In order that reviews be consistent among reviewers, acceptance criteria as stated in Appendix A.1 (pages 4-25) should be used. Additional guidance can be found in the National Inorganic Functional Guidelines of October 1, 1989.

6.0 **SMO Contract Compliance Screening (CCS)** - This is intended to aid reviewer in locating any problems, both corrected and uncorrected. However, the validation should be carried out even if CCS is not present. Resubmittals received from laboratory in response to CCS must be used by the reviewer.

7.0 **Request for Reanalysis** - Data reviewers must note all items of contract non-compliance within Data Assessment Narrative.If holding times and sample storage times have not been exceeded, TPO may request reanalysis if items of non-compliance are critical to data assessment. Requests are to be made on "CLP Re-Analysis Request/Approval Record".

8.0 **Record of Communication** - Provided by the Regional Sample Control Center (RSCC) to indicate which data packages have been received and are ready to be reviewed.

9.0 **Rounding off numbers** - The data reviewer will follow the standard practice.

	YES	NO	N/A
A.1.1 Contract Compliance Screening Report (CCS) - Present?	[___]	___	___
ACTION: If no, contact RSCC.			
A.1.2 Record of Communication (from RSCC) - Present?	[___]	___	___
ACTION: If no, request from RSCC.			
A.1.3 Trip Report - Present and complete?	[___]	___	___
ACTION: If no, contact RSCC for trip report.			
A.1.4 Sample Traffic Report - Present?	[___]	___	___
Legible?	[___]	___	___
ACTION: If no, request from Regional Sample Control Center (RSCC).			
A.1.5 Cover Page - Present?	[___]	___	___
Is cover page properly filled in and signed by the lab manager or the manager's designee?	[___]	___	___
ACTION: If no, prepare Telephone Record Log, and contact laboratory.			
Do numbers of samples correspond to numbers on Record of Communication?	[___]	___	___
Do sample numbers on cover page agree with sample numbers on:			
(a) Traffic Report Sheet?	[___]	___	___
(b) Form I's?	[___]	___	___
ACTION: If no for any of the above, contact RSCC for clarification.			

A.1.6	Form I to IX	Yes	No	N/A
A.1.6.1	Are all the Form I through Form IX labeled with:			
	Laboratory name?	[___]	___	___
	Case/SAS number?	[___]	___	___
	EPA sample No.?	[___]	___	___
	SDG No.?	[___]	___	___
	Contract No.?	[___]	___	___
	Correct units?	[___]	___	___
	Matrix?	[___]	___	___

ACTION: If no for any of the above, note under Contract Problem/Non-Compliance section of the "Data Assessment Narrative".

A.1.6.2	Do any computation/transcription errors exceed 10% of reported values on Forms I-IX for:			
	(NOTE: Check all forms against raw data.)			
	(a) all analytes analyzed by ICP?	[___]	___	___
	(b) all analytes analyzed by GFAA?	[___]	___	___
	(c) all analytes analyzed by AA Flame?	[___]	___	___
	(d) Mercury?	[___]	___	___
	(e) Cyanide?	[___]	___	___

ACTION: If yes, prepare Telephone Log, contact laboratory for corrected data and correct errors with red pencil and initial.

Title: Evaluation of Metals Data for the Contract Laboratory Program
Appendix A.1: Data Assessment - Contract Compliance (Total Review)

Date: Jan. 1992
Number: HW-2
Revision: 11

		YES	NO	N/A
A.1.7	**Raw Data**			
A.1.7.1	Digestion Log* for flame AA/ICP (Form XIII) present?	[___]	___	___
	Digestion Log for furnace AA Form XIII present?	[___]	___	___
	Distillation Log for mercury Form XIII present?	[___]	___	___
	Distillation Log for cyanides Form XIII present?	[___]	___	___
	Are pH values (pH<2 for all metals, pH>12 for cyanide) present?	[___]	___	___
	*Weights, dilutions and volumes used to obtain values.			
	Percent solids calculation present for soils/sediments?	[___]	___	___
	Are preparation dates present on sample preparation logs/bench sheets?	[___]	___	___
A.1.7.2	Measurement read out record present? ICP	[___]	___	___
	Flame AA	[___]	___	___
	Furnace AA	[___]	___	___
	Mercury	[___]	___	___
	Cyanides	[___]	___	___
A.1.7.3	Are all raw data to support all sample analyses and QC operations present?	[___]	___	___
	Legible?	[___]	___	___
	Properly Labeled?	[___]	___	___

ACTION: If no for any of the above questions in sections A.1.7.1 through A.1.7.3, write Telephone Record Log and contact laboratory for resubmittals.

		YES	NO	N/A
A.1.8	**Holding Times** - (aqueous and soil samples)			
	(Examine sample traffic reports and digestion/distillation logs.)			
	Mercury analysis (28 days). . . . . exceeded?	___	[___]	___
	Cyanide distillation (14 days). . . . . exceeded?	___	[___]	___
	Other Metals analysis (6 months). . . . exceeded?	___	[___]	___
	NOTE: Prepare a list of all samples and analytes for which holding times have been exceeded. Specify the number of days from date of collection to the date of preparation (from raw data). Attach to checklist.			
	ACTION: If yes, reject (red-line) values less than Instrument Detection Limit (IDL) and flag as estimated (J) the values above IDL even though sample(s) was preserved properly.			
A.1.8.2	Is pH of aqueous samples for: Metals Analysis >2?	___	[___]	___
	Cyanides Analysis <12?	___	[___]	___
	Action: If yes, flag the associated metals and cyanides data as estimated.			
A.1.9	**Form I (Final Data)**			
A.1.9.1	Are all Form I's present and complete?	[___]	___	___
	ACTION: If no, prepare telephone record log and contact laboratory for submittal.			
A.1.9.2	Are correct units (ug/l for waters and mg/kg for soils) indicated on Form I's?	[___]	___	___
	Are soil sample results for each parameter corrected for percent solids?	[___]	___	___
	Are all "less than IDL" values properly coded with "U"?	[___]	___	___

		YES	NO	N/A
	Are the correct concentration qualifiers used with final data?	[___]	___	___
	ACTION: If no for any of the above, prepare Telephone Record Log, and contact laboratory for corrected data.			
A.1.9.3	Are EPA sample # s and corresponding laboratory sample ID # s the same as on the Cover Page, Form I's and in the raw data?	[___]	___	___
	Was a brief physical description of samples given on Form I's?	[___]	___	___
	Was the dilution of any sample diluted beyond the requirements of the contract noted on Form I or Form XIV?	___	[___]	___
	ACTION: If no for any of the above, note under Contract-Problem/Non-Compliance of the"Data Assessment Narrative".			
A.1.10	**Calibration**			
A.1.10.1	Is record of at least 2 point calibration present for ICP analysis?	[___]	___	___
	Is record of 5 point calibration present for Hg analysis?	[___]	___	___
	Is record of 4 point calibration present for:			
	Flame AA?	[___]	___	___
	Furnace AA?	[___]	___	___
	Cyanides?	[___]	___	___
	Is one calibration standard at the CRDL level for all AA (except Hg) and cyanides analyses?	[___]	___	___

ACTION: If no for any of the above, write in the Contract Problem/Non-Compliance section of the "Data Assessment Narrative".

		YES	NO	N/A
A.1.10.2	Is correlation coefficient less than 0.995 for:			
	Mercury Analysis?	___	[___]	___
	Cyanide Analysis?	___	[___]	___
	Atomic Absorption Analysis?	___	[___]	___

ACTION: If yes, flag the associated data as estimated.

NOTE: The data validator shall calculate the correlation coefficient using concentrations of the standards and the corresponding instrument response (e.g. absorbance, peak area, peak height, etc.).

A.1.10.3	In the instance where less than 4 standards are measured in absorbance (or peak area, peak height,etc.) mode, are the remaining standards analyzed in concentration mode immediately after calibration within ±10% of the true values?	[___]	___	___

ACTION: If no, flag the associated data as estimated if standards are not within ±10% of true values. Do not flag the data as estimated in linear range indicated by good recovery of standard(s).

A.1.11 **Form II A (Initial and Continuing Calibration Verification)-**

A.1.11.1	Present and complete for every metal and cyanide?	[___]	___	___
	Present and complete for AA and ICP when both are used for the same analyte?	[___]	___	___

ACTION: If no for any of the above, prepare Telephone Record Log and contact laboratory.

A.1.11.2	Circle on each Form IIA all percent recoveries that are outside the contract windows. Are all calibration standards (initial and continuing) within control limits:			
	Metals- 90-110%R?	[___]	___	___
	Hg - 80-120%R?	[___]	___	___
	Cyanides- 85-115%R?	[___]	___	___

	YES	NO	N/A
ACTION: Flag as estimated (J) all positive data (not flagged with a "U") analyzed between a calibration standard with %R between 75-89% (65-79% for Hg; 70-84% for CN) or 111-125% (121-135% for Hg; 116-130% for CN) recovery and nearest good calibration standard. Qualify results <IDL as estimated (UJ) if the ICV or CCV %R is 75-89% (CN, 70-84% ; HG, 65-79%). Reject (red-line) as unacceptable data if recovery of the ICV or CCV is outside the range 75-125% (CN, 70-130%; Hg, 65-135%). Qualify five samples on either side of verification standard out of control limits.			
A.1.11.3 Was continuing calibration performed every 10 samples or every 2 hours?	[___]	___	___
Was ICV for cyanides distilled?	[___]	___	___
ACTION: If no for any of the above, write in the Contract-Problem/Non-Compliance section of the "Data Assessment Narrative".			
A.1.12 <u>Form II B (CRDL Standards for AA and ICP)</u> -			
A.1.12.1 Was a CRDL standard (CRA) analyzed after initial calibration for all AA metals (<u>except Hg</u>)?	[___]	___	___
Was a mid-range calib. verification standard distilled and analyzed for cyanide analysis?	[___]	___	___
Was a 2xCRDL (or 2xIDL when IDL>CRDL) analyzed (CRI) for each ICP run? (Note: CRI for AL,Ba,Ca,Fe,Mg,Na,or K is not required.)	[___]	___	___
ACTION: If no for any of the above, flag as estimated all data falling within the affected ranges. The affected ranges are: AA Analysis - **True Value ± CRDL; ICP Analysis - **True Value ± 2CRDL; CN Analysis - **True Value ± 0.5 x True Value.			

rue value of CRA, CRI or mid-range standard. Substitute IDL for CRDL when IDL > CRDL. Compute the concentration of the missing mid-range standard from the calibration range.

		YES	NO	N/A
A.1.12.2	Was CRI analyzed after ICV/ICB and before the final CCV/CCB, and twice every eight hours of ICP run?	[___]	___	___
	ACTION: If no, write in Contract Problem/Non-Compliance Section of the "Data Assessment Narrative".			
A.1.12.3	Circle on each Form IIB all the percent recoveries that are outside the acceptance windows.			
	Are CRA and CRI standards within control limits:			
	Metals 80 - 120%R?	[___]	___	___
	Is mid-range standard within control limits:			
	Cyanide 80 - 120%R?	[___]	___	___
	ACTION: Flag as estimated all sample results within the affected range if the recovery of the standard is between 50-79%; flag only positive data within the affected range if the recovery is between 121-150%; reject all data within the affected range if the recovery is less than 50%; reject only positive data within the affected range if the recovery is greater than 150%. Qualify 50% of the samples on either side of CRI standard outside the control limits.			
	Note: Flag or reject the final results only when sample raw data are within the affected ranges and the CRDL standards are outside the acceptance windows.			
A.1.13	**Form III (Initial and Continuing Calibration Blanks)**			
A.1.13.1	Present and complete?	[___]	___	___
	For both AA and ICP when both are used for the same analyte?	[___]	___	___
	Was an initial calibration blank analyzed?	[___]	___	___
	Was a continuing calibration blank analyzed after every 10 samples or every 2 hours (which ever is more frequent)?	[___]	___	___

		YES	NO	N/A
	ACTION: If no, prepare Telephone Record Log, contact laboratory and write in the Contract-Problems/ Non-Compliance section of the "Data Assessment Narrative".			
A.1.13.2	Circle on each Form III all calibration blank values that are above CRDL (or 2 x IDL when IDL > CRDL).			
	Are all calibration blanks (when IDL<CRDL) less than or equal to the Contract Required Detection Limits (CRDLs)?	[___]	___	___
	Are all calibration blanks less than two times Instrument Detection Limit (when IDL>CRDL)?	[___]	___	___
	ACTION: If no for any of the above, flag as estimated (J) positive sample results when raw sample value is less than or equal to calibration blank value analyzed between calibration blank with value over CRDL (or 2xIDL) and nearest good calibration blank. Flag five samples on either side of the calibration blank outside the control limits.			
A.1.14	FORM III (Preparation Blank) - (Note: The preparation blank for mercury is the same as the calibration blank.)			
A.1.14.1	Was one prep. blank analyzed for:			
	each Sample Delivery Group (SDG)?	[___]	___	___
	each batch of digested samples?	[___]	___	___
	each matrix type?	[___]	___	___
	both AA and ICP when both are used for the same analyte?	[___]	___	___
	ACTION: If no for any of the above, flag as estimated (J) all the associated positive data <10 x IDLs for which prep. blank was not analyzed.			
	NOTE: If only one blank was analyzed for more than 20 samples, then first 20 samples analyzed do not have to be flagged as estimated (J).			

		YES	NO	N/A
A.1.14.2	Is concentration of prep. blank value greater than the CRDL when IDL is less than or equal to CRDL?	___	[___]	___
	If yes, is the concentration of the sample with the least concentrated analyte less than 10 times the prep.blank?	___	[___]	___
	ACTION: If yes, reject (red-line) all associated data greater than CRDL concentration but less than ten times the prep. blank value.			
A.1.14.3	Is concentration of prep. blank value (Form III) less than two times IDL, when IDL is greater than CRDL?	[___]	___	___
	ACTION: If no, reject (red-line) all positive sample results when sample raw data are less than 10 times the prep. blank value.			
A.1.14.4	Is concentration of prep. blank below the negative CRDL?	___	[___]	___
	ACTION: If yes, reject (red-line) all associated sample results less than 10xCRDL.			
A.1.15	**Form IV (ICP Interference Check Sample)**			
A.1.15.1	Present and complete?	[___]	___	___
	(NOTE: Not required for furnace AA, flame AA, mercury, cyanide and Ca, Mg, K and Na.)			
	Was ICS analyzed at beginning and end of run (or at least twice every 8 hours)?	[___]	___	___
	ACTION: If no, flag as estimated (J) all the samples for which AL, Ca, Fe, or Mg is higher than in ICS.			
A.1.15.2	Circle all values on each Form IV that are more than ± 20% of true or established mean value.			
	Are all Interference Check Sample results inside the control limits (± 20%)?	[___]	___	___
	If no, is concentration of Al, Ca, Fe, or Mg lower than the respective concentration in ICS?	[___]	___	___

		YES	NO	N/A
	ACTION: If no, flag as estimated (J) those positive results for which ICS recovery is between 121-150%; flag all sample results as estimated if ICS recovery falls within 50-79%; reject (red-line) those sample results for which ICS recovery is less than 50%; if ICS recovery is above 150%, reject positive results only (not flagged with a "U").			
A.1.16	**Form V A (Spiked Sample Recovery - Pre-Digestion/Pre-Distillation)**- (Note: Not required for Ca, Mg, K, and Na (both matrices), Al, and Fe (soil only.)			
A.1.16.1	Present and complete for: each SDG?	[___]	___	___
	each matrix type?	[___]	___	___
	each conc. range (i.e. low, med., high)?	[___]	___	___
	For both AA and ICP when both are used for the same analyte?	[___]	___	___
	ACTION: If no for any of the above, flag as estimated (J) all the positive data less than four times the spiking levels specified in SOW for which spiked sample was not analyzed.			
	NOTE: If one spiked sample was analyzed for more than 20 samples, then first 20 samples analyzed do not have to be flagged as estimated (J).			
A.1.16.2	Was field blank used for spiked sample?	___	[___]	___
	ACTION: If yes, flag all positive data less than 4 x spike added as estimated (J) for which field blank was used as spiked sample.			
A.1.16.3	Circle on each Form VA all spike recoveries that are outside control limits (75% to 125%).			
	Are all recoveries within control limits?	[___]	___	___
	If no, is sample concentration greater than or equal to four times spike concentration?	[___]	___	___

	YES	NO	N/A
ACTION: If yes, disregard spike recoveries for analytes whose concentrations are greater than or equal to four times spike added. If no, circle those analytes on Form V for which sample concentration is less than four times the spike concentration.			
Are results outside the control limits (75-125%) flagged with "N" on Form I's and Form VA?	[___]	___	___
ACTION: If no, write in the Contract - Problem/Non - Compliance section of "Data Assessment Narrative".			

A.1.16.4 **Aqueous**

Are any spike recoveries:

(a) less than 30%?	___	[___]	___
(b) between 30-74%?	___	[___]	___
(c) between 126-150%?	___	[___]	___
(d) greater than 150%?	___	[___]	___

ACTION: If less than 30%, reject all associated aqueous data; if between 30-74%, flag all associated aqueous data as estimated (J); if between 126-150%, flag as estimated (J) all associated aqueous data not flagged with a "U"; if greater than 150%, reject (red-line) all associated aqueous data not flagged with a "J".

A.1.16.5 **Soil/Sediment**

Are any spike recoveries:

(a) less than 10%?	___	[___]	___
(b) between 10-74%?	___	[___]	___
(c) between 126-200%?	___	[___]	___
(d) greater than 200%?	___	[___]	___

		YES	NO	N/A
	ACTION: If less than 10%, reject all associated data; if between 10-74%, flag all associated data as estimated; if between 126-200%, flag as estimated all associated data was not flagged with a "U"; if greater than 200%, reject all associated data not flagged with a "U".			
A.1.17	**Form VI (Lab Duplicates)**			
A.1.17.1	Present and complete for: each SDG?	[___]	___	___
	each matrix type?	[___]	___	___
	each concentration range (i.e. low, med., high)?	[___]	___	___
	both AA and ICP when both are used for the same analyte?	[___]	___	___
	ACTION: If no for any the above, flag as estimated (J) all the data ≥CRDL* for which duplicate sample was not analyzed.			
	Note: 1. If one duplicate sample was analyzed for more than 20 samples, then first 20 samples do not have to be flagged as estimated.			
	2. If percent solids for soil sample and its duplicate differ by more than 1%, prepare a Form VI for each duplicate pair, report concentrations in ug/L on wet weight basis and calculate RPD or Difference for each analyte.			
A.1.17.2	Was field blank used for duplicate analysis?	___	[___]	___
	ACTION: If yes, flag all data ≥CRDL* as estimated (J) for which field blank was used as duplicate.			
A.1.17.3	Are all values within control limits (RPD 20% or difference ≤ ±CRDL)?	[___]	___	___
	If no, are all results outside the control limits flagged with an * on Form I's and VI?	[___]	___	___
	ACTION: If no, write in the Contract - Problems/Non-Compliance section of "Data Assessment Narrative".			

* Substitute IDL for CRDL when IDL > CRDL.

	YES	NO	N/A

NOTE: 1. RPD is not calculable for an analyte of the sample - duplicate pair when both values are less than IDL.
2. If the result of lab duplicate analyzed by GFAA is rejectable due to coefficient of correlation of MSA, analytical spike recovery, or duplicate injections criteria, do not apply precision criteria to metals analyzed by GFAA.

A.1.17.4 **Aqueous**

Circle on each Form VI all values that are:

RPD > 50%, or
Difference > CRDL*

Is any RPD greater than 50% where sample and duplicate are both greater than or equal to 5 times *CRDL?	___	[___]	___
Is any difference** between sample and duplicate greater than *CRDL where sample and/or duplicate is less than 5 times *CRDL?	___	[___]	___

ACTION: If yes, flag the associated data as estimated.

A.1.17.5 **Soil/Sediment**

Circle on each Form VI all values that are:

RPD > 100%, or

Difference > 2 x CRDL*

Is any RPD (where sample and duplicate are both greater than or equal to 5 times *CRDL) :

> 100%?	___	[___]	___
Is any **difference between sample and duplicate (where sample and/or duplicate is less than 5x*CRDL) :			
> 2x*CRDL?	___	[___]	___

* Substitute IDL for CRDL when IDL > CRDL.
** Use absolute values of sample and duplicate to calculate the difference.

		YES	NO	N/A
	ACTION: If yes, flag the associated data as estimated.			
A.1.18	**Field Duplicates**			
A.1.18.1	Were field duplicates analyzed?	[___]	___	___

ACTION: If yes, prepare a Form VI for each aqueous field duplicate pair. Prepare a Form VI for each soil duplicate pair, if percent solids for sample and its duplicate differ by more than 1%; report concentrations of soils in ug/l on wet weight basis and calculate RPDs or Difference for each analyte.

NOTE: 1. Do not calculate RPD when both values are less than IDL.
2. Flag all associated data only for field duplicate pair.

A.1.18.2 **Aqueous**

Circle all values on self prepared Form VI for field duplicates that are:

RPD > 50%, or
Difference > CRDL*

Is any RPD greater than 50% where sample and duplicate are both greater than or equal to 5 times *CRDL?	___	[___]	___
Is any **difference between sample and duplicate greater than *CRDL where sample and/or duplicate is less than 5 times *CRDL?	___	[___]	___

ACTION: If yes, flag the associated data as estimated.

* Substitute IDL for CRDL when IDL > CRDL.
** Use absolute values of sample and duplicate to calculate the difference.

		YES	NO	N/A
A.1.18.3	**Soil/Sediment**			
	Circle all values on self prepared Form VI for field duplicates that are:			
	RPD >100%, or			
	Difference > 2 x CRDL*			
	Is any RPD (where sample and duplicate are both greater than 5 times *CRDL) : >100%?	___	[___]	___
	Is any **difference between sample and duplicate (where sample and/or duplicate is less than 5x *CRDL): >2x *CRDL?	___	[___]	___
	ACTION: If yes, flag the associated data as estimated.			
A.1.19	**Form VII (Laboratory Control Sample)** (Note: LCS - not required for aqueous Hg and cyanide analyses.)			
A.1.19.1	Was one LCS prepared and analyzed for:			
	each SDG?	[___]	___	___
	each batch samples digested/distilled?	[___]	___	___
	both AA and ICP when both are used for the same analyte?	[___]	___	___
	ACTION: If no for any of the above, prepare Telephone Record Log and contact laboratory for submittal of results of LCS. Flag as estimated (J) all the data for which LCS was not analyzed.			
	NOTE: If only one LCS was analyzed for more than 20 samples, then first 20 samples close to LCS do not have to be flagged as estimated.			

* Substitute IDL for CRDL when IDL > CRDL.
* Use absolute values of sample and duplicate to calculate the difference.

		YES	NO	N/A
A.1.19.2	**Aqueous LCS**			
	Circle on each Form VII the LCS percent recoveries outside control limits (80 - 120%) except for aqueous Ag and Sb.			
	Is any LCS recovery: less than 50%?	___	[___]	___
	between 50% and 79%?	___	[___]	___
	between 121% and 150%?	___	[___]	___
	greater than 150%?	___	[___]	___

ACTION: Less than 50%, reject (red-line) all data; between 50% and 79%, flag all associated data as estimated (J); between 121% and 150%, flag all positive (not flagged with a "U") results as estimated; greater than 150%, reject all positive results.

A.1.19.3 **Solid LCS**

NOTE: 1. If "Found" value of LCS is rejectable due to duplicate injections or analytical spike recovery criteria, regardless of LCS recovery, flag the associated data as estimated (J).
2. If IDL of an analyte is equal to or greater than true value of LCS, disregard the "Action" below even though LCS is out of control limits.

	YES	NO	N/A
Is LCS "Found" value higher than the control limits on Form VII?	___	[___]	___

ACTION: If yes, qualify all associated positive data as estimated.

	YES	NO	N/A
Is LCS "Found" value lower than the Control limits on Form VII?	___	[___]	___

ACTION: If yes, qualify all associated data as estimated.

		YES	NO	N/A
A.1.20	**Form IX (ICP Serial Dilution)** -			
	NOTE: Serial dilution analysis is required only for initial concentrations equal to or greater than 10 x IDL.			
A.1.20.1	Was Serial Dilution analysis performed for:			
	each SDG?	[___]	___	___
	each matrix type?	[___]	___	___
	each concentration range (i.e. low, med.)?	[___]	___	___
	ACTION: If no for any of the above, flag as estimated all the positive data ≥ 10xIDLs or ≥ CRDL when 10xIDL ≤ CRDL for which Serial Dilution Analysis was not performed.			
A.1.20.2	Was field blank(s) used for Serial Dilution Analysis?	___	[___]	___
	ACTION: If yes, flag all associated data ≥ 10 x IDL as estimated (J). If 10xIDL ≤ CRDL, flag all data ≥ CRDL.			
A.1.20.3	Are results outside control limit flagged with an "E" on Form I's and Form IX when initial concentration on Form IX is equal to 50 times IDL or greater.	[___]	___	___
	ACTION: If no, write in the Contract-Problem/Non-Compliance section of the "Data Assessment Narrative".			
A.1.20.4	Circle on each Form IX all percent difference that are outside the control limits for initial concentrations equal to or greater than 10 x IDLs only.			
	Are any % difference values:			
	> 10%?	___	[___]	___
	≥ 100%?	___	[___]	___

		YES	NO	N/A
	ACTION: Flag as estimated (J) all the associated sample data ≥ 10xIDLs (or ≥ CRDL when 10xIDL ≤ CRDL) for which percent difference is greater than 10% but less than 100%. Reject (red-line) all the associated sample results equal to or greater than 10xIDLs (or ≥ CRDL when 10xIDL ≤ CRDL) for which PD is greater than or equal to 100%.			
	Note: Flag or reject on Form I's only the sample results whose associated raw data are ≥ 10xIDL (or ≥ CRDL when 10xIDL≤ CRDL)			
A.1.21	**Furnace Atomic Absorbtion (AA) QC Analysis**			
A.1.21.1	Are duplicate injections present in furnace raw data (except during full Method of Standard Addition) for each sample analyzed by GFAA?	[___]	___	___
	ACTION: If no, reject the data on Form I's for which duplicate injections were not performed.			
A.1.21.2	Do the duplicate injection readings agree within 20% Relative Standard Deviation (RSD) or Coefficient of Variation (CV) for concentration greater than CRDL?	[___]	___	___
	Was a dilution analyzed for sample with analytical spike recovery less than 40%?	[___]	___	___
	ACTION: If no for any of the above, flag all the associated data as estimated.			
A.1.21.3	Is *analytical spike recovery outside the control limits (85-115%) for any sample?	___	[___]	___
	ACTION: If yes, flag as estimated the affected sample results if the recovery is between 10-84%; if the recovery is between 115-200%, flag the associated positive sample results as estimated; reject the associated sample results if the recovery is less than 10%; reject positive sample results if the recovery is greater than 200%.			

ıalytical spike is not required on the pre-digestion spiked sample.

		YES	NO	N/A
	NOTE: Reject or flag the data only when the affected sample(s) was not subsequently analyzed by Method of Standard Addition.			
A.1.22	**Form VIII (Method of Standard Addition Results)**			
A.1.22.1	Present?	[___]	___	___
	If no, is any Form I result coded with "S" or a "+"?	___	[___]	___
	ACTION: If yes, write request on Telephone Record Log and contact laboratory for submittal of Form VIII.			
A.1.22.2	Is coefficient of correlation for MSA less than 0.990 for any sample?	___	[___]	___
	ACTION: If yes, reject (red-line) the affected data.			
A.1.22.3	Was *MSA required for any sample but not performed?	___	[___]	___
	Is coefficient of correlation for MSA less than 0.995?	___	[___]	___
	Are MSA calculations outside the linear range of the calibration curve generated at the beginning of the analytical run?	___	[___]	___
	ACTION: If yes for any of the above, flag all the associated data as estimated (J).			
A.1.22.4	Was proper quantitation procedure followed correctly as outlined in the SOW on page E-23?	[___]	___	___
	ACTION: If no, note exception under Contract Problem/ Non-Compliance section of the "Data Assessment Narrative", and prepare a separate list.			

* MSA is not required on LCS and prep. blank.

		YES	NO	N/A
A.1.23	**Dissolved/Total or Inorganic/Total Analytes** -			
A.1.23.1	Were any analyses performed for dissolved as well as total analytes on the same sample(s).	___	[___]	___
	Were any analyses performed for inorganic as well as total (organic + inorganic) analytes on the same sample(s)?	___	[___]	___
	NOTE: 1. If yes, prepare a list comparing differences between all dissolved (or inorganic) and total analytes. Compute the differences as a percent of the total analyte only when dissolved concentration is greater than CRDL as well as total concentration. 2. Apply the following questions only if inorganic (or dissolved) results are (i) above CRDL, and (ii) greater than total constituents. 3. At least one preparation blank, ICS, and LCS should be analyzed in each analytical run.			
A.1.23.2	Is the concentration of any dissolved (or inorganic) analyte greater than its total concentration by more than 10%?	___	[___]	___
A.1.23.3	Is the concentration of any dissolved (or inorganic) analyte greater than its total concentration by more than 50%?	___	[___]	___
	ACTION: If more than 10%, flag both dissolved (or inorganic) and total values as estimated (J); if more than 50%, reject (red-line) the data for both values.			
A.1.24	**Form I (Field Blank)** -			
	(Note: Designate "Field Blank" as such on Form I.)			
A.1.24.1	Circle all field blank values on Form I that are greater than CRDL, (or 2 x IDL when IDL > CRDL).			
	Is field blank concentration less than CRDL (or 2 x IDL when IDL > CRDL) for all parameters of associated aqueous and soil samples?	[___]	___	___

	YES	NO	N/A
If no, was field blank value already rejected due to other QC criteria?	[___]	___	___

ACTION: If no, reject (except field blank results) all associated positive sample data less than or equal to five times the field blank value. Reject on Form I's the soil sample results that when converted to ug/L on wet basis are less than or equal to five times the field blank value in ug/L.

A.1.25 **Form X, XI, XII (Verification of Instrumental Parameters).**

A.1.25.1 Is verification report present for:

Instrument Detection Limits (quarterly)?	[___]	___	___
ICP Interelement Correction Factors (annually)?	[___]	___	___
ICP Linear Ranges (quarterly)?	[___]	___	___

ACTION: If no, contact TPO of the lab.

A.1.25.2 **Form X (Instrument Detection Limits)** - (Note: IDL is not required for Cyanide.)

A.1.25.2.1 Are IDLs present for: all the analytes?	[___]	___	___
all the instruments used?	[___]	___	___
For both AA and ICP when both are used for the same analyte?	[___]	___	___

ACTION: If no for any of the above, prepare Telephone Record Log and contact laboratory.

A.1.25.2.2 Is IDL greater than CRDL for any analyte?	___	[___]	___
If yes, is the concentration on Form I of the sample analyzed on the instrument whose IDL exceeds CRDL, greater than 5 x IDL.	[___]	___	___

	YES	NO	N/A
Action : If no, flag as estimated all values less than five times IDL of the instrument whose IDL exceeds CRDL.			
A.1.25.3 **Form XI (Linear Ranges)**			
A.1.25.3.1 Was any sample result higher than high linear range of ICP.	___	[___]	___
Was any sample result higher than the highest calibration standard for non-ICP parameters?	___	[___]	___
If yes for any of the above, was the sample diluted to obtain the result on Form I?	[___]	___	___
ACTION: If no, flag the result reported on Form I as estimated(J).			
A.1.26 **Percent Solids of Sediments**			
A.1.26.1 Are percent solids in sediment(s):			
< 50%?	___	[___]	___
< 10%?	___	[___]	___

ACTION: If yes, qualify as estimated all the results of a sample that has per cent solids between 10%-50% (i.e. moisture content between 50%-90%). Reject all the results of a sample that has per cent solids less than 10% (i.e. moisture content greater than 90%).

NOTE: Reject or flag(J) only the sample results that were not previously rejected or flaged due to other QC criteria.

Case#	_____	Site	_____	Matrix:	Soil _____
SDG#	_____	Lab	_____		Water_____
Contractor	_____	Reviewer	_____		Other_____

A.2.1 **Validation Flags-** The following flags have been applied in red by the data validator and must be considered by the data user.

J- This flag indicates the result qualified as estimated

Red- Line- A red-line drawn through a sample result indicates unusable value. The red-lined data are known to contain significant errors based on documented information and must not be used by the data user.

Fully Usable Data- The results that do not carry "J" or "red-line" are fully usable.

Contractual Qualifiers- The legend of contractual qualifiers applied by the lab on Form I's is found on page B-20 of SOW ILM01.0.

A.2.2 The data assessment is given below and on the attached sheets.

_____

_____

_____

_____

_____

_____

_____

_____

_____

A.2.2 (continuation)

A.2.2 (continuation)

A.2.3 Contract-Problem/Non-Compliance

MMB/ESAT Rviewer: _____ Date: _____
Signature

Contractor Reviewer: _____ Date: _____
Signature

Verified by: _____ Date: _____

CONTRACT NON-COMPLIANCE
(SMO REPORT)

Regional Review of Uncontrolled Hazardous Waste
Site Contract Laboratory Data Package

CASE NO._____

The hardcopied (laboratory name)_____
Inorganic data package received at Region II has been reviewed and the quality assurance and performance data summarized. The data reviewed included:
SMO Sample No.:_____

Conc. & Matrix:_____

Contract No.(_____) requires that specific analytical work be done and that associated reports be provided by the contractor to the Regions, EMSL-LV, and SMO. The general criteria used to determine the performance were based on an examination of:

- Data Completeness
- Matrix Spike Results
- Calibration Standards Results
- Duplicate Analysis Results
- Blank Analysis Results
- MSA Results

Items of non-compliance with the above contract are described below.

Comments:_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ Reviewer's Initial

_____ Date

ED/MAILING LIST FOR DATA REVIEWERS

1. USEPA Region I (ESD)
60 Westview Street
Lexington, MA 02173
Dan Szaro
(617) 861-6312
CT, ME, MA, NH, RI, VT
CAA, Resource Analysts, York, EJI, Skinner, IDA

2. USEPA Region II (ESD)
Woodbridge Avenue
Edison, New Jersey 08837

(201) 321-6676
NJ, NY, PR, VI
Century, Chemtech, US Test, Naeco, ETC, Gedeon, EMS, Galson, ICM

3. USEPA Region III (CRL)
839 Bestgate Road
Annapolis, MD 21401
Chuck Sands
(301) 266-9180
DE, MD, PA, VA, WV, DC
Centec, Hitman, JTC, MACK, VERSAR, ITAS, Weston, MATS, EA Engineering Subject Tech., Key PA

4. USEPA Region IV (ESD)
Analytical Support Branch
College Station Road
Athens, GA 30613
Tom Barnett, Jr.
(404) 546-3112
AL, FL, GA, KY, MS, NC, SC, TN
Compuchem, EPS, ESI, PASLO, Triangle Labs

5. USEPA Region V (ESD)
536 South Clark Street
Tenth Floor, CRL
Chicago, IL 60605
Pat Churilla
312-353-9387
IL, IN, MI, MN, OH, WI
NEI, IAI/EPC

6. USEPA Region VI (ESD)
Monterey Park Plaza, Bldg. C
6608 Hornwood Drive
Houston, TX 77074
David Stockton
(713) 953-3425
AR, LA, NM, TX, OK
ANACON, RADIAN, SPECS, EIS, Gleeher Research, Inc., SPL Inc., SWRI, Allied, Key TX, EDRA

7. USEPA Region VII Laboratory
25 Funston Road
Kansas City, KS 66115
Debra Morey
(913) 236-3881
IO, KS, NB, MO
Wilson, Kansas City Scientific Enterprises, Eagle Pitcher

8. USEPA Region VIII Laboratory
BOX 25366
Denver Federal Center
Lakewood, CO 80225
Eva Hoffman
(303) 236-7371
CO, ND, SD, UT, WY, MT
ACCL, CSMRI, MASL, Data Chem, Centef

9. USEPA Region IX (ESD)
QA Management Section
215 Fremont Street
San Francisco, CA 94105
Kent Kitchingman
(415) 974-0924
AZ, CA, HI, NV, American Samoa, Guam Trust Territories of Pacific Islands, Wake Island
ALI, CAL Weston, S-Cubed, IT-CA, Vegas

10. USEPA Region X Laboratory
P.O. BOX 549
Manchester, WA 98353
Gerald Muth
(206) 442-0370
AK, ID, OR, WA
Laucks Testing Labs, Century Testing Labs (For VOA Only), Weyerhauser Co. Columbia Testing, Silver Valley

11. Carla Dempsey - (OS-230)
USEPA
401 "M" Street, S.W.
Washington, DC 20460
FTS 382-5746

12. Edward Kantor
USEPA
EMSL-LV
944 E. Harmon Avenue
BOX 93478
Las Vegas, NV 89119

13. Sample Management Office
Viar and Company
P.O. BOX 818
Alexandria, VA 22313

CLP DATA ASSESSMENT SUMMARY FORM (INORGANICS)

ype of Review: _____ Date: _____ Case #: _____

ite: _____ Lab Name: _____

eviewer's Initials: _____ Number of Samples: _____

Analytes Rejected Due to Exceeding Review Criteria:*

	Holding Times	Calibration	Prep Blank	Field Blank	Inter-ferences	Spike Recovery	Duplicates Lab	Duplicates Field	Detection Limits	LCS	Serial Dilution	MSA	Total Analytes	Rejection
ICP														
Flame AA														
Furnace AA														
Mercury														
Total														
Other														

Analytes Flagged as Estimated (J) Due to Exceeding Criteria For:*

CP														
lame AA														
urnace AA														
ercury														
Total														
Other														

Note:
Asterisk (*) Indicates additional exceedances of review criteria.

INORGANIC REGIONAL DATA ASSESSMENT

Region____

CASE NO._____ SITE_____

LABORATORY_____ NO. OF SAMPLES/ MATRIX_____

SDG#_____ REVIEWER (IF NOT ESD)_____

SOW#_____ REVIEWER'S NAME_____

DPO: ACTION_____ FYI_____ COMPLETION DATE_____

DATA ASSESSMENT SUMMARY

		ICP	AA	Hg	CYANIDE
1.	HOLDING TIMES				
2.	CALIBRATIONS				
3.	BLANKS				
4.	ICS				
5.	LCS				
6.	DUPLICATE ANALYSIS				
7.	MATRIX SPIKE				
8.	MSA				
9.	SERIAL DILUTION				
10.	SAMPLE VERIFICATION				
11.	OTHER QC				
12.	OVERALL ASSESSMENT				

O = Data has no problems/or qualified due to minor problems.
M = Data qualified due to major problems.
Z = Data unacceptable.
X = Problems, but do not affect data.

ACTION ITEMS:_____

AREAS OF CONCERN:_____

NOTABLE PERFORMANCE:_____