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UNIFORM FEDERAL POLICY SAMPLING AND ANALYSIS PLAN RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION SOLID WASTE MANAGEMENT UNIT 27 (SWMU 27) NSB KINGS BAY GA
9/1/2014
RESOLUTION CONSULTANTS

UNIFORM FEDERAL POLICY – SAMPLING AND ANALYSIS PLAN

RESOURCE CONSERVATION AND RECOVERY ACT
FACILITY INVESTIGATION
SOLID WASTE MANAGEMENT UNIT 27
NAVAL SUBMARINE BASE KINGS BAY, GEORGIA

Version Number: 0

Prepared For:

Department of the Navy
Naval Facilities Engineering Command Southeast
Building 135 North, P.O. Box 30
Jacksonville, Florida 32212-0030

Prepared By:

Resolution Consultants
A Joint Venture of AECOM & EnSafe
1500 Wells Fargo Building
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Contract Number: N62470-11-D-8013
CTO JM66

September 2014

Revised: 18 November 2014

SAP WORKSHEET #1: TITLE AND APPROVAL PAGE
(UFP-QAPP Manual Section 2.1)

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Dana Miller Digitally signed by Dana Miller DN: cn=Dana Miller, o=EnSafe, ou, email=dmiller@ensafe.com, c=US Date: 2014.11.18 09:34:08 -06'00'

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Resolution Consultants Project Chemist Date

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David Warren
Resolution Consultants Task Order Manager Date

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Dana Hayworth
Navy Remedial Project Manager Date

Amy Potter, Georgia Environmental Protection Division
Unit Coordinator Date

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June 2014

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Digitally signed by BOWERS.KENNETH.A.1230092474
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Date: 2014.06.10 16:56:11 -04'00'

Dana Miller
Resolution Consultants Project Chemist Date

Ken Bowers
Navy Quality Assurance Officer/Chemist Date

David Warren
Resolution Consultants Task Order Manager Date

Dana Hayworth
Navy Remedial Project Manager Date

Amy Potter, Georgia Environmental Protection Division
Unit Coordinator Date

Compliance Status Report
Qualified Groundwater Scientist Certification

I certify that I am a qualified groundwater scientist who has received a baccalaureate or postgraduate degree in the natural sciences or engineering, and have sufficient training and experience in groundwater hydrology and related fields as demonstrated by state registration and completion of accredited university courses that enable me to make sound professional judgments regarding groundwater monitoring and contaminant fate and transport. I further certify that this report was prepared by me or by a subordinate working under my direction.

Benjamin Brantley

(Signature)

Benjamin Brantley

11/18/2014

BENJAMIN J. BRANTLEY ★ GEOLOGIST NO. 1051 REGISTERED PROFESSIONAL GEORGIA

Professional Geologist License Number: PG001051

Professional Geologist Seal:

EXECUTIVE SUMMARY

Resolution Consultants has prepared this Uniform Federal Policy - Sampling and Analysis Plan (SAP) for the Resource Conservation and Recovery Act (RCRA) Facility Investigation for former Satellite Accumulation Area (SAA) 2010-2/Solid Waste Management Unit (SWMU) 27, at Naval Submarine Base (SUBASE) Kings Bay, Georgia, under Contract No. N62470-11-D-8013, Comprehensive Long-term Environmental Action Navy, Contract Task Order JM66.

SWMU 27, situated in an industrial setting on USS Tecumseh Road in the western portion of SUBASE, consists of an 18-foot by 14-foot fenced enclosure, to the west of Building 2010. Land use surrounding the Site consists of paved storage, parking areas, and industrial facilities in support of SUBASE operations. Local topography is relatively flat, with surface runoff flowing toward maintained, grassy medians to the north and south of SWMU 27 and eventually to earthen ditches and retention ponds.

From approximately 1995 through 2011, SWMU 27 served as a SAA for the temporary storage of wastes, including universal wastes, fuel and debris, miscellaneous liquids and solid oily liquid debris, non-flammable and vulcanizing adhesives and sealants, and paint. Wastes were contained in 5-gallon pails and/or 55-gallon drums positioned on wooden pallets, pending transfer to SUBASE's hazardous waste storage facility. The area was not equipped with secondary containment.

Stains were observed on the Site's asphalt surface during a historical RCRA Facility Assessment, thus SWMU 27 was recommended for further study as prescribed in SUBASE's Hazardous Waste Facility Permit #HW-014(S&T)-4. On 30 September 2013, Naval Facilities Engineering Command Southeast, on behalf of SUBASE, submitted the *Final Phase 1 RCRA Facility Investigation Work Plan SWMU 27* (Work Plan) proposing limited soil sampling to evaluate potential spills to soil in the immediate vicinity of SAA 2010-2. The Work Plan was approved by the Georgia Environmental Protection Division (GA EPD) on 1 November 2013.

This SAP, which has been prepared to accompany the Work Plan, outlines the organization, objectives, planned activities, and data review/reporting procedures associated with the RCRA Facility Investigation. As approved via email correspondence with GA EPD, this SAP has been prepared using the United States Department of the Navy's (Navy) streamlined Tier II Uniform Federal Policy-Sampling and Analysis Plan outline, which includes select SAP worksheets considered sufficient for limited soil sampling activities. Protocols for sample collection, sample handling and storage, chain-of-custody documentation, laboratory and field analyses, data validation, and reporting are addressed herein. This SAP was generated for, and complies with, applicable Navy, United States Environmental Protection Agency (U.S. EPA) Region 4, and GA EPD requirements, regulations, guidance, and technical standards, as appropriate. This includes the Department of

Defense, Department of Energy, and U.S. EPA Interagency Data Quality Task Force environmental requirements regarding federal facilities, as specified in the Uniform Federal Policy Quality Assurance Project Plan guidance (U.S. EPA 2005) and the Navy's SAP guidance. Field activities conducted under this SAP will be conducted in accordance with Resolution Consultants' Standard Operating Procedures and a Site-Specific Health and Safety Plan.

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List of Acronyms

bgs	Below ground surface
°C	Degree Celsius
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
COPC	Contaminant of potential concern
CSM	Conceptual site model
CTO	Contract task order
DL	Detection limit
DoD QSM	Department of Defense Quality systems manual
DQO	Data quality objective
DVM	Data validation manager
DVA	Data validation assistant
EICP	Extracted ion current profile
ENCO	Environmental Conservation Laboratories, Inc.
eQAPP	Electronic Quality Assurance Project Plan
FTL	Field team leader
GA EPD	Georgia Environmental Protection Division
GC/MS	Gas chromatograph/mass spectrometer
GIS	Geographic information system
GPS	Global positioning system
ICP	Inductively coupled plasma
ICAL	Initial calibration
IDW	Investigation derived waste
LCS	Laboratory control sample
LOQ	Limit of quantitation
LOD	Limit of detection
mg/kg	Milligrams per kilogram
ml	Milliliter
MS/MSD	Matrix spike/matrix spike duplicate
NA	Not applicable
NAVFAC SE	Naval Facilities Engineering Command Southeast
NIRIS	Naval Installation Restoration Information Solution

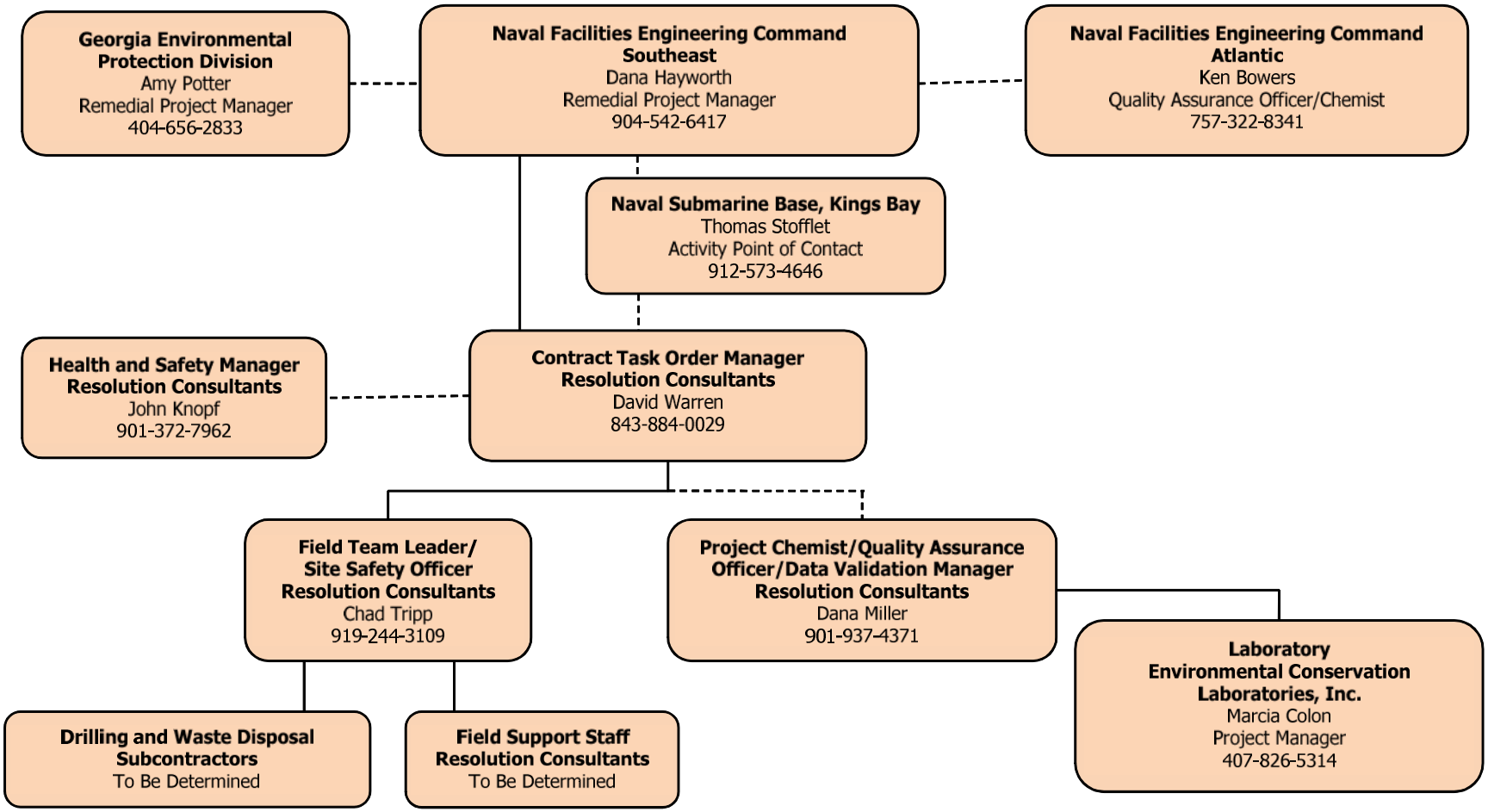
oz.	Ounce
PALS	Project action limits
PAH	Polycyclic aromatic hydrocarbons
PCBs	Polychlorinated biphenyls
PM	Project manager
POC	Point of contact
PSQ	Principle study question
QA	Quality assurance
QAO	Quality assurance officer
QAPP	Quality assurance project plan
QC	Quality control
QL	Quantitation limit
QMP	Quality management plan
QSM	Quality systems manual
RCRA	Resource Conservation and Recovery Act
RFI	Resource Conservation and Recovery Act Facility Investigation
RI	Remedial investigation
RPD	Relative percent difference
RPM	Remedial project manager
Res RSL-Surr	U.S. EPA Residential RSL Soil Screening Level — Surrogate
RSD	Relative standard deviation
SAA	Satellite Accumulation Area
SAP	Sampling and analysis plan
SOP	Standard operating procedure
SSL	Soil Screening Levels
SSO	Site Safety Office
SSL-Risk	U.S. EPA RSL Risk-Based Soil Screening Level
SSL-MCL	U.S. EPA RSL Risk-Based Soil Screening Level
SUBASE	Naval Submarine Base Kings Bay
SVOC	Semi-volatile organic compounds
SWMU	Solid waste management unit
TALs	Target analyte list
TCLP	Toxicity characteristic leaching procedure
TBD	To be determined
TOM	Task order manager
UFP	Uniform Federal Policy
U.S. EPA	United States Environmental Protection Agency
USGS	United States Geological Society

VOC	Volatile organic compounds
YSP	Visual sample plan

SAP WORKSHEET #5: PROJECT ORGANIZATIONAL CHART

(UFP-QAPP Manual Section 2.4.1)

Lines of Authority ———————— Lines of Communication - - - - - - - - - - - - - -



SAP WORKSHEET #6: COMMUNICATION PATHWAYS

(UFP-QAPP Manual Section 2.4.2)

The communication pathways for the SAP are shown below.

Communication Pathways				
Communication Drivers	**Responsible Entity**	**Name**	**Phone Number**	**Procedure (Timing, Pathway To/From, etc.)**
Regulatory Agency Interface	GA EPD RPM NAVFAC SE RPM	Amy Potter Dana Hayworth	404-656-2833 904-542-6417	The NAVFAC SE RPM will contact the regulatory agency via phone and/or email within 24 hours of recognizing the issue whenever issues arise.
Field Progress Reports	Resolution Consultants TOM Resolution Consultants FTL	David Warren Chad Tripp	843-884-0029 919-244-3109	The Resolution Consultants FTL will contact the Resolution Consultants TOM on a daily basis via phone and every 1 to 2 days summarizing progress via email.
Gaining Site Access	Resolution Consultants FTL SUBASE POC	Chad Tripp Thomas Stofflet	919-244-3109 912-573-4646	The Resolution Consultants FTL will contact the SUBASE POC verbally or via email at least 10 working days prior to commencement of fieldwork to arrange for access to the Site for all field personnel.
Obtaining Utility Clearances for Intrusive Activities	Resolution Consultants FTL SUBASE POC	Chad Tripp Thomas Stofflet	919-244-3109 912-573-4646	The Resolution Consultants FTL will coordinate verbally or via email with SUBASE POC at least 14 days in advance of site access to initiate the utility clearance process for all intrusive sampling locations. The Resolution Consultants FTL will contact both the Georgia Utility Protection Center, Inc. and SUBASE personnel (as directed by the SUBASE POC) verbally or via email at least 14 days prior to commencement of fieldwork to complete a utility clearance ticket for areas under investigation.
Stop Work Due to Safety Issues	Resolution Consultants TOM Resolution Consultants FTL/SSO Resolution Consultants QAO Resolution Consultants Health and Safety Manager NAVFAC SE RPM SUBASE POC	David Warren Chad Tripp Dana Miller John Knopf Dana Hayworth Thomas Stofflet	843-884-0029 919-244-3109 901-937-4371 901-372-7962 904-542-6417 912-573-4646	Any field team member who observes an unsafe situation has the authority to stop work. If Resolution Consultants is the responsible party for a stop work command, the Resolution Consultants SSO will inform onsite personnel, subcontractor(s), the site manager, and the identified Partnering Team members within 1 hour (verbally or by email). If a subcontractor is the responsible party, the subcontractor PM must verbally inform the Resolution Consultants SSO within 15 minutes, and the Resolution Consultants SSO will then follow the procedure listed above.
SAP Changes Prior to Field/ Laboratory Work	Resolution Consultants FTL Resolution Consultants TOM NAVFAC SE RPM SUBASE POC GA EPD RPM	Chad Tripp David Warren Dana Hayworth Thomas Stofflet Amy Potter	919-244-3109 843-884-0029 904-542-6417 912-573-4646 404-656-2833	Any change of the approved SAP will be made only upon authorization of the Navy RPM and regulatory agency. The Resolution Consultants TOM is responsible for initiating any SAP change requests via the communication channels described for the Navy and regulatory agencies.

Communication Pathways

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure (Timing, Pathway To/From, etc.)
SAP Changes in the Field	Resolution Consultants TOM Resolution Consultants FTL NAVFAC SE RPM SUBASE POC GA EPD RPM	David Warren Chad Tripp Dana Hayworth Thomas Stofflet Amy Potter	843-884-0029 919-244-3109 904-542-6417 912-573-4646 404-656-2833	The Resolution Consultants FTL will inform the Resolution Consultants TOM verbally within same day; the TOM will inform the Navy RPM by email within 24 hours; the TOM sends a concurrence letter to the Navy RPM, if warranted, within 7 calendar days and the RPM signs the letter within 5 business days of receipt. Scope change is to be implemented before work is executed. Document the change on a field task modification request form (within 2 business days) or SAP amendment (within timeframe agreed to by Project Team). The Navy will notify the regulatory agencies of any significant SAP field changes within 5 business days. Any change of the approved SAP affecting the scope or implementation of the sampling program will be made only upon authorization of the Navy RPM and regulatory agency.
Field Corrective Actions	Resolution Consultants TOM Resolution Consultants QAO NAVFAC SE RPM	David Warren Dana Miller Dana Hayworth	843-884-0029 901-937-4371 904-542-6417	The Resolution Consultants FTL will inform the Resolution Consultants TOM verbally within same day; the TOM will inform the Navy RPM by email within 24 hours that corrective actions have been implemented. Corrective actions will be documented in weekly progress reports. The Navy RPM will notify the regulatory agencies of any significant corrective actions taken within 5 business days.
Sample Receipt Variances	Resolution Consultants TOM Resolution Consultants Project Chemist ENCO Laboratory PM	David Warren Dana Miller Marcia Colon	843-884-0029 901-937-4371 407-826-5314	The Laboratory PM will notify (verbally or via email) the Resolution Consultants FTL and/or Project Chemist immediately upon receipt of any chain of custody/sample receipt variances for clarification or direction from the Resolution Consultants FTL. The Resolution Consultants FTL will notify (verbally or via email) the Resolution Consultants TOM within 1 business day, if corrective action is required. The Resolution Consultants TOM will notify (verbally or via email) the Laboratory PM and the Resolution Consultants FTL within 1 business day of any required corrective action.

Communication Pathways

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure (Timing, Pathway To/From, etc.)
Reporting Laboratory Quality Variances and Corrective Actions	ENCO Laboratory PM Resolution Consultants Project Chemist Resolution Consultants TOM Resolution Consultants FTL NAVFAC SE RPM NAVFAC QAO/Chemist	Marcia Colon Dana Miller David Warren Chad Tripp Dana Hayworth Ken Bowers	407-826-5314 901-937-4371 843-884-0029 919-244-3109 904-542-6417 757-322-8341	The Laboratory PM will notify (verbally or via email) the Resolution Consultants Project Chemist of any variance from the quality limits identified in this SAP on the day that the variance becomes known. The Resolution Consultants Project Chemist will notify (verbally or via email) the Resolution Consultants TOM within 1 business day of the need for corrective action, if the variance is a significant issue. The Resolution Consultants TOM will notify (verbally or via email) the Laboratory PM and the Resolution Consultants FTL and Project Chemist within 1 business day of any required corrective action. The Laboratory QAO will document all quality variances in the Case Narrative of the Analytical Laboratory Report. If there are significant data quality or non-useable data issues, the NAVFAC QAO/chemist will be contacted to ensure the issues do not have the potential to impact other Navy projects.
Analytical Data Quality Issues	Resolution Consultants Project Chemist Resolution Consultants TOM Resolution Consultants FTL ENCO Laboratory PM NAVFAC QAO/Chemist	Dana Miller David Warren Chad Tripp Marcia Colon Ken Bowers	901-937-4371 843-884-0029 919-244-3109 407-826-5314 757-322-8341	The analytical Laboratory PM will notify verbally or by email the Resolution Consultants Project Chemist within 1 business day of when an issue related to analytical laboratory data is discovered. The Resolution Consultants Project Chemist will notify the Resolution Consultants TOM within 1 business day. The Resolution Consultants Project Chemist will notify the Resolution Consultants TOM verbally or by email within 48 hours of validation completion that a non-routine and significant analytical laboratory quality deficiency has been detected that could affect this project and/or other projects. The Resolution Consultants TOM will verbally advise the Navy RPM within 24 hours of notification from the Project Chemist. The Navy RPM takes corrective action that is appropriate for the identified deficiency. If there are significant data quality or non-useable data issues, the Navy QAO/chemist will be contacted to ensure the issues do not have the potential to impact other Navy projects.

Communication Pathways				
Communication Drivers	**Responsible Entity**	**Name**	**Phone Number**	**Procedure (Timing, Pathway To/From, etc.)**
Notification of Non-Usable Data	ENCO Laboratory PM Resolution Consultants Project Chemist/DVM Resolution Consultants TOM NAVFAC SE RPM NAVFAC QAO/Chemist GA EPD RPM	Marcia Colon Dana Miller David Warren Dana Hayworth Ken Bowers Thomas Stofflet	407-826-5314 901-937-4371 843-884-0029 904-542-6417 757-322-8341 912-573-4646	If the laboratory determines that any data they have generated is non-usable, the Laboratory PM will notify (verbally or via email) the Resolution Consultants Project Chemist within 1 business day of when the issue is discovered. The Resolution Consultants Project Chemist will notify (verbally or via email) Resolution Consultants TOM within 1 business day of the need for corrective action, if the non-usable data is a significant issue (i.e., critical sample data). Corrective action may include resampling and/or reanalyzing the effected samples. If a Resolution Consultants Project Chemist or data validator identifies non-usable data during the data validation process, the TOM will be notified verbally or via email within 48 hours of validation completion that a non-routine and significant laboratory quality deficiency has resulted in non-usable data. The Resolution Consultants TOM will take corrective action appropriate for the identified deficiency to ensure the project objectives are met. The Resolution Consultants TOM will notify (verbally or via email) the NAVFAC RPM on any problems with the laboratory or analysis that could significantly affect the usability of the data or project failures that impact the ability to complete the scope of work. The NAVFAC RPM, may at their discretion, contact the Navy Project Chemist for assistance in problem resolution. Such notification will be made within 1 business day of when the issue is discovered. If there are significant data quality or non-useable data issues, the NAVFAC QAO/chemist will be contacted to ensure the issues do not have the potential to impact other Navy projects. The NAVFAC RPM will notify GA EPD when any significant corrective action is taken.

Communication Pathways				
Communication Drivers	**Responsible Entity**	**Name**	**Phone Number**	**Procedure (Timing, Pathway To/From, etc.)**
Analytical Corrective Actions and Reporting Data Validation Issues	ENCO Laboratory PM Resolution Consultants Project Chemist/DVM Resolution Consultants TOM NAVFAC SE RPM NAVFAC QAO/Chemist	Marcia Colon Dana Miller David Warren Dana Hayworth Ken Bowers	407-826-5314 901-937-4371 843-884-0029 904-542-6417 757-322-8341	The Laboratory PM will notify (verbally or via email) the Resolution Consultants Project Chemist within 1 business day of when an issue related to laboratory data is discovered. The Resolution Consultants Project Chemist will notify (verbally or via email) the DVM and the Resolution Consultants TOM within 1 business day. Resolution Consultants DVM or Project Chemist will notify the Resolution Consultants TOM verbally or via email within 48 hours of validation completion that a non-routine and significant laboratory quality deficiency has been detected that could affect this project and/or other projects. The Resolution Consultants TOM will verbally advise the NAVFAC SE RPM within 24 hours of notification from the Resolution Consultants DVM or Project Chemist. The NAVFAC SE RPM will take corrective action appropriate for the identified deficiency. Examples of significant laboratory deficiencies include data reported that has a corresponding failed gas chromatograph/mass spectrometer tune or initial calibration verification. Corrective actions may include a consult with the Navy QAO/chemist.
Data Validation Corrective Actions	Resolution Consultants DVM Resolution Consultants TOM	Dana Miller David Warren	901-937-4371 843-884-0029	See "Notification of Non-Usable Data" procedure above. If a Resolution Consultants DVM identifies non-usable data during the data validation process that requires corrective action, the Resolution Consultants DVM will coordinate with the Resolution Consultants TOM to take corrective action appropriate for the identified deficiency to ensure the project objectives are met. Corrective action may include resampling and/or reanalyzing the affected samples, as determined by the Resolution Consultants TOM.

Notes:

DVM	=	Data validation manager
GA EPD	=	Georgia Environmental Protection Division
NAVFAC SE	=	Naval Facilities Engineering Command, Southeast
ENCO	=	Environmental Conservation Laboratories, Inc.
POC	=	Point of contact
FTL	=	Field team leader
RPM	=	Remedial project manager
SSO	=	Site safety office
TOM	=	Task order manger
PM	=	Project manger
SAP	=	Sampling and Analysis Plan
QAO	=	Quality assurance officer
SUBASE	=	Naval Submarine Base Kings Bay
SSO	=	Site safety officer

SAP WORKSHEET #9: PROJECT PLANNING SESSION PARTICIPANTS SHEET

(UFP-QAPP Manual Section 2.5.1)

No scoping meetings have been conducted to-date; however, the scope of work for this Sampling and Analysis Plan (SAP) was developed/presented in the following documents.

Document	Document Description
Final Phase I RCRA Facility Investigation Work Plan SWMU 27 (Site 2010-2), Naval Submarine Base Kings Bay, Camden County, Georgia, September 2013	Presented background, history, preliminary CSM, and a draft Work Plan for sampling and analysis. The Georgia Environmental Protection Division provided formal approval of the Work Plan in a letter dated 1 November 2013.
14 August 2014, letter from Georgia Environmental Protection Division, relaying comments associated with the *Draft Uniform Federal Policy — Sampling and Analysis Plan for Naval Submarine Base Kings Bay, Georgia; dated 24 June 2014.*	Regulatory comments associated with *Draft Uniform Federal Policy — Sampling and Analysis Plan for Naval Submarine Base Kings Bay, Georgia; dated 24 June 2014.*
17 September 2014, Response to Comments memorandum associated with the *Draft Uniform Federal Policy —- Sampling and Analysis Plan for Naval Submarine Base Kings Bay, Georgia; dated 24 June 2014.*	Response to 14 August 2014, regulatory comments associated with *Draft Uniform Federal Policy —- Sampling and Analysis Plan for Naval Submarine Base Kings Bay, Georgia; dated 24 June 2014.*

Notes:

RCRA = Resource Conservation and Recovery Act
SWMU = Solid Waste Management Unit
CSM = Conceptual Site Model

SAP WORKSHEET #10: CONCEPTUAL SITE MODEL

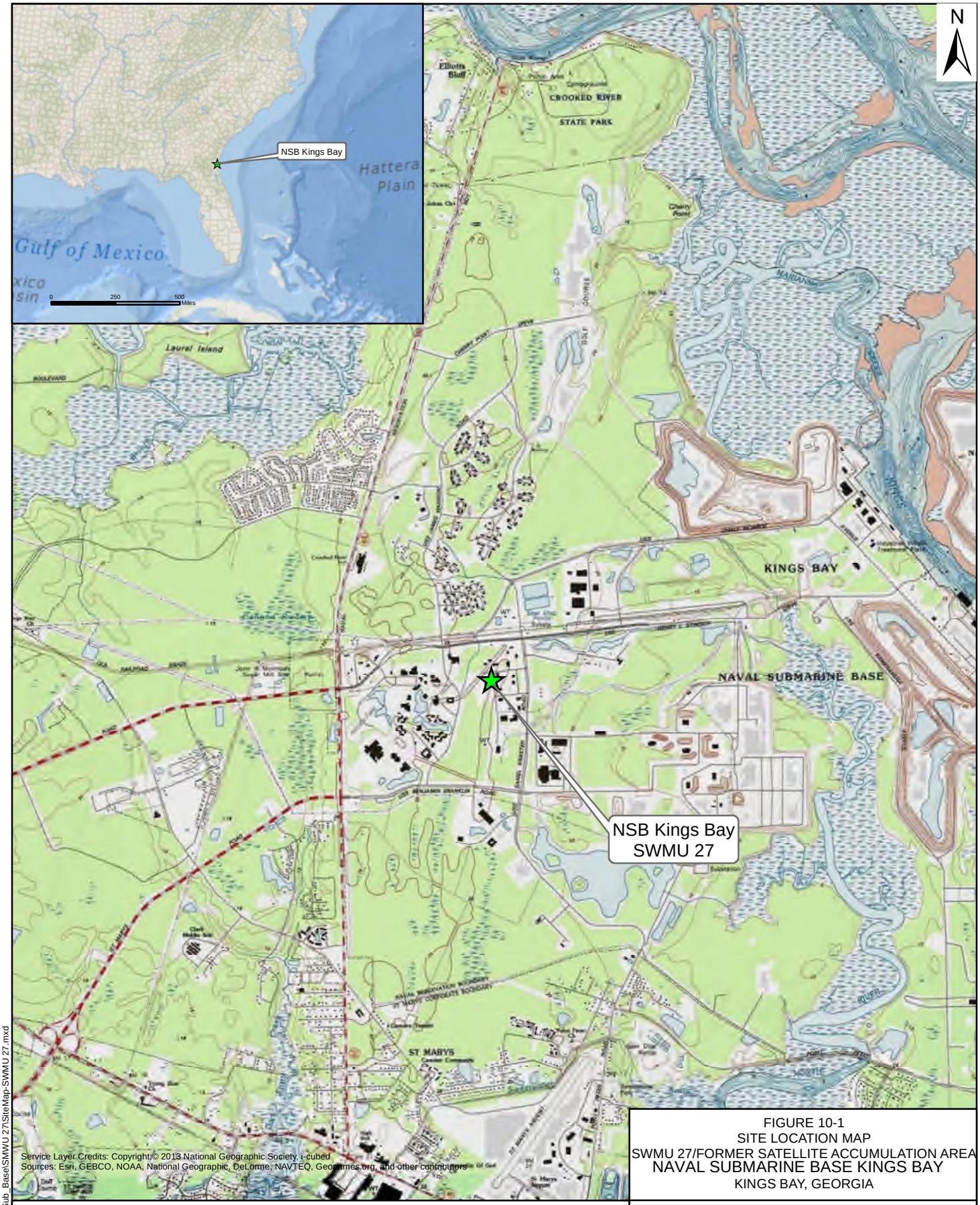
(UFP-QAPP Manual Section 2.5.2 — Worksheet #10)

This worksheet presents a brief description, history, and a preliminary conceptual site model (CSM) for former Satellite Accumulation Area (SAA) 2010-2/Solid Waste Management Unit (SWMU) 27 (the Site). The CSM describes potential contamination routes and possible exposure pathways to human receptors, and serves as the basis for the sampling and analysis program. The preliminary CSM will be refined with information obtained during forthcoming Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) activities.

10.1 Site Description and History

Naval Submarine Base Kings Bay (SUBASE), Georgia, is an approximately 16,168-acre property in Camden County, located in the southeastern corner of Georgia, approximately eight miles north of the Georgia-Florida state line (Figure 10-1). The subject Site, SWMU 27, situated in an industrial setting on USS Tecumseh Road in the western portion of SUBASE (Figure 10-2), consists of an 18-foot by 14-foot fenced enclosure, to the west of Building 2010. The enclosure is covered by sheet metal roofing, with overhead clearance of approximately 6 feet, while the floor is comprised of concrete pavement and asphalt. During a November 2013 site visit conducted by Resolution Consultants, various tools, signs, and other equipment owned by Kings Bay Support Services were noted in and around temporary trailers and sheds adjacent to the north and south of SWMU 27. A parking area, adjacent to the east of the Site, is also covered by asphalt.

Local topography is relatively flat, with surface runoff assumed to be toward maintained, grassy medians to the north and south of SWMU 27. Based on observations made during the November 2013 site visit, storm water likely discharges to earthen drainage ditches along USS Casmir Pulaski Drive and USS Henry Clay Boulevard. Although dry during the site visit, the drainage ditches likely discharge to retention ponds approximately 2,000 feet to the southwest.



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Sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, NAVTEQ, Geonames.org, and other contributors

FIGURE 10-1
SITE LOCATION MAP
SWMU 27/FORMER SATELLITE ACCUMULATION AREA
NAVAL SUBMARINE BASE KINGS BAY
KINGS BAY, GEORGIA

Legend

SITE LOCATION

1 inch = 4,000 feet

0 2,000 4,000 8,000 Feet

Basemap Source: Harrietts Bluff, Georgia Quadrangle Topographic Map
http://services.arcgisonline.com/arcgis/services/USA_Topo_Maps
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NAVFAC Naval Facilities Engineering Command

REQUESTED BY: J. King	DATE: 12/18/2013
DRAWN BY: K. Burnum	CTO NO.: JM66

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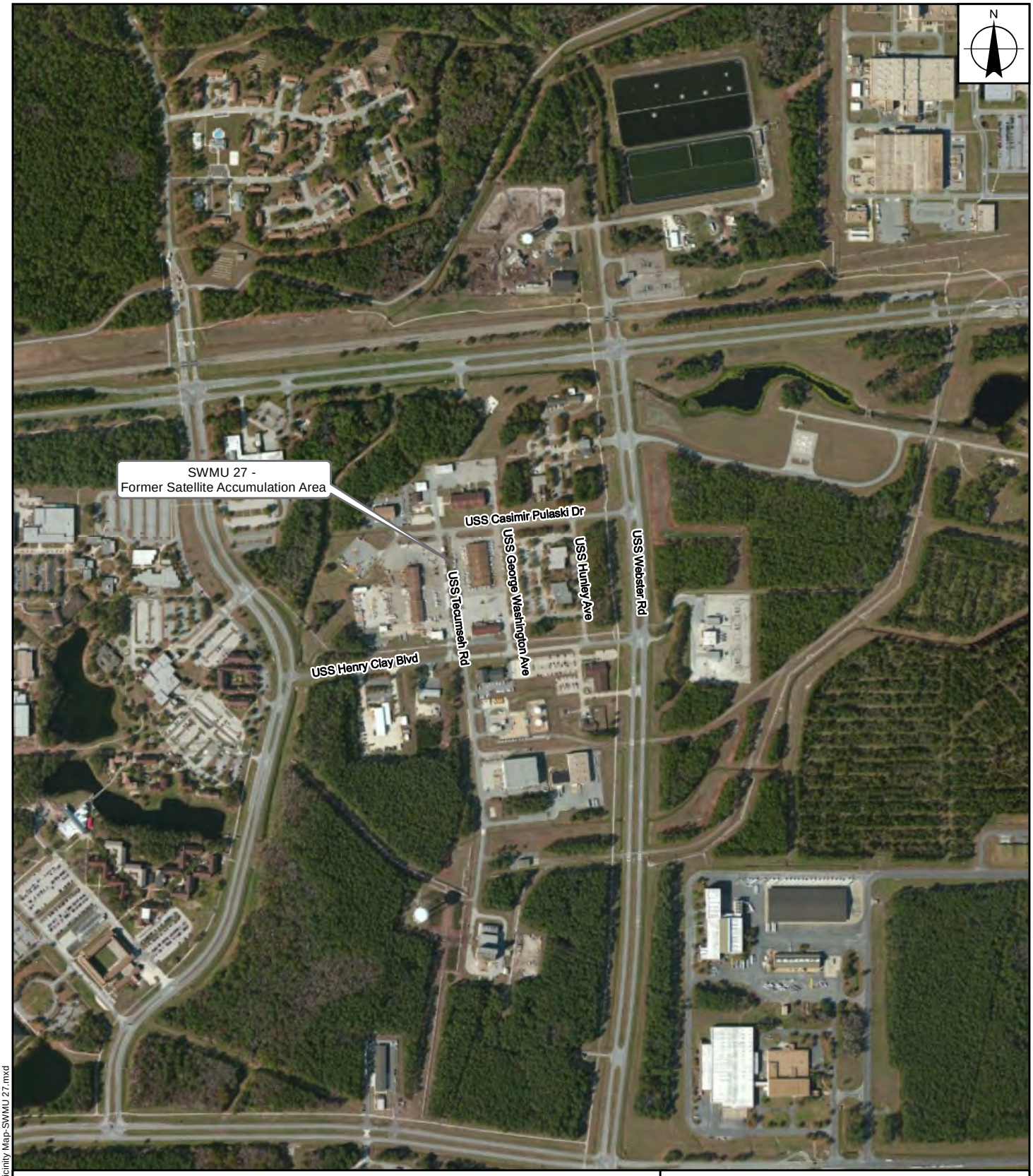

0 800 1,600 Feet

FIGURE 10-2
VICINITY MAP
SWMU 27/FORMER SATELLITE ACCUMULATION AREA
NAVAL SUBMARINE BASE KINGS BAY
KINGS BAY, GEORGIA

NAVFAC Naval Facilities Engineering Command

REQUESTED BY: J. King	DATE: 3/12/2014
DRAWN BY: kburnum	TASK ORDER NUMBER: JM66

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Historically, SWMU 27 served as a SAA for temporary storage of wastes generated by base operations support contractor activities from approximately 1995 through 2011. Wastes temporarily stored at SWMU 27 were contained in 5-gallon pails and/or 55-gallon drums positioned on wooden pallets, pending transfer to SUBASE's hazardous waste storage facility.

The August 2009 RCRA Facility Assessment (RFA) Report, as prepared by the United States Environmental Protection Agency (U.S. EPA), identified the Site as SAA 2010-2. From 11 August through 13 August 2009, a four-person contractor team performed a visual site inspection (VSI) at SUBASE. Also present during the VSI were representatives of U.S. EPA Region 4, Georgia Environmental Protection Division (GA EPD), SUBASE, and Naval Facilities Engineering Command Southeast (NAVFAC SE). The purpose of the visit was to address information gaps and to identify and document information associated with SWMUs designated during the preliminary review as documented in the ***Resource Conservation and Recovery Act Facility Assessment Report*** (Booz Allen Hamilton 2009), dated 4 January 2009. During the VSI, wastes stored at SAA 2010-2 included:

- Universal waste, including:
  - Dry cell batteries, nickel cadmium batteries (>2 pounds) (D006), lithium batteries (D003)
  - Flammable/non-flammable universal waste, aerosol cans (D001, D005, D007, D008)
  - Light bulbs (D008, D009)
- Fuel (RJ-4/JP-10) and debris
- Miscellaneous liquid and solid oily/greasy debris
- Non-flammable adhesives and sealants
- Vulcanizing adhesives with lead (D001, D008, D040)

- Paint solids and containers, including:
  - Paint-related trash/debris (D005, D007, D008, D035, D043, F002)
  - Paint waste with lead, chromium, barium, vinyl chloride, and listed solvents (D001, D005, D007, D008, D043, F003, F005)
- Mercury-containing articles (D009)

As previously discussed, SAA 2010-2 is no longer in use. The RFA concluded that no further action was warranted based upon the VSI and historical documentation. In 2009, the Draft RFA was provided to stakeholders for comment. SUBASE provided comments to this report, which were submitted to GA EPD.

GA EPD reviewed SUBASE comments and responded via letter on 31 January 2011. The letter designated SAA 2010-2 as a RCRA SWMU, and stated that it would be added to the list of SWMUs as SWMU 27. Due in part to the GA EPD comments, SUBASE re-evaluated several historical SAA to determine if a potential exists for a release of hazardous constituents. Their reassessment indicated that SAA 2010-2 did not have secondary containment to prevent spilled waste from migrating onto the adjacent soils, and exhibited evidence of a release due to the appearance of surface staining and gaps in the asphalt base at this unit. On 28 September 2012, GA EPD included SWMU 27 in Section IV.A1 — Applicability and IV.C — RCRA Facility Investigation, requiring a work plan to be prepared and submitted in accordance with SUBASE's Hazardous Waste Facility Permit #HW-014(S&T)-4. On 30 September 2013, NAVFAC SE, on behalf of SUBASE, submitted the *Final Phase 1 RCRA Facility Investigation Work Plan SWMU 27 (Site 2010-2)* (NAVFAC SE 2013) (Work Plan). GA EPA provided formal approval of the work plan in a letter dated 1 November 2013. This SAP has been prepared to supplement the Navy's approved Work Plan, which details the project scope of work and specifies the analyte list.

10.2 Site Geology

No environmental sampling has been conducted at the Site, thus site-specific geologic information is currently unavailable. According to general information obtained during a review of SUBASE environmental files and per *Soil Chemistry and Groundwater Quality of Water Table Zone Surficial Aquifer Naval Submarine Base Kings Bay* (USGS 2002), as prepared by the United States Geological Society (USGS), soils likely consist of very fine- to fine-grained sand to approximately 27 feet below ground surface (bgs), underlain by silty clay.

10.3 Site Hydrogeology

Local hydrogeologic units include, in descending order: the surficial aquifer, the upper and lower Brunswick aquifers, and the Floridan aquifer system. This study focuses on the surficial aquifer, where water occurs under unconfined (water table) conditions. A resistance to vertical groundwater flow exists due to an increase in clay and silt content with depth. The thickness of the surficial aquifer generally varies between 60 and 80 feet bgs, largely as a result of variations in topography (USGS 2002). According to general information obtained during a review of SUBASE environmental files, the Site's shallow water table likely exists at approximately 7 feet bgs.

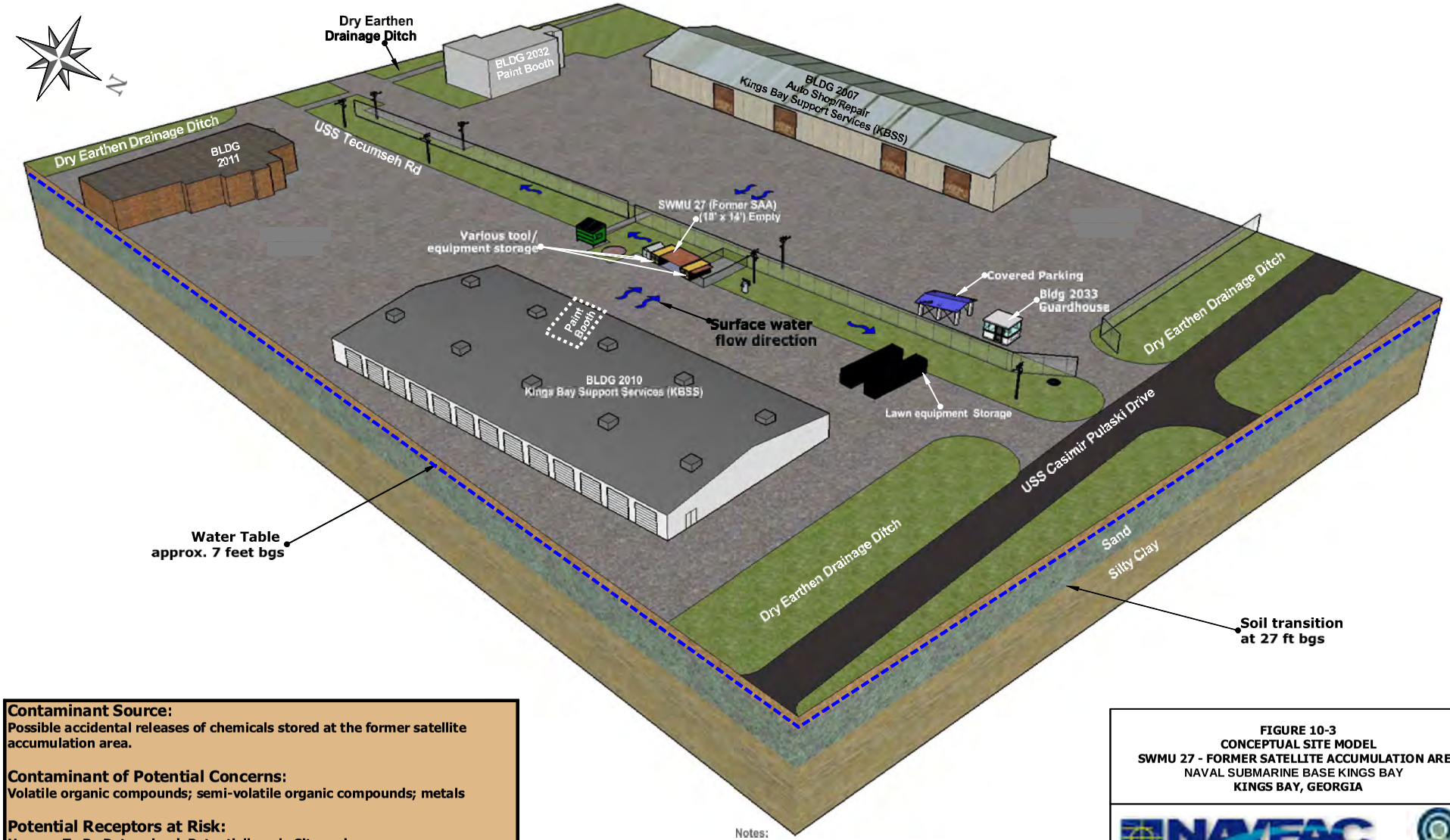
According to GA EPD's *Groundwater Recharge Areas Map* and *Groundwater Pollution Susceptibility Map* (Georgia Department of Natural Resources 1992), SUBASE is regionally positioned in a recharge zone for the Miocene/Pliocene-Recent unconfined aquifers; therefore, SUBASE is considered a High Groundwater Pollution Susceptibility Area per Georgia State Rule 391-3-15-.09.

10.4 Preliminary Conceptual Site Model

The preliminary CSM is graphically presented as Figure 10-3 and summarized below. Potential sources of contaminants, nature and extent, fate and transport mechanisms, and potential exposure pathways and receptors are presented. Development of the CSM is an iterative process, and will be refined throughout this study.

10.4.1 Source of Contaminants

Sources of potential contamination at SWMU 27 would likely be associated with historical accidental releases (i.e., surface spills) of wastes stored at the former SAA. Stains and cracks have been observed in the paved surface cover. The area was not equipped with secondary containment. Accidental releases may have reached soils underlying and adjacent to the Site's paved surfaces.



Contaminant Source:
Possible accidental releases of chemicals stored at the former satellite accumulation area.

Contaminant of Potential Concerns:
Volatile organic compounds; semi-volatile organic compounds; metals

Potential Receptors at Risk:
Human: To Be Determined; Potentially only Site and construction/landscaping workers.

Notes:
1. Conceptual Site Model not to scale. Horizontal dimensions based on recent aerial imaging and historic reports. Vertical dimensions exaggerated for purpose of conveying pertinent site information.
2. Groundwater monitoring well locations are approximated based on geographic information system data.
3. bgs = below ground surface

FIGURE 10-3
CONCEPTUAL SITE MODEL
SWMU 27 - FORMER SATELLITE ACCUMULATION AREA
NAVAL SUBMARINE BASE KINGS BAY
KINGS BAY, GEORGIA

NAVFAC Naval Facilities Engineering Command

REQUESTED BY: J. King	Date: 03/11/2014
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10.4.2 Nature and Extent of Contamination

To date, no environmental samples have been collected at the Site. The presence or absence of impacts has not yet been confirmed. As specified in the GA EPD approved *Final Phase 1 RCRA Facility Investigation Work Plan SWMU 27 (Site 2010-2)* (NAVFAC SE 2013), soil will be evaluated for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) including polycyclic aromatic hydrocarbons (PAHs), and target analyte list (TAL) metals, based on historical activities and wastes stored onsite, as noted in the RFA.[1]

10.4.3 Fate and Transport Mechanisms

A fate and transport pathway describes mechanisms whereby contaminants are transported from the source to a receptor. Soil is the only media of concern to be evaluated during this initial (Phase 1) investigation. Contaminants in soils may have migrated from accidental releases that occurred at SWMU 27 and spilled beyond the asphalt/concrete floor or infiltrated through surface cracks. Soil contamination, if determined to be present, may have migrated to groundwater via infiltration. If necessary, the groundwater pathway will be further evaluated during subsequent phases of this investigation. Surface water is not present in the immediate vicinity of SWMU 27; therefore, it is unlikely that sediment or surface water media would be impacted as a result of any accidental release from SWMU 27.

The Site is situated in a paved, industrial setting. Surrounding areas are also paved, with the exception of several maintained, grassy medians. Based on current information, potential receptors at the Site are limited to humans. The need for additional sampling and analysis (i.e., additional delineation in the earthen ditches) and evaluation of potential risks to ecological receptors will be re-assessed pending results of this initial phase of the investigation. Details associated with any additional sampling and analysis and/or ecological risk evaluation (if required) would be described in a forthcoming UFP-SAP addendum to be submitted for review and comment by GA DEP.

[1] The inventory of waste material historically stored at SAA 2010-2 in August 2009 is summarized in Section 10.2.

SAP WORKSHEET #11: DATA QUALITY OBJECTIVES/SYSTEMATIC PLANNING PROCESS STATEMENTS

(UFP-QAPP Manual Section 2.6.1)

Project quality objectives were developed based on the U.S. EPA's *Guidance for Systematic Planning Using the DQO Process* (U.S. EPA 2006) and presented below.

11.1 Problem Statement

Staining and cracks have been observed in the paved surface cover at SWMU 27. The former SAA was not equipped with secondary containment. Potential releases may have reached underlying or adjacent soils. No analytical data have been collected to-date to evaluate the presence/absence of potential contaminants in underlying or adjacent soil.

11.2 Goals of the Study

The goal of this study is to evaluate the presence or absence of impacted soil at SWMU 27. As specified in the GA EPD approved *Final Phase 1 RCRA Facility Work Plan SWMU 27 (Site 2010-2)* (NAVFAC SE 2013), and based on historical operations, soil will be evaluated for VOCs, SVOCs including PAHs, and TAL metals. Findings will provide information to support the development, evaluation, and selection of appropriate response alternatives, if necessary.

The principal study question (PSQ) developed to define decision statements to resolve the problem is:

> *Do concentrations in soil exceed applicable screening levels, resulting in the need for additional investigation and/or risk evaluation?*

Based on the PSQ, the following project decision statement has been developed:

> *Assess whether concentrations in impacted soil exceed applicable screening levels and should be retained as chemicals of potential concern (COPCs).*

11.3 Inputs to Problem Resolution

The inputs needed to resolve the project problem statement identified in Section 11.1 include the following measurements, observations, data, and screening levels as described below. Details of the sampling design are presented in Worksheet #17.

- Chemical Data: To assess if target analytes are present, soil chemical data will be collected for VOCs by SW-846 Method 8260B, SVOCs by SW-846 Method 8270D (including PAHs via selective ion monitoring), and TAL metals by SW-846 Methods 6010C, 6020A, and 7471B. Concentrations of any detected target analytes will be compared to their respective screening levels to support the decision making process.

- Geologic/Hydrogeologic Information: Onsite geologists/engineers will use the Unified Soil Classification System to describe soil characteristics. Moisture content will be observed at each soil boring to provide information on the approximate depth of groundwater table. Such information will be used to refine the CSM and would be considered during any future investigations/risk evaluation (if necessary).

- Field Screening: A photoionization detector, used to measure organic vapors, will assist with characterization and in selecting samples to be submitted for laboratory analysis. Results of field screening are not considered definitive; thus, any decision-making will be made using chemical data.

- Location data: Boring locations will be field-located using a hand-held global-positioning system (GPS) unit, so that coordinates of each sample location can be recorded in field logs.

- Screening Levels: Chemical data will be compared to screening levels to determine COPCs at the Site. Initial soil screening levels will consist of U.S. EPA Residential Regional Screening Levels and default Soil Screening Levels (SSLs) for the Migration to Groundwater, which uses a dilution attenuation factor of 1, to evaluate leaching to groundwater. A target hazard quotient of 0.1 will be applied in the screening process. The most recent version of screening levels will be considered during the data evaluation process. Any analytes measured at concentrations exceeding these screening levels and that are above yet-to-be-determined site-specific background concentrations will be retained as COPCs. In the event that COPCs are determined to exist at the Site, further investigation/risk evaluation may be required.

- Project Action Levels: Worksheet #15 identifies the lowest project action level (PAL) currently identified based on applicable screening levels defined above. The laboratory selected for current work and any laboratories selected for future work are expected to achieve limits of quantitation (LOQs) that are low enough to measure constituent concentrations less than the Worksheet #15 PAL.

Analytical data reported by the laboratory will use the following reporting conventions:

- All concentrations less than the limit of detection (LOD) will be considered non-detects and will be reported as the LOD value with a "U" qualifier
- Concentrations between the LOD and LOQ will be reported as estimated values with a "J" qualifier
- In the event that a target analyte has a Worksheet #15 PAL between the LOD and LOQ, the "J" flagged data will be accepted to achieve project goals
- The inability to quantify select analytes to Worksheet #15 PALs with confidence will be addressed in the RFI report

The complete list of applicable PALs are presented in Worksheet #15 and are identified to ensure laboratory sensitivity is sufficient to meet current standards. Worksheet #15 provides sources for screening levels considered in PAL development; however, note that the most recent version of screening levels will be considered during the data evaluation process.

Uncertainties introduced by LOQs that are greater than the project action level will be discussed in the Resource Conservation and Recovery Act Facility Investigation Report. Furthermore, any constituents with method detection limits reported above PALs will be retained as COPCs to be further evaluated in risk assessment.

11.4 Study Area Boundaries

The horizontal boundaries for Phase I RFI sampling activities are comprised of the fenced enclosure area and drainage areas, which accept runoff from the Site. The vertical boundary for RFI sampling activities extends from the ground surface to the soil/water table interface, estimated at less than 10 feet bgs. Temporal boundaries include the estimated duration of field activities.

11.5 Analytical Approach

During this study, chemical data from soil sampling will be used to evaluate the presence/absence of potential contaminants of concern at the Site. Biased sampling locations will be collected within and outside of the potential release area based on observations of staining, surface cover (asphalt and/or concrete) cracks, and any evidence of stressed vegetation. Initial determinations on the need for follow-up action (i.e., supplemental sampling and analysis, background studies, risk evaluation, etc.) will be based on whether chemical data exceed screening levels. The resulting decision rules are summarized below:

If an analyte at a soil sampling point is reported below its screening level, then no further action is required for that given analyte.

If an analyte at a soil sampling point exceeds its screening level, then the analyte will be identified as a COPC and additional investigation/risk evaluation will be required. Details associated with any additional investigation/risk evaluation (if required) would be described in a forthcoming UFP-SAP addendum to be submitted for review and comment by GA EPD.

11.6 Performance or Acceptance Criteria

The objective of this section is to complete the following:

- Identify potential sources of study error (i.e., field error, analytical error)
- Establish and identify the methods used to reduce potential sources of error
- Determine how decision errors will be managed during the project

Sampling Strategy — Sampling design errors are a function of the selection of sample locations or analytical methods used to characterize the Site. Initial soil boring locations are biased to areas most likely to be contaminated. The sampling design was developed to evaluate the presence/absence of VOCs, SVOCs including PAHs, and metals in soil. Judgmental sampling, based on results of field screening and visual and olfactory observations, will be used to select samples for laboratory analysis.

Sources of Error — Sources of error in the soil investigation may be divided into two main categories: sampling errors and measurement errors. A sampling error occurs when the sampling design, planning, and implementation do not provide for a representative range of heterogeneity at the Site. A measurement error occurs because of performance variance from laboratory

instrumentation, analytical methods, or operator error. The U.S. EPA identifies the combination of all these errors as a "total study error" (U.S. EPA 2006). One objective of the investigation is to reduce the total study error so that decision-makers can be confident that the data collected accurately represent the chemical characteristics of the Site.

Managing Decision Error — This investigation will utilize decision-error minimization techniques in sampling design, sampling methodologies, and laboratory measurements. Possible decision errors will be minimized during the field investigation by using the following methods:

- Use standard field sampling methodologies (as discussed in Worksheets #18 and #21).
- Use applicable analytical methods and standard operating procedures (SOPs) for sample analysis by a competent analytical laboratory having state appropriate National Environmental Laboratory Accreditation Program accreditation, and be accredited through the Department of Defense Environmental Laboratory Accreditation Program.
- Confirm analytical data to identify and control potential laboratory error and sampling error by using matrix spikes, blanks, and duplicate samples.

Decision errors associated with judgmental sampling are based on sample design and measurement errors. Assuming that the best possible professional judgment was used to develop the judgmental sampling plan (i.e., position sampling locations), the most important decision errors will be associated with field and laboratory techniques involved in the collection and analysis of the data.

Field Data Logs — Sample information will be transcribed into a field logbook and/or onto field data sheets.

Analytical Laboratory Sample Management — The sample matrix, number of samples, and number and type of laboratory quality assurance (QA)/quality control (QC) samples are summarized in Worksheets #18, #19, #20, and #30. Also included in this combined worksheet are details on the analytical group, sample volumes, sample container specifications, preservation requirements, and maximum and holding times.

The laboratory will provide electronic data deliverable files, portable document format files of the data deliverables for all project data, and a hard copy of data deliverables for all results. Designated samples will be used to obtain necessary subsamples for laboratory QC measurements (i.e., analytical sample duplicate and sample matrix spike/matrix spike duplicate). Tasks will be completed using the laboratory SOPs.

Resolution Consultants will provide data validation services and verify and evaluate the usability of the data as described in Worksheets #34 through #36.

Portable document format copies of all analytical data packages will be stored on CD-ROM, archived in the NAVFAC Atlantic Administrative Record, and uploaded onto the Naval Installation Restoration Information Solution (NIRIS) system at the close of the project. All other data generated in the field and reports generated for the project will be stored as computer readable data files by Resolution Consultants.

11.7 Data Collection Plan

Non-statistical methods (professional judgment) will be used as the primary basis for the sampling design. This approach was chosen to evaluate the presence/absence of VOCs, SVOCs including PAHs, and metals in soil. The sample design and rationale is presented in Worksheet #17.

SAP WORKSHEET #12: FIELD QUALITY CONTROL SAMPLES

(UFP-QAPP Manual Section 2.6.2)

Measurement Performance Criteria Table — Field QC Samples				
QC Sample	**Analytical Group**	**Frequency**	**Data Quality Indicators**	**Measurement Performance Criteria**
Equipment Rinsate Blank	All	One per sampling day per matrix	Bias/Contamination	No analytes > ½ LOQ, except common lab contaminants, which must be < LOQ
Trip Blanks	VOCs	One per cooler containing VOC samples	Bias/Contamination	No analytes > ½ LOQ, except common lab contaminants, which must be < LOQ
Field Duplicate	All	One per 10 field samples per sampling event	Precision	Values > 5X LOQ: RPD must be ≤50 (Soil)
Matrix Spike/Matrix Spike Duplicate	All	One pair per 20 field samples per sampling event	Accuracy/Bias/ Precision	Percent recoveries — DoD QSM Limits RPD must be ≤ 30% (Organics) and RPD ≤ 20% (Inorganics)
Cooler Temperature Indicator	All	One per cooler	Representativeness	Temperature less than 6 degrees Celsius

Notes:

QC = Quality control
VOCs = Volatile organic compounds
LOQ = Limit of quantitation
DoD QSM = Department of Defense Quality Systems Manual
RPD = Relative percent difference

SAP WORKSHEET #17: SAMPLING DESIGN AND RATIONALE

(UFP-QAPP Manual Section 3.1.1)

17.1 Sampling Approach

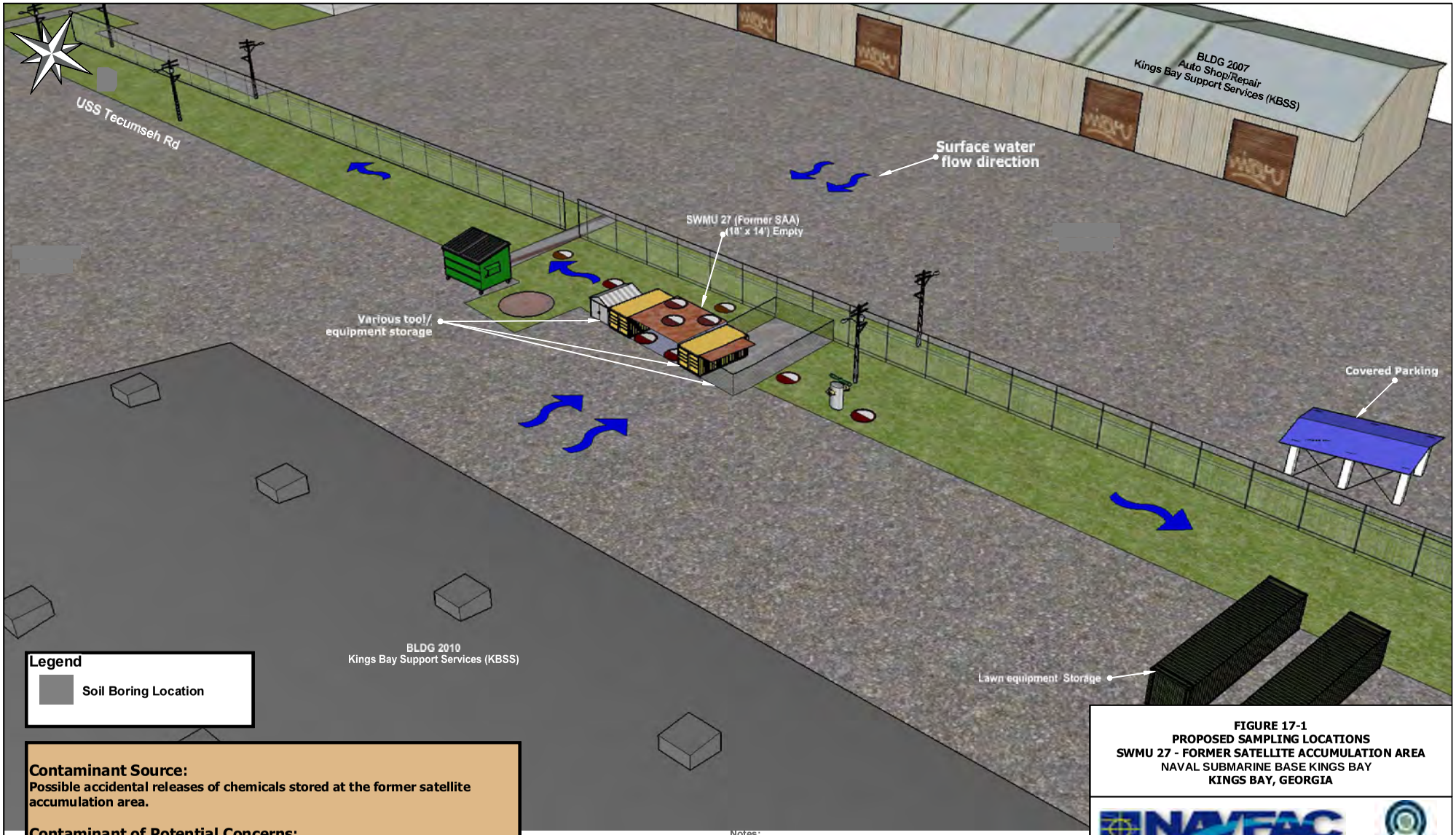
As previously described in Worksheet #11, data are necessary to evaluate the presence/absence of potential contaminants of concern in soil. Sampling strategies, as presented herein, are designed to evaluate soil for VOCs, SVOCs (including PAHs), and metals, based on historical operations at the Site. Furthermore, the proposed strategy, as presented herein, is consistent with the GA EPD approved *Final Phase I RCRA Facility Investigation Work Plan SWMU 27 (Site 2010-2)* (NAVFAC SE 2013). Findings will provide information to support a decision concerning whether or not future action is required.

This Worksheet presents the design and rationale of the sampling and analysis program to be conducted during the soil investigation. The sampling approach, based on professional judgment, is biased to determine the extent of contamination based on the presence of surficial soil staining and subsurface screening. Proposed sampling locations are illustrated on Figure 17-1. A summary table, including sample identification numbers, depth, relevant SOPs, and applicable laboratory and field analyses, is included as Worksheet #18. SOPs for field activities are summarized in Worksheet #21 and included as Appendix A.

Professional judgment may be used to adjust sampling locations and/or depths in the field. Examples of criteria, which may lead to changes to the sampling plan, may include (but not limited to) visual observations/staining, odors, elevated headspace organic vapor readings, etc.

Soil samples will be submitted to Environmental Conservation Laboratories, Inc. (ENCO) for chemical analyses. Analytical methods are identified in Worksheet #23. Laboratory SOPs are listed in Worksheet #23. The total numbers of sample analyses to be performed for each target analyte or analytical group are identified in Worksheets #18 and #20. Worksheets #19 and #30 present a summary of the sample analyses, container types and volumes, preservation requirements, and holding times.

Planned field QC samples will include trip blanks, field duplicates, and equipment rinsate blanks. Worksheet #12 presents the field QC sample summary. Additional sample volume will be collected as necessary for laboratory QC analysis of matrix spike/matrix spike duplicate samples.



Legend

Soil Boring Location

Contaminant Source:
Possible accidental releases of chemicals stored at the former satellite accumulation area.

Contaminant of Potential Concerns:
Volatile organic compounds; semi-volatile organic compounds; metals

Notes:
1. Conceptual Site Model not to scale. Horizontal dimensions based on recent aerial imaging and historic reports. Vertical dimensions exaggerated for purpose of conveying pertinent site information.
2. Groundwater monitoring well locations are approximated based on geographic information system data.
3. bgs = below ground surface

FIGURE 17-1
PROPOSED SAMPLING LOCATIONS
SWMU 27 - FORMER SATELLITE ACCUMULATION AREA
NAVAL SUBMARINE BASE KINGS BAY
KINGS BAY, GEORGIA

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

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Sample locations will be marked in the field using a wooden stake or brightly colored pin flag. Coordinates of each sample location will be recorded using a GPS device, which will allow for future reacquisition of the locations if further investigation or remedial action is necessary. All sample location markers will be removed prior to final demobilization.

17.2 Soil Sampling Program

Following subsurface utility clearance and coring of asphalt/concrete, hand augers and/or direct push technology will be used to advance ten soil borings, as depicted on Figure 17-1. Five of the soil borings will be positioned within the fenced-in, historical SAA, while the remaining five borings will be positioned in areas which receive runoff. Soil will be continuously logged for lithological characterization. A photoionization detector will be used to screen for organic vapors at 1-foot depth intervals. Each boring will be terminated at the water table, expected to be encountered at approximately 7 feet bgs.

Soil samples will be collected from each boring in accordance with the approved Work Plan and submitted for chemical analysis. VOC soil samples will be collected using Method 5035 and TerraCore kits (or equivalent). One surface sample will be collected from 0 to 0.5 feet bgs, with additional samples collected every two feet deep thereafter until the water table is reached. Samples will be submitted for chemical analysis of VOCs by SW-846 Method 8260B, SVOCs by SW-846 Method 8270D (including PAHs via selective ion monitoring), and TAL metals by SW-846 Methods 6010C, 6020A, and 7471B. Following sampling activities, soil borings will be abandoned per applicable state guidance.

SAP WORKSHEET #14: FIELD PROJECT TASKS

(UFP-QAPP Manual Section 2.8.1)

FIELD PROJECT IMPLEMENTATION (FIELD PROJECT INSTRUCTIONS)

In general, this project includes the advancement of soil borings and the collection and analysis of soil samples. Project-specific SOPs and field forms for field tasks referenced in this worksheet are identified by title in Worksheet #21 and copies of each SOP are provided in Appendix A. Field tasks are as follows:

- Mobilization/Demobilization
- Site-Specific Health and Safety Training
- Utility Clearance
- Equipment Calibration
- Soil Sampling
- GPS Locating
- Waste Handling
- Decontamination
- Site Restoration
- Field Documentation

Additional project-related tasks include:

- Analytical Tasks
- Data Management
- Data Review
- Report Preparation

Mobilization/Demobilization

Mobilization will consist of the delivery, assembly, and secure storage of necessary equipment, materials, and supplies, along with the acquisition of personnel and vehicle base access badges. The Resolution Consultants Field Team Leader (FTL) or designee will coordinate with the SUBASE's point of contact (POC) to identify appropriate locations for the temporary storage of equipment and supplies.

Site-specific health and safety training for all Resolution Consultants field personnel and subcontractors will be conducted as part of mobilization. There are no specialized/non-routine project-specific training requirements or certifications needed by personnel to successfully complete the project tasks. All field personnel will have appropriate training to conduct the field activities to which they are assigned. Each worker will be required to have completed the Occupational Safety and Health Administration 40-hour Hazardous Waste Operations and Emergency Response course and 8-hour refresher, if applicable. Additional health and safety requirements are addressed in greater detail in the Site Safety and Health Plan.

Demobilization will consist of the prompt and timely removal of equipment, materials, and supplies from the Site, at the completion of fieldwork. Demobilization also includes the cleanup and removal of waste generated during the investigation.

Utility Clearance

A minimum of two weeks prior to the commencement of any intrusive activities, Resolution Consultants will coordinate utility clearance with the SUBASE POC and the Utility Protection Center Inc., of Georgia, in accordance with SOP-3-01. SUBASE personnel and the Utility Protection Center Inc. will identify and mark utilities that may be present near the proposed intrusive sampling locations. The Resolution Consultants FTL will document the utility clearance process and obtain all required approvals, as deemed necessary by the SUBASE POC. Utilities that are identified in the field, but not shown or incorrectly shown on the work approval documentation, will be marked directly on the document and returned to the SUBASE POC for inclusion in the Geographic Information System database, if available.

Equipment Calibration

Field equipment (photoionization detector) calibration procedures are described in SOP-3-20. At a minimum, field equipment will be calibrated at the beginning and end of each day, unless stated otherwise by the equipment manufacturer. Documentation of field equipment calibration is required.

Soil Sampling

The sampling and analysis program is outlined in Worksheets #17 and #18. Subsurface soil samples will be collected from soil borings advanced via hand auger or direct push technology tooling, in accordance with SOP-3-17 and SOP-3-21. Representative soil will be obtained, at a minimum of 2-foot depth intervals, for lithologic logging and field screening for organic vapors per SOP-3-19 and SOP-3-20. Sample collection and handling will be in accordance with SOP-3-03A, SOP-3-04A, and SOP-3-21 and as described in Worksheet #21. VOC soil samples will be collected using Method 5035 and TerraCore kits (or equivalent). A soil boring log will be prepared for each boring with soil descriptions and all relevant information, observations, depth to water, and field screening results. Sample depths will be included on each log. After sampling, each borehole will be backfilled to within 6 inches of grade using soil cuttings removed from the borehole and/or bentonite grout. The surface cover will be repaired using ready-mix concrete or asphalt.

Global Positioning System Locating

In general accordance with the U.S. EPA SOP SESDPROC-110-R3, a hand-held GPS unit capable of sub-meter accuracy (i.e., Trimble GeoXM or Trimble GeoHX) will be used to locate sampling points. GPS data will be stored in the GPS unit and downloaded to a computer daily or as soon as possible after acquisition. Data will also be manually entered into a field log as it is collected. Once downloaded from the GPS unit, the data will then be uploaded for processing by Resolution Consultants' Geographic Information System personnel. To ensure sub-meter accuracy, a minimum of six satellites is desired for each position. If GPS accuracy is not sub-meter, data will not be collected until more satellites become available and the accuracy criteria are met. In locations where the overhead canopy interferes with satellite lines-of-sight and GPS accuracy cannot be reasonably established, an alternative positioning technique will be employed (e.g., compass and tape measure, fiducials, or total station) to ensure that sample locations can be reacquired at a later date, if necessary.

Waste Handing

Investigative derived waste (IDW) will be managed in accordance with SOP-3-05 KB27, included as Appendix A of this SAP. IDW may consist of soil cuttings, personal protective equipment, and decontamination fluids. IDW will be containerized in adequately labeled 55-gallon department of transportation approved drums. Characterization samples will be collected and submitted for chemical analysis, as required by the disposal facility. Pending characterization data, the drums will be temporarily staged in a fenced secured area, a 90-day storage facility, or as instructed by the SUBASE POC. Based on characterization results, IDW will be transported and appropriately disposed at a Navy-approved offsite disposal facility. IDW disposal manifests will be appended to the report. Personal protective equipment, including gloves, wipes, discarded paper towels, and disposable equipment (i.e., tubing), will be bagged and properly discarded in an appropriate on-base solid waste container.

Decontamination

Decontamination of reusable sampling equipment will be conducted prior to sampling and between samples at each location, in accordance with SOP-3-06. An area for the temporary decontamination pad and a source of potable water for steam cleaning will be arranged by the FTL through the SUBASE POC.

Site Restoration

If investigation activities disturb or alter the landscape or vegetation, surfaces will be restored to pre-existing conditions (to the extent possible). Asphalt and/or concrete patching will be performed where borings penetrate paved surfaces. Equipment and supplies used during the investigation will be removed at the conclusion of field activities.

Field Documentation

Field documentation will be performed in accordance with SOP-3-02 and SOP-3-03A. A summary of field activities will be properly recorded in indelible ink in a bound logbook with consecutively numbered pages that cannot be removed. If an incorrect entry is made, striking a single line through the incorrect information will make the correction; and the person making the correction will initial and date the change. Logbooks will be assigned to field personnel and stored in a secured area when not in use. Boring logs, sampling forms, and other field forms will also be used to document field activities.

Analytical Tasks

Chemical analyses will be performed by ENCO in Orlando, Florida, a National Environmental Laboratory Accreditation Program and Department of Defense Environmental Laboratory Accreditation Program-accredited laboratory. Copies of pertinent laboratory accreditation certificates may be found in Appendix B. Chemical analyses will be performed in accordance with the analytical methods identified in Worksheets #23 and #30. ENCO will provide fully validatable chemical data packages, which will include summary forms containing all quality control information and raw data. Soil results will be reported on an adjusted dry-weight basis. Results of percent moisture will be reported in each analytical data package and associated electronic data deliverable files. This information will also be captured in the project database and RFI report, which will eventually be uploaded to the NIRIS database.

Data Management and Review

The principal data generated for this project will be from field data and laboratory analytical data. The field forms, chain-of-custody, air bills, and logbooks will be placed in the project files after the completion of the field program. The field logbooks for this project will be used only for this Site, and will also be categorized and maintained in the project files after the completion of the field program. All project records will be maintained in a secure location.

Data Tracking — The Resolution Consultants Task Order Manager (TOM), or designee, is responsible for the overall tracking and control of data generated for the project. Data are tracked from generation to archiving in the project specific files. The Project Chemist, or designee, is responsible for tracking the samples collected and shipped to the contracted laboratory. Upon receipt of the data packages from the analytical laboratory, the Project Chemist will oversee the data validation effort, which includes verifying that the data packages are complete and that results for all samples have been delivered by the analytical laboratory.

Resolution Consultants shall submit all Administrative Record Files, Site Files, and Post Decision Files in accordance with the specifications defined in the NAVFAC *Environmental Restoration Recordkeeping Manual* (NAVFAC, 1 September 2009). Additionally, Resolution Consultants will update and manage the project related documents, data, and maps in NIRIS. Project related spatial data including maps, models, and associated collected or created data will also be uploaded into NIRIS. All documentation submittals for NIRIS will be coordinated with the Navy RPM.

Data Storage, Archiving, and Retrieval — After the data are validated; the data packages are entered into the Resolution Consultants file system and archived in secure files. The field records including field logbooks, sample logs, chain-of-custody records, and field calibration logs will be submitted by the Resolution Consultants FTL to be entered into the file system before archiving in secure project files. Project files are audited for accuracy and completeness. Project files will be kept in a secured, limited access area. At the completion of the Navy contract, files will be shipped to the Federal Records Center for storage where the files will remain until 50 years after the last decision document for the facility.

Data Security — Access to Resolution Consultants project files is restricted to designated personnel only. The Resolution Consultants Data Manager maintains the electronic data files, and access to the data files is restricted to qualified personnel only. File and data backup procedures are routinely performed.

Electronic Data — Laboratory data, provided in electronic format, will be verified for accuracy prior to use and during the data validation process. After data are validated, the electronic data results will be uploaded into the Resolution Consultants database for use in data evaluation and subsequent report preparation. The project database will be on a password protected secure network and access to changing data files will be restricted to qualified personnel. The Resolution Consultants TOM (or designee) is responsible for the overall tracking and control of data generated for the project. All final electronic data and administrative records will be compiled and uploaded into the NIRIS database for final repository.

Data Review and Validation — After receipt of analytical laboratory results, Resolution Consultants will verify data completeness as specified on Worksheet #34. To ensure that the analytical results meet the project quality objectives, the laboratory data will undergo verification and validation as cited in Worksheets #34 through #36 and described below.

Prior to data validation, electronic laboratory data will be verified for accuracy against the hardcopy laboratory report and the electronic quality assurance project plan (eQAPP) will be established using the project-specific criteria defined in Worksheets #12, #19, and #28. The laboratory will be requested to resubmit electronic data found to be inaccurate.

During the data validation process, the Resolution Consultants Data Validation Assistant (DVA) tool will be used to review method accuracy and precision data from field and laboratory QC samples contained in the laboratory electronic data deliverable and to qualify that data according to the project-specific eQAPP. The DVA tool uses EarthSoft's EQuIS relational database to assemble a series of Excel worksheets into a DVA workbook for the validator that present:

- Data validation QC elements that need review, compared to control limits stored in the project-specific eQAPP.
- Associated sample results for duplicated samples and blanks.
- A place to make the necessary qualifications and result updates directly into an electronic format documentation of qualifications using coded reasons.
- A list of all samples affected by the qualification.

Laboratory calibration will be assessed against the criteria presented in the Department of Defense *Quality Systems Manual* using the hardcopy laboratory report; the results of these findings will be added to the Excel DVA workbook. The DVA workbook is used to update the project database with the validator's changes, eliminating the manual data entry process and allowing for 100 percent of data to be reviewed prior to uploading to the project database.

Report Preparation

A Phase I RFI report will be prepared to present results of the investigation and satisfy Data Quality Objectives, as identified in Worksheet #11. Draft RFI reports will be submitted to NAVFAC SE, SUBASE, and GA EPD for comments and approval. Response to comments and necessary revisions will be made to the draft reports before issuing a final report.

SAP WORKSHEET #21: FIELD SOPS REFERENCE TABLE

(UFP-QAPP Manual Section 3.1.2)

Field sampling SOPs for activities presented in this SAP are listed below.

Field SOPs Reference Table					
SOP Reference Number	**Title/Author**	**Revision Date or Version Number**	**Location of SOP**	**Any Planned Deviation for Project Work**	**Comments**
SOP-3-01	Utility Clearance/Resolution Consultants	Revision 0; June 2012	Appendix A	No	
SOP-3-02	Log Books/Resolution Consultants	Revision 0; May 2012	Appendix A	No	
SOP-3-03A	Record Keeping, Sampling Labeling, and Chain-of-Custody/Resolution Consultants	Revision 0; August 2012	Appendix A	No	
SOP-3-04A	Sample Handling, Storage, and Shipping/Resolution Consultants	Revision 0; May 2012	Appendix A	No	
SOP-3-05 KB27	Investigation-Derived Waste Management/Resolution Consultants	Revision 1; March 2014	Appendix A	No	Investigative-derived waste will be disposed to an approved offsite facility.
SOP-3-06	Equipment Decontamination/Resolution Consultants	Revision 0; May 2012	Appendix A	No	
SOP-3-17	Direct Push Sampling Techniques/Resolution Consultants	Revision 0; May 2012	Appendix A	No	
SOP-3-19	Headspace Screening for VOCs/Resolution Consultants	Revision 0; May 2012	Appendix A	No	
SOP-3-20	Operation and Calibration of a Photoionization Detector/Resolution Consultants	Revision 0; May 2012	Appendix A	No	
SOP-3-21	Surface and Subsurface Soil Sampling/Resolution Consultants	Revision 0; May 2012	Appendix A	No	
SESDPROC-110-R3	Global Positioning System/United States Environmental Protection Agency, Region 4	Revision 3, April 2011	Appendix A	No	

Notes: SOP = Standard operating procedure VOC = Volatile organic compounds

SAP WORKSHEETS #18, #19, #20, AND #30: LOCATION-SPECIFIC SAMPLING METHODS/SOP REQUIREMENTS TABLE

(UFP-QAPP Manual Sections 3.1.1 and 3.5.2.3)

FIELD PROJECT IMPLEMENTATION (FIELD PROJECT INSTRUCTIONS), CONTINUED

Laboratory Name and Address: Environmental Conservation Laboratories, Inc., 10775 Central Port Drive, Orlando, FL 32824

Laboratory Point of Contact: Marcia Colon, mcolon@encolabs.com, 407-826-5314

	VOCs	SVOCs/ PAHs via SIM	Metals
Analysis Group:	VOCs	SVOCs/ PAHs via SIM	Metals
Analytical Method:	SW-846 5035/8260B	SW-846 8270D	SW-846 6010C, 6020A, 7470B, 7470A
Laboratory SOP Reference:	VGCMS-05	EXSV-16,SVGCMS-03	EXMT-09, MET-05, MET-15, MET-16
Data Package Turnaround Time:	21 Days	21 Days	21 Days
Container Type/Volume Required:	3 — 40 mL glass vials plus 2 ounce jar	1 — 4 ounce jar	1 — 4 ounce jar
Preservative:	Methanol (1 vial) and water (2 vials), Cool to ≤ 6°C	Cool to ≤ 6°C	Cool to ≤ 6°C
Holding Time:	48 hours to freeze water vials; 14 days for analysis	14 days to preparation, 40 days from preparation to analysis	180 days (28 days mercury)

Matrix	Sample Location	Sample ID	X	Y			
Soil	KB27SB01	KB27SB01SO00N1	TBD	TBD	1	1	1
Soil	KB27SB01	KB27SB01SO02N1	TBD	TBD	1	1	1
Soil	KB27SB01	KB27SB01SO04N1	TBD	TBD	1	1	1
Soil	KB27SB01	KB27SB01SO06N1	TBD	TBD	1	1	1
Soil	KB27SB02	KB27SB02SO00N1	TBD	TBD	1	1	1
Soil	KB27SB02	KB27SB02SO02N1	TBD	TBD	1	1	1
Soil	KB27SB02	KB27SB02SO04N1	TBD	TBD	1	1	1
Soil	KB27SB02	KB27SB02SO06N1	TBD	TBD	1	1	1
Soil	KB27SB03	KB27SB03SO00N1	TBD	TBD	1	1	1
Soil	KB27SB03	KB27SB03SO02N1	TBD	TBD	1	1	1
Soil	KB27SB03	KB27SB03SO04N1	TBD	TBD	1	1	1
Soil	KB27SB03	KB27SB03SO06N1	TBD	TBD	1	1	1
Soil	KB27SB04	KB27SB04SO00N1	TBD	TBD	1	1	1
Soil	KB27SB04	KB27SB04SO02N1	TBD	TBD	1	1	1

Laboratory Name and Address: Environmental Conservation Laboratories, Inc., 10775 Central Port Drive, Orlando, FL 32824 **Laboratory Point of Contact:** Marcia Colon, mcolon@encolabs.com, 407-826-5314		**Analysis Group:**			**VOCs**	**SVOCs/ PAHs via SIM**	**Metals**
		Analytical Method:			SW-846 5035/8260B	SW-846 8270D	SW-846 6010C, 6020A, 7470B, 7470A
		Laboratory SOP Reference:			VGCMS-05	EXSV-16,SVGCMS-03	EXMT-09, MET-05, MET-15, MET-16
		Data Package Turnaround Time:			21 Days	21 Days	21 Days
		Container Type/Volume Required:			3 — 40 mL glass vials plus 2 ounce jar	1 — 4 ounce jar	1 — 4 ounce jar
		Preservative:			Methanol (1 vial) and water (2 vials), Cool to ≤ 6°C	Cool to ≤ 6°C	Cool to ≤ 6°C
		Holding Time:			48 hours to freeze water vials; 14 days for analysis	14 days to preparation, 40 days from preparation to analysis	180 days (28 days mercury)
Matrix	**Sample Location**	**Sample ID**	**X**	**Y**			
Soil	KB27SB04	KB27SB04SO04N1	TBD	TBD	1	1	1
Soil	KB27SB04	KB27SB04SO06N1	TBD	TBD	1	1	1
Soil	KB27SB05	KB27SB05SO00N1	TBD	TBD	1	1	1
Soil	KB27SB05	KB27SB05SO02N1	TBD	TBD	1	1	1
Soil	KB27SB05	KB27SB05SO04N1	TBD	TBD	1	1	1
Soil	KB27SB05	KB27SB05SO06N1	TBD	TBD	1	1	1
Soil	KB27SB06	KB27SB06SO00N1	TBD	TBD	1	1	1
Soil	KB27SB06	KB27SB06SO02N1	TBD	TBD	1	1	1
Soil	KB27SB06	KB27SB06SO04N1	TBD	TBD	1	1	1
Soil	KB27SB06	KB27SB06SO06N1	TBD	TBD	1	1	1
Soil	KB27SB07	KB27SB07SO00N1	TBD	TBD	1	1	1
Soil	KB27SB07	KB27SB07SO02N1	TBD	TBD	1	1	1
Soil	KB27SB07	KB27SB07SO04N1	TBD	TBD	1	1	1
Soil	KB27SB07	KB27SB07SO06N1	TBD	TBD	1	1	1
Soil	KB27SB08	KB27SB08SO00N1	TBD	TBD	1	1	1
Soil	KB27SB08	KB27SB08SO02N1	TBD	TBD	1	1	1
Soil	KB27SB08	KB27SB08SO04N1	TBD	TBD	1	1	1
Soil	KB27SB08	KB27SB08SO06N1	TBD	TBD	1	1	1

Laboratory Name and Address: Environmental Conservation Laboratories, Inc., 10775 Central Port Drive, Orlando, FL 32824 **Laboratory Point of Contact:** Marcia Colon, mcolon@encolabs.com, 407-826-5314							
				Analysis Group:	**VOCs**	**SVOCs/ PAHs via SIM**	**Metals**
				Analytical Method:	SW-846 5035/8260B	SW-846 8270D	SW-846 6010C, 6020A, 7470B, 7470A
				Laboratory SOP Reference:	VGCMS-05	EXSV-16,SVGCMS-03	EXMT-09, MET-05, MET-15, MET-16
				Data Package Turnaround Time:	21 Days	21 Days	21 Days
				Container Type/Volume Required:	3 — 40 mL glass vials plus 2 ounce jar	1 — 4 ounce jar	1 — 4 ounce jar
				Preservative:	Methanol (1 vial) and water (2 vials), Cool to ≤ 6°C	Cool to ≤ 6°C	Cool to ≤ 6°C
				Holding Time:	48 hours to freeze water vials; 14 days for analysis	14 days to preparation, 40 days from preparation to analysis	180 days (28 days mercury)
Matrix	**Sample Location**	**Sample ID**	**X**	**Y**			
Soil	KB27SB09	KB27SB09SO00N1	TBD	TBD	1	1	1
Soil	KB27SB09	KB27SB09SO02N1	TBD	TBD	1	1	1
Soil	KB27SB09	KB27SB09SO04N1	TBD	TBD	1	1	1
Soil	KB27SB09	KB27SB09SO06N1	TBD	TBD	1	1	1
Soil	KB27SB10	KB27SB10SO00N1	TBD	TBD	1	1	1
Soil	KB27SB10	KB27SB10SO02N1	TBD	TBD	1	1	1
Soil	KB27SB10	KB27SB10SO04N1	TBD	TBD	1	1	1
Soil	KB27SB10	KB27SB10SO06N1	TBD	TBD	1	1	1
Field Duplicate	TBD	TBD	TBD	TBD	4	4	4
Matrix Spike	TBD	TBD	TBD	TBD	2	2	2
Matrix Spike Duplicate	TBD	TBD	TBD	TBD	2	2	2
Equipment Blank	—	EBMMDDYY	—	—	3	3	3
Trip Blank	—	TBMMDDYY	—	—	3	0	0
Total Number of Samples to the Laboratory (minus MS/MSDs):					**50**	**47**	**47**

Notes:

VOCs	=	Volatile organic compounds
SVOCs	=	Semi-volatile organic compounds
°C	=	Degree Celsius
PAHs	=	Polynuclear aromatic hydrocarbons
SIM	=	Selective ion monitoring
TBD	=	Survey coordinates, field duplicates, and matrix spike/matrix spike duplicates will be determined in the field
MMDDYY	=	month (MM), day (DD), year (YY), (e.g., 030114 for 1 March 2014)

Frequency of quality assurance/quality control sample collection:
Field Duplicate — One per 10 field samples
MS/MSD — One pair per 20 field samples (including field QC samples)
Trip Blank — One per cooler to the laboratory containing volatiles (anticipated to be 3 coolers)
Equipment Blank — One per day of sampling (anticipated to be 3 days)

SAP WORKSHEET #15: REFERENCE LIMITS AND EVALUATION TABLES

(UFP-QAPP Manual Section 2.8.1)

Matrix:	Soil									
Analytical Group:	Volatile Organic Compounds by U.S. EPA Method SW8260B									
Analyte	**CAS No.**	**U.S. EPA R RSL (µg/kg)**	**Risk-Based SSLs for Migration to GW (DAF 1) (µg/kg)**	**MCL-Based SSLs for Migration to GW (DAF 1) (µg/kg)**	**Project Action Level (µg/kg)**	**Project Action Level Reference**	**Project Quantitation Limit Goal (µg/kg)**	**Laboratory Limits (1)**		
								LOQ (µg/kg)	**LOD (µg/kg)**	**DL (µg/kg)**
1,1,1,2-Tetrachloroethane	630-20-6	2000	0.22	-	0.22	SSL-Risk	0.073	**2.0**	**1.0**	**0.4**
1,1,1-Trichloroethane	71-55-6	810000	280	70	70	SSL-MCL	23	2.0	1.0	0.4
1,1,2,2-Tetrachloroethane	79-34-5	600	0.05	-	0.05	SSL-Risk	0.017	**2.0**	**1.0**	**0.3**
1,1,2-Trichloroethane	79-00-5	150	0.013	1.6	0.013	SSL-Risk	0.0043	**2.0**	**1.0**	**0.6**
1,1-Dichloroethane	75-34-3	3600	0.78	-	0.78	SSL-Risk	0.26	**2.0**	**1.0**	0.6
1,1-Dichloroethene	75-35-4	23000	10	2.5	2.5	SSL-MCL	0.83	2.0	1.0	0.6
1,1-Dichloropropene	563-58-6	-	-	-	-	-	-	2.0	1.0	0.5
1,2,3-Trichlorobenzene	87-61-6	4900	2.1	-	2.1	SSL-Risk	0.7	2.0	1.0	0.9
1,2,3-Trichloropropane	96-18-4	5.1	0.00032	-	0.00032	SSL-Risk	0.00011	**2.0**	**1.0**	**0.3**
1,2,4-Trichlorobenzene	120-82-1	5800	1.2	200	1.2	SSL-Risk	0.4	**2.0**	1.0	0.8
1,2,4-Trimethylbenzene	95-63-6	5800	2.1	-	2.1	SSL-Risk	0.7	2.0	1.0	0.7
1,2-Dibromo-3-chloropropane	96-12-8	5.3	0.00014	0.086	0.00014	SSL-Risk	0.000047	**2.0**	**1.0**	**0.6**
1,2-Dibromoethane	106-93-4	36	0.0021	0.014	0.0021	SSL-Risk	0.0007	**2.0**	**1.0**	**0.3**
1,2-Dichlorobenzene	95-50-1	180000	30	580	30	SSL-Risk	10	2.0	1.0	0.4
1,2-Dichloroethane	107-06-2	460	0.048	1.4	0.048	SSL-Risk	0.016	**2.0**	**1.0**	**0.3**
1,2-Dichloropropane	78-87-5	1000	0.15	1.7	0.15	SSL-Risk	0.05	**2.0**	**1.0**	**0.6**
1,3,5-Trimethylbenzene	108-67-8	78000	17	-	17	SSL-Risk	5.7	2.0	1.0	0.6
1,3-Dichlorobenzene	541-73-1	-	-	-	-	-	-	2.0	1.0	0.5
1,3-Dichloropropane	142-28-9	160000	12	-	12	SSL-Risk	4	2.0	1.0	0.4
1,4-Dichlorobenzene	106-46-7	2600	0.46	72	0.46	SSL-Risk	0.15	**2.0**	**1.0**	0.4
2,2-Dichloropropane	594-20-7	-	-	-	-	-	-	2.0	1.0	0.4
2-Butanone	78-93-3	2700000	120	-	120	SSL-Risk	40	5.0	2.5	1.8
2-Chlorotoluene	95-49-8	160000	23	-	23	SSL-Risk	7.7	2.0	1.0	0.5
2-Hexanone	591-78-6	20000	0.88	-	0.88	SSL-Risk	0.29	**5.0**	**2.5**	**0.9**
4-Chlorotoluene	106-43-4	160000	24	-	24	SSL-Risk	8	2.0	1.0	0.6
4-Methyl-2-pentanone	108-10-1	530000	28	-	28	SSL-Risk	9.3	5.0	2.5	1.4
Acetone	67-64-1	6100000	290	-	290	SSL-Risk	97	25	12	1.7
Benzene	71-43-2	1200	0.23	2.6	0.23	SSL-Risk	0.077	**2.0**	**1.0**	**0.4**

Matrix:	Soil									
Analytical Group:	Volatile Organic Compounds by U.S. EPA Method SW8260B									
Analyte	**CAS No.**	**U.S. EPA R RSL (µg/kg)**	**Risk-Based SSLs for Migration to GW (DAF 1) (µg/kg)**	**MCL-Based SSLs for Migration to GW (DAF 1) (µg/kg)**	**Project Action Level (µg/kg)**	**Project Action Level Reference**	**Project Quantitation Limit Goal (µg/kg)**	**Laboratory Limits (1)**		
								LOQ (µg/kg)	**LOD (µg/kg)**	**DL (µg/kg)**
Bromobenzene	108-86-1	29000	4.2	-	4.2	SSL-Risk	1.4	2.0	1.0	0.4
Bromochloromethane	74-97-5	15000	2.1	-	2.1	SSL-Risk	0.7	2.0	1.0	0.4
Bromodichloromethane	75-27-4	290	0.036	22	0.036	SSL-Risk	0.012	**2.0**	**1.0**	**0.4**
Bromoform	75-25-2	67000	2.4	21	2.4	SSL-Risk	0.8	2.0	1.0	0.3
Bromomethane	74-83-9	680	0.19	-	0.19	SSL-Risk	0.063	**10**	**5.0**	**0.9**
Carbon disulfide	75-15-0	77000	12	-	12	SSL-Risk	4	10	5.0	2.1
Carbon tetrachloride	56-23-5	650	0.18	1.9	0.18	SSL-Risk	0.06	**2.0**	**1.0**	**0.6**
Chlorobenzene	108-90-7	28000	5.3	68	5.3	SSL-Risk	1.8	2.0	1.0	0.5
Chloroethane	75-00-3	1400000	590	-	590	SSL-Risk	200	2.0	1.0	0.5
Chloroform	67-66-3	320	0.061	22	0.061	SSL-Risk	0.02	**2.0**	**1.0**	**0.4**
Chloromethane	74-87-3	11000	4.9	-	4.9	SSL-Risk	1.6	2.0	1.0	0.6
cis-1,2-Dichloroethene	156-59-2	16000	1.1	21	1.1	SSL-Risk	0.37	**2.0**	1.0	0.5
cis-1,3-Dichloropropene	10061-01-5	-	-	-	-	-	-	2.0	1.0	0.3
Dibromochloromethane	124-48-1	730	0.045	21	0.045	SSL-Risk	0.015	**2.0**	**1.0**	**0.3**
Dibromomethane	74-95-3	2300	0.2	-	0.2	SSL-Risk	0.067	**2.0**	**1.0**	**0.4**
Dichlorodifluoromethane	75-71-8	8700	30	-	30	SSL-Risk	10	2.0	1.0	0.6
Ethylbenzene	100-41-4	5800	1.7	780	1.7	SSL-Risk	0.57	**2.0**	1.0	0.6
Hexachlorobutadiene	87-68-3	6200	0.57	-	0.57	SSL-Risk	0.19	**2.0**	**1.0**	**0.9**
Isopropylbenzene	98-82-8	190000	74	-	74	SSL-Risk	25	2.0	1.0	0.5
m-Xylene	108-38-3	55000	19	-	19	SSL-Risk	6.3	4.0	2.0	1.0
p-Xylene	106-42-3	56000	19	-	19	SSL-Risk	6.3	4.0	2.0	1.0
Methyl Tert-Butyl Ether	1634-04-4	47000	3.2	-	3.2	SSL-Risk	1.1	2.0	1.0	0.3
Methylene chloride	75-09-2	35000	2.7	1.3	1.3	SSL-MCL	0.43	**10**	**5.0**	0.7
n-Butylbenzene	104-51-8	390000	320	-	320	SSL-Risk	110	2.0	1.0	0.9
Propylbenzene	103-65-1	330000	120	-	120	SSL-Risk	40	2.0	1.0	0.6
o-Xylene	95-47-6	65000	19	-	19	SSL-Risk	6.3	2.0	1.0	0.5
4-Isopropyltoluene	99-87-6	-	-	-	-	-	-	2.0	1.0	0.8
sec-Butylbenzene	135-98-8	780000	590	-	590	SSL-Risk	200	2.0	1.0	0.6
Styrene	100-42-5	600000	130	110	110	SSL-MCL	37	2.0	1.0	0.4
tert-Butylbenzene	98-06-6	780000	110	-	110	SSL-Risk	37	2.0	1.0	0.6
Tetrachloroethene	127-18-4	8100	1.8	2.3	1.8	SSL-Risk	0.6	**2.0**	1.0	0.5

Matrix:	Soil									
Analytical Group:	Volatile Organic Compounds by U.S. EPA Method SW8260B									
Analyte	**CAS No.**	**U.S. EPA R RSL (µg/kg)**	**Risk-Based SSLs for Migration to GW (DAF 1) (µg/kg)**	**MCL-Based SSLs for Migration to GW (DAF 1) (µg/kg)**	**Project Action Level (µg/kg)**	**Project Action Level Reference**	**Project Quantitation Limit Goal (µg/kg)**	**Laboratory Limits (1)**		
								LOQ (µg/kg)	**LOD (µg/kg)**	**DL (µg/kg)**
Toluene	108-88-3	490000	76	690	76	SSL-Risk	25	2.0	1.0	0.5
trans-1,2-Dichloroethene	156-60-5	160000	1.1	29	1.1	SSL-Risk	0.37	**2.0**	1.0	0.7
trans-1,3-Dichloropropene	10061-02-6	-	-	-	-	-	-	2.0	1.0	0.3
Trichloroethene	79-01-6	410	0.1	1.8	0.1	SSL-Risk	0.033	**2.0**	**1.0**	**0.5**
Trichlorofluoromethane	75-69-4	73000	73	-	73	SSL-Risk	24	2.0	1.0	0.5
Vinyl chloride	75-01-4	59	0.0065	0.69	0.0065	SSL-Risk	0.0022	**2.0**	**1.0**	**0.4**

Notes:

U.S. EPA	=	United States Environmental Protection Agency
LOQ	=	Limit of quantitation
LOD	=	Limit of detection
DL	=	Detection limit
MCL	=	Maximum Contaminant Level
µg/kg	=	Micrograms per kilogram
SSL-Risk	=	U.S. EPA Regional Screening Level Risk-Based Soil Screening Level based on migration to groundwater with a dilution attenuation factor of 1 (U.S. EPA, May 2014). During the screening process, both the residential RSLs and default SSLs will be assessed, but only the lower of the two values are shown in this table to represent worst-case human health values against laboratory detection limits.
Res RSL-Surr	=	U.S. EPA Residential RSL Soil Screening Level (U.S. EPA, May 2014); structurally similar surrogate compound used.
SSL-MCL	=	U.S. EPA RSL Risk-Based Soil Screening Level based on Maximum Contaminant Level (U.S. EPA, May 2014).
(1)	=	LOQ, LOD, and DLs, as provided by Environmental Conservation Laboratories, Inc. are targets that are achievable under optimal conditions and may vary during the course of project. Physical characteristics, such as moisture content, will affect the actual limits achieved. Results will be reported on a dry weight basis.
Shaded cells	=	Indicate that an LOQ, LOD, or DL does not meet the project action level. Analytes with method detection limits above project action levels will be retained as chemicals of potential concern to be evaluated in a risk assessment..

Matrix:	Soil									
Analytical Group:	Semi-volatile Organic Compounds by U.S. EPA Method SW8270D, Polycyclic Aromatic Hydrocarbons by Selective Ion Monitoring									
Analyte	**CAS No.**	**U.S. EPA R RSL (µg/kg)**	**Risk-Based SSLs for Migration to GW (DAF 1) (µg/kg)**	**MCL-Based SSLs for Migration to GW (DAF 1) (µg/kg)**	**Project Action Level (µg/kg)**	**Project Action Level Reference**	**Project Quantitation Limit Goal (µg/kg)**	**Laboratory Limits (1)**		
								LOQ (µg/kg)	**LOD (µg/kg)**	**DL (µg/kg)**
1,2,4-Trichlorobenzene	120-82-1	5800	1.2	200	1.2	SSL-Risk	0.4	**330**	**170**	**12**
1,2-Diphenylhydrazine	122-66-7	670	0.25	-	0.25	SSL-Risk	0.083	**330**	**170**	**14**
2,4,5-Trichlorophenol	95-95-4	620000	440	-	440	SSL-Risk	150	330	170	8
2,4,6-Trichlorophenol	88-06-2	6200	4.5	-	4.5	SSL-Risk	1.5	**330**	**170**	**11**
2,4-Dichlorophenol	120-83-2	18000	5.4	-	5.4	SSL-Risk	1.8	**330**	**170**	**11**
2,4-Dimethylphenol	105-67-9	120000	42	-	42	SSL-Risk	14	**330**	**170**	34
2,4-Dinitrophenol	51-28-5	12000	4.4	-	4.4	SSL-Risk	1.5	**330**	**170**	**16**
2,4-Dinitrotoluene	121-14-2	1700	0.32	-	0.32	SSL-Risk	0.11	**330**	**170**	**16**
2,6-Dichlorophenol	87-65-0	-	-	-	-	-	-	330	170	11
2,6-Dinitrotoluene	606-20-2	360	0.067	-	0.067	SSL-Risk	0.022	**330**	**170**	**11**
2-Chloronaphthalene	91-58-7	630000	380	-	380	SSL-Risk	130	330	170	11
2-Chlorophenol	95-57-8	39000	7.4	-	7.4	SSL-Risk	2.5	**330**	**170**	**22**
2-Methylphenol	95-48-7	310000	75	-	75	SSL-Risk	25	**330**	**170**	19
2-Nitroaniline	88-74-4	61000	8	-	8	SSL-Risk	2.7	**330**	**170**	**21**
2-Nitrophenol	88-75-5	-	-	-	-	-	-	330	170	15
3,3-Dichlorobenzidine	91-94-1	1200	0.81	-	0.81	SSL-Risk	0.27	**330**	**170**	**10**
3- and 4-Methylphenol	108-39-4/106-44	310000	74	-	74	SSL-Risk	25	**660**	**330**	41
3-Nitroaniline	99-09-2	-	-	-	-	-	-	330	170	16
4,6-Dinitro-2-methylphenol	534-52-1	490	0.26	-	0.26	SSL-Risk	0.087	**330**	**170**	**12**
4-Bromophenyl-phenylether	101-55-3	-	-	-	-	-	-	330	170	11
4-Chloro-3-methylphenol	59-50-7	620000	170	-	170	SSL-Risk	57	**330**	**170**	16
4-Chloroaniline	106-47-8	2700	0.16	-	0.16	SSL-Risk	0.053	**330**	**170**	**15**
4-Chlorophenyl-phenylether	7005-72-3	-	-	-	-	-	-	330	170	14
4-Nitroaniline	100-01-6	25000	1.6	-	1.6	SSL-Risk	0.53	**330**	**170**	**22**
4-Nitrophenol	100-02-7	-	-	-	-	-	-	330	170	14
Benzidine	92-87-5	2000	0.00027	-	0.00027	SSL-Risk	0.00009	**330**	**170**	**65**
Benzoic acid	65-85-0	25000000	1800	-	1800	SSL-Risk	600	**2500**	1200	200
Benzyl alcohol	100-51-6	620000	48	-	48	SSL-Risk	16	**330**	**170**	22
Bis(2-chloroethoxy)methane	111-91-1	18000	1.3	-	1.3	SSL-Risk	0.43	**330**	**170**	**15**
Bis(2-chloroethyl)ether	111-44-4	230	0.0036	-	0.0036	SSL-Risk	0.0012	**330**	**170**	**19**
Bis(2-chloroisopropyl)ether	39638-32-9	-	-	-	-	-	-	330	170	18

Matrix:	Soil									
Analytical Group:	Semi-volatile Organic Compounds by U.S. EPA Method SW8270D, Polycyclic Aromatic Hydrocarbons by Selective Ion Monitoring									
Analyte	**CAS No.**	**U.S. EPA R RSL (µg/kg)**	**Risk-Based SSLs for Migration to GW (DAF 1) (µg/kg)**	**MCL-Based SSLs for Migration to GW (DAF 1) (µg/kg)**	**Project Action Level (µg/kg)**	**Project Action Level Reference**	**Project Quantitation Limit Goal (µg/kg)**	**Laboratory Limits (1)**		
								LOQ (µg/kg)	**LOD (µg/kg)**	**DL (µg/kg)**
Bis(2-ethylhexyl)phthalate	117-81-7	38000	1300	1400	1300	SSL-Risk	430	330	170	14
Butylbenzylphthalate	85-68-7	280000	230	-	230	SSL-Risk	77	**330**	170	12
Carbazole	86-74-8	-	-	-	-	-	-	330	170	12
Dibenzofuran	132-64-9	7200	15	-	15	SSL-Risk	5	**330**	**170**	13
Diethylphthalate	84-66-2	4900000	610	-	610	SSL-Risk	200	330	170	13
Dimethyl phthalate	131-11-3	-	-	-	-	-	-	330	170	13
Di-n-butylphthalate	84-74-2	620000	230	-	230	SSL-Risk	77	**330**	170	12
Di-n-octylphthalate	117-84-0	62000	20000	-	20000	SSL-Risk	6700	330	170	12
Hexachlorobenzene	118-74-1	330	0.61	13	0.61	SSL-Risk	0.2	**330**	**170**	**9**
Hexachloroethane	67-72-1	4300	0.42	-	0.42	SSL-Risk	0.14	**330**	**170**	**15**
Isophorone	78-59-1	560000	26	-	26	SSL-Risk	8.7	**330**	**170**	13
Nitrobenzene	98-95-3	5100	0.092	-	0.092	SSL-Risk	0.031	**330**	**170**	**19**
N-Nitrosodinpropylamine	621-64-7	76	0.0081	-	0.0081	SSL-Risk	0.0027	**330**	**170**	**11**
N-nitrosodiphenylamine	86-30-6	110000	66	-	66	SSL-Risk	22	**660**	**330**	20
N-Nitrosodimethylamine	62-75-9	2.3	0.00012	-	0.00012	SSL-Risk	0.00004	**330**	**170**	**35**
Pentachlorophenol	87-86-5	990	0.4	10	0.4	SSL-Risk	0.13	**330**	**170**	**11**
Phenol	108-95-2	1800000	330	-	330	SSL-Risk	110	**330**	170	25
2-Methylnaphthalene	91-57-6	23000	19	-	19	SSL-Risk	6.3	**33**	**23**	3.2
Acenaphthene	83-32-9	350000	550	-	550	SSL-Risk	180	33	23	3.5
Acenaphthylene	208-96-8	-	-	-	-	-	-	33	23	3.2
Anthracene	120-12-7	1700000	5800	-	5800	SSL-Risk	1900	33	23	2.1
Benzo[a]anthracene	56-55-3	150	12	-	12	SSL-Risk	4	**33**	**23**	2.4
Benzo[a]pyrene	50-32-8	15	4	240	4	SSL-Risk	1.3	**33**	**23**	2.5
Benzo[b]fluoranthene	205-99-2	150	41	-	41	SSL-Risk	14	33	23	2.8
Benzo[g,h,i]perylene	191-24-2	-	-	-	-	-	-	33	23	2.2
Benzo[k]fluoranthene	207-08-9	1500	400	-	400	SSL-Risk	130	33	23	3.0
Chrysene	218-01-9	15000	1200	-	1200	SSL-Risk	400	33	23	2.3
Dibenz[a,h]anthracene	53-70-3	15	13	-	13	SSL-Risk	4.3	**33**	**23**	2.8
Fluoranthene	206-44-0	230000	8900	-	8900	SSL-Risk	3000	33	23	2.9
Fluorene	86-73-7	230000	540	-	540	SSL-Risk	180	33	23	3.0
Indeno[1,2,3-cd]pyrene	193-39-5	150	240	-	150	U.S. EPA R RSL	50	33	23	2.8

Matrix:	Soil									
Analytical Group:	Semi-volatile Organic Compounds by U.S. EPA Method SW8270D, Polycyclic Aromatic Hydrocarbons by Selective Ion Monitoring									
Analyte	**CAS No.**	**U.S. EPA R RSL (µg/kg)**	**Risk-Based SSLs for Migration to GW (DAF 1) (µg/kg)**	**MCL-Based SSLs for Migration to GW (DAF 1) (µg/kg)**	**Project Action Level (µg/kg)**	**Project Action Level Reference**	**Project Quantitation Limit Goal (µg/kg)**	**Laboratory Limits (1)**		
								LOQ (µg/kg)	**LOD (µg/kg)**	**DL (µg/kg)**
Naphthalene	91-20-3	3800	0.54	-	0.54	SSL-Risk	0.18	**33**	**23**	**2.5**
Phenanthrene	85-01-8	-	-	-	-	-	-	33	23	3.5
Pyrene	129-00-0	170000	1300	-	1300	SSL-Risk	430	33	23	3.3

Notes:

U.S. EPA = United States Environmental Protection Agency
LOQ = Limit of quantitation
LOD = Limit of detection
DL = Detection limit
MCL = Maximum Contaminant Level
µg/kg = Micrograms per kilogram
SSL-Risk = U.S. EPA Regional Screening Level Risk-Based Soil Screening Level based on migration to groundwater with a dilution attenuation factor of 1 (U.S. EPA, May 2014). During the screening process, both the residential RSLs and default SSLs will be assessed, but only the lower of the two values are shown in this table to represent worst-case human health values against laboratory detection limits.
Res RSL-Surr = U.S. EPA Residential RSL Soil Screening Level (U.S. EPA, May 2014); structurally similar surrogate compound used.
(1) = LOQ, LOD, and DLs, as provided by Environmental Conservation Laboratories, Inc., are targets that are achievable under optimal conditions and may vary during the course of project. Physical characteristics, such as moisture content, will affect the actual limits achieved. Results will be reported on a dry weight basis.
Shaded cells = Indicate that a LOQ, LOD, or DL does not meet the project action level. Analytes with method detection limits above project action levels will be retained as chemicals of potential concern to be evaluated in a risk assessment..

Matrix:	Soil									
Analytical Group:	Target Analyte List Metals by U.S. EPA Method 6020A/7471B									
Analyte	**CAS No.**	**USEPA R RSL (µg/kg)**	**Risk-Based SSLs for Migration to GW (DAF 1) (µg/kg)**	**MCL-Based SSLs for Migration to GW (DAF 1) (µg/kg)**	**Project Action Level (µg/kg)**	**Project Action Level Reference**	**Project Quantitation Limit Goal (µg/kg)**	**Laboratory Limits (1)**		
								LOQ (µg/kg)	**LOD (µg/kg)**	**DL (µg/kg)**
Aluminum (by 6010)	7429-90-5	7700	2300	-	2300	SSL-Risk	770	20	10	2.4
Antimony	7440-36-0	3.1	0.035	0.27	0.035	SSL-Risk	0.012	**1.6**	**0.8**	**0.2**
Arsenic (by 6010)	7440-38-2	0.67	0.0015	0.29	0.0015	SSL-Risk	0.0005	**2**	**1**	**0.28**
Barium (by 6010)	7440-39-3	1500	16	82	16	SSL-Risk	5.3	0.5	0.25	0.022
Beryllium (by 6010)	7440-41-7	16	1.9	3.2	1.9	SSL-Risk	0.63	0.05	0.025	0.0061
Cadmium (by 6010)	7440-43-9	7	-	-	7	U.S. EPA R RSL	2.3	0.2	0.1	0.018
Calcium (by 6010)	7440-70-2	-	-	-	-	-	-	25	12.5	1.3
Chromium, total (by 6010)	7440-47-3	-	-	180000	180000	SSL-MCL	60000	0.5	0.25	0.036
Cobalt (by 6010)	7440-48-4	2.3	0.027	-	0.027	SSL-Risk	0.009	**0.5**	**0.25**	**0.035**
Copper (by 6010)	7440-50-8	310	2.8	46	2.8	SSL-Risk	0.93	0.5	0.25	0.079
Iron (by 6010)	7439-89-6	5500	35	-	35	SSL-Risk	12	5	2.5	1.7
Lead (by 6010)	7439-92-1	400	-	14	14	SSL-MCL	4.7	2	1	0.11
Magnesium (by 6010)	7439-95-4	-	-	-	-	-	-	25	12.5	0.855
Manganese (by 6010)	7439-96-5	180	2.8	-	2.8	SSL-Risk	0.93	1	0.5	0.011
Mercury	7439-97-6	0.94	0.0033	0.1	0.0033	SSL-Risk	0.0011	**0.048**	**0.024**	**0.007**
Nickel (by 6010)	7440-02-0	150	2.6	-	2.6	SSL-Risk	0.87	0.5	0.25	0.034
Potassium (by 6010)	7440-09-7	-	-	-	-	-	-	50	25	4.9
Selenium (by 6010)	7782-49-2	39	0.052	0.26	0.052	SSL-Risk	0.017	**2**	**1**	**0.32**
Silver	7440-22-4	39	0.08	-	0.08	SSL-Risk	0.027	**0.5**	**0.224**	0.055
Sodium (by 6010)	7440-23-5	-	-	-	-	-	-	25	12.5	3
Thallium (by 6010)	7440-28-0	0.078	0.0014	0.14	0.0014	SSL-Risk	0.00047	**2**	**1**	**2.01**
Vanadium (by 6010)	7440-62-2	39	8.6	-	8.6	SSL-Risk	2.9	1	0.5	1.01
Zinc (by 6010)	7440-66-6	2300	37	-	37	SSL-Risk	12	1	0.5	0.21

Notes:

U.S. EPA	=	United States Environmental Protection Agency
LOQ	=	Limit of quantitation
LOD	=	Limit of detection
DL	=	Detection limits
Res-RSL	=	U.S. EPA Residential Regional Screening Level
mg/kg	=	Milligrams per kilogram
SSL-Risk	=	U.S. EPA RSL Risk-Based Soil Screening Level based on migration to groundwater with a dilution attenuation factor of 1 (U.S. EPA, May 2014). During the screening process, both the residential RSLs and default SSLs will be assessed, but only the lower of the two values are shown in this table to represent worst-case human health values against laboratory detection limits.
SSL-MCL	=	U.S. EPA RSL Risk-Based Soil Screening Level based on Maximum Contaminant Level (U.S. EPA, May 2014).
(1)	=	LOQ, LOD, and DLs, as provided by Environmental Conservation Laboratories, Inc., are targets that are achievable under optimal conditions and may vary during the course of project. Physical characteristics, such as moisture content, will affect the actual limits achieved. Results will be reported on a dry weight basis.
Shaded cells	=	Indicate that a LOQ, LOD, or DL does not meet the project action level. Analytes with method detection limits above project action levels will be retained as chemicals of potential concern to be evaluated in a risk assessment..

SAP WORKSHEET #23: ANALYTICAL SOP REFERENCES TABLE

(UFP-QAPP Manual Section 3.2.1)

Laboratory Name and Address: Environmental Conservation Laboratories, Inc., 10775 Central Port Drive, Orlando, Florida 32824
Laboratory Point of Contact: Marcia Colon, mcolon@encolabs.com, 407-826-5314

Lab SOP Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Variance to Quality Systems Manual	Modified for Project Work? (Yes/No)
VGCMS-05	*Analysis of Volatile Organic Compounds by GC/MS*, Revision 17, 8/26/2011	Definitive	Soil, Volatile Organic Compounds	GC-MS	No	No
EXSV-16	*Extraction of Soil/Solid Samples Using Sonication*, Revision 8, 8/16/2013	Definitive	Soil, SVOCs and PAHs via SIM Extraction	Sonicator	No	No
SVGCMS-03	*Semi-volatile Organic Compounds by GC/MS*, Revision 18, 12/15/2013	Definitive	Soil, SVOCs and PAHs via SIM Analysis	GC-MS	No	No
EXMT-09	*Acid Digestion Of Soil And Waste Samples For Analysis By ICP And ICP-MS*, Revision 7, 8/3/2012	Definitive	Soil, Metals Digestion	Digestion Block	No	No
MET-05	*Metals Analysis by ICP-AES*, Revision 12, 12/20/2013	Definitive	Soil, Metals Analysis 6010C	ICP-AES	No	No
MET-15	*Metals Using Inductively Coupled Plasma Mass Spectrometry (ICP-MS)*, Revision 6, 8/1/2013	Definitive	Soil, Metals Analysis 6020A	ICP-MS	No	No
MET-16	*Mercury in Soil by Digestion/CVAA*, Revision 5, 3/12/2012	Definitive	Soil, Mercury Digestion and Analysis 7471B	Flow Injection Mercury System	No	No

Notes:

SOP = Standard operating procedure
SVOCs = Semi-volatile organic compounds
PAHs = Polynuclear aromatic hydrocarbons
SIM = Selective ion monitoring
GC/MS = Gas chromatography/mass spectrometry
ICP = Inductively coupled plasma
ICP-AES = Inductively coupled plasma atomic emission spectrometry
ICP-MS = Inductively coupled plasma mass spectrometry
CVAA = Cold vapor atomic absorption

SAP WORKSHEET #28: LABORATORY QC SAMPLES TABLE

(UFP-QAPP Manual Section 3.4)

Matrix:	Soil
Analytical Group:	Volatile Organic Compounds
Analytical Method/SOP Reference:	SW-846 8260B/VGCMS-05

QC Sample	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicators	Measurement Performance Criteria
Method Blank	One per batch of 20 or fewer samples per matrix	No analytes detected >½ LOQ or >1/10 the amount measured in any sample or 1/10 the regulatory limit, whichever is greater. Common contaminants must not be detected >LOQ.	Correct problem. If required, re-prepare and re-analyze method blank and all samples processed with the contaminated blank.	Analyst, Supervisor, QA Manager	Bias, Contamination	See Method/SOP QC Acceptance Limit Column
Surrogates	All field and QC samples	**Surrogate** / **Soil Limits** 1,2-Dichloroethane-d4: 71-136% 4-Bromofluorobenzene: 79-119% Dibromofluoromethane: 78-119% Toluene-d8: 85-116%	Correct problem, then re-prepare and re-analyze all failed samples for all surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic interference with surrogate is present, reanalysis may not be necessary.	Analyst, Supervisor, QA Manager	Accuracy, Bias	See Method/SOP QC Acceptance Limit Column; QC criteria specified in DoD QSM Version 5.0 and laboratory limits for those not cited in QSM
LCS	One per batch of 20 or fewer samples per matrix	QC acceptance criteria specified in DoD QSM Version 5.0	Correct problem, then re-prepare and re-analyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available.	Analyst, Supervisor, QA Manager	Accuracy, Bias	See Method/SOP QC Acceptance Limit Column
Internal Standards	In all field samples and standards	Retention time within ±10 seconds from retention time of the midpoint standard in the initial calibration; Extracted ion current profile area within -50% to +100% of initial calibration midpoint standard.	Inspect instrument for malfunctions and correct problem. Reanalysis of samples analyzed while system was malfunctioning is mandatory.	Analyst, Supervisor, QA Manager	Accuracy, Bias	See Method/SOP QC Acceptance Limit Column
MS/MSD	One per batch of 20 or fewer samples per matrix	For matrix accuracy evaluation, use LCS recovery criteria; Relative percent difference ≤20%.	Contact the client as to additional measures to be taken.	Analyst, Supervisor, QA Manager	Accuracy, Bias, Precision	See Method/SOP QC Acceptance Limit Column

Notes:

SOP = Standard operating procedure
QC = Quality control
LOQ = Limit of quantitation
QA = Quality assurance
DoD QSM = Department of Defense Quality Systems Manual
LCS = Laboratory control sample
MS/MSD = Matrix spike/matrix spike duplicate

Matrix:	Soil
Analytical Group:	Semivolatile Organic Compounds/Polynuclear Aromatic Hydrocarbons via Selective Ion Monitoring
Analytical Method/SOP Reference:	SW-846 8270C/SVGCMS-03

QC Sample	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicators	Measurement Performance Criteria
Method Blank	One per batch of 20 or fewer samples per matrix	No analytes detected >½ LOQ or >1/10 the amount measured in any sample or 1/10 the regulatory limit, whichever is greater. Common contaminants must not be detected >LOQ.	Correct problem. If required, re-prepare and re-analyze method blank and all samples processed with the contaminated blank.	Analyst, Supervisor, QA Manager	Bias, Contamination	See Method/SOP QC Acceptance Limit Column
Surrogates	All field and QC samples	**Surrogate** / **SVOC Soil Limits** / **PAH SIM Soil Limits** 2-Fluorobiphenyl: 44-115% / 46-115% Terphenyl-d14: 54-127% / 58-133% 2,4,6-Tribromophenol: 39-132% / — 2-Fluorophenol: 35-115% / — Phenol-d5: 33-122% / — Nitrobenzene-d5: 37-122% / 44-125% *p-Terphenyl (PAH SIM only)*: — / 50-150%	Correct problem, then re-prepare and re-analyze all failed samples for all surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic interference with surrogate is present, reanalysis may not be necessary.	Analyst, Supervisor, QA Manager	Accuracy, Bias	QC acceptance criteria specified in DoD QSM Version 5.0 and laboratory limits for those not cited in QSM See Method/SOP QC Acceptance Limit Column
LCS	One per batch of 20 or fewer samples per matrix	QC acceptance criteria specified in DoD QSM Version 5.0	Correct problem, then re-prepare and re-analyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available.	Analyst, Supervisor, QA Manager	Accuracy, Bias	See Method/SOP QC Acceptance Limit Column
Internal Standards	In all field samples and standards	Retention time within ±10 seconds from retention time of the midpoint standard in the initial calibration; Extracted ion current profile area within -50% to +100% of initial calibration midpoint standard.	Inspect instrument for malfunctions and correct problem. Reanalysis of samples analyzed while system was malfunctioning is mandatory.	Analyst, Supervisor, QA Manager	Accuracy, Bias	See Method/SOP QC Acceptance Limit Column
MS/MSD	One per batch of 20 or fewer samples per matrix	For matrix accuracy evaluation, use LCS recovery criteria; Relative percent difference ≤20%.	Contact the client as to additional measures to be taken.	Analyst, Supervisor, QA Manager	Accuracy, Bias, Precision	See Method/SOP QC Acceptance Limit Column

Notes:

SOP = Standard operating procedure
QC = Quality control
LOQ = Limit of quantitation
QA = Quality assurance
DoD QSM = Department of Defense Quality Systems Manual
LCS = Laboratory control sample
MS/MSD = Matrix spike/matrix spike duplicate

Matrix:	Soil
Analytical Group:	Metals
Analytical Method/SOP Reference:	SW-846 6010C/MET-05

QC Sample	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicators	Measurement Performance Criteria
Method Blank	One per batch of 20 or fewer samples per matrix	No analytes detected > 1/2 LOQ or >1/10 the amount measured in any sample or 1/10 the regulatory limit, whichever is greater.	Correct problem. If required, re-prepare and reanalyze method blank and all samples processed with contaminated blank.	Analyst, Supervisor, QA Manager	Bias, Contamination	See Method/SOP QC Acceptance Limit Column
LCS	One per batch of 20 or fewer samples per matrix	QC acceptance criteria specified in DoD QSM Version 5.0	Correct problem, then re-prepare and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available.	Analyst, Supervisor, QA Manager	Accuracy, Bias	See Method/SOP QC Acceptance Limit Column
Sample Duplicate or MSD	One per batch of 20 or fewer samples per matrix	Relative percent difference ≤20%	Contact the client to determine if additional measures are required.	Analyst, Supervisor, QA Manager	Precision	See Method/SOP QC Acceptance Limit Column
Matrix Spike	One per preparatory batch per matrix	For matrix evaluation, use LCS recovery criteria	Contact the client to determine if additional measures are required.	Analyst, Supervisor, QA Manager	Accuracy, Bias	See Method/SOP QC Acceptance Limit Column
Dilution Test	One per batch of 20 or fewer samples per matrix if matrix spike or MSD fails	Five-fold dilution must agree within ±10% of the original measurement for samples with concentrations >50 x LOQ	Perform Post Digestion Spike	Analyst, Supervisor, QA Manager	Accuracy, Bias	See Method/SOP QC Acceptance Limit Column
Post Digestion Spike	Perform if MS/MSD fails. One per preparatory batch (using the same sample as used for the MS/MSD if possible).	Recovery 80-120%	Contact the client to determine if additional measures are required.	Analyst, Supervisor, QA Manager	Accuracy, Bias	See Method/SOP QC Acceptance Limit Column

Notes:

SOP = Standard operating procedure
QC = Quality control
LOQ = Limit of quantitation
QA = Quality assurance
LCS = Laboratory control sample
DoD QSM = Department of Defense Quality Systems Manual
MSD = Matrix spike duplicate
MS/MSD = Matrix spike /matrix spike duplicate

Matrix:	Soil
Analytical Group:	Metals
Analytical Method/SOP Reference:	SW-846 6020A/MET-15

QC Sample	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicators	Measurement Performance Criteria
Method Blank	One per batch of 20 or fewer samples per matrix	No analytes detected > 1/2 LOQ or >1/10 the amount measured in any sample or 1/10 the regulatory limit, whichever is greater.	Correct problem. If required, re-prepare and reanalyze method blank and all samples processed with contaminated blank.	Analyst, Supervisor, QA Manager	Bias, Contamination	See Method/SOP QC Acceptance Limit Column
LCS	One per batch of 20 or fewer samples per matrix	QC acceptance criteria specified in DoD QSM Version 5.0	Correct problem, then re-prepare and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available.	Analyst, Supervisor, QA Manager	Accuracy, Bias	See Method/SOP QC Acceptance Limit Column
Sample Duplicate or MSD	One per batch of 20 or fewer samples per matrix	Relative percent difference ≤20%	Contact the client to determine if additional measures are required.	Analyst, Supervisor, QA Manager	Precision	See Method/SOP QC Acceptance Limit Column
Matrix Spike	One per preparatory batch per matrix	For matrix evaluation, use LCS recovery criteria	Contact the client to determine if additional measures are required.	Analyst, Supervisor, QA Manager	Accuracy, Bias	See Method/SOP QC Acceptance Limit Column
Dilution Test	One per batch of 20 or fewer samples per matrix if matrix spike or MSD fails	Five-fold dilution must agree within ±10% of the original measurement for samples with concentrations >50 x LOQ	Perform Post Digestion Spike	Analyst, Supervisor, QA Manager	Accuracy, Bias	See Method/SOP QC Acceptance Limit Column
Post Digestion Spike	Perform if MS/MSD fails. One per preparatory batch (using the same sample as used for the MS/MSD if possible).	Recovery 80-120%	Contact the client to determine if additional measures are required.	Analyst, Supervisor, QA Manager	Accuracy, Bias	See Method/SOP QC Acceptance Limit Column

Notes:

SOP = Standard operating procedure
QC = Quality control
LOQ = Limit of quantitation
QA = Quality assurance
LCS = Laboratory control sample
DoD QSM = Department of Defense Quality Systems Manual
MSD = Matrix spike duplicate
MS/MSD = Matrix spike /matrix spike duplicate

Matrix:	Soil
Analytical Group:	Mercury
Analytical Method/SOP Reference:	SW-846 7471B/MET-16

QC Sample	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicators	Measurement Performance Criteria
Method Blank	One per batch of 20 or fewer samples per matrix	No analytes detected > 1/2 LOQ or >1/10 the amount measured in any sample or 1/10 the regulatory limit, whichever is greater.	Correct problem. If required, re-prepare and reanalyze method blank and all samples processed with contaminated blank.	Analyst, Supervisor, QA Manager	Bias, Contamination	See Method/SOP QC Acceptance Limit Column
LCS	One per batch of 20 or fewer samples per matrix	QC acceptance criteria specified in DoD QSM Version 5.0	Correct problem, then re-prepare and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available.	Analyst, Supervisor, QA Manager	Accuracy, Bias	See Method/SOP QC Acceptance Limit Column
Sample Duplicate or MSD	One per batch of 20 or fewer samples per matrix	Relative percent difference ≤20%	Contact the client to determine if additional measures are required.	Analyst, Supervisor, QA Manager	Precision	See Method/SOP QC Acceptance Limit Column
Matrix Spike	One per preparatory batch per matrix	For matrix evaluation, use LCS recovery criteria	Contact the client to determine if additional measures are required.	Analyst, Supervisor, QA Manager	Accuracy, Bias	See Method/SOP QC Acceptance Limit Column
Dilution Test	One per batch of 20 or fewer samples per matrix if matrix spike or MSD fails	Five-fold dilution must agree within ±10% of the original measurement for samples with concentrations >50 x LOQ	Perform Post Digestion Spike	Analyst, Supervisor, QA Manager	Accuracy, Bias	See Method/SOP QC Acceptance Limit Column
Post Digestion Spike	Perform if MS/MSD fails. One per preparatory batch (using the same sample as used for the MS/MSD if possible).	Recovery 80-120%	Contact the client to determine if additional measures are required.	Analyst, Supervisor, QA Manager	Accuracy, Bias	See Method/SOP QC Acceptance Limit Column

Notes:

SOP = Standard operating procedure
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LOQ = Limit of quantitation
QA = Quality assurance
LCS = Laboratory control sample
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MS/MSD = Matrix spike /matrix spike duplicate

SAP WORKSHEETS #34 — 36: DATA VERIFICATION AND VALIDATION (STEPS I AND IIA/IIB) PROCESS TABLE

(UFP-QAPP Manual Section 5.2.1, UFP-QAPP Manual Section 5.2.2, Figure 37 UFP-QAPP Manual, Table 9 UFP-QAPP Manual)

Data Review Input	Description	Responsible for Verification (name, organization)	Step I/ IIa/IIb [1]	Internal/ External[2]
Verification Chain-of-custody forms Sample Login/Receipt	Review the sample shipment for completeness, integrity, and sign accepting the shipment. All sample labels will be checked against the chain-of-custody form, and any discrepancies will be identified, investigated, and corrected. The samples will be logged in at every storage area and work station required by the designated analyses. Individual analysts will verify the completeness and accuracy of the data recorded on the forms. Verification of sample login/receipt and chain-of-custody forms will be documented on the laboratory sample receipt form.	Laboratory sample custodians and analysts	I	Internal
Verification Chain-of-custody forms	Check that the chain-of-custody form was signed/dated by the sampler relinquishing the samples and by the laboratory sample custodian receiving the samples for analyses. Verification of chain-of-custody forms will be documented in the DVA workbook.	Project Chemist or Data Validators, Resolution Consultants	I	External
Verification SAP sample tables	Verify that all proposed samples listed in the SAP tables have been collected. Sample completeness will be documented in the data validation report.	FTL or designee, Resolution Consultants	I	Internal
Verification Sample log sheets and field notes	Verify that information recorded in the log sheets and field notes are accurate and complete. Sample log sheet verification will be documented by dated signature on the last page or page immediately following the review material.	FTL or designee, Resolution Consultants	I	Internal
Verification Field QC samples	Check that field QC samples, described in Worksheet #12 and listed in Worksheet #20, were collected as required. QC sample completeness will be documented in the data validation report.	FTL or designee, Resolution Consultants	I	Internal
Verification Analytical data package	Verify all analytical data packages will be verified internally for completeness by the laboratory performing the work. The laboratory project manager (or designee) will sign the case narrative for each data package. All laboratory data package reviews will be documented in the laboratory narratives.	Laboratory Project Manager	I	Internal
Verification Analytical data package	Verify the data package for completeness. Missing information will be requested from the laboratory and validation (if performed) will be suspended until missing data are received. Data package completeness will be documented in the DVA workbook.	FTL, Project Chemist or Data Validators, Resolution Consultants	I	External
Verification Electronic data deliverables	Verify the electronic data against the chain-of-custody and hard copy data package for accuracy and completeness before loading into project database. Electronic data deliverable verification will be documented in the DVA workbook.	Data Manager and/or Validator, Resolution Consultants	I	External

Data Review Input	Description	Responsible for Verification (name, organization)	Step I/ IIa/IIb [1]	Internal/ External[2]
Validation Chain-of-custody	Examine the traceability of the data from time of sample collection until reporting of data. Ensure that the custody and integrity of the samples were maintained from collection to analysis and the custody records are complete and any deviations are recorded. Chain-of-custody verification will be documented in the DVA workbook and data validation report.	Project Chemist or Data Validators, Resolution Consultants	IIa	External
Validation Holding Times	Review that the samples were shipped and stored at the required temperature and sample pH for chemically-preserved samples meet the requirements listed in Worksheet #19. Ensure that the analyses were performed within the holding times. If holding times were not met, confirm that deviations were documented. Holding time examination will be documented in the DVA workbook and data validation report.	Project Chemist or Data Validators, Resolution Consultants	IIa	External
Validation Sample results for representativeness	Check that the laboratory recorded the temperature at sample receipt and the pH of the chemically preserved samples to ensure sample integrity from sample collection to analysis. Representativeness will be documented in the DVA workbook and data validation report.	Project Chemist or Data Validators, Resolution Consultants	IIa/IIb	External
Validation Laboratory data results for accuracy	Ensure that the laboratory QC samples were analyzed and that the measurement performance criteria, listed in Worksheet #28, were met for all field samples and QC analyses. Check that specified field QC samples were collected and analyzed, as listed in Worksheet #12, and that the analytical QC criteria were met. Accuracy will be documented in the DVA workbook and data validation report.	Project Chemist or Data Validators, Resolution Consultants	IIa/IIb	External
Validation Field and laboratory duplicate analyses for precision	Check the field sampling precision by calculating the RPD for field duplicate samples. Check the laboratory precision by reviewing the RPD or percent difference values from laboratory duplicate analyses; MS/MSDs; and LCS/LCSDs. Ensure compliance with the precision goals listed in Worksheets #12 and #28. Precision will be documented in the DVA workbook and data validation report.	Project Chemist or Data Validators, Resolution Consultants	IIa/IIb	External
Validation Project action limits	Assess and document the impact on matrix interferences or sample dilutions performed because of the high concentration of one or more contaminant, on the other target compounds reported as undetected. Project action limit achievement will be documented in the DVA workbook and data validation report.	Project Chemist or Data Validators, Resolution Consultants	IIa/IIb	External
Validation Data quality assessment report	Summarize deviations from methods, procedures, or contracts. Qualify data results based on method or QC deviation and explain all the data qualifications. Present tabular qualified data and data qualifier codes and summarize data qualification outliers. Determine if the data met the measurement performance criteria and determine the impact of any deviations on the technical usability of the data. Result qualification will be documented in the in the DVA workbook and data validation report.	Project Chemist or Data Validators, Resolution Consultants	IIa/IIb	External
Validation SAP QC sample documentation	Ensure that all QC samples specified in the SAP were collected and analyzed and that the associated results were within acceptance limits. QC sample documentation will be documented in the DVA workbook and data validation report	Project Chemist or Data Validators, Resolution Consultants	IIa/IIb	External

Data Review Input	Description	Responsible for Verification (name, organization)	Step I/ IIa/IIb [1]	Internal/ External[2]
Validation Analytical data deviations	Determine the impact of any deviation from sampling or analytical methods, and laboratory SOP requirements and matrix interferences effect on the analytical results. Data deviations will be documented in the DVA workbook and data validation report.	Project Chemist or Data Validators, Resolution Consultants	IIb	External
Validation Project quantitation limits for sensitivity	Ensure that the project detection limits were achieved. Project quantitation limit achievement will be documented in the DVA workbook and data validation report.	Project Chemist or Data Validators, Resolution Consultants	IIb	External
Validation Organics: VOCs, SVOCs, PAHs via SIM	Assess organic analytical data against MPC identified in Worksheets #12, #19, and #28. ***U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review***, (October 1999) will be used as a guidance on applying qualifiers when MPC identified in Worksheets #12, #19, and #28 are not met, including identifying when samples will be qualified estimated or rejected and when individual or all samples in a batch will be qualified. Validation will be limited to reviewing laboratory quality control summary information and raw data will not be reviewed.	Project Chemist or Data Validators, Resolution Consultants	IIa/IIb	External
Validation Inorganics: Metals	Assess metals data against MPC identified in Worksheets #12, #19, and #28. ***U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review***, (October 2004) will be used as a guidance on applying qualifiers when MPC identified in Worksheets #12, #19, and #28 are not met, including identifying when samples will be qualified estimated or rejected and when individual or all samples in a batch will be qualified. Validation will be limited to reviewing laboratory quality control summary information and raw data will not be reviewed.	Project Chemist or Data Validators, Resolution Consultants	IIa/IIb	External
Validation Data qualifiers	Qualifiers that will be applied during the data validation process are summarized below and, as indicated, results will be considered usable unless qualified by an R-flag. Rejected data will be evaluated and may be used in circumstances identified by the Partnering Team. **Data Qualifier** / **Qualifier Definition** / **Interpret Result As a Detection?** / **Result Usable?** / **Potential Result Bias** no qualifier / Acceptable / Yes / Yes / None expected J / Estimated / Yes / Yes / High or Low U / Undetected / No / Yes / None expected UJ / Undetected and Estimated / No / Yes / High or Low UR / Undetected and Rejected / No / No / Unspecified R / Rejected / No / No / Unspecified	Project Chemist or Data Validators, Resolution Consultants	IIa/IIb	External

Notes:

[1]IIa	=	Compliance with methods, procedures, and contracts [see Table 10, page 117, UFP-QAPP manual, V.1, March 2005]
[1]IIb	=	Comparison with measurement performance criteria in the SAP [see Table 11, page 118, UFP-QAPP manual, V.1, March 2005]
[2]	=	Internal or external (independent) from the data generation activities
SAP	=	Sampling and analysis plan
FTL	=	Field team leader
DVA	=	Data validation assistant
QC	=	Quality control
RPD	=	Relative percent difference
MS/MSD	=	Matrix spike/Matrix Spike duplicate
LCS/LCSD	=	Laboratory control sample/laboratory control sample duplicate
SOP	=	Standard operating procedure
DoD QSM	=	***Department of Defense Quality Systems Manual for Environmental Laboratories***, Version 4.2, October 2010. DOD QSM Version 4.2 may be updated to Version 5.0 after the laboratory has been audited and accredited for the updated version. Therefore, acceptance and measurement performance criteria may change to reflect the new version during the course of this project.
MPC	=	Measurement performance criteria
VOCs	=	Volatile organic compounds
SVOCs	=	Semi-volatile organic compounds
PAHs	=	Polynuclear aromatic hydrocarbons
SIM	=	Selective ion monitoring
U.S. EPA	=	U.S. Environmental Protection Agency

Appendix A
Standard Operating Procedures

Utility Clearance

Procedure 3-01

1.0 Purpose and Scope

1.1 This standard operating procedure (SOP) describes the process for determining the presence of subsurface utilities and other cultural features at locations where planned site activities involve the physical disturbance of subsurface materials.

1.2 This procedure is the Program-approved professional guidance for work performed by Resolution Consultants under the Comprehensive Long-Term Environmental Action Navy (CLEAN) contract (Contract Number N62470-11-D-8013).

1.3 The procedure applies to the following activities: soil gas surveying, excavating, trenching, drilling of borings and installation of monitoring and extraction wells, use of soil recovery or slide-hammer hand augers, and all other intrusive sampling activities.

1.4 The primary purpose of the procedure is to minimize the potential for damage to underground utilities and other subsurface features, which could result in physical injury, disruption of utility service, or disturbance of other subsurface cultural features.

1.5 If there are procedures, whether it be from Resolution Consultants, state, and/or federal, that are not addressed in this SOP and are applicable to utility clearance, those procedures should be added as an appendix to the project specific SAP.

1.6 As guidance for specific activities, this procedure does not obviate the need for professional judgment. Deviations from this procedure while planning or executing planned activities must be approved in accordance with Program requirements for technical planning and review.

2.0 Safety

2.1 Field and subcontractor personnel shall adhere to a site-specific health and safety plan (HASP).

3.0 Terms and Definitions

3.1 **Utility**

For the proposes of this SOP, a utility is defined as a manmade underground line or conduit, cable, pipe, vault or tank that is, or was, used for the transmission of material or energy (e.g., gas, electrical, telephone, steam, water or sewage, product transfer lines, or underground storage tanks).

3.2 **As-Built Plans**

As-built plans are plans or blueprints depicting the locations of structures and associated utilities on a property.

3.3 **One-Call**

The Utility Notification Center is the one-call agency for nationwide call before you dig. The Utility Notification Center is open 24 hours a day, and accepts calls from anyone planning to dig. The phone number 811 is the designated call before you dig phone number that directly connects you to your local one-call center. Additional information can be found at www.call811.com.

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Calling before you dig ensures that any publicly owned underground lines will be marked so that you can dig around them safely. Having the utility lines marked not only prevents accidental damage to the lines, but prevents property damage and personal injuries that could result in breaking a line.

The following information will need to be provided when a call is placed to One-Call:

- Your name, phone number, company name (if applicable), and mailing address.
- What type or work is being done.
- Who the work is being done for.
- The county and city the work is taking place in.
- The address or the street where the work is taking place.
- Marking instructions, (specific instructions as to where the work is taking place).

Under normal circumstances it takes between 2 to 5 days from the time you call (not counting weekends or holidays) to have the underground lines marked. Because these laws vary from state to state, exactly how long it will take depends on where your worksite is located. You will be given an exact start time and date when your locate request is completed, which will comply with the laws in your area.

In the event of an emergency (any situation causing damage to life or property, or a service outage), lines can be marked sooner than the original given time if requested.

3.4 **Toning**

Toning is the process of surveying an area utilizing one or more surface geophysical methods to determine the presence or absence of underground utilities. Typically, toning is conducted after identifying the general location of utilities and carefully examining all available site utility plans. Each location is marked according to the type of utility being identified. In addition, areas cleared by toning are flagged or staked to indicate that all identified utilities in a given area have been toned.

4.0 Training and Qualifications

4.1 The **Contract Task Order (CTO) Manager** is responsible for verifying that these utility locating procedures are performed prior to the initiation of active subsurface exploration.

4.2 The **Program Quality Manager** is responsible for ensuring overall compliance with this procedure.

4.3 The **Field Manager** is responsible for ensuring that all utility locating activities are performed in accordance with this procedure.

4.4 All **Field Personnel** are responsible for the implementation of this procedure.

5.0 Equipment and Supplies

5.1 Equipment and supplies necessary for locating subsurface utilities will be provided by the subcontractor; however, the project **Field Manager/Field Personnel** will provide any additional equipment and supplies as needed as well as maintain information regarding the utility clearance activities in the field logbook.

6.0 Procedure

Proceed wtih the following steps where subsurface exploration will include excavations, drilling, or any other subsurface investigative method that could damage utilities at a site. In addition to the steps outlined below, always exercise caution while conducting subsurface exploratory work.

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6.1 Prepare Preliminary Site Plan

- Prepare a preliminary, scaled site plan depicting the proposed exploratory locations as part of the project specific Sampling and Analysis Plan (SAP) or Work Plan. Include as many of the cultural and natural features as practical in this plan.

6.2 Review Background Information

- Search existing plan files to review the as-built plans to identify the known location of utilities at the site. Plot the locations of utilities identified onto a preliminary, scaled site plan. Inform the CTO Manager if utilities lie within close proximity to a proposed exploration or excavation location. The CTO Manager will determine if it is necessary to relocate proposed sampling or excavation locations.
- Include the utility location information gathered during previous investigations (e.g., remedial investigation or remedial site evaluation) in the project design documents for removal or remedial actions. In this manner, information regarding utility locations collected during implementation of a CTO can be shared with the subcontractor during implementation of a particular task order. In many instances, this will help to reduce the amount of additional geophysical surveying work the subcontractor may have to perform.
- Conduct interviews with onsite and facility personnel familiar with the site to obtain additional information regarding the known and suspected locations of underground utilities. In addition, if appropriate, contact shall be made with local utility companies to request their help in locating underground lines. Pencil in the dimensions, orientation, and depth of utilities, other than those identified on the as-built plans, at their approximate locations on the preliminary plans. Enter the type of utility, the personnel who provided the information, and the date the information was provided into the field log.
- During the pre-field work interviewing process, the interviewer will determine which site personnel should be notified in the event of an incident involving damage to existing utilities. Record this information in the field logbook with the corresponding telephone numbers and addresses.

6.3 Site Visit/Locate Utilities/Toning

- Prior to the initiation of field activities, the Field Task Manager or similarly qualified field personnel shall visit the site and note existing structures and evidence of associated utilities, such as fire hydrants, irrigation systems, manhole and vault box covers, standpipes, telephone switch boxes, free-standing light poles, gas or electric meters, pavement cuts, and linear depression. Compare notes of the actual site configuration to the preliminary site plan. Note deviations in the field logbook and on the preliminary site plan. Accurately locate or survey and clearly mark with stakes, pins, flags, paint, or other suitable devices all areas where subsurface exploration is proposed. These areas shall correspond with the locations drawn on the preliminary site plan.
- Following the initial site visit by the Field Task Manager, a trained utility locating subcontractor will locate, identify, and tone all utilities depicted on the preliminary site plan. The Field Task Manager or similarly qualified field personnel shall visit the site and identify the areas of subsurface disturbance with white spray paint, chalk, white pin flags or some other easily identifiable marking. The utility locator should utilize appropriate sensing equipment to attempt to locate utilities that might not have appeared on the as-built plans. At a minimum, the utility subcontractor should utilize a metal detector and/or magnetometer; however, it is important to consider the possibility that non-metallic utilities or tanks might be present at the site. Use other appropriate surface geophysical methods such as Ground Penetrating Radar, Radiodetection, etc. as appropriate. Clear proposed exploration areas of all utilities in the immediate area where subsurface exploration is proposed. Clearly tone all anomalous areas. Clearly identify all toned areas on the preliminary site plan. All utilities near the area of subsurface disturbance should also be marked out by the utility subcontractor using the universal colors for subsurface utilities (i.e., red – electric; blue – water; green – sewer; yellow – gas; etc.). After toning the site and plotting all known or suspected buried utilities on the preliminary site plan, the utility locator shall provide the Field Task Manager with a copy of the completed preliminary

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site plan. Alternatively, the Field Task Manager or designee shall document the results of the survey on the preliminary site plan.

- Report to the Field Task Manager anomalous areas detected and toned that are in close proximity to the exploration or excavation areas. The Field Task Manager shall determine the safe distance to maintain from the known or suspected utility. It may be necessary to relocate the proposed exploration or excavation areas. If this is required, the Field Task Manager or designee shall relocate them and clearly mark them using the methods described above. Completely remove the markings at the prior location. Plot the new locations on the site plan and delete the prior locations from the plan. In some instances, such as in areas extremely congested with subsurface utilities, it may be necessary to dig by hand or use techniques such as air knife to determine the location of the utilities.

6.4 **Prepare Site Plan**

- Prior to the initiation of field activities, draft a final site plan that indicates the location of subsurface exploration areas and all known or suspected utilities present at the site. Provide copies of this site plan to the Navy Technical Representative (NTR), the CTO Manager, and the subcontractor who is to conduct the subsurface exploration/excavation work. Review the site plan with the NTR to verify its accuracy prior to initiating subsurface sampling activities.

7.0 Quality Control and Assurance

7.1 Utility locating must incorporate quality control measures to ensure conformance to these and the project requirements.

8.0 Records, Data Analysis, Calculations

8.1 A bound field logbook will be kept detailing all activities conducted during the utility locating procedure.

8.2 The logbook will describe any changes and modifications made to the original exploration plan. The trained utility locator shall prepare a report and keep it in the project file. Also, a copy of the final site plan will be kept in the project file.

9.0 Attachments or References

Department of Defense, United States (DoD). 2005. *Uniform Federal Policy for Quality Assurance Project Plans, Part 1: UFP-QAPP Manual.* Final Version 1. DoD: DTIC ADA 427785, EPA-505-B-04-900A. In conjunction with the U. S. Environmental Protection Agency and the Department of Energy. Washington: Intergovernmental Data Quality Task Force. March. On-line updates available at: http://www.epa.gov/fedfac/pdf/ufp_qapp_v1_0305.pdf.

Author	Reviewer	Revisions (Technical or Editorial)
Caryn DeJesus Senior Scientist	Bob Shoemaker Senior Scientist	Rev 0 – Initial Issue (June 2012)

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Logbooks

Procedure 3-02

1.0 Purpose and Scope

1.1 This standard operating procedure (SOP) describes the activities and responsibilities pertaining to the identification, use, and control of logbooks and associated field data records.

1.2 As guidance for specific activities, this procedure does not obviate the need for professional judgment. Deviations from this procedure while planning or executing planned activities must be approved in accordance with Program requirements for technical planning and review.

2.0 Safety

2.1 In order to keep the logbook clean, store it in a clean location and use it only when outer gloves used for PPE have been removed.

3.0 Terms and Definitions

3.1 **Logbook**

A logbook is a bound field notebook with consecutively numbered, water-repellent pages that is clearly identified with the name of the relevant activity, the person assigned responsibility for maintenance of the logbook, and the beginning and ending dates of the entries.

3.2 **Data Form**

A data form is a predetermined format utilized for recording field data that may become, by reference, a part of the logbook (e.g., soil boring logs, trenching logs, surface soil sampling logs, groundwater sample logs, and well construction logs are data forms).

4.0 Training and Qualifications

4.1 The **Contract Task Order (CTO) Manager** or **designee** is responsible for determining which team members shall record information in field logbooks and for obtaining and maintaining control of the required logbooks. The **CTO Manager** shall review the field logbook on at least a monthly basis. The **CTO Manager** or **designee** is responsible for reviewing logbook entries to determine compliance with this procedure and to ensure that the entries meet the project requirements.

4.2 A knowledgeable individual such as the **Field Manager**, **CTO Manager**, or **Program Quality Manager** shall perform a technical review of each logbook at a frequency commensurate with the level of activity (weekly is suggested, or, at a minimum, monthly). Document these reviews by the dated signature of the reviewer on the last page or page immediately following the material reviewed.

4.3 The **Program Quality Manager** is responsible for ensuring overall compliance with this procedure.

4.4 The **Field Manager** is responsible for ensuring that all **field personnel** follow these procedures and that the logbook is completed properly and daily. The **Field Manager** is also responsible for submitting copies to the **CTO Manager**, who is responsible for filing them and submitting a copy (if required by the CTO Statement of Work).

4.5 The **logbook user** is responsible for recording pertinent data into the logbook to satisfy project requirements and for attesting to the accuracy of the entries by dated signature. The **logbook user** is also responsible for safeguarding the logbook while having custody of it.

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4.6 All **field personnel** are responsible for the implementation of this procedure.

5.0 Equipment and Supplies

5.1 Field logbooks shall be bound field notebooks with water-repellent pages.

5.2 Pens shall have indelible black ink.

6.0 Procedure

6.1 The field logbook serves as the primary record of field activities. Make entries chronologically and in sufficient detail to allow the writer or a knowledgeable reviewer to reconstruct the applicable events. Store the logbook in a clean location and use it only when outer gloves used for personal protective equipment (PPE) have been removed.

6.2 Individual data forms may be generated to provide systematic data collection documentation. Entries on these forms shall meet the same requirements as entries in the logbook and shall be referenced in the applicable logbook entry. Individual data forms shall reference the applicable logbook and page number. At a minimum, include names of all samples collected in the logbook even if they are recorded elsewhere.

6.3 Enter field descriptions and observations into the logbook, as described in Attachment 1, using indelible black ink.

6.4 Typical information to be entered includes the following:

- Dates (month/day/year) and times (military) of all on-site activities and entries made in logbooks/forms;
- Site name and description;
- Site location by longitude and latitude, if known;
- Weather conditions, including temperature and relative humidity;
- Fieldwork documentation, including site entry and exit times;
- Descriptions of, and rationale for, approved deviations from the work plan (WP) or field sampling plan;
- Field instrumentation readings;
- Names, job functions, and organizational affiliations of on-site personnel;
- Photograph references;
- Site sketches and diagrams made on site;
- Identification and description of sample morphology, collection locations, and sample numbers;
- Sample collection information, including dates (month/day/year) and times (military) of sample collections, sample collection methods and devices, station location numbers, sample collection depths/heights, sample preservation information, sample pH (if applicable), analysis requested (analytical groups), etc., as well as chain-of-custody (COC) information such as sample identification numbers cross-referenced to COC sample numbers;
- Sample naming convention;
- Field quality control (QC) sample information;
- Site observations, field descriptions, equipment used, and field activities accomplished to reconstruct field operations;

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- Meeting information;
- Important times and dates of telephone conversations, correspondence, or deliverables;
- Field calculations;
- PPE level;
- Calibration records;
- Contractor and subcontractor information (address, names of personnel, job functions, organizational affiliations, contract number, contract name, and work assignment number);
- Equipment decontamination procedures and effectiveness;
- Laboratories receiving samples and shipping information, such as carrier, shipment time, number of sample containers shipped, and analyses requested; and
- User signatures.

6.5 The logbook shall reference data maintained in other logs, forms, etc. Correct entry errors by drawing a single line through the incorrect entry, then initialing and dating this change. Enter an explanation for the correction if the correction is more than for a mistake.

6.6 At least at the end of each day, the person making the entry shall sign or initial each entry or group of entries.

6.7 Enter logbook page numbers on each page to facilitate identification of photocopies.

6.8 If a person's initials are used for identification, or if uncommon acronyms are used, identify these on a page at the beginning of the logbook.

6.9 At least weekly and preferably daily, the **preparer** shall photocopy and retain the pages completed during that session for backup. This will prevent loss of a large amount of information if the logbook is lost.

7.0 Quality Control and Assurance

7.1 Review per Section 4.2 shall be recorded.

8.0 Records, Data Analysis, Calculations

8.1 Retain the field logbook as a permanent project record. If a particular CTO requires submittal of photocopies of logbooks, perform this as required.

8.2 Deviations from this procedure shall be documented in field records. Significant changes shall be approved by the **Program Quality Manager**.

9.0 Attachments or References

9.1 Attachment 1 – Description of Logbook Entries

9.2 Department of Defense, United States (DoD). 2005. *Uniform Federal Policy for Quality Assurance Project Plans, Part 1: UFP-QAPP Manual*. Final Version 1. DoD: DTIC ADA 427785, EPA-505-B-04-900A. In conjunction with the U. S. Environmental Protection Agency and the Department of Energy. Washington: Intergovernmental Data Quality Task Force. March. On-line updates available at: http://www.epa.gov/fedfac/pdf/ufp_qapp_v1_0305.pdf.

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Author	Reviewer	Revisions (Technical or Editorial)
Mark Kromis Program Chemist	Chris Barr Program Quality Manager	Rev 0 – Initial Issue

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Attachment 1
Description of Logbook Entries

Logbook entries shall be consistent with Section A.1.4 *Field Documentation SOPs* of the UFP-QAPP Manual (DoD 2005) and contain the following information, as applicable, for each activity recorded. Some of these details may be entered on data forms, as described previously.

Name of Activity	For example, Asbestos Bulk Sampling, Charcoal Canister Sampling, Aquifer Testing.
Task Team Members and Equipment	Name all members on the field team involved in the specified activity. List equipment used by serial number or other unique identification, including calibration information.
Activity Location	Indicate location of sampling area as indicated in the field sampling plan.
Weather	Indicate general weather and precipitation conditions.
Level of PPE	Record the level of PPE (e.g., Level D).
Methods	Indicate method or procedure number employed for the activity.
Sample Numbers	Indicate the unique numbers associated with the physical samples. Identify QC samples.
Sample Type and Volume	Indicate the medium, container type, preservative, and the volume for each sample.
Time and Date	Record the time and date when the activity was performed (e.g., 0830/08/OCT/89). Use the 24-hour clock for recording the time and two digits for recording the day of the month and the year.
Analyses	Indicate the appropriate code for analyses to be performed on each sample, as specified in the WP.
Field Measurements	Indicate measurements and field instrument readings taken during the activity.
Chain of Custody and Distribution	Indicate chain-of-custody for each sample collected and indicate to whom the samples are transferred and the destination.
References	If appropriate, indicate references to other logs or forms, drawings, or photographs employed in the activity.
Narrative (including time and location)	Create a factual, chronological record of the team's activities throughout the day including the time and location of each activity. Include descriptions of general problems encountered and their resolution. Provide the names and affiliations of non-field team personnel who visit the site, request changes in activity, impact the work schedule, request information, or observe team activities. Record any visual or other observations relevant to the activity, the contamination source, or the sample itself. It should be emphasized that logbook entries are for recording data and chronologies of events. The logbook author must include observations and descriptive notations, taking care to be objective and recording no opinions or subjective comments unless appropriate.
Recorded by	Include the signature of the individual responsible for the entries contained in the logbook and referenced forms.
Checked by	Include the signature of the individual who performs the review of the completed entries.

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Sample Labeling and Chain of Custody Procedures
Procedure 3-03A

1.0 Purpose and Scope

1.1 The purpose of this standard operating procedure is to establish standard protocols for all field personnel for use in maintaining field and sampling activity records, labeling samples, ensuring that proper sample custody procedures are utilized, and completing chain-of-custody/analytical request forms.

1.2 As guidance for specific activities, this procedure does not obviate the need for professional judgment. Deviations from this procedure while planning or executing planned activities must be approved in accordance with Program requirements for technical planning and review.

2.0 Safety

Not applicable

3.0 Definitions

3.1 **Logbook**

A logbook is a bound field notebook with consecutively numbered, water-repellent pages that is clearly identified with the name of the relevant activity, the person responsible for maintenance of the logbook, and the beginning and ending dates of the entries.

3.2 **Chain-of-Custody**

Chain-of-custody (COC) is documentation of the process of custody control. Custody control includes possession of a sample from the time of its collection in the field to its receipt by the analytical laboratory, and through analysis and storage prior to disposal.

4.0 Training and Qualifications

4.1 The **CTO Manager**, or designee, is responsible for determining which team members shall record information in the field logbook and for checking sample logbooks and COC forms to ensure compliance with these procedures. The **CTO Manager**, or designee, shall review COC forms at the completion of each sampling event.

4.2 The **Program Quality Manager** is responsible for ensuring overall compliance with this procedure.

4.3 The **Field Manager** is responsible for ensuring that all field equipment is decontaminated according to this procedure.

4.4 The **Project Chemist**, or designee, is responsible for verifying that the COC/analytical request forms have been completed properly and match the sampling and analytical plan. The **Project Chemist**, or designee, is responsible for notifying the laboratory, data managers, and data validators in writing if analytical request changes are required as a corrective action. These small changes are different from change orders, which involve changes to the scope of the subcontract with the laboratory and must be made in accordance with a respective contract.

4.5 All **Field Personnel** are are responsible for recording pertinent data onto the COC forms to satisfy project requirements and for attesting to the accuracy of the entries by dated signature.

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5.0 Procedure

This procedure provides standards for labeling the samples, documenting sample custody, and completing COC/analytical request forms. The standards presented in this section shall be followed to ensure that samples collected are maintained for their intended purpose and that the conditions encountered during field activities are documented.

5.1 Sample Labeling

Affix a waterproof sample label with adhesive backing to each individual sample container. Record the following information with a waterproof marker on each label:

- Project name or number (optional)
- COC sample number
- Date and time of collection
- Sampler's initials
- Matrix (optional)
- Sample preservatives (if applicable)
- Analysis to be performed on sample (This shall be identified by the method number or name identified in the subcontract with the laboratory)

These labels may be obtained from the analytical laboratory or printed from a computer file onto adhesive labels.

5.2 Custody Procedures

For samples intended for chemical analysis, sample custody procedures shall be followed through collection, transfer, analysis, and disposal to ensure that the integrity of the samples is maintained. A description of sample custody procedures is provided below.

Sample Collection Custody Procedures

According to the EPA guidelines, a sample is considered to be in custody if one of the following conditions is met:

- It is in one's actual physical possession or view
- It is in one's physical possession and has not been tampered with (i.e., it is under lock or official seal)
- It is retained in a secured area with restricted access
- It is placed in a container and secured with an official seal such that the sample cannot be reached without breaking the seal

Place custody seals on shipping coolers (and sample jars, if required) if the cooler/container is to be removed from the sampler's custody. Place a minimum of two custody seals in such a manner that they must be broken to open the containers or coolers. Label the custody seals with the following information:

- Sampler's name or initials
- Date and time that the sample/cooler was sealed

These seals are designed to enable detection of sample tampering. An example of a custody seal is shown in Attachment 1.

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Field personnel shall also log individual samples onto COC forms (carbon copy or computer generated) when a sample is collected. These forms may also serve as the request for analyses. Procedures for completing these forms are discussed in Section 0, indicating sample identification number, matrix, date and time of collection, number of containers, analytical methods to be performed on the sample, and preservatives added (if any). The samplers will also sign the COC form signifying that they were the personnel who collected the samples. The COC form shall accompany the samples from the field to the laboratory. When a cooler is ready for shipment to the analytical laboratory, the person delivering the samples for transport will sign and indicate the date and time on the accompanying COC form. One copy of the COC form will be retained by the sampler and the remaining copies of the COC form shall be placed inside a self-sealing bag and taped to the inside of the cooler. Each cooler must be associated with a unique COC form. Whenever a transfer of custody takes place, both parties shall sign and date the accompanying carbon copy COC forms, and the individual relinquishing the samples shall retain a copy of each form. One exception is when the samples are shipped; the delivery service personnel will not sign or receive a copy because they do not open the coolers. The laboratory shall attach copies of the completed COC forms to the reports containing the results of the analytical tests. An example COC form is provided in Attachment 2.

5.3 Completing COC/Analytical Request Forms

COC form/analytical request form completion procedures are crucial in properly transferring the custody and responsibility of samples from field personnel to the laboratory. This form is important for accurately and concisely requesting analyses for each sample; it is essentially a release order from the analysis subcontract.

Attachment 2 is an example of a completed COC/analytical request form that may be used by field personnel, with box numbers identified and discussed in text below. Multiple copies may be tailored to each project so that much of the information described below need not be handwritten each time. Each record on the form (Attachment 2) is identified with a bold number corresponding to the instructions given below.

1. Record the project name, site location.
2. Record the site location, including the state.
3. Record the Contract Task Order number
4. Record the Resolution Consultants Task Order Manager
5. Record the sampler/site phone or cell number (if applicable).
6. Record the laboratory name where the samples were sent.
7. Record the requested turnaround time, in days. If a specific turnaround time is required to meet project objectives, but was not indicated on the laboratory service request form submitted to the purchasing department, the sampler, project manager, or site manager should contact the purchasing department so the laboratory contract can be modified.
8. Record the COC number that is defined by the sampler and should be unique throughout the project's history. An example would be to use the sampler's initials followed by the data. If multiple custodies are generated on a given day, use a unique sequential identifier. Example: CRC040105A, CRC040105B
9. Record the purchase order number provided by the purchasing department.
10. Record the page and total number of COC forms used in a shipment.
11. Record the project, and phase applicable to the sampling task.
12. Record the two-character code corresponding to the *chemical* preservation type, which is found on the bottom of the COC form. If no chemical preservation was added to the sample, the field should be left blank. Temperature preservation need not be documented at this location, but will be indicated elsewhere on the COC form (see 33).

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13. List the requested analysis. Whenever possible, list the corresponding analytical method. (e.g., VOCs, 8260).

14. For Lab identification use only.

15. Record the full ***unique*** sample identification as detailed in the Site's Sampling and Analysis Plan.

16. Record the location identification, which is a shortened ID used for presentation and mapping, as detailed in the Site's Sampling and Analysis Plan.

17. Record the sample date using the format mm/dd/yy.

18. Record the sample time using the military format of hhmm.

19. Record the matrix code of the sample, which is located at the bottom of the COC form. The matrix code is a crucial element of the Navy's data management system. For simplicity, only typical matrix codes are listed on the bottom COC form, but below is a complete listing of all applicable Navy matrix codes:

Table 1
Navy Matrix Codes

Matrix Code	Matrix Code Description	Matrix Code	Matrix Code Description
AA	Ambient air	RK	Rock
AC	Composite air sample	SB	Bentonite
AD	Air - Drilling	SBS	Sub-surface soil (> 6")
AIN	Integrated air sample (under sample form of gas)	SC	Cement/Concrete
AQ	Air quality control matrix	SD	Drill cuttings — solid matrix
AQS	Aqueous	SE	Sediment
ASB	Asbestos	SEEP	SEEP
ASBF	Asbestos-Fibrous	SF	Filter sand pack
ASBNF	Asbestos-Non-Fibrous	SJ	Sand
AVE	Air-Vapor extraction, effluent	SK	Asphalt
AX	Air sample from unknown origin	SL	Sludge
BK	Brick	SM	Water filter (solid material used to filter water)
BS	Brackish sediment	SN	Miscellaneous solid/building materials
CA	Cinder ash	SO	Soil
CK	Caulk	SP	Casing (PVC, stainless steel, cast iron, iron pipe
CN	Container	SQ	Soil/Solid quality control matrix
CR	Carbon (usually for a remediation system)	SS	Scrapings
DF	Dust/Fallout	SSD	Subsurface sediment
DR	Debris/rubble	STKG	Stack gas
DS	Storm drain sediment	STPM	Stripper Tower Packing Media
DT	Trapped debris	SU	Surface soil (less than 6 inches)
EF	Emissions flux	SW	Swab or wipe
EW	Elutriate water	SZ	Wood
FB	Fibers	TA	Animal tissue
FL	Forest litter	TP	Plant tissue
GE	Soil gas effluent — stack gas (from system)	TQ	Tissue QC
GI	Soil gas influent (into system)	TX	Tissue
GL	Headspace of liquid sample	UNK	Unknown
GQ	Gaseous or Headspace QC	W	Water (not groundwater, unspecified)
GR	Gravel	WA	Drill cuttings - aqueous mix
GS	Soil gas	WB	Brackish Water

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Table 1
Navy Matrix Codes

Matrix Code	Matrix Code Description	Matrix Code	Matrix Code Description
GT	Grit	WC	Drilling water (used for well construction)
IC	IDW Concrete	WD	Well development water
IDD	IDW Solid	WF	Freshwater (not groundwater)
IDS	IDW soil	WG	Ground water
IDW	IDW Water	WH	Equipment wash water
IW	Interstitial water	WI	Ground water influent (into system)
LA	Aqueous phase of a multiphase liquid/soil	WL	Leachate
LF	Product (floating or free)	WM	Marine water
LQ	Organic liquid quality control matrix	WN	Pore water
MA	Mastic	WO	Ocean water
MO	Mortar	WP	Drinking water
MR	Marine sediment	WQ	Water for QC samples
MS	Metal shavings	WR	Ground water effluent (from system)
NS	Near-surface soil	WS	Surface water
PA	Paper	WT	Composite groundwater sample
PC	Paint Chips	WU	Storm water
PP	Precipitate	WW	Waste water
RE	Residue		

Field QC blanks will require matrix codes that identify the type of blank associated with parent sample. Aqueous field QC blanks are not automatically identified with a matrix code of "WQ," indicating a water quality control blank; they are only identified with a matrix code of "WQ" if the associated samples are also aqueous. Trip blanks, field blanks, and equipment rinsate blanks collected in association with ***soil*** samples will be identified with a matrix code of "SQ," even though the actual matrix is aqueous, because the blanks were collected to assess potential contamination imparted during decontamination activities or transport of ***soil*** samples.

20. Record the sample type code, which is located at the bottom of the COC form. The sample type is a crucial element of the EQuIS data management system. For simplicity, only typical sample type codes are listed on the bottom of the COC form, but below is a list of all applicable Navy field sample type codes:

Table 2
Navy Sample Type Codes

Sample Type Code	Sample Type Code Description
AB	Ambient condition blank
BIOCON	Bioassay control sample
BS	Blank spike
BSD	Blank spike duplicate
EB	Equipment blank
EBD	Equipment blank/rinsate duplicate
FB	Field blank
FD	Field duplicate
FS	Field spike
IDW	Purge and rinsate water
LB	Lab Blank

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Table 2
Navy Sample Type Codes

Sample Type Code	Sample Type Code Description
LR	Lab Replicate
MB	Material blank
MIS	Multi-Incremental Sample
MS	Matrix spike
N	Normal (Regular)
PE	Performance evaluation
PURGE	Purge water sample
RD	Regulatory duplicate
SB	Source blank
SBD	Source blank duplicate
SCREEN	Screening Sample
SD	Matrix spike duplicate
SPLIT	Sample split
SRM	Standard reference material
TB	Trip Blank
TBD	Trip blank duplicate
TBR	Trip blank replicate

Field duplicate samples — Field duplicates will be identified using the format detailed in the Site's Sampling and Analysis Plan. However, field duplicates will also be differentiated from the parent sample on the chain-of-custody form. The parent sample will have a sample type code of "N," for normal environmental sample; while its duplicate will have a sample type code of "FD."

21. Record whether the sample is field filtered with a "Y" or not field filtered with an "N." If a project requires collecting samples for both total and dissolved constituents, the same sample and location ID is used for both (see 15 and 16); however, the sampler will indicate whether the sample is field filtered at this location on the COC form. This field must always be filled out; even when soil samples are collected (where "N" appropriately applies, in most cases).

22. Record the total number of containers that are submitted for all of the tests. This must add up to the total number of containers listed for each individual test in 23.

23. Record the number of containers for each test. Do not use Xs, rather indicate the number of containers submitted for each test listed in 14. For example, Sample 010MW007002 requires analysis for VOCs (8260), and SVOCs (8270). Record 3 under the VOC analysis and 2 under the SVOC (assuming 3 containers were submitted for VOCs and 2 were submitted for SVOCs). The total number of containers in this example is 5, which should be the total number of containers listed in 22. Extra containers submitted for matrix spike/matrix spike duplicates (MS/MSDs) will be appropriately recorded.

24. Indicate if extra sample volume was included for MS/MSD analysis using an "X." Samples to be used for MS/MSDs will use the same sample ID and location ID (see 15 and 16), but will be collected in triplicate, particularly for liquid samples, to ensure the analytical laboratory receives sufficient volume for the analyses.

25. Indicate if the samples should be held by the laboratory for future testing using an "X."

26. Record any field comments.

27. Reserved for laboratory comments.

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28. Indicate the total number of coolers in each shipment. *Note*: When multiple coolers are submitted, each should contain a COC form.

29. Signature(s) of the person(s) relinquishing sample custody.

30. Signature(s) of the person(s) receiving sample custody.

31. Indicate whether the samples are iced, by checking the appropriate response.

32. Indicate the method of shipment (e.g., FedEx, hand-delivered, laboratory courier).

33. Record the airbill number when a commercial courier is used. This is particularly important when multiple coolers are sent in the same shipment or when the laboratory is sent the COC form in advance of receiving samples because it aids in tracking lost coolers.

34. Record the date the coolers were shipped.

COC forms tailored to each CTO can be drafted and printed onto multiple forms. This eliminates the need to rewrite the analytical methods column headers each time. It also eliminates the need to write the project manager, name, and number; QC Level; turnaround time; and the same general comments each time.

Complete one COC form per cooler. Whenever possible, place all volatile organic analyte vials into one cooler in order to reduce the number of trip blanks. Complete all sections and be sure to sign and date the COC form. One copy of the COC form must remain with the field personnel.

6.0 Records

The COC/analytical request form shall be faxed or emailed approximately daily to the Project Chemist, or designee for verification of accuracy. Following the completion of sampling activities, the sample logbook and COC forms will be transmitted to the CTO Manager for storage in project files. The original COC/analytical request form shall be submitted by the laboratory along with the data delivered. Any changes to the analytical requests that are required shall be made in writing to the laboratory. A copy of this written change shall be sent to the data validators and placed in the project files. The reason for the change shall be included in the project files so that recurring problems can be easily identified.

7.0 References and Attachments

Department of Defense, United States (DoD). 2005. *Uniform Federal Policy for Quality Assurance Project Plans, Part 1: UFP-QAPP Manual*. Final Version 1. DoD: DTIC ADA 427785, EPA-505-B-04-900A. In conjunction with the U. S. Environmental Protection Agency and the Department of Energy. Washington: Intergovernmental Data Quality Task Force. March. On-line updates available at: http://www.epa.gov/-fedfac/pdf/ufp_qapp_v1_0305.pdf.

Attachment 1: Chain-of-Custody Seal

Attachment 2: Generic Chain-of-Custody/Analytical Request Form

Author	Reviewer	Revisions (Technical or Editorial)
Tina Cantwell QA Officer	Ben Brantley Project Manager	Rev 0 — Initial Issue

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Attachment 1
Chain-of-Custody Seal

EXAMPLE CHAIN-OF-CUSTODY SEAL

[LABORATORY]	SAMPLE NO.	DATE	SEAL BROKEN BY
	SIGNATURE		DATE
	PRINT NAME AND TITLE *(Inspector, Analyst or Technician*		

Attachment 2
Example Chain-of-Custody/Analytical Request Form

RESOLUTION CONSULTANTS

CHAIN OF CUSTODY AND ANALYTICAL REQUEST RECORD

Project Name:	1	COC No. 7	Page of 9
Site Location:	2	PO No. 8	Project No. 10
Contract Task Order No.	3		Lab Name 11

Sampler/Site Phone# 4

Send Results To: 5

Data Shipping Address: 6

Sample Analysis Requested (Enter number of containers for each test)

Lab ID	Sample ID (sys_samp_code)	Location ID (sys_loc_code)	Date (mm/dd/yy)	Time (Military) (hhmm)	Matrix Code (1)	Sample Type (2)	Field Filtered (Y/N)	Total No. of Containers	12									Extra Volumes for MS/MSD	HOLD
									13										
14	15	16	17	18	19	20	21	22	23									24	25

Turnaround Time(specify): 26 Final _____ days Email (if applicable) _____ days

Deliverable(check): 27 Level 2_____ Level 3_____ Full/Level 4_____ TX TRRP-13_____

Field Comments: 28

Lab Comments: 29

Sample Shipment and Delivery Details

Number of coolers in shipment: 30

Relinquished by (signature)	Date	Time	Received by (signature)	Date	Time
1 31			1 32		
2			2		
3			3		

Samples Iced?(check) 33 Yes___ No___

Method of Shipment: 34

Airbill No: 35

Date Shipped: 36

(1) **AA**=Ambient air, **AQ**=Air quality control, **ASB**=Asbestos, **CK**=Caulk, **DS**=Storm drain sediment, **GS**=Soil gas, **IC**=IDW Concrete, **IDD**=IDW Solid, IDS=IDW soil, **IDW**=IDW Water, **LF**=Free Product, **MA**=Mastic, **PC**=Paint Chips, **SC**=Cement/Concrete, **SE**=Sediment, **SL**=Sludge, **SO**=Soil, **SQ**=Soil/Solid quality control, **SSD**=Sassafras sediment, **SU**=Surface soil (<6 in), **SW**=Swab or wipe, **TA**=Animal tissue, **TP**=Plant tissue, **TQ**=Tissue quality control, **WG**=Ground water, **WL**=Leachate, **WO**=Ocean water, **WP**=Drinking water, **WQ**=Water quality control, **WR**=Ground water effluent, **WS**=Surface water, **WU**=Storm water, **WW**=Waste water

(2) **Sample Type: AB**=Ambient Blk, **EB**=Equipment Blk, **FB**=Field Blk, **FD**=Field Duplicate Sample, **IDW**=Investigative-Derived Waste, **MIS**=Incremental Sampling Methodology, **N**=Normal Environmental Sample, **PE**=Performance Eval., **TB**=Trip Blk

(3) **Preservative added**: **HA**=Hydrochloric Acid, **NI**=Nitric Acid, **SH**=Sodium Hydroxide, **SA**=Sulfuric Acid, **AA**=Ascorbic Acid, **HX**=Hexane, **ME**=Methanol, **SB**=sodium bisulfate, **ST**=Sodium Thiosulfate, If **NO preservative** added leave blank

Sample Handling, Storage, and Shipping of Low Level Environmental Samples

Procedure 3-04A

1.0 Purpose and Scope

1.1 This Standard Operating Procedure (SOP) sets forth the methods for use by personnel engaged in handling, storing, and transporting low level environmental samples.

1.2 As guidance for specific activities, this procedure does not obviate the need for professional judgment. Deviations from this procedure while planning or executing planned activities must be approved in accordance with Program requirements for technical planning and review.

2.0 Safety

2.1 To avoid lifting injuries associated with heavy coolers, use the large muscles of the legs, not the back. Use dollies if possible.

2.2 When using tools for cutting purposes, cut away from yourself. The use of appropriate, task specific cutting tools is recommended.

2.3 Wear proper gloves, such as blue nitrile and latex, as defined in the site-specific project health and safety plan, when handling sample containers to avoid contacting any materials that may have spilled out of the sample containers.

3.0 Terms and Definitions

DOT — Department of Transportation

4.0 Training and Qualifications

4.1 The **Contract Task Order** (CTO) **Manager** is responsible for verifying that these procedures are performed prior to the initiation of active subsurface exploration.

4.2 The **Program Quality Manager** is responsible for ensuring overall compliance with this procedure.

4.3 The **Field Manager** is responsible for ensuring that sample handling, storage, and shipping are performed in accordance with this procedure.

4.4 All **Field Personnel** are responsible for the implementation of this procedure.

5.0 Procedures

5.1 Handling and Packaging

Environmental samples should be packaged prior to shipment using the following procedures:

1. Allow sufficient headspace in all bottles (except volatile organic analysis containers with a septum seal) to compensate for any pressure and temperature changes (approximately 1 percent of the volume of the container).

2. Ensure that the lids on all bottles are tight (will not leak).

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3. Glass bottles should be wrapped in bubble wrap — preferably sealable bubble wrap sample bags, if available. Place bottles in separate and appropriately-sized polyethylene bags and seal the bags.

4. Select a sturdy cooler in good repair. Secure and tape the drain plug with fiber or duct tape inside and outside. Line the cooler with a large heavy-duty plastic bag.

5. Place cushioning/absorbent material in the bottom of the cooler, if available, and then place the containers in the cooler with sufficient space to allow for the addition of cushioning between the containers.

6. Put "blue ice" (or ice that has been "double bagged" in heavy-duty polyethylene bags and properly sealed) on top of and/or between the containers. Fill all remaining space between the containers with bubble wrap or other suitable absorbent material.

7. Securely fasten the top of the large garbage bag with packaging tape.

8. Place the completed Chain-of-Custody (COC) Record into a sealed plastic bag, and tape the bag to the inner side of the cooler lid.

9. Close the cooler and securely tape (preferably with fiber tape) the top of the cooler shut. COC seals should be affixed to opposing sides of the cooler within the securing tape so that the cooler cannot be opened without breaking the seal.

5.2 Shipping

Follow all appropriate DOT regulations (e.g., 49 Code of Federal Regulations, Parts 171-179) for shipment of air, soil, water, and other samples. Elements of these procedures are summarized in the following subsections.

5.2.1 Non-hazardous Materials Shipment

If the samples are suspected to be non-hazardous based on previous site sample results, field screening results, or visual observations, if applicable, then samples may be shipped as non-hazardous.

When a cooler is ready for shipment to the laboratory, prepare standard air bill paperwork for shipment of the samples to the laboratory. Write the shippers tracking/airbill number on the COC form. Place two copies of the COC form inside a self-sealing bag and tape it to the inside of the cooler. Seal the cooler with waterproof tape and label it with “Fragile,” “This-End-Up” (or directional arrows pointing up), or other appropriate notices. Affix a label stating the destination (laboratory address) to each cooler. Personnel should be aware of carrier weight or other policy restrictions.

5.2.2 Hazardous Materials Shipment

Shipment of Hazardous Material is not covered in this SOP; all samples handled under this SOP are anticipated to be non-hazardous or not dangerous goods. The CTO Manager, or designee, is responsible for determining if samples collected during a specific field investigation meet the definitions for dangerous goods. If a sample is collected of a material that is listed in the Dangerous Goods List, Section 4.2, of International Air Transport Authority (IATA), then that sample must be identified, packaged, marked,

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labeled, and shipped according to the instructions given for that material. If the composition of the collected sample(s) is unknown, and the project leader knows or suspects that it is a regulated material (dangerous goods), the sample may not be offered for air transport. If the composition and properties of a waste sample or a highly contaminated soil, sediment, or water sample are unknown, or only partially known, the sample may not be offered for air transport.

6.0 Records

Maintain all copies of chain of custodies and air bills with the project file. .

7.0 Attachments or References

International Air Transport Authority (IATA). Dangerous Goods Regulations

http://www.iata.org/whatwedo/cargo/dangerous_goods/Documents/DGR52-significant-changes.pdf

Department of Defense, United States (DoD). 2005. *Uniform Federal Policy for Quality Assurance Project Plans, Part 1: UFP-QAPP Manual*. Final Version 1. DoD: DTIC ADA 427785, EPA-505-B-04-900A. In conjunction with the U. S. Environmental Protection Agency and the Department of Energy. Washington: Intergovernmental Data Quality Task Force. March. On-line updates available at: http://www.epa.gov/fedfac/pdf/ufp_qapp_v1_0305.pdf.

Author	Reviewer	Revisions (Technical or Editorial)
Ben Brantley	Tina Cantwell	Rev 0 — Initial Issue
Program Manager	QA Officer	

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Investigation Derived Waste Management

Procedure 3-05 KB27

1.0 Purpose and Scope

1.1 This standard operating procedure (SOP) describes activities and responsibilities with regard to management of investigation-derived waste (IDW). The purpose of this procedure is to provide guidance for the minimization, handling, labelling, temporary storage, inventory, classification, and disposal of IDW generated under the United States (U.S.) Navy Environmental Restoration Program. This procedure will also apply to personal protective equipment (PPE), sampling equipment, decontamination fluids, non-IDW trash, non-indigenous IDW, and hazardous waste generated during implementation of removal or remedial actions.

1.2 This procedure serves as facility-approved guidance for the management of IDW and focuses on minimizing, segregating, handling, labelling, storing, and inventorying IDW in the field. Certain drum inventory requirements related to the screening, sampling, classification, and disposal of IDW are noted in this procedure.

1.3 As guidance for specific activities, this procedure does not obviate the need for professional judgment. Deviations from this procedure while planning or executing planned activities must be approved in accordance with Program requirements for technical planning and review.

2.0 Safety

2.1 The health and safety considerations for the work associated with this SOP, including both potential physical and chemical hazards, are addressed in the project Accident Prevention Plan (APP).

2.2 All **Field Personnel** responsible for IDW management must adhere to the APP and must wear the PPE specified in the site-specific APP. Generally, this includes, at a minimum, steel-toed boots or steel-toed rubber boots, safety glasses, American National Standards Institute-standard hard hats, and hearing protection (if heavy equipment is in operation). If safe alternatives are not achievable, discontinue site activities immediately.

3.0 Terms and Definitions

None

4.0 Training and Qualifications

4.1 The **CTO Manager** is responsible for ensuring that IDW management activities comply with this procedure. The **CTO Manager** is responsible for ensuring that all personnel involved in IDW management shall have the appropriate education, experience, and training to perform their assigned tasks.

4.2 The **Program Quality Manager** is responsible for ensuring overall compliance with this procedure.

4.3 The **Field Manager** is responsible for ensuring that all IDW is managed according to this procedure.

4.4 All **Field Personnel** are responsible for the implementation of this procedure.

5.0 Equipment and Supplies

The equipment and supplies required for implementation of this SOP include the following:

- Containers for waste (e.g., [U.S. Department of Transportation] DOT approved 55-gallon open and closed top drums) and material to cover waste to protect from weather (e.g., plastic covering);

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- Hazardous /non-hazardous waste drum labels (weatherproof);
- Permanent marking pens;
- Inventory forms for project file;
- Plastic garbage bags, zip lock storage bags, roll of plastic sheeting; and
- Steel-toed boots, chemical resistant gloves, coveralls, safety glasses, and any other PPE required in the HASP.

6.0 Waste Management Procedures

The following federal and state regulations shall be used as resources for determining waste listings or characteristics and requirements for waste storage, transportation, and disposal:

- Georgia (GA) Rules 391-3-11-.08
- Code of Federal Regulations (CFR), Title 40, Parts 261, 262, 264, 265. 266, and 268;
- CFR, Title 49, Parts 171, 172, 173, 178, and 179.

Wastes are either classified as non-investigative waste or investigative-derived waste (IDW). Non-investigative waste, such as litter and household garbage, will be collected on an as needed basis to maintain each site in a clean and orderly manner. Nitrile gloves and plastic sheeting that have come in contact with sampling equipment and decontamination water are anticipated to have little to no contact with contaminated water; therefore, gloves and plastic sheeting will be bagged and disposed in a designated Base general trash collection bin. Tubing from monitoring wells will be decontaminated and the rinsate water will be collected and characterized as either hazardous or non-hazardous depending on the characterization of the purge water.

6.1 Temporary Storage

Waste generated during investigation activities, classified as "characterization pending analysis", will be contained in U.S. Department of Transportation approved steel 55-gallon drums and temporarily stored onsite, prior to disposal. The containers will be transported to a designated staging location in such a manner to prevent spillage or particulate loss to the atmosphere. IDW will be segregated according to matrix (solid or liquid) and as to how it was derived (soil cuttings and decontamination fluids). Until disposal, such containers will be inventoried, stored as securely as possible, and inspected regularly, as a general good practice.

Solid, liquid, or PPE waste generated during investigation activities that are characterized as hazardous waste shall not be accumulated onsite longer than 90 days. All hazardous waste containers shall be closed, marked, and labelled as "Hazardous Waste" with an accumulation start date, and stored in a secured storage area. Proper hazardous waste signs shall be posted at the 90-day storage area as required by any state or federal statutes.

6.2 Identification

Labelling of waste containers will be in accordance with 49 CFR 172, 173 and 178, GA Rules 391-3-11-.08, and 40 CFR 262.34. Labels will include the type of waste, location from which the waste was generated, and accumulation start date. Specifically, containers (including soil and decontamination water) will include one of the following labels:

- "Analysis Pending" or "Waste Material" — Pre-printed labels are to be used until analytical results are received and reviewed, and a waste designation determined. This label will include the accumulation start date.
- "Hazardous Waste" — Pre-printed hazardous waste labels that include the following information:
  - Accumulation start date

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- Generator Name
- Site United States Environmental Protection Agency (U.S. EPA) ID number
- Hazardous waste codes
- Manifest Number for containers less than 110-gallon capacity

- "Non-Hazardous Waste" — Pre-printed labels with the following information:
  - Accumulation start date
  - Generator Name
  - Site U.S. EPA ID Number
  - Waste-specific information (e.g., contaminated liquid)

Upon completion of activities, field personnel will assure that drum lids and bungs are secure and the drums will be moved to a designated temporary storage point.

6.3 Hazardous Determination

Hazardous waste determination will be conducted in accordance with GA Rules 391-3-11-.08(1) incorporating 40 CFR parts 261 and 262. To complete a hazardous waste determination for IDW waste from soil and decontamination water activities, the following questions will be answered.

1. Is the IDW waste excluded from regulation per 40 CFR 261.4?

2. Is the IDW waste a U.S. EPA defined listed waste per subpart D of 40 CFR part 261?

3. Is the IDW waste U.S. EPA defined characteristically hazardous waste either by testing the waste according to the methods in subpart C of 40 CFR 261 or applying knowledge of the hazard characteristics of the waste in light of the materials or process used?

The investigation at Solid Waste Management Unit 27 for Kings Bay is associated with a historical storage area with no known contamination; therefore, IDW waste generated from the investigation will not be excluded from regulation and will not be a listed waste (F-, K-, P-, U-listed).

In order to determine if IDW waste is characteristically hazardous and restricted from land disposal per 40 CFR 268, field personnel will obtain individual discrete samples from each container of IDW waste (both soil and water); the sampling process is described by waste stream in subsequent sections of this SOP.

6.4 Anticipated Waste Streams

Wastes will be managed and disposed in accordance with the generator regulations of the Georgia Hazardous Waste Management Act, Resource Conservation and Recovery Act (RCRA), and applicable conditions of the Hazardous Waste Facility Permit for Naval Submarine Base Kings Bay. This SOP includes requirements applicable to waste generation and subsequent management, including management of wastes in a 90-day accumulation unit or transfer to a permitted unit, but does not address the management of wastes within the permitted unit.

The waste streams associated with this scope of work may include:

- Purge and development water; decontamination waste/wastewater
- Soil generated during environmental borings/sampling activities
- Sampling wastes (e.g., used PPE)

6.5 Container Management

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Wastes will be stored according to the following requirements:

- Drums of hazardous waste will be transported to a designated temporary accumulation area on wood pallets and will be secured together with non-metallic bonding.
- Drums will be inspected and inventoried upon arrival onsite for signs of contamination and/or deterioration.
- Adequate aisle space (e.g., 30 inches) will be provided to allow the unobstructed movement of personnel and equipment. A row of drums should be no more than two drums wide.
- Each drum will be provided with its own label.
- Drums will remain closed except when removing or adding waste to the drum. Lids will be properly secured when not adding or removing waste.
- Drums will be disposed of with the contents. If the contents are removed from the drums for offsite transportation and treatment or disposal, the drums will be decontaminated prior to re-use or before leaving the site.
- Secondary containment will be provided for hazardous waste drums.
- If a container begins to leak, the waste will be transferred to another container that is in good condition; any leaked waste will be absorbed, containerized, characterized, and marked/labelled as either hazardous or non-hazardous waste depending on what type of waste leaked
- Drums will be made of or lined with materials that will not react with, and are otherwise compatible with, the waste to be stored.

6.6 Characterization

To determine if IDW waste is characteristically (per GA Rules GA Rules 391-3-11-.08(1) and 40 CFR 262.11, §261) hazardous and restricted from land disposal per 40 CFR 268, discrete samples will be collected from each container of IDW waste (both soil and water). Soil IDW samples will be submitted for laboratory analysis of toxic characteristic leaching procedure (TCLP) volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and total metals (RCRA 8 Metals). Liquid IDW will be submitted for analysis of VOCs, SVOCs, and metals.

Analytical results will be directly comparable to toxic characteristic leaching procedure (TCLP) threshold values in 40 CFR 261.24. IDW wastes with analytical results that exceed TCLP values will be managed as hazardous wastes; IDW wastes with analytical results below TCLP values will be managed as non-hazardous special wastes. All hazardous or non-hazardous waste determinations will be documented on a waste profile or waste characterization determination form.

An approved copy of the waste profile will be received from the accepting disposal facility prior to offsite transportation of the material. Navy personnel will provide generator certification and/or signature, if required.

6.7 Disposal

Waste generated during field activities will be stored, transported, and disposed of according to applicable state, federal, and local regulations. Transportation of wastes will be conducted by a subcontracted transporter, with appropriate licenses. A state-certified hazardous waste hauler shall transport all wastes classified as hazardous. Typically, the facility receiving any waste can coordinate a hauler to transport the waste. The following procedures are observed when hauling and transporting wastes offsite:

- Minimize impacts to general public traffic.
- Repair road damage caused by construction and/or hauling traffic.
- Clean-up material spilled in transit.

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- Line and cover (when applicable) trucks/trailers used for hauling contaminated materials to prevent releases and contamination.
- Decontaminate vehicles prior to re-use, other than hauling contaminated material.
- All personnel involved in offsite disposal activities will follow safety and spill response procedures outlined in the APP.
- No materials from other projects will be combined with materials from Naval Submarine Base Kings Bay

Shipped hazardous waste shall be disposed of in accordance with applicable GA/RCRA/U.S. EPA requirements. All IDW wastes will be treated and/or disposed at an appropriately licensed offsite treatment or disposal facility. All hazardous wastes will be transported to a permitted, RCRA Subtitle C facility. Prior to coordinating the waste pickup, a waste profile, along with supporting documentation, will be completed for each waste stream. Waste profiles will be reviewed by the disposal facility and a manifest will be prepared to document the disposal location. Manifests will be reviewed and signed by the Navy as the generator of the waste.

The offsite treatment or disposal facility will be responsible for providing a copy of the final waste manifest and for providing a certificate of treatment or disposal for each load of waste received. If the signed hazardous waste manifest from the designated offsite facility is not received within 35 days, Resolution Consultants will contact the transporter or the designated facility to determine the status of the waste. If the signed hazardous waste manifest has not been received within 45 days, Resolution Consultants will prepare an "Exception Report" for the Navy to submit to the State of Georgia, as required under 40 CFR 262.42.

7.0 Records and Data

7.1 Maintain records as required by implementing the procedures in this SOP.

7.2 Deviations from this procedure or the sampling and analysis plan shall be documented in field records. Significant changes shall be approved by the **Program Quality Manager**.

8.0 Attachments or References

Department of Defense, United States (DoD). 2005. *Uniform Federal Policy for Quality Assurance Project Plans, Part 1: UFP-QAPP Manual.* Final Version 1. DoD: DTIC ADA 427785, EPA-505-B-04-900A. In conjunction with the U. S. Environmental Protection Agency and the Department of Energy. Washington: Intergovernmental Data Quality Task Force. March. On-line updates available at: http://www.epa.gov/fedfac/pdf/ufp_qapp_v1_0305.pdf

Department of Energy, United States (DOE). 1994. *The Off-Site Rule*. EH-231-020/0194. Office of Environmental Guidance. March.

1999. *Management of Remediation Waste under the Resource Conservation and Recovery Act (RCRA)*. Office of Environmental Policy and Assistance. 20 December.

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2007. *Navy Environmental and Natural Resources Program Manual.* OPNAV Instruction 5090.1c . October.

Environmental Protection Agency, United States (EPA). 1991. *Management of Investigative-Derived Wastes During Site Inspections*. Office of Emergency and Remedial Response. EPA/540/G-91/009. May.

1992a. *Guidance for Performing Site Inspections under CERCLA*. EPA/540/R-92/021. Office of Emergency and Remedial Response. September.

1992b. *Guide to Management of Investigative-Derived Wastes*. Quick reference fact sheet. OSWER Dir. 9345.3-03FS. Office of Solid Waste and Emergency Response. January.

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1997a. *Sending Wastes Off Site? OSC and RPM Responsibilities under the Off-Site Rule*. EPA/540-F-97-006, Office of Solid Waste and Emergency Response. September.

1997b. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846.* 3rd ed., Final Update IIIA. Office of Solid Waste. Updates available: www.epa.gov/epaoswer/hazwaste/test/new-meth.htm

1998. *Management of Remediation Waste under RCRA*. EPA/530-F-98-026. Office of Solid Waste and Emergency Response. October.

(No Date). *Compliance with the Off-Site Rule During Removal Actions.* Office of Regional Counsel (Region 3). Hendershot, Michael.

Author	***Reviewer***	***Revisions (Technical or Editorial)***
Mark Kromis Program Chemist	Chris Barr Program Quality Manager	Rev 0 – Initial Issue (May 2012)
David Warren	Kevin Arick	Rev. 1 – SWMU 27 NSB Kings Bay Specific (March 2014)

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Equipment Decontamination

Procedure 3-06

1.0 Purpose and Scope

1.1 This standard operating procedure (SOP) describes methods of equipment decontamination, to be used for activities where samples for chemical analysis are collected or where equipment will need to be cleaned before leaving the site or before use in subsequent activities.

1.2 As guidance for specific activities, this procedure does not obviate the need for professional judgment. Deviations from this procedure while planning or executing planned activities must be approved in accordance with Program requirements for technical planning and review.

2.0 Safety

It is the responsibility of the **Site Safety Officer (SSO)** to set up the site zones (i.e., exclusion, transition, and clean) and decontamination areas. Generally the decontamination area is located within the transition zone, upwind of intrusive activities, and serves as the washing area for both personnel and equipment to minimize the spread of contamination into the clean zone. Typically, for equipment, a series of buckets are set up on a visqueen-lined bermed area. Separate spray bottles containing cleaning solvents as described in this procedure or the Contract Task Order (CTO) Work Plan (WP) and distilled water are used for final rinsing of equipment. Depending on the nature of the hazards and the site location, decontamination of heavy equipment, such as augers, pump drop pipe, and vehicles, may be accomplished using a variety of techniques.

All **Field Personnel** responsible for equipment decontamination must adhere to the site-specific health and safety plan (HSP) and must wear the personal protective equipment (PPE) specified in the site-specific HSP. Generally this includes, at a minimum, Tyvek® coveralls, steel-toed boots with boot covers or steel-toed rubber boots, safety glasses, American National Standards Institute-standard hard hats, and hearing protection (if heavy equipment is in operation). Air monitoring by the **SSO** may result in an upgrade to the use of respirators and cartridges in the decontamination area; therefore, this equipment must be available on site. If safe alternatives are not achievable, discontinue site activities immediately.

In addition to the aforementioned precautions, the following sections describe safe work practices that will be employed.

2.1 Chemical Hazards associated with Equipment Decontamination

- Avoid skin contact with and/or incidental ingestion of decontamination solutions and water.
- Utilize PPE as specified in the site-specific HSP to maximize splash protection.
- Refer to material safety data sheets, safety personnel, and/or consult sampling personnel regarding appropriate safety measures (i.e., handling, PPE including skin and respiratory).
- Take the necessary precautions when handling detergents and reagents.

2.2 Physical Hazards associated with Equipment Decontamination

- To avoid possible back strain, it is recommended to raise the decontamination area 1 to 2 feet above ground level.
- To avoid heat stress, over exertion, and exhaustion, it is recommended to rotate equipment decontamination among all site personnel.

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- Take necessary precautions when handling field sampling equipment.

3.0 Terms and Definitions

None.

4.0 Training and Qualifications

4.1 The **CTO Manager** is responsible for ensuring that decontamination activities comply with this procedure. The **CTO Manager** is responsible for ensuring that all personnel involved in equipment decontamination shall have the appropriate education, experience, and training to perform their assigned tasks.

4.2 The **Program Quality Manager** is responsible for ensuring overall compliance with this procedure.

4.3 The **Field Manager** is responsible for ensuring that all field equipment is decontaminated according to this procedure.

4.4 All **Field Personnel** are responsible for the implementation of this procedure.

5.0 Procedure

Decontamination of equipment used in soil/sediment sampling, groundwater monitoring, well drilling and well development, as well as equipment used to sample groundwater, surface water, sediment, waste, wipe, asbestos, and unsaturated zone, is necessary to prevent cross-contamination and to maintain the highest integrity possible in collected samples. Planning a decontamination program requires consideration of the following factors:

- Location where the decontamination procedures will be conducted
- Types of equipment requiring decontamination
- Frequency of equipment decontamination
- Cleaning technique and types of cleaning solutions appropriate to the contaminants of concern
- Method for containing the residual contaminants and wash water from the decontamination process
- Use of a quality control measure to determine the effectiveness of the decontamination procedure

The following subsections describe standards for decontamination, including the frequency of decontamination, cleaning solutions and techniques, containment of residual contaminants and cleaning solutions, and effectiveness.

5.1 Decontamination Area

Select an appropriate location for the decontamination area at a site based on the ability to control access to the area, the ability to control residual material removed from equipment, the need to store clean equipment, and the ability to restrict access to the area being investigated. Locate the decontamination area an adequate distance away and upwind from potential contaminant sources to avoid contamination of clean equipment.

5.2 Types of Equipment

Drilling equipment that must be decontaminated includes drill bits, auger sections, drill-string tools, drill rods, split barrel samplers, tremie pipes, clamps, hand tools, and steel cable. Decontamination of monitoring well development and groundwater sampling equipment includes submersible pumps, bailers, interface probes, water level meters, bladder pumps, airlift pumps, peristaltic pumps, and lysimeters. Other sampling equipment that requires decontamination includes, but is not limited to, hand trowels,

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hand augers, slide hammer samplers, shovels, stainless-steel spoons and bowls, soil sample liners and caps, wipe sampling templates, composite liquid waste samplers, and dippers. Equipment with a porous surface, such as rope, cloth hoses, and wooden blocks, cannot be thoroughly decontaminated and shall be properly disposed of after one use.

5.3 Frequency of Equipment Decontamination

Decontaminate down-hole drilling equipment and equipment used in monitoring well development and purging prior to initial use and between each borehole or well. Down-hole drilling equipment, however, may require more frequent cleaning to prevent cross-contamination between vertical zones within a single borehole. When drilling through a shallow contaminated zone and installing a surface casing to seal off the contaminated zone, decontaminate the drilling tools prior to drilling deeper. Initiate groundwater sampling by sampling groundwater from the monitoring well where the least contamination is suspected. Decontaminate groundwater, surface water, and soil sampling devices prior to initial use and between collection of each sample to prevent the possible introduction of contaminants into successive samples.

5.4 Cleaning Solutions and Techniques

Decontamination can be accomplished using a variety of techniques and fluids. The preferred method of decontaminating major equipment, such as drill bits, augers, drill string, and pump drop-pipe, is steam cleaning. To steam clean, use a portable, high-pressure steam cleaner equipped with a pressure hose and fittings. For this method, thoroughly steam wash equipment and rinse it with potable tap water to remove particulates and contaminants.

A rinse decontamination procedure is acceptable for equipment such as bailers, water level meters, new and re-used soil sample liners, and hand tools. The decontamination procedure shall consist of the following: (1) wash with a non-phosphate detergent (Alconox®, Liquinox®, or other suitable detergent) and potable water solution; (2) rinse with potable water; (3) spray with laboratory-grade isopropyl alcohol; (4) rinse with deionized or distilled water; and (5) spray with deionized or distilled water. If possible, disassemble equipment prior to cleaning. Add a second wash at the beginning of the process if equipment is very soiled.

Decontaminating submersible pumps requires additional effort because internal surfaces become contaminated during usage. Decontaminate these pumps by washing and rinsing the outside surfaces using the procedure described for small equipment or by steam cleaning. Decontaminate the internal surfaces by recirculating fluids through the pump while it is operating. This recirculation may be done using a relatively long (typically 4 feet) large-diameter pipe (4-inch or greater) equipped with a bottom cap. Fill the pipe with the decontamination fluids, place the pump within the capped pipe, and operate the pump while recirculating the fluids back into the pipe. The decontamination sequence shall include: (1) detergent and potable water; (2) potable water rinse; (3) potable water rinse; and (4) deionized water rinse. Change the decontamination fluids after each decontamination cycle.

Solvents other than isopropyl alcohol may be used, depending upon the contaminants involved. For example, if polychlorinated biphenyls or chlorinated pesticides are contaminants of concern, hexane may be used as the decontamination solvent; however, if samples are also to be analyzed for volatile organics, hexane shall not be used. In addition, some decontamination solvents have health effects that must be considered. Decontamination water shall consist of distilled or deionized water. Steam-distilled water shall not be used in the decontamination process as this type of water usually contains elevated concentrations of metals. Decontamination solvents to be used during field activities will be specified in the CTO WP.

Rinse equipment used for measuring field parameters, such as pH (indicates the hydrogen ion concentration – acidity or basicity), temperature, specific conductivity, and turbidity with deionized or distilled water after each measurement. Also wash new, unused soil sample liners and caps with a fresh

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detergent solution and rinse them with potable water followed by distilled or deionized water to remove any dirt or cutting oils that might be on them prior to use.

5.5 Containment of Residual Contaminants and Cleaning Solutions

A decontamination program for equipment exposed to potentially hazardous materials requires a provision for catchment and disposal of the contaminated material, cleaning solution, and wash water.

When contaminated material and cleaning fluids must be contained from heavy equipment, such as drill rigs and support vehicles, the area must be properly floored, preferably with a concrete pad that slopes toward a sump pit. If a concrete pad is impractical, planking can be used to construct solid flooring that is then covered by a nonporous surface and sloped toward a collection sump. If the decontamination area lacks a collection sump, use plastic sheeting and blocks or other objects to create a bermed area for collection of equipment decontamination water. Situate items, such as auger flights, which can be placed on metal stands or other similar equipment, on this equipment during decontamination to prevent contact with fluids generated by previous equipment decontamination. Store clean equipment in a separate location to prevent recontamination. Collect decontamination fluids contained within the bermed area and store them in secured containers as described below.

Use wash buckets or tubs to catch fluids from the decontamination of lighter-weight drilling equipment and hand-held sampling devices. Collect the decontamination fluids and store them on site in secured containers, such as U.S. Department of Transportation-approved drums, until their disposition is determined by laboratory analytical results. Label containers in accordance with Procedure 3-05, *IDW Management*.

6.0 Quality Control and Assurance

A decontamination program must incorporate quality control measures to determine the effectiveness of cleaning methods. Quality control measures typically include collection of equipment blank samples or wipe testing. Equipment blanks consist of analyte-free water that has been poured over or through the sample collection equipment after its final decontamination rinse. Wipe testing is performed by wiping a cloth over the surface of the equipment after cleaning. These quality control measures provide "after-the fact" information that may be useful in determining whether or not cleaning methods were effective in removing the contaminants of concern.

7.0 Records, Data Analysis, Calculations

Any project where sampling and analysis is performed shall be executed in accordance with an approved sampling and analysis plan. This procedure may be incorporated by reference or may be incorporated with modifications described in the plan.

Deviations from this procedure or the sampling and analysis plan shall be documented in field records. Significant changes shall be approved by the **Program Quality Manager**.

8.0 Attachments or References

8.1 ASTM Standard D5088. 2008. *Standard Practice for Decontamination of Field Equipment Used at Waste Sites.* ASTM International, West Conshohocken, PA. 2008. DOI: 10.1520/D5088-02R08. www.astm.org.

8.2 NAVSEA T0300-AZ-PRO-010. *Navy Environmental Compliance Sampling and Field Testing Procedures Manual*. August 2009.

8.3 Procedure 3-05, *IDW Management*.

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Author	Reviewer	Revisions (Technical or Editorial)
Mark Kromis Program Chemist	Chris Barr Program Quality Manager	Rev 0 – Initial Issue

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Direct Push Sampling Techniques

Procedure 3-17

1.0 Purpose and Scope

1.1 This standard operating procedure (SOP) provides guidance on the use of direct push techniques for the United States Navy Environmental Restoration (ER) Program, Naval Facilities Engineering Command, Atlantic (NAVFAC Atlantic).

1.2 This procedure is the Program-approved professional guidance for work performed by Resolution Consultants under the Comprehensive Long-Term Environmental Action Navy (CLEAN) contract (Contract Number N62470-11-D-8013).

1.3 This procedure shall serve as management-approved professional guidance for the ER Program and is consistent with protocol in the Uniform Federal Policy-Quality Assurance Project Plan (DoD 2005). As professional guidance for specific activities, this procedure is not intended to obviate the need for professional judgment during unforeseen circumstances. Deviations from this procedure while planning or executing planned activities must be approved by both the Contract Task Order (CTO) Manager and the Quality Assurance (QA) Manager or Technical Director, and documented.

1.4 If there are procedures whether it be from Resolution Consultants, state and/or federal that are not addressed in this SOP and are applicable to direct push sampling then those procedures may be added as an appendix to the project specific SAP.

2.0 Safety

2.1 Field personnel shall perform work in accordance with the site-specific health and safety plan (HASP). During monitoring well installation, subcontractors in direct contact with potentially contaminated media shall wear the proper personal protective equipment (PPE) as outlined in the site-specific health and safety plan. Failure to comply will result in disciplinary action.

2.2 If circumstances warrant, a real-time immediate response instrument, such as a Miniram Dust Monitor, organic vapor analyzer, HNu, Thermo, Draeger or Sensidyne tubes, or explosimeter, should be used to monitor the work area. When real/time instrument response exceeds the permissible exposure limit, personnel shall don the appropriate PPE and alternate control measures to ensure personnel safety. If safe control measures are not achievable, field activities shall be discontinued immediately. Company-specific HASPs offer guidelines on air surveillance and on selection of PPE. In addition, the site-specific HASP includes an air monitoring program and suggested PPE.

2.3 In addition to the aforementioned precautions and depending upon the type of contaminant expected, employ the following safe work practices:

Particulate or Metal Compounds

1. Avoid skin contact and/or incidental ingestion of soil.
2. Wear protective clothing, steel-toed boots, gloves, safety glasses, and hearing protection as warranted.

VOCs

1. Avoid breathing constituents venting from holes by approaching upwind, and/or by use of respiratory protection.

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2. Pre-survey the area with a flame ionization detector (FID) or photoionization detector (PID) prior to sampling.
3. If monitoring results indicate organic vapors that exceed action levels as specified in the site-specific HASP, sampling activities may need to be conducted in Level C protection. At a minimum, skin protection will be required by use of gloves and Tyvek or other media that is protective against the media being encountered.

Flammable or Explosive Conditions

1. Monitor explosive gases as continuously as possible using an explosimeter and oxygen meter.
2. Place all ignition sources upwind or crosswind of the borehole.
3. If explosive gases exceed the designated action levels as specified in the site-specific HASP, cease operations and evaluate conditions.

Physical Hazards Associated With Soil Sampling

1. To avoid possible back strain associated with sample collection, use the large muscles of the legs, not the back, when retrieving soil samplers.
2. Stay clear of all moving equipment, and avoid wearing loose fitting clothing.
3. To avoid slip/trip/fall hazards, be wary of open trenches, pits, or holes.
4. Be aware of restricted mobility due to PPE.
5. To avoid hand, wrist, arm, shoulder, and back trauma due to the use of slide hammers or hand augers, rotate sampling among field personnel

3.0 Terms and Definitions

3.1 Direct push techniques are methods for subsurface sampling or monitoring that involve the application of downward pressure (usually supplied through hydraulic means) without the benefit of cutting tool rotation to enter soil. A variety of systems are available under several trade names, such as GeoProbe®. Equipment may be skid-mounted, trailered, or mounted directly on the frame of a vehicle.

4.0 Interferences

4.1 Potential interferences could result from cross-contamination between samples or sample locations. Minimization of the cross contamination will occur through the following:

- The use of clean sampling tools at each location as necessary.
- Avoidance of material that is not representative of the media to be sampled.

5.0 Training and Qualifications

5.1 Qualifications and Training

The individual executing these procedures must have read, and be familiar with, the requirements of this SOP.

5.2 Responsibilities

5.2.1 The **CTO Manager** is responsible for ensuring that these standard direct push technique procedures are followed during projects conducted under the ER Program and that a qualified individual conducts or supervises the projects. A qualified individual for subsurface sampling or monitoring using direct push techniques is defined as a person with a degree in geology, hydrogeology, or geotechnical/civil engineering with at least 1 year of experience supervising soil boring construction using conventional drilling or direct push techniques. The CTO Manager

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or designee is responsible for ensuring that all personnel involved in direct push sampling techniques shall have the appropriate education, experience, and training to perform their assigned tasks as specified in Chief of Naval Operations Instruction 5090.1c (DON 2007).

5.2.2 The Program Quality Manager is responsible for ensuring overall compliance with this procedure.

5.2.3 The Field Manager is responsible for ensuring that all field personnel follow these procedures.

5.2.4 All Field Personnel are responsible for the implementation of this procedure.

5.2.5 The Field Personnel and/or Field Manager is responsible for directly supervising the direct push sampling procedures to ensure that they are conducted according to this procedure, and for recording all pertinent data collected during sampling.

6.0 Equipment and Supplies

In addition to those materials provided by the subcontractor, the project **Field Manager/Field Personnel** will require:

- Boring Logs;
- Spoons or scoops;
- Sample kit (bottles, labels, custody records and tape, cooler, ice), if laboratory analysis is required;
- Sample collection pan;
- Folding rule or tape measure;
- Plastic sheeting;
- Utility knife;
- Equipment decontamination materials (as described in SOP 3-06, *Equipment Decontamination*);
- Health and safety equipment (as required by HASP); and
- Field project notebook/pen.

7.0 Procedure

Direct push techniques may be used as a cost-effective alternative to conventional drilling techniques for obtaining subsurface soil and groundwater samples and for monitoring subsurface conditions.

7.1 Method Selection

Base the decision to use direct push techniques on: (1) their ability to achieve the required information at the required level of quality control and (2) their cost-effectiveness compared to conventional drilling methods. Major limitations of direct push techniques are their inability to penetrate rock or cobbles and a shallow maximum depth of penetration. The capabilities of direct push systems vary significantly among vendors. Consider these differences in capabilities when evaluating the method for a subsurface exploration program.

Use direct push techniques to obtain groundwater samples for confirmatory analyses only if the screen placement method protects the screen from clogging during installation and allows the installation of a sand-pack around the exterior of the well screen.

7.2 Inspection of Equipment

Inspect direct push equipment prior to use for signs of fluid leakage, which could introduce contaminants to the soil. If, at any time during equipment operation, fluid is observed leaking from the rig, cease

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operations and immediately repair or contain the leak. Collect, containerize, and label soil and other materials affected by the leak for proper disposal (see SOP 3-05, *IDW Management*).

7.3 Preparation of Work Site

Inspect the work site prior to commencing operations to ensure that no overhead hazards exist that could impact the direct push equipment, and the work area should cleared and/or marked by the local underground utility locating service (e.g., DigSafe). In addition, clear locations planned for subsurface exploration using either geophysical methods and/or hand excavate locations to a depth of 2 to 3 feet prior to soil penetration, unless it is certain (by virtue of subsurface clearing activities) that no utilities or other hazardous obstructions will be encountered in the first 2 to 3 feet. Hand excavation may be waived when it is not practical.

Locate the direct push rig so that it is downslope from the penetration point, if the work is to be performed on a grade. Locate the rig downwind or crosswind of the penetration point, if possible. Cover the area surrounding, and in the vicinity of, the penetration point with plastic. Establish required exclusion zones using plastic tape or cones to designate the various areas.

7.4 Equipment Decontamination

To avoid cross-contamination, thoroughly decontaminate equipment used for direct push exploration and sampling as described in SOP 3-06, *Equipment Decontamination*. Decontaminate sampling tools and downhole equipment between each sampling event and between penetration points. At a minimum, steam clean or wash and rinse the equipment. Collect, containerize, and label all wash and rinse water for proper disposal. Clean equipment (e.g., drive rods and samplers) shall not come into contact with contaminated soils or other contaminated materials. Keep equipment on plastic or protect it in another suitable fashion. Store push rods and other equipment removed from a hole on plastic sheeting until properly decontaminated.

7.5 Soil Sampling

This SOP assumes that the subcontractor will perform sampling; therefore, detailed procedures regarding sample acquisition are not provided. Vendors of direct push equipment offer a variety of sampling systems designed specifically for their equipment. Both continuous and discreet soil samples may be obtained using sampling equipment similar to that described in Procedure 3-21, *Surface and Subsurface Soil Sampling*. The preferred methods for soil sampling using direct push techniques use brass or stainless steel split-tube samplers that are driven through the horizon to be sampled. Use plastic sample tubes (e.g., Macro-Core Samplers) only for screening purposes or, in the case of confirmatory sampling, if samples will not be analyzed for volatile organic compounds (VOCs) or semivolatile organic compounds (SVOCs).

7.6 Groundwater Sampling

Direct push vendors offer numerous methods for obtaining groundwater samples. Key differences among methods involve: (1) the maximum well diameter achievable; (2) the ability to protect the well screen from exposure to contaminated overburden soils during installation; (3) the ability to install packing around the screen; (4) flexibility in the size, materials of construction, and design of well screens; and (5) the ability to convert sampling points into permanent monitoring wells. The limitations and abilities of a given system must be thoroughly understood and matched to the needs of the project before committing to the collection of groundwater samples using direct push techniques.

Use direct push techniques only to collect screening samples unless it is confirmed that the system:

1. Effectively protects the well screen from exposure to contaminated overburden soils during installation
2. Allows the installation of effective packing around the well screen

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3. Allows the well screen to be effectively sealed against the downward infiltration of overlying groundwater or surface precipitation
4. Is constructed of materials compatible with the intended sampling and analysis goals of the project
5. Allows the use of a well screen properly sized and slotted for the needs of the project

Additional information on the collection of groundwater samples can be found in SOP 3-14 Monitoring Well Sampling.

It is the responsibility of the **CTO Manager** to evaluate and determine the appropriateness of direct push systems prior to committing to their use on any project involving groundwater sampling. As part of this evaluation, it is recommended to obtain concurrence from regulatory authorities in advance for the method selection.

7.7 Borehole Abandonment

Methods for abandoning boreholes created with direct push systems will vary among vendors. Coordinate the desired method for abandonment with the vendor in the planning stages of the project to ensure proper abandonment.

Some direct push boreholes will close naturally as the drive rods and sampling tools are withdrawn. This may occur in loose, unconsolidated soils, such as sands. Close all boreholes using one of the procedures described in this procedure, unless natural caving precludes such closure.

The three methods for closing direct push boreholes are:

1. Add granulated or pelletized bentonite and hydrate in layers, proceeding from the bottom of the hole to the surface.
2. Pour premixed cement/water (or cement/water/bentonite) mixture into the hole.
3. Fill the entire hole with granular or pelletized bentonite and hydrate by means of a previously emplaced water tube that is gradually withdrawn as water is supplied to the bentonite.

The second method is recommended. For shallow holes less than 10 feet in depth, pour a cement/water/bentonite mix directly into the opening using a funnel. For deeper holes, use a conductor (tremie) pipe to carry the grout mix to the far reaches of the borehole. Lower the conductor pipe to within 2 inches of the bottom and gradually withdraw it as grout is added, keeping the lower end of the pipe submerged in grout at all times.

The recommended grout mixture for well abandonment is 7 to 9 gallons of water per 94-pound bag of Portland cement, with 3 percent to 5 percent by weight of powdered bentonite added to the mixture. Commercial products, such as Volcay are acceptable with pre-approval of the **CTO Manager**.

Seal boreholes to within 0.5 to 2.0 feet of the surface. Inspect the abandoned borehole after 24 hours to ensure that grout shrinkage does not occur. If significant shrinkage has occurred, re-grout the borehole. Fill the remaining portion of the hole with local topsoil or appropriate paving materials.

8.0 Quality Control and Assurance

8.1 Collection of representative samples will be ensured through adherence to the procedures in this SOP and the sampling strategy outlined in the SAP. The field quality control samples identified in the SAP must be collected. These samples may include field duplicates, equipment rinsate blanks, trip blanks, and matrix spike/matrix spike duplicates

9.0 Records, Data Analysis, Calculations

9.1 Various forms are required to ensure that adequate documentation is made of the sample collection activities. These forms may include:

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- Boring logs;
- Field logbook;
- Sample collection records;
- Chain-of-custody forms; and
- Shipping labels.

9.2 Boring logs (Attachment 1) will provide visual and descriptive information for samples collected at each soil boring and are often the most critical form of documentation generated during a soil sampling program.

9.3 The field logbook is kept as a general log of activities and should not be used in place of the boring log.

9.4 Chain-of-custody forms are transmitted with the samples to the laboratory for sample tracking purposes.

9.5 Shipping labels are required is sample coolers are to be transported to a laboratory by a third party (courier service).

10.0 Attachments or References

10.1 Attachment 1 – Boring Log

10.2 NAVSEA T0300-AZ-PRO-010. ***Navy Environmental Compliance Sampling and Field Testing Procedures Manual***. August 2009.

10.3 Department of Defense, United States (DoD). 2005. *Uniform Federal Policy for Quality Assurance Project Plans, Part 1: UFP-QAPP Manual*. Final Version 1. DoD: DTIC ADA 427785, EPA-505-B-04-900A. In conjunction with the U. S. Environmental Protection Agency and the Department of Energy. Washington: Intergovernmental Data Quality Task Force. March. On-line updates available at: http://www.epa.gov/fedfac/pdf/ufp_qapp_v1_0305.pdf.

10.4 Department of the Navy (DON). 2007. *Navy Environmental and Natural Resources Program Manual*. OPNAV Instruction 5090.1c. October.

10.5 SOP 3-05, ***IDW Management.***

10.6 SOP 3-06, ***Equipment Decontamination.***

10.7 SOP 3-21, ***Surface and Subsurface Soil Sampling.***

Author	Reviewer	Revisions (Technical or Editorial)
Mark Kromis Program Chemist	Chris Barr Program Quality Manager	Rev 0 – Initial Issue (May 2012)

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Attachment 1
Boring Log

RESOLUTION CONSULTANTS

Boring ID:

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Project Name:	Drilling Company:	Type of Surface Material:
Project Number:	Drilling Method:	Patching Material:
Date Started Drilling:	Rig Type:	Drilling Water Level:
Date Finished Drilling:	Core Size:	Boring Total Depth (bgs):
Physical Location:		Logged By:

(Note: bgs = below ground surface)

Depth Range	Re covery ft/ft	PID (ppm)	Moisture Content	GA Class.	USCS	GA Class: Garfield Avenue Sites classification & Modified Unified Soil Clasiffication System	
						Ground Surface Cover and Thickness:	Sample name & #:
0-1							
1-2							
2-3							
3-4							
4-5							
5-6							
6-7							
7-8							
8-9							
9-10							
10-11							
11-12							
12-13							
13-14							
14-15							
15-16							
16-17							
17-18							
18-19							
19-20							

Stratigraphic Unit Intervals:		Comments:
1.)	5.)	
2.)	6.)	
5.)	6.)	

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Headspace Screening for Total VOCs

Procedure 3-19

1.0 Purpose and Scope

1.1 This standard operating procedure (SOP) describes the basic techniques for using headspace analysis to screen for volatile organics in contaminated soils using a portable Photo Ionization Detector (PID) or Flame Ionization Detector (FID).

1.2 As guidance for specific activities, this procedure does not obviate the need for professional judgment. Deviations from this procedure while planning or executing planned activities must be approved in accordance with Program requirements for technical planning and review.

2.0 Safety

2.1 The health and safety considerations for the work associated with this SOP will be addressed in the project Health and Safety Plan (HASP). In the absence of a HASP, work will be conducted according to the Contract Task Order (CTO) Work Plan (WP) and/or direction from the **Site Safety Officer (SSO)**. Note that headspace screening usually requires Level D personal protection unless there is a potential for airborne exposure to site contaminants. Under circumstances where potential airborne exposure is possible respiratory protective equipment may be required based on personal air monitoring results. Upgrades to Level C will be coordinated with the Site Safety Officer (SSO) or **CTO Manager**.

2.2 Health and safety hazards and corresponding precautions include, but are not limited to, the following:

2.2.1 Dermal contact with contaminated soil. Personnel should treat all soil as potentially contaminated and wear chemically impervious gloves. Minimize skin contact with soil by using sampling instruments such as stainless steel spades or spoons. Do not touch any exposed skin with contaminated gloves.

2.2.2 Inhalation hazards. Appropriate air monitoring should be conducted to ensure that organic vapor concentrations in the breathing zone do not exceed action levels as specified in the Site-Specific HASP. When ambient temperatures are low enough to require warming samples using the vehicle heater, the vehicle's windows should be opened enough to prevent the build-up of any organic vapors. Use the PID or FID to verify the airborne concentrations in the vehicle remain below applicable action levels. Note that many volatile organic compounds (VOCs) are flammable and all precautions must be observed to eliminate any potential ignition sources.

2.2.3 Shipping limitations. Follow applicable regulations when shipping FID/PID equipment. When shipping an FID by air, the hydrogen tank must be bled dry. Calibration gas canisters are considered dangerous goods and must be shipped according to IATA and DOT regulations. Consult your EHS Coordinator and check with your shipping company to determine the correct shipping procedures

3.0 Terms and Definitions

None.

4.0 Interferences

4.1 Regardless of which gas is used for calibration, the instrument will respond to all analytes present in the sample that can be detected by the type of lamp used in the PID.

4.2 Moisture will generate a positive interference in the concentration measured for a PID and is characterized by a slow increase in the reading as the measurement is made. Care must be taken to

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minimize uptake of moisture to the extent possible. Refer to the manufacturers' instructions for care, cleaning, and maintenance.

4.3 Uptake of soil into the PID must be avoided as it will compromise instrument performance by blocking the probe, causing a positive interference, or dirtying the PID lamp. Refer to the manufacturers' instructions for care, cleaning, and maintenance.

4.4 The user should listen to the pitch of the sampling pump. Any changes in pitch may indicate a blockage and corrective action should be initiated.

5.0 Training and Qualifications

5.1 Qualifications and Training

The individual executing these procedures must have read, and be familiar with, the requirements of this SOP.

5.2 Responsibilities

5.2.1 The CTO Manager is responsible for ensuring that the collection of headspace readings comply with this procedure. The CTO Manager is responsible for ensuring that all personnel involved in the collection of headspace readings shall have the appropriate education, experience, and training to perform their assigned tasks.

5.2.2 The Program Quality Manager is responsible for ensuring overall compliance with this procedure.

5.2.3 The Field Manager is responsible for ensuring that all headspace readings are conducted according to this procedure as well as verifying that the PID/FID is in proper operating condition prior to use and for implementing the calibration.

5.2.4 All Field Personnel are responsible for the implementation of this procedure.

6.0 Equipment and Supplies

6.1 The following materials must be on hand in good operating condition and/or in sufficient quantity to ensure that proper field analysis procedures may be followed:

- Calibrated PID/FID instrument;
- Top-sealing "Zip-Loc" type plastic bags – or – 16 ounces of soil or "mason-" type glass jars and aluminum foil;
- Project field book and/or boring logs;
- Personal Protective Equipment (PPE) as specified in the project HASP; and
- Material Safety Data Sheets (MSDSs) for any chemicals or site-specific contaminants.

7.0 Procedure

7.1 Preparation

Review available project information to determine the types of organic vapors that will likely be encountered to select the right instrument. The two basic types of instruments are FIDs and PIDs.

FIDs work well with organic compounds that have relatively lightweight molecules, but may have problems detecting halogenated compounds or heavier organic compounds; FIDs can detect methane for example. Since the FID uses a flame to measure organic compounds, ensure that work is conducted in an atmosphere, which is free of combustible vapors. If ambient temperatures are below 40°F, the flame of the FID may be difficult to light.

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When using a PID, select an instrument that can measure the ionization potential of the anticipated contaminants of concern. PIDs work well with a range of organic compounds and can detect some halogenated hydrocarbons; PIDs cannot detect methane. The correct ultraviolet (UV) light bulb must be selected according to the types of organic vapors that will likely be encountered. The energy of the UV light must equal or exceed the ionization potential of the organic molecules that the PID will measure. The NIOSH Pocket Guide to Chemical Hazards is one source for determining ionization potentials for different chemicals. Bulbs available for PIDs include 9.4 eV, 10.6 (or 10.2) eV, and 11.7 eV bulbs. The 10.6 eV bulb is most commonly used as it detects a fairly large range of organic molecules and does not burn out as easily as the 11.7 eV bulb. The 9.4 eV bulb is the most rugged, but detects only a limited range of compounds. Under very humid or very cold ambient conditions, the window covering the UV light may fog up, causing inaccurate readings. Ask the **SSO** about correction factors when high humidity conditions exist.

After selecting the correct instrument, calibrate the PID/FID according to the manufacturer's instructions. Record background/ambient levels of organic vapors measured on the PID/FID after calibration and make sure to subtract the background concentration (if any) from your readings. Check the PID/FID readings against the calibration standard every 20 readings or at any time when readings are suspected to be inaccurate, and recalibrate, if necessary. Be aware that, after measuring highly contaminated soil samples, the PID/FID may give artificially high readings for a time.

7.2 Top-Sealing Plastic Bag

Place a quantity of soil in a top-sealing plastic bag and seal the bag immediately. The volume of soil to be used should be determined by the **CTO Manager** or **Field Manager**. The volume of soil may vary between projects but should be consistent for all samples collected for one project. Ideally, the bag should be at least 1/10th-filled with soil and no more than half-filled with soil. Once the bag is sealed, shake the bag to distribute the soil evenly. If the soil is hard or clumpy, use your fingers to gently work the soil (through the bag) to break up the clumps. Do not use a sampling instrument or a rock hammer since this may create small holes in the plastic bag and allow organic vapors to escape. Alternatively, the sample may be broken up before it is placed in the bag. Use a permanent marker to record the following information on the outside of the bag:

- Site identification information (i.e., borehole number);
- Depth interval; and
- Time the sample was collected. For example: "SS-12, 2-4 ft, @1425".

Headspace should be allowed to develop before organic vapors are measured with a PID/FID. The amount of time required for sufficient headspace development will be determined by the project-specific sampling plan and the ambient temperature. Equilibration time should be the same for all samples to allow an accurate comparison of organic vapor levels between samples. However, adjustments to equilibration times may be necessary when there are large variations in ambient temperature from day to day. When ambient temperatures are below 32°F, headspace development should be within a heated building or vehicle. When heating samples, be sure there is adequate ventilation to prevent the build-up or organic vapors above action levels.

Following headspace development, open a small opening in the seal of the plastic bag. Insert the probe of a PID/FID and seal the bag back up around the probe as tightly as possible. Alternatively, the probe can be inserted through the bag to avoid loss of volatiles. Since PIDs and FIDs are sensitive to moisture, avoid touching the probe to the soil or any condensation that has accumulated inside of the bag. Since the PID/FID consumes organic vapors, gently agitate the soil sample during the reading to release fresh organic vapors from the sample. Erratic meter response may occur at high organic vapor concentrations or conditions of elevated headspace moisture, in which case, headspace data should be discounted. Record the highest reading on the field form or in the field notebook as described in Section 9.

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7.3 **Jar and Aluminum Foil (Alternate Method)**

Half-fill a clean glass jar with the soil sample to be screened. Quickly cover the jar's opening with one to two sheets of clean aluminum foil and apply the screw cap to tightly seal the jar. Allow headspace development for at least ten minutes. Vigorously shake the jar for 15 seconds, both at the beginning and at the end of the headspace development period. Where ambient temperatures are below 32°F (0°C), headspace development should be within a heated area. When heating samples, be sure there is adequate ventilation to prevent the build-up of organic vapors above action levels.

Subsequent to headspace development, remove the jar lid and expose the foil seal. Quickly puncture the foil seal with the instrument sampling probe, to a point about one-half of the headspace depth. Exercise care to avoid uptake of water droplets or soil particulates. As an alternative, use a syringe to withdraw a headspace sample, and then inject the sample into the instrument probe or septum-fitted inlet. This method is acceptable contingent upon verification of methodology accuracy using a test gas standard. Following probe insertion through the foil seal or sample injection to probe, record the highest meter response on the field form or in the field notebook. Using foil seal/probe insertion method, maximum response should occur between two and five seconds. Erratic meter response may occur at high organic vapor concentrations or conditions of elevated headspace moisture, in which case, headspace data should be discounted.

8.0 Quality Control and Assurance

Quality Assurance/Quality Control (QA/QC) will include the collection of duplicate samples. In general, one duplicate will be collected per 20 samples. Organic vapor concentrations measured in the primary and duplicate samples should be similar within plus or minus 20 percent. The frequency of headspace duplicate collection will be determined by the project manager/task manager. The PID/FID instrument must be calibrated according to the manufacturer's instructions before beginning screening, and checked or recalibrated every 20 analyses or when readings are suspected to be inaccurate. Record ambient organic vapor levels in the field notebook and on the field form. Periodically check ambient organic vapor levels. If ambient levels have changed more than 20 percent, recalibrate the PID/FID. Make sure readings are not collected near a vehicle exhaust or downwind of a drill rig exhaust. If grossly contaminated soil is encountered, decontaminate sampling instruments between samples and/or change contaminated gloves to avoid cross contaminating less contaminated samples.

9.0 Records, Data Analysis, Calculations

9.1 All data generated (results and duplicate comparisons) will be recorded in the field notebook and/or on the field form. Any deviation from the outlined procedure will also be noted. Field conditions (ambient temperature, wind, etc.) should also be recorded in the field notebook.

9.2 Readings may be recorded in a field notebook, on a boring log, or on an appropriate form specific to the project. The form should include the following information:

- When the PID/FID was calibrated (date/time) and calibration standard used;
- Background/ambient concentrations measured after PID/FID calibration;
- Location of sample (i.e., bore-hole number);
- Depth interval of sample measured;
- Lithology of material measured; and
- PID/FID reading and units of measure.

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9.3 Note that if PID/FID measurements are recorded on a boring log, it is not necessary to duplicate information in the column where the PID/FID readings are recorded (e.g., borehole number, depth interval, lithology type).

9.4 All documentation will be stored in the project files and retained following completion of the project.

10.0 Attachments or References

SOP 3-20 Operation and Calibration of a Photoionization Detector

Author	Reviewer	Revisions (Technical or Editorial)
Robert Shoemaker Senior Scientist	Chris Barr Program Quality Manager	Rev 0 – Initial Issue (May 2012)

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Operation and Calibration of a Photoionization Detector

Procedure 3-20

1.0 Purpose and Scope

1.1 Purpose and Applicability

1.1.1 This standard operating procedure (SOP) describes the procedures that will be followed by field staff for operation and calibration of a photoionization detector (PID). The PID is primarily used by AECOM personnel for safety and survey monitoring of ambient air, determining the presence of volatiles in soil and water, and detecting leakage of volatiles.

1.1.2 PIDs routinely used by field personnel include the Photovac Microtip, Thermoelectron 580EZ, and MiniRAE 2000. Personnel responsible for using the PID should first read and thoroughly familiarize themselves with the instrument instruction manual.

1.2 Principle of Operation

1.2.1 The PID is a non-specific vapor/gas detector. The unit generally consists of a hand-held probe that houses a PID, consisting of an ultraviolet (UV) lamp, two electrodes, and a small fan which pulls ambient air into the probe inlet tube. The probe is connected to a readout/control box that consists of electronic control circuits, a readout display, and the system battery. Units are available with UV lamps having an energy from 9.5 electron volts (eV) to 11.7 eV.

1.2.2 The PID analyzer measures the concentration of trace gas present in the atmosphere by photoionization. Photoionization occurs when an atom or molecule absorbs a photon of sufficient energy to release an electron and become a positive ion. This will occur when the ionization potential of the molecule (in electron volts (eV)) is less than the energy of the photon. The source of photons is an ultraviolet lamp in the probe unit. Lamps are available with energies ranging from 9.5 eV to 11.7 eV. All organic and inorganic vapor/gas compounds having ionization potentials lower than the energy output of the UV lamp are ionized and the resulting potentiometric change is seen as a positive reading on the unit. The reading is proportional to the concentration of organics and/or inorganics in the vapor.

1.2.3 Sample gases enter the probe through the inlet tube and enter the ion chamber where they are exposed to the photons emanating from the UV lamp. Ionization occurs for those molecules having ionization potentials near to or less than that of the lamp. A positive- biased polarizing electrode causes these positive ions to travel to a collector electrode in the chamber. Thus the ions create an electrical current which is amplified and displayed on the meter. This current is proportional to the concentration of trace gas present in the ion chamber and to the sensitivity of that gas to photoionization.

1.2.4 In service, the analyzer is first calibrated with a gas of known composition equal to, close to, or representative of that to be measured. Gases with ionization potentials near to or less than the energy of the lamp will be ionized. These gases will thus be detected and measured by the analyzer. Gases with ionization potentials greater than the energy of the lamp will not be detected. The ionization potentials of the major components of air, i.e., oxygen, nitrogen, and carbon dioxide, range from about 12.0 eV to 15.6 eV and are not ionized by any of the lamps available. Gases with ionization potentials near to or slightly higher than the lamp are partially ionized, with low sensitivity.

1.3 Specifications

1.3.1 Refer to the manufacturer's instructions for the technical specifications of the instrument being used. The operating concentration range is typically 0.1 to 2,000 ppm isobutylene equivalent.

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2.0 Safety

2.1 The health and safety considerations for the work associated with this SOP, including both potential physical and chemical hazards, will be addressed in the project Health and Safety Plan (HASP). In the absence of a HASP, work will be conducted according to the Contract Task Order (CTO) Work Plan (WP) and/or direction from the **Site Safety Officer (SSO)**.

2.2 Only PIDs stamped Division I Class I may be used in explosive atmospheres. Refer to the project HASP for instructions pertaining to instrument use in explosive atmospheres.

3.0 Terms and Definitions

None.

4.0 Interferences

4.1 Regardless of which gas is used for calibration, the instrument will respond to all analytes present in the sample that can be detected by the type of lamp used in the PID.

4.2 Moisture will generate a positive interference in the concentration measured for a PID and is characterized by a slow increase in the reading as the measurement is made. Care must be taken to minimize uptake of moisture to the extent possible. Refer to the manufacturers' instructions for care, cleaning, and maintenance.

4.3 Uptake of soil into the PID must be avoided as it will compromise instrument performance by blocking the probe, causing a positive interference, or dirtying the PID lamp. Refer to the manufacturers' instructions for care, cleaning, and maintenance.

4.4 The user should listen to the pitch of the sampling pump. Any changes in pitch may indicate a blockage and corrective action should be initiated.

5.0 Training and Qualifications

5.1 **Qualifications and Training**

The individual executing these procedures must have read, and be familiar with, the requirements of this SOP.

5.2 **Responsibilities**

5.2.1 The CTO Manager is responsible for ensuring that the operation and calibration activities comply with this procedure. The CTO Manager is responsible for ensuring that all personnel involved in the operation and calibration shall have the appropriate education, experience, and training to perform their assigned tasks.

5.2.2 The Program Quality Manager is responsible for ensuring overall compliance with this procedure.

5.2.3 The Field Manager is responsible for ensuring that all operation and calibration activities are conducted according to this procedure.

5.2.4 All Field Personnel are responsible for the implementation of this procedure.

6.0 Equipment and Supplies

- Calibration Gas: Compressed gas cylinder of isobutylene in air or similar stable gas mixture of known concentration. The selected gas should have an ionization potential similar to that of the vapors to be monitored, if known. The concentration should be at 50-75% of the range in which the instrument is to be calibrated;

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- Regulator for calibration gas cylinder;
- Approximately 6 inches of Teflon® tubing;
- Tedlar bag (optional);
- Commercially-supplied zero grade air (optional);
- "Magic Marker" or “Sharpie” or other waterproof marker;
- Battery charger;
- Moisture traps;
- Spare lamps;
- Manufacturer’s instructions; and
- Field data sheets or logbook/pen.

7.0 Procedure

7.1 Preliminary Steps

7.1.1 Preliminary steps (battery charging, check-out, calibration, maintenance) should be conducted in a controlled or non-hazardous environment.

7.2 Calibration

7.2.1 The PID must be calibrated in order to display concentrations in units equivalent to ppm. First a supply of zero air (ambient air or from a supplied source), containing no ionizable gases or vapors is used to set the zero point. A span gas, containing a known concentration of a photoionizable gas or vapor, is then used to set the sensitivity.

7.2.2 Calibrate the instrument according to the manufacturer’s instructions. Record the instrument model and identification number, the initial and adjusted meter readings, the calibration gas composition and concentration, and the date and the time in the field records.

7.2.3 If the calibration cannot be achieved or if the span setting resulting from calibration is 0.0, then the lamp must be cleaned (Section 7.4).

7.3 Operation

7.3.1 Turn on the unit and allow it to warm up (minimum of 5 minutes). Check to see if the intake fan is functioning; if so, the probe will vibrate slightly and a distinct sound will be audible when holding the probe casing next to the ear. Also, verify on the readout display that the UV lamp is lit.

7.3.2 Calibrate the instrument as described in Section 7.2, following the manufacturer’s instructions. Record the calibration information in the field records.

7.3.3 The instrument is now operational. Readings should be recorded in the field records.

7.3.4 When the PID is not being used or between monitoring intervals, the unit may be switched off to conserve battery power and UV lamp life; however, a “bump” test should be performed each time the unit is turned on and prior to taking additional measurements. To perform a bump test, connect the outlet tubing from a Tedlar bag containing a small amount of span gas to the inlet tubing on the unit and record the reading. If the reading is not within the tolerance specified in the project plan, the unit must be recalibrated.

7.3.5 At the end of each day, recheck the calibration. The check will follow the same procedures as the initial calibration (Section 7.2) except that no adjustment will be made to the instrument. Record the information in the field records.

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7.3.6 Recharge the battery after each use (Section 7.4).

7.3.7 When transporting, ensure that the instrument is packed in its stored condition in order to prevent damage.

7.4 **Routine Maintenance**

7.4.1 Routine maintenance associated with the use of the PID includes charging the battery, cleaning the lamp window, replacing the detector UV lamp, replacing the inlet filter, and replacing the sample pump. Refer to the manufacturer's instructions for procedures and frequency.

7.4.2 All routine maintenance should be performed in a non-hazardous environment.

7.5 **Troubleshooting Tips**

7.5.1 One convenient method for periodically confirming instrument response is to hold the sensor probe next to the tip of a magic marker. A significant reading should readily be observed.

7.5.2 Air currents or drafts in the vicinity of the probe tip may cause fluctuations in readings.

7.5.3 A fogged or dirty lamp, due to operation in a humid or dusty environment, may cause erratic or fluctuating readings. The PID should never be operated without the moisture trap in place.

7.5.4 Moving the instrument from a cool or air-conditioned area to a warmer area may cause moisture to condense on the UV lamp and produce unstable readings.

7.5.5 A zero reading on the meter should not necessarily be interpreted as an absence of air contaminants. The detection capabilities of the PID are limited to those compounds that will be ionized by the particular probe used.

7.5.6 Many volatile compounds have a low odor threshold. A lack of meter response in the presence of odors does not necessarily indicate instrument failure.

7.5.7 When high vapor concentrations enter the ionization chamber in the PID the unit can become saturated or "flooded". Remove the unit to a fresh air environment to allow the vapors to be completely ionized and purged from the unit.

8.0 Quality Control and Assurance

8.1 The end use of the data will determine the quality assurance requirements that are necessary to produce data of acceptable quality. These quality assurance requirements will be defined in the site-specific workplan or Sampling and Analysis Plan (SAP), hereafter referred to as the project plan.

8.2 Calibration of the PID will be conducted at the frequency specified in the project plan. In the absence of project-specific guidance, calibration will be performed at the beginning of each day of sampling and will be checked at the end of the sampling day or whenever instrument operation is suspect. The PID will sample a calibration gas of known concentration. The instrument must agree with the calibration gas within ±10%. If the instrument responds outside this tolerance, it must be recalibrated.

8.3 Checks of the instrument response (Section 7.5) should be conducted periodically and documented in the field records.

9.0 Records, Data Analysis, Calculations

Safety and survey monitoring with the PID will be documented in a bound field logbook, or on standardized forms, and retained in the project files. The following information is to be recorded:

- Project name and number;
- Instrument manufacturer, model, and identification number;

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- Operator's signature;
- Date and time of operation;
- Calibration gas used;
- Calibration check at beginning and end of day (meter readings before adjustment);
- Span setting after calibration adjustment;
- Meter readings (monitoring data obtained);
- Instances of erratic or questionable meter readings and corrective actions taken; and
- Instrument checks and response verifications – e.g., battery check, magic marker response (Section 7.5) or similar test.

10.0 Attachments or References

United States Environmental Protection Agency. Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM). USEPA, Region 4, SESD, Enforcement and Investigations Branch, Athens, GA. November 2001.

Author	Reviewer	Revisions (Technical or Editorial)
Robert Shoemaker Senior Scientist	Chris Barr Program Quality Manager	Rev 0 – Initial Issue (May 2012)

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Surface and Subsurface Soil Sampling Procedures

Procedure 3-21

1.0 Purpose and Scope

1.1 This standard operating procedure (SOP) describes the procedures for soil sampling. The procedure includes surface and subsurface sampling by various methods using hand auguring, test pit, direct-push, and split-spoon equipment.

1.2 The procedure includes soil sampling for volatile organic compounds (VOCs). For project specific information (e.g. sampling depths, equipment to be used, and frequency of sampling), refer to the Sampling and Analysis Plan (SAP), which takes precedence over these procedures. Surface soil sampling, typically considered to be up to two feet below ground surface by EPA standards, is typically accomplished using hand tools such as shovels or hand augers. Test pit samples are considered subsurface samples, although normally collected via hand tools similar to surface soil sampling or by excavation machinery. Direct-push and split-spoon sampling offer the benefit of collecting soil samples from a discrete or isolated subsurface interval, without the need of extracting excess material above the target depth. These methods dramatically reduce time and cost associated with disposal of material from soil cuttings when compared to test pit sampling. In addition, direct-push and split-spoon sampling methods can obtain samples at targeted intervals greater than 15 feet in depth, allowing for discrete depth soil sampling while speeding up the sampling process. Direct-push methods work best in medium to fine-grained cohesive materials such as medium to fine sands, silts, and silty clay soils. Split-spoon sampling works well in all types of soil, but is somewhat slower than direct-push methods. Samples are composited so that each sample contains a homogenized representative portion of the sample interval. Due to potential loss of analytes, samples for volatile analysis are not composited. Samples for chemical analysis can be collected by any of the above-mentioned sampling methods, as disturbed soil samples. Undisturbed samples are collected, sealed, and sent directly to the laboratory for analysis. For undisturbed samples, the samples are not homogenized.

2.0 Safety

2.1 The health and safety considerations for the work associated with this SOP, including both potential physical and chemical hazards, will be addressed in the project Health and Safety Plan (HASP). In the absence of a HASP, work will be conducted according to the Contract Task Order (CTO) Work Plan (WP) and/or direction from the **Site Safety Officer (SSO)**.

2.2 Before soil sampling commences, appropriate entities (e.g. DigSafe, local public works departments, company facilities) must be contacted to assure the anticipated soil sampling locations are marked for utilities, including electrical, telecommunications, water, sewer, and gas.

3.0 Terms and Definitions

None.

4.0 Interferences

4.1 Low recovery of soil from sampling equipment will prevent an adequate representation of the soil profile and sufficient amount of soil sample. If low recovery is a problem, the hole may be offset and re-advanced, terminated, or continued using a larger diameter sampler.

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4.2 Asphalt in soil samples can cause false positive results for hydrocarbons. To ensure samples are free of asphalt, do not collect samples that may contain asphalt. If the collection of samples potentially containing asphalt is unavoidable, note the sampling depths at which the presence of asphalt are suspected.

4.3 Instrumentation interferences addressed in SOPs for Calibration of the Photoionization Detector (PID), Headspace Screening for Total Volatile Organics, and Equipment Decontamination must also be considered.

4.4 Cross contamination from sampling equipment must be prevented by using sampling equipment constructed of stainless steel that is adequately decontaminated between samples.

5.0 Training and Qualifications

5.1 Qualifications and Training

The individual executing these procedures must have read, and be familiar with, the requirements of this SOP.

5.2 Responsibilities

5.2.1 The CTO Manager is responsible for ensuring that soil sampling activities comply with this procedure. The CTO Manager is responsible for ensuring that all personnel involved in soil sampling shall have the appropriate education, experience, and training to perform their assigned tasks.

5.2.2 The Program Quality Manager is responsible for ensuring overall compliance with this procedure.

5.2.3 The Field Manager is responsible for ensuring that all soil sampling activities are conducted according to this procedure.

5.2.4 All Field Personnel are responsible for the implementation of this procedure.

6.0 Equipment and Supplies

The depth at which samples will be collected and the anticipated method of sample collection (direct-push, split-spoon, hand auger, shovel, or test pits) will be presented in the SAP. The following details equipment typically needed for soil sampling, based on the various methods. See the SAP for specific detail of equipment and supply needs.

6.1 Depending on the nature of suspected contamination, field screening instrumentation may be used for direct sampling. Appropriate instrumentation and calibration standards should be available. If volatile organic contaminants are suspected and a PID will be used, refer to the equipment and instrumentation listed in SOP 3-20 Operation and Calibration of a Photoionization Detector. Equipment in this SOP includes but is not limited to:

- PID/FID;
- Calibration gas; and
- Tedlar® gas bags (for calibration).

6.2 If field screening methods include jar headspace screening for volatile organics, refer to the equipment and procedure in SOP 3-19 Headspace Screening for Total VOCs. Equipment in this SOP includes but is not limited to:

- Clean soil (“drillers jars”) jars; and
- Aluminium foil.

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6.3 Appropriate decontamination procedures must be followed for sampling equipment. Refer to SOP 3-06 Equipment Decontamination. Equipment in this SOP includes but is not limited to:

- Phosphate-free detergent;
- Isopropyl Alcohol;
- Tap water;
- Deionized Ultra-Filtered (DIUF) Water;
- Plastic buckets or washbasins;
- Brushes; and
- Polyethylene sheeting.

6.4 The following general equipment is needed for all soil sampling, regardless of method:

- Stainless steel bowls;
- Stainless steel trowels;
- Appropriate sample containers for laboratory analysis;
- Personal Protective Equipment (PPE);
- Logbook;
- Cooler and ice for preservation; and
- Stakes and flagging to document sampling location.

6.5 The following additional equipment is needed for volatile organic sampling:

- Electronic pan scale and weights for calibration; and
- Syringes or other discrete soil core samplers.

6.6 The following additional equipment may be needed for surface and test pit soil sampling:

- Hand Auger

6.7 The following additional equipment may be needed for soil sampling from direct push and/or split-spoon equipment:

- Tape measure or folding carpenter's rule for recording the length of soil recovered.

Note: All subsurface drilling equipment will be provided and maintained by the subcontractor.

7.0 Procedure

7.1 General Soil Sampling Procedure for All Soil Sampling Methods

7.1.1 Record the weather conditions and other relevant on-site conditions.

7.1.2 Select the soil sampling location, clear vegetation if necessary, and record the sampling location identification number and pertinent location details.

7.1.3 Verify that the sampling equipment is properly decontaminated, in working order, and situated at the intended sampling location.

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7.1.4 Place polyethylene sheeting on the ground and assemble all necessary sampling equipment on top of it. Cover surfaces onto which soils or sampling equipment will be placed (i.e. tables with polyethylene sheeting).

7.1.5 Follow the appropriate procedures listed below for either surface, split-spoon, direct push, or test pit sample collection (7.2, 7.3, 7.4, and 7.5 respectively).

7.1.6 Collect soil samples according to procedures listed in Section 7.6 depending on project specific analyses.

7.1.7 Record date/time, sample ID, and sample descriptions in the field logbook or field form. A sketch or description of the location may also be recorded so the sample location can be re-constructed, especially if the location will not be recorded using global positioning satellite (GPS) equipment.

7.1.8 Immediately label the sample containers and place them on ice, if required for preservation. Complete the chain-of-custody form(s) as soon as possible.

7.1.9 Dispose of all excess excavated soil in accordance with the SAP.

7.1.10 If required, mark the sample location with a clearly labelled wooden stake or pin flag. If the location is on a paved surface, the location may be marked with spray paint.

7.1.11 Decontaminate the sampling equipment according to SOP 3-06 Equipment Decontamination.

7.2 Surface Sampling

7.2.1 The criteria used for selecting surface soil locations for sampling may include the following:

- Visual observations (soil staining, fill materials);
- Other relevant soil characteristics;
- Site features;
- Screening results;
- Predetermined sampling approach (i.e. grid or random); and
- Sampling objectives as provided in the SAP.

7.2.2 The following procedures are to be used to collect surface soil samples. Surface soils are considered to be soils that are up to two feet below ground surface, though state regulations and project objectives may define surface soils differently; therefore, the SAP should be consulted for direction on the depth from which to collect the surface soil samples. Sampling and other pertinent data and information will be recorded in the field logbook and/or on field forms. Photographs may be taken as needed or as specified in the SAP.

1. Gently scrape any vegetative covering until soil is exposed. Completely remove any pavement.
2. Remove soil from the exposed sampling area with a trowel, hand auger, or shovel. Put soils within the sampling interval in a stainless steel bowl for homogenizing. Monitor the breathing zone and sampling area as required in the HASP.
3. For VOC analyses, collect representative soil samples directly from the recently-exposed soil using a syringe or other soil coring device (e.g., TerraCore®, EnCore®). Follow procedures in Section 7.6.1 for VOC sampling.
4. Collect sufficient soil to fill all remaining sample jars into a stainless steel bowl. Homogenize the soil samples to obtain a uniform soil composition which is representative of the total soil sample collected according to the following procedure:
   a) Remove all rocks and non-soil objects using a stainless steel spoon or scoop.

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b) Form a cone shaped mound with the sample material, then flatten the cone and split the sample into quarters.

c) Use the stainless steel spoon/scoop to mix the quarter samples that are opposite.

d) After mixing the opposite quarters, reform the cone shaped mound.

e) Repeat this procedure a minimum of five (5) times, removing any non-soil objects and breaking apart any clumps.

7.3 Split-Spoon Sampling

7.3.1 At each boring location, the frequency and depth of split-spoon samples will be determined from the SAP. Split-spoon samples may be collected continuously, intermittently, or from predetermined depths.

7.3.2 Split-spoon samplers shall be driven into undisturbed soil by driving the spoon ahead of the drill augers/casing. In cohesive soils, or soils where the borehole remains open (does not collapse), two split-spoon samples may be taken prior to advancing the augers/casing.

7.3.3 After split-spoons are retrieved, open the split-spoon and measure the recovery of soil. If a PID will be used for screening, immediately scan the recovered sample for VOCs using the PID. Scan the recovered soil boring by making a hole in the soil with a decontaminated trowel and placing the PID inlet very close to the hole. Be very careful not to get soil on the tip of the PID. Take PID readings every 6 inches along the split-spoon and/or in any areas of stained or disturbed soil. Record the highest PID reading and the depth at which it was observed along with all other pertinent observations. If required in the SAP, VOC and headspace samples should be collected (see Section 7.6.1) prior to logging the sample.

7.3.4 If headspace screening for VOCs is required in the SAP, collect a soil sample (as defined in the SAP) and perform headspace screening according to SOP 3-19 Headspace Screening for Total VOCs.

7.3.5 Soils collected using the split-spoon sampler will be logged by the field representative using the procedure required in the SAP.

7.3.6 Collect the remainder of the sample volume required into a stainless steel bowl. Homogenize the soil so the material is uniform in composition and representative of the total soil sample collected. Follow homogenizing techniques as described in Section 7.2.

7.3.7 The SAP may specify that intervals to be sent to the laboratory be determined by visual observation and/or highest PID screening or headspace results, which can only be determined once the boring is complete. In this instance, a VOC sample should be collected at each interval. The remainder of the soil from that interval will be set aside in a clearly labelled stainless steel bowl covered with aluminium foil. Once the boring has been completed and the sample interval has been determined, the remainder of the soil can be homogenized according to Section 7.2 and submitted for laboratory analysis.

7.3.8 Once a boring is complete and all required samples have been collected, the boring must be completed as specified in the SAP (e.g., completed as a monitoring well, backfilled with bentonite, etc).

7.4 Direct Push Sampling

At each boring location, the frequency of direct-push samples will be determined from the SAP. Typically, samples with direct-push equipment are collected in 4 foot (ft) intervals, but smaller (e.g., 2 ft) and larger (e.g., 5 ft) intervals are also possible.

1. Sample using Macro-Core samplers with acetate liners to obtain discrete soil samples at the depths specified in the SAP.

2. Cut open the acetate liner. If required in the SAP, immediately scan the recovered soil boring for VOCs using a PID by making a hole in the soil with a decontaminated trowel and placing the PID inlet very close to the hole. Be very careful not to get soil on the tip of the PID. Take PID readings every 6 inches along the split-spoon and/or in any areas of stained or disturbed soil. Record the

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highest PID reading and the depth at which it was observed along with all other pertinent observations. VOC and headspace samples, if required in the SAP should be collected (see Section 7.6.1) prior to logging the sample.

3. If required in the SAP, collect a soil sample (as defined in the SAP) and perform headspace screening according to SOP 3-19 Headspace Screening for Total VOCs.

4. Soils collected using the direct-push sampler will be logged by the by the field representative using the procedure required in the SAP.

5. Collect the remainder of the sample into a stainless steel bowl. Homogenize the soil collected so that the material is uniform in composition and representative of the total soil sample collected. Follow homogenizing techniques as described in Section 7.2.

6. Once a boring is complete and all required samples have been collected, the boring must be completed as specified in the SAP (e.g., completed as a monitoring well, backfilled with bentonite, etc).

7.5 Test Pit Sampling

7.5.1 Excavate the test pit to the desired depth.

7.5.2 Using the excavator bucket, collect soil samples as specified in the SAP. Collect a sample and perform screening analyses as required by the SAP. If VOCs contamination is suspected, perform headspace screening according to SOP 3-19 Headspace Screening for Total VOCs.

7.5.3 Collect the sample from center of the bucket to avoid potential contamination from the bucket.

7.5.4 VOC samples should also be collected from an undisturbed section soil in the excavator bucket. The top layer of exposed soil should be scraped away just prior to collecting the VOC samples.

7.5.5 Collect the remainder of the sample volume required into a stainless steel bowl. Homogenize the soil so the material is uniform in composition and representative of the total soil sample collected. Follow homogenizing techniques as described in Section 7.2.

7.5.6 Dispose of all excavated soil according to the SAP.

7.6 Sample Collection Methods

7.6.1 Volatile Organics Sampling

For soils collected for analyses of volatile organics, including Volatile Petroleum Hydrocarbons (VPH) or other purgable compounds, a closed system is maintained. From collection through analysis, the sample bottles are not opened. The bottle kit for a routine field sample for these analyses will typically include three 40-mL VOA vials and one soil jar. Two 40-mL VOA vials will contain either 5 mL reagent water or 5 mL sodium bisulfate and magnetic stir bars (i.e., low level vials). The third VOA vial will contain 15 mL methanol with no magnetic stir bar (i.e., high level vial). These vials are usually provided by the laboratory and are pre-weighed, with the tare weight recorded on the affixed sample label. No additional sample labels are affixed to the VOA vials, as addition of a label would alter the vial weight. All information is recorded directly on the sample label using an indelible marker. The soil jar is provided for percent solids determination. For VOC or VPH analyses, samples are collected prior to sample homogenization. Collect the VOC sample in accordance with the procedure described below.

1. Determine the soil volume necessary for the required sample weight, typically 5 grams:

   a) Prepare a 5 mL sampling corer (e.g., Terra Core®) or cut-off plastic syringe.

   b) Tare the sampler by placing it on the scale, and zeroing the scale.

   c) Draw back the plunger to the 5 gram mark or 5mL (5cc) mark on cut-off syringe, and insert the open end of the sampler into an undisturbed area of soil with a twisting motion, filling the

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sampler with soil. Note the location of the plunger with respect to the milliliter (cc) or other graduation printed on the sampler.

d) Weigh the filled sampler, and remove or add soil until the desired weight is obtained. Note the location of the plunger which corresponds to this weight. Do not use this sample for laboratory analysis.

2. Once the required soil volume has been determined, pull the plunger back to this mark and hold it there while filling the syringe for each sample.

3. Collect 5 grams of soil using the cut-off syringe or Terra Core® sample device. Extrude the 5-grams of soil into one of the low level 40-mL VOA vials. Quickly wipe any soil from the threads of the VOA vial with a clean Kimwipe® and immediately close the vial. It is imperative that the threads be free from soil or other debris prior to replacing the cap on the vial in order to maintain the closed system necessary for the analysis.

4. Gently swirl the vial so that all of the soil is fully wetted with the preservative.

5. Fill the other low level 40 mL VOA vial in this manner.

6. Repeat the process for the high level VOA vials, only for the high level VOA vial three 5 gram aliquots (i.e., 15 grams total) should be extruded into the high level VOA vial.

   NOTE: Depending on the laboratory, some high level VOA vials only contain 5 mL or 10 mL of methanol. If this is the case, either 5 grams total or 10 grams total, respectively, should be extruded into the high level VOA vial. In other words, the mass of soil in grams should be identical to the volume of methanol in mL (i.e., 1:1 ratio of soil to methanol).

7. Collect any additional QC sample collected (e.g., field duplicate, MS, and MSD) in the same manner as above.

8. Fill the 4-oz glass jar with soil from the same area for percent moisture determination.

7.6.2 Soil Sampling Method (All other analyses except VOC/VPH)

When all the required soil for a sampling location has been obtained, the soil can be homogenized as described in section 7.2. Collect sufficient volume to fill all of the remaining sample containers at least ¾ full for all other analyses. Homogenize the soil in a decontaminated stainless steel bowl, removing rocks, sticks, or other non-soil objects and breaking apart any lumps of soil prior to filling the remaining sample containers.

NOTE: Soil samples must contain greater than 30% solids for the data to be considered valid.

8.0 Quality Control and Assurance

8.1 Sampling personnel should follow specific quality assurance guidelines as outlined in the SAP. Proper quality assurance requirements should be provided which will allow for collection of representative samples from representative sampling points. Quality assurance requirements outlined in the SAP typically suggest the collection of a sufficient quantity of field duplicate, field blank, and other samples.

8.2 Quality control requirements are dependent on project-specific sampling objectives. The SAP will provide requirements for equipment decontamination (frequency and materials), sample preservation and holding times, sample container types, sample packaging and shipment, as well as requirements for the collection of various quality assurance samples such as trip blanks, field blanks, equipment blanks, and field duplicate samples.

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9.0 Records, Data Analysis, Calculations

All data and information (e.g., sample collection method used) must be documented on field data sheets, boring logs, or within site logbooks with permanent ink. Data recorded may include the following:

- Weather conditions;
- Arrival and departure time of persons on site;
- Instrument type, lamp (PID), make, model and serial number;
- Calibration gas used;
- Date, time and results of instrument calibration and calibration checks;
- Sampling date and time;
- Sampling location;
- Samples collected;
- Sampling depth and soil type;
- Deviations from the procedure as written; and
- Readings obtained.

10.0 Attachments or References

SOP 3-06, *Equipment Decontamination*

SOP 3-19, *Headspace Screening for Total VOCs*

SOP 3-20, *Operation and Calibration of a Photoionization Detector*

Author	Reviewer	Revisions (Technical or Editorial)
Robert Shoemaker Senior Scientist	Chris Barr Program Quality Manager	Rev 0 – Initial Issue (May 2012)

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Region 4
U.S. Environmental Protection Agency
Science and Ecosystem Support Division
Athens, Georgia

OPERATING PROCEDURE

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Revision History

This table shows changes to this controlled document over time. The most recent version is presented in the top row of the table. Previous versions of the document are maintained by the SESD Document Control Coordinator.

History	Effective Date
SESDPROC-110-R3, *Global Positioning System*, replaces SESDPROC-110-R2 **Cover Page:** The EIB Branch Chief was changed from Antonio Quinones to Archie Lee. The FQM was changed from Laura Ackerman to Liza Montalvo. **Revision History:** Changed Field Quality Manager to Document Control Coordinator. **Section 1.2:** Added the following statement: Mention of trade names or commercial products in this operating procedure does not constitute endorsement or recommendation for use. **Section 1.3:** Omitted the reference to the H: drive of the LAN. Changed Field Quality Manager to Document Control Coordinator.	April 20, 2011
SESDPROC-110-R2, *Global Positioning System*, replaces SESDPROC-110-R01 **Title Page** Changed title for Antonio Quinones from Environmental Investigations Branch to Enforcement and Investigations Branch. Changed Bill Cosgrove‟s title from Acting Chief to Chief. **Section 1.4** Alphabetized and added a reference.	November 1, 2007
SESDPROC-110-R1, *Global Positioning System*, replaces SESDPROC-110-R0 This revision reflects the following changes: **General** Extensive rewrite with additional information added to most sections. Brian Striggow added as coauthor. **Section 2.1** Rewritten description of GPS system. Descriptions of "GPS Accuracy Factors" and "Differential GPS" isolated as separate subsections.	October 1, 2007

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Section 2.2 This Section, titled "Requirements for Locational Information" inserted. Supplies guidance on accuracy requirements for various study types and potential means used to obtain requisite accuracy. Subsection on datums and data formats included. **Section 2.3** "Quality Control Procedures", previously numbered as Section 2.2. Most information in this section moved to Section 2.1 discussion of Accuracy Factors and Section 2.4 discussion of specific receivers. Explicit statement added that no specific GPS quality control procedures are required for most SESD studies. **Section 2.4** Information added to sections on Trimble and Garmin receivers. **Section 2.5** Issue of electronic data-logging addressed. Storage of electronic data records addressed.	
SESDPROC-110-R0, Global Positioning System, Original Issue	March 22, 2007

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1 General Information

1.1 Purpose

This document describes the Global Positioning System (GPS) and procedures, methods and considerations to be used and observed when using GPS to record location data in the field. Guidance is provided on accuracy requirements for various uses of location data and potential means to obtain the requisite accuracy. This document contains direction developed solely to provide internal guidance to SESD employees.

1.2 Scope/Application

The procedures contained in this document are to be used by SESD field investigators when using the Global Positioning System to obtain the geographical coordinates of sampling locations and/or measurements during field investigations. In SESD investigations, GPS is the preferred means of collecting horizontal location information. In most cases the accuracy of GPS is unsuitable for collection of elevation data.

On the occasion that SESD field personnel determine that any of the procedures described in this section cannot be used to obtain the required coordinate information and alternate procedures are employed, the alternate procedure will be documented in the field log book, along with a description of the circumstances requiring its use. GPS users must be currently qualified as proficient in the operation of the specific GPS equipment to be used. The manufacturer‟s operation manuals should be used for detailed information on the use of specific GPS equipment. Mention of trade names or commercial products in this operating procedure does not constitute endorsement or recommendation for use.

1.3 Documentation/Verification

This procedure was prepared by persons deemed technically competent by SESD management, based on their knowledge, skills and abilities and has been tested in practice and reviewed in print by a subject matter expert. The official copy of this procedure resides on the SESD local area network (LAN). The Document Control Coordinator is responsible for ensuring the most recent version of the procedure is placed on the LAN and for maintaining records of review conducted prior to its issuance.

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1.4 References

Rand Corporation, The Global Positioning System, Assessing National Policies, Appendix B, GPS History, Chronology, and Budgets, 1995.

SESD Operating Procedure for Control of Records, SESDPROC-002, Most Recent Version.

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USEPA, GIS Technical Memorandum 3. Global Positioning Systems – Technology and It‟s Application in Environmental Programs, Research and Development (PM-225). EPA/600/R-92/036, 1992.

USEPA, Locational Data Policy, Office of Information Resources Management, IRM Policy Manual 2100 Chapter 13, 1991.

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2 Methodology

2.1 General

2.1.1 GPS Description

The Navigation Satellite Time and Ranging (NAVSTAR) Global Positioning System (GPS) is a worldwide radio-navigation system created by the U. S. Department of Defense (DOD) to provide navigation, location, and timing information for military operations. System testing using a limited number of satellites began in 1978 with the system being declared fully operational in 1995. The system was declared available for civilian uses in the 1980s and has seen burgeoning civilian application for navigation and mapping.

The GPS system consists of three basic elements: the space segment, control segment, and user segment. The space segment consists of the constellation of up to 24 active NAVSTAR satellites in six orbital tracks. The satellites are not in geo-synchronous orbit and are in constant motion relative to a ground user. The control segment consists of several ground stations that serve as uplinks to the satellites and that make adjustments to satellite orbits and clocks when necessary. The user segment consists of the GPS receiver which will typically consist of an antenna, multi-channel receiver, and processing unit.

For the purposes of this document, the user segment GPS receivers may be loosely grouped into Recreational and Navigational receivers (henceforth referred to as General Use receivers), Mapping Grade receivers, and Survey Grade receivers.

- Most General Use grade receivers are available on the retail market to consumers for a variety of applications including boating, hiking, and automotive navigation. They display an instantaneous reading of position and are generally not optimized for data collection. Waypoints containing instantaneous position fixes can often be stored and downloaded. The accuracy of these receivers is adequate for many environmental applications.

- Mapping Grade receivers are used for applications such as resource management and Geographical Information System (GIS) feature collection. The receivers are capable of averaging multiple position fixes for greater accuracy and then data-logging the results with sufficient information to post-correct the positions as described below. The potential accuracy that can be achieved may be better than one meter.

- Survey Grade receivers can provide accuracy at the centimeter level by using long occupation times and special techniques for receiver use and data processing. Survey Grade receivers are not used by SESD in field investigations.

GPS receivers derive positions by simultaneously measuring the distance (range) to several satellites in precisely known orbits, and using triangulation of the ranges to calculate a unique position for the receiver. The range to each satellite is determined by precisely measuring the transit time of radio signals broadcast from the satellites.

2.1.2 GPS Accuracy Factors

The accuracy of the basic GPS system is approximately 15m. GPS accuracy can be affected by a number of factors including the Selective Availability feature, atmospheric delays, satellite clock and orbit errors, multipath signals, signal strength, and satellite geometry relative to the user.

In the early GPS implementation, the DOD used a feature known as Selective Availability (SA) to degrade the quality and subsequent accuracy of the GPS signals to non-DOD users. With Selective Availability enabled, accuracy of position fixes could be as poor as 100m without the use of differential correction techniques described below. Currently there is no SA limitation in accuracy in place with a stated Executive Branch intention to not return to the use of the SA signal degradation.

As satellites move in their orbits and some signals are blocked by obstructions, the geometry of the available satellite signals relative to the user will constantly change. When the satellites with available signals are clustered closely together in the sky, small errors in range will result in large errors in reported position. Conversely, when the satellites are distributed more broadly across the sky, the resultant position errors will be at their minimum. The general measure of this phenomenon is Dilution of Precision (DOP), which may be represented as Position Dilution of Precision (PDOP), or more specifically for geographical coordinate collection, Horizontal Dilution of Precision (HDOP). Mapping and Survey Grade receivers generally can calculate and display DOP and allow the user to limit logging to times when the higher potential accuracy conditions of low DOP prevail. General Use receivers may display DOP and use DOP with other factors to estimate a general accuracy figure. DOP may range from approximately 2 to 50, with high quality work usually requiring a HDOP of less than 4-6.

Signal strength and multipath signals relate to the strength and quality of the signal reaching the receiver antenna. Signal attenuation by the atmosphere, buildings, and tree cover limit the accuracy of the ranges obtained. The measure of signal strength is Signal to Noise Ratio (SNR), generally measured in decibels(db). Most receivers of any grade will display the SNR of the satellite signals in a bar graph or table. Mapping Grade Receivers generally allow the user to specify a minimum signal strength for the use of a satellite signal (commonly 2-15db). Poor signal strength can be resolved by waiting for satellite locations to change or moving the receiver location. Multipath signals result

from portions of the satellite signal bouncing off terrain, structures, or atmospheric disturbances, resulting in a degraded total signal. Higher quality Mapping Grade receivers may be capable of rejecting the stray multipath signals, such as Trimble® receivers using Everest™ technology.

2.1.3 Differential GPS

Selective Availability, clock errors, and orbital errors affect all GPS users and atmospheric delays affect all users over a relatively wide region. A second GPS receiver in the same general area as the user will experience the same errors from these sources as the user‟s receiver. Consequently, correction factors from a remote station at a known location can be applied to the user‟s receiver in a process known as Differential GPS (DGPS). DGPS can be applied in real-time using additional radio signals, or after the collection event by a method called post-correction.

Real-time DGPS uses established networks of base stations at precisely surveyed locations. The US Coast Guard operates a system of 80 base stations which became fully operational in 1999. The range corrections are broadcast on marine radiobeacon frequencies, with redundant coverage of most of the US coastline and the Mississippi River. There is near complete single beacon coverage of most of the internal US, but there are known gaps in coverage in both EPA Region 4 and the US as a whole. The system is sometimes referred to using the more general term DGPS or in nomenclature referring to the beacon-based nature of the system. Beacon-based DGPS is implemented primarily in Navigational and Mapping Grade receivers.

Real-time DGPS can also be implemented with a Space Based Augmentation System (SBAS). The most common SBAS currently used in the United States is the Wide Area Augmentation System (WAAS), developed by the Federal Aviation Administration to meet the additional demands on GPS for aircraft navigation. The WAAS network of base stations collects information on satellite clock errors, orbital errors, and atmospheric conditions. The error information is transferred to satellites in geo-synchronous orbits and subsequently broadcast to suitably equipped GPS receivers on frequencies compatible with the GPS range signals. While beacon-based DGPS passes range corrections to the receivers, WAAS communicates a model for the errors which is capable of providing more accurate corrections. Current Mapping Grade receivers will likely use WAAS with or without the option of beacon-based DGPS. All but the least expensive General Use receivers are generally equipped with WAAS differential correction capability.

Post-Corrected DGPS is generally accomplished by downloading the receiver survey files to a desktop or laptop computer and then retrieving correction files for the same time period (generally via the internet) from an established base station in the area of the survey. Post-processed accuracy improves with proximity of the base station to the surveyed locations and base station data should be used from a station within 300km of the site surveyed. The survey positions are processed by application software and a new

set of positions is generated using the correction data. The capability for post-processed differential correction is generally limited to Mapping Grade and Survey Grade receivers.

Various factors limit GPS accuracy in the vertical plane to approximately half of that obtainable in the horizontal plane, i.e., if a location fix is accurate to 3 m in the horizontal plane, it may only be accurate to 6 m in the vertical plane. Since relatively high accuracy is usually required for the uses of elevation data, GPS is rarely used to obtain and report elevations.

2.2 Requirements for Locational Information

2.2.1 Data Uses

Locational information can serve many purposes in an environmental investigation, a few of which are listed below:

1. Providing an unambiguous means to identify facilities or sampling plats.
2. Providing locational information to key analytical data in a GIS based data archiving system to the original sampling locations.
3. Differentiating watersheds.
4. Providing information to calculate extents and volumes of contamination.
5. Providing a means to relocate the media represented by samples for removal or treatment.
6. Providing information to prepare presentation graphics of sampling locations.

Depending on the specific uses for the data and the type of work being performed, there will be different needs for the accuracy of the locational data. Studies where a sample represents a large area of relatively homogeneous material would not require the same accuracy as the location of a permanent monitoring well. Below are broad guidelines for the accuracy that might be required for different applications.

Desired Accuracy	**Application**
100 m	Open ocean work where sample is presumed to be representative of a large area
20 m	Open water work (lakes or estuaries) where sample is presumed to be representative of a large area
10 m	Stream and river work where samples are presumed to be broadly representative of a reach
5-3 m	Stream work where samples are representative of a specific narrowly defined section

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10 m	Air Monitoring Stations
10 - 3 m	Microscale air monitoring
3 - 1 m	Permanent monitoring wells
1 m	Locations of 'Hot Spots' destined for removal of limited areal extent
3 - 1 m	Locations of Temporary groundwater wells in plumes requiring narrow delineation
3 m	Locations of Temporary groundwater wells in broad plumes
3 m	Locations of environmental samples with sample spacing >20 m
5 m	Locations of environmental samples with sample spacing >60 m
200 - 20 m	Coordinates describing a facility where mobile waste units are sampled
30 - 3 m	Locations of industrial process areas or NPDES permitted facilities where the sampling locations are described in field notes relative to the process or site features

Specific demands of a study may drive increased or decreased requirements for accuracy. The preferred means of locational data collection for most studies will be GPS, although alternate means are permissible if they meet accuracy requirements. The following table indicates the accuracy that may be expected from various means of establishing coordinates.

Accuracy	**Description**
200 - 50 m	Map Derived, coarse work
40 - 20 m	Map Derived, fine work or using GIS with digital imagery
15 m	General Use Grade GPS, w/o WAAS
5 m	General Use Grade GPS, w/ WAAS or beacon corrections
10 m	Mapping Grade GPS, no corrections, averaged readings,
3 m	Mapping Grade GPS w/ differential correction, averaged readings
1 m	Mapping Grade GPS w/ differential correction, controlled DOP and SNR, averaged readings
10 cm	Surveying Grade GPS or optical surveying (dependent on baseline length)

Accuracy is a term used to describe the degree of conformity of a measurement. In GPS, accuracy is usually specified as an estimate of the radius from the measured coordinates that is likely to include the actual coordinates. The estimate is based on several standard deviations probability of including the actual point in the measurement. As such, it is recognized that some measurements will fall outside of the specified accuracy. For the purposes of SESD GPS work, the nominal accuracy figures derived from manufacturer‟s literature for specific operating conditions, displayed by the receiver at the time of feature collection, or output from processing software will be taken at face value.

2.2.2 Datums and Data formats

In general, a datum is a reference from which other measurements are taken. In the development of surveying systems by civil entities, different datums were used as base references that will result in differing coordinates for the same location. A GPS receiver will generally display coordinates in a number of different user-selected datums. **Unless there are specific requirements on a project, all SESD work should be conducted using the WGS84 datum. A**lternatively, the nearly equivalent NAD83 datum may be used if WGS84 is unavailable as a receiver option. If an alternate coordinate system is used where coordinates are obtained and recorded in field logbooks, the use of the alternate coordinate system should also be noted in the logbook.

The SESD Data Archival and Retrieval System (DART) requires that coordinates for sample locations be entered in the WGS84 datum and dd.dddddd format. Unless specific project requirements dictate otherwise, all coordinates explicitly stated in reports will be in WGS84 format and in all cases the datum used will be specified.

There is no SESD policy on significant digits for GPS information, and accuracy should not be implied from the presence of significant digits in reported coordinates. However, good scientific practice should be followed in the presentation of locational information in order that useful information not be truncated or a higher degree of accuracy implied. The following table shows the incremental distance in latitude represented by the least significant digit for various coordinate formats:

dd.dddddd°	Approximately 4" or 10 cm
dd.ddddd°	Approximately 44" or 1.1 m
dd.dddd°	Approximately 36' or 11 m
dd°mm’ss”	Approximately 100' or 30 m
dd°mm’ss.x”	Approximately 10' or 3 m
dd°mm’ss.xx”	Approximately 1' or 30 cm
dd°mm.xxxx’	Approximately 7" or 18 cm
dd°mm.xxx’	Approximately 6' or 1.8 m
dd°mm.xx’	Approximately 60' or 18 m

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2.3 Quality Control Procedures

By nature of its origin in the DOD and recent application to aircraft navigation, the GPS is designed for high reliability. GPS failures resulting in an incorrect reading beyond the bounds of known errors are so rare that the possibility can be ignored for most SESD studies. If a study requires the verification of receiver function, this can be accomplished by verifying that a receiver displays the correct position while occupying a known benchmark.

2.4 Special Considerations

The application will dictate the type of receiver used. There are several specific considerations for the use of the various receiver types.

2.4.1 Special considerations for the use of Trimble® Mapping Grade Receivers

The suggested settings for Trimble® receivers are:

1. Position mode: Overdetermined 3D (or manual 3D if only 4 satellites are visible)
2. Elevation mask: 15 degrees
3. PDOP: 6
4. Signal to noise ratio (SNR) mask: 6
5. Dynamics code: Land
6. Logging interval: 1 second for points, 5 seconds for lines and areas
7. Audible click: Yes
8. Log DOP data: Yes
9. Coordinate System: Geographic Datum WGS84

When using Trimble® Geoexplorer receivers, the option of using the accuracy „slider bar" display may be used to consolidate many of the above parameters. The slider bar position must be positioned at midscale or towards the „Precision" end of the scale to achieve 1m accuracy work. When conducting work requiring less accuracy, the slider should be initially positioned midscale and may be adjusted toward the Production" end of the scale if the higher level of accuracy can not be maintained.

The receivers may be configured to force real-time position correction. The use of real-time correction reduces the risk of being unable to obtain appropriate post-correction files, but may limit productivity when differential signals cannot be

received or are intermittent. The use of forced real-time vs. post-correction is an operator decision. If the positions are not to be downloaded and the accuracy of differential correction is required, it will be necessary to force real-time correction.

Trimble® receivers at SESD contain a data dictionary that can facilitate the management of GIS data. If the COC_GIS dictionary is selected at the time of file creation, SESD standard media codes can be assigned to features at the time of logging that will accompany the data through the download process. The use of the COC_GIS data dictionary can simplify the management of the data when processed in a GIS system or when entered into the DART system.

The logging interval of most Trimble® GPS receivers defaults to a 5 second interval. This may be changed to a 1 second interval to expedite feature collection. A point feature should have a minimum of 36 positions logged to obtain the additional accuracy afforded by averaging positions. After a minimum of 36 positions are logged and the feature is closed, the averaged position can be obtained by selecting the feature on the „Map" screen. The averaged position should always be the one entered into field notebooks.

Some Trimble® receivers may only display data in dd°mm"ss.sss" format. If the coordinates are downloaded and processed through Pathfinder Office software, they can be output in the dd.dddddd (or any other) format. If the coordinates were only recorded in field logbooks, they can be converted to decimal degrees as follows:

Converting to decimal degrees (dd.dddddd) from degrees°minutes"seconds" (dd°mm"ss.sss"):

dd.dddddd = dd + (mm/60) + (ss.sss/3600)

Example: Convert 33°28"45.241" to decimal degrees

33 + (28/60) + (45.241/3600) = 33.479236

The reverse conversion is accomplished as follows:

Converting to degrees°minutes"seconds" from decimal degrees

Starting with dd.dddddd

Multiply .dddddd by 60 to obtain mm.mmmm

Multiply .mmmm by 60 to obtain ss.sss

Then dd°mm"ss.sss" = dd & mm & ss.sss

Example: Convert 33.479236 to dd°mm‟ss.sss” format

Multiply .479236 by 60 to obtain 28.7540 (mm.mmmm)

Multiply .7540 by 60 to obtain 45.241 (ss.sss)

Dd°mm‟ss.sss” = 33° & 28‟ & 45.241” = 33°28‟45.241”

2.4.2 Special considerations for the use of Garmin® General Use Grade Receivers

The standard format for navigational purposes is decimal minutes (dd°mm.mmm‟). This format is utilized due to the fact that nautical navigation charts are set up in this format. However, location information must be converted to a decimal degree (dd.ddddd°) format in order for GIS software to properly interpret the information. The conversion is accomplished by dividing the minutes portion of the coordinates by 60.

<u>Converting to decimal degrees from decimal minutes:</u>

dd.ddddd° = dd + (mm.mmm/60)

Example: Convert 81°49.386 degrees to decimal degrees

81 + (49.386/60) = 81.8231 degrees

<u>The reverse conversion is accomplished as follows:</u>

dd°mm.mmm‟ = dd & (.ddddd*60)

Example: Convert 81.8231 degrees to decimal minutes (dd°mm.mmm‟)

Multiply .8231 by 60 to obtain 49.386 (mm.mmm)

81° & 49.386‟ = 81°49.386‟

GPS users need to familiarize themselves with the differences between the two formats, as they appear similar. Spreadsheets can automate the conversion process.

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2.5 Records

The GPS coordinates and the SESD equipment identification number of the GPS receiver should be recorded in field logbooks at the time of GPS coordinate collection. The data logging capability of receivers may be used in lieu of the requirement to record the coordinates in logbooks when the following conditions can be met:

1. The location can easily be found later if it needs to be resurveyed prior to demobilization. A permanent monitoring well can easily be resurveyed, while most open-water work would not afford this opportunity.

2. The data is downloaded and ascertained to meet the accuracy requirements for the project prior to demobilization from the site.

3. The data is stored in at least two separate locations for transport, such as a laptop hard drive and a flash drive or compact disc.

In all cases where positions are electronically recorded, the provisions of the Electronic Records section of the SESD Operating Procedure for Control of Records (SESDPROC-002) should be followed.

Where locational data is collected and processed electronically, but not reported explicitly in the final report, a copy of the coordinates in text format should be output and entered into the project file in paper or electronic form. The output should include:

1. Latitude, generally in dd.dddddd format.

2. Longitude, generally in dd.dddddd format.

3. Date of collection.

4. DOP information where it supports the accuracy requirements.

5. Correction status of each point where it supports the accuracy requirements.

6. The datum used for the export.

Trimble® Pathfinder Office will create files with this information by exporting to a text file. The information will be contained in the .pos and .inf files.

Appendix B
Laboratory Accreditation Certificates

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

ENVIRONMENTAL CONSERVATION LABORATORIES – JACKSONVILLE
4810 Executive Park Court, Suite 111
Jacksonville, FL 32216
Denise K. Stern Phone: 904 296 3007
Email address: dstern@encolabs.com

ENVIRONMENTAL

Valid To: April 30, 2016 Certificate Number: 3000.02

In recognition of the successful completion of the A2LA evaluation process, (including an assessment of the laboratory's compliance with ISO IEC 17025:2005, the 2009 TNI Standard, and the requirements of the DoD Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in version 5.0 of the DoD Quality Systems Manual for Environmental Laboratories) accreditation is granted to this laboratory to perform recognized EPA methods using the following testing technologies and in the analyte categories identified below:

Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste (Solid)	Air
Isopropyl alcohol (2-Propanol)	EPA 8015C	EPA 8015C	ENCO VGCMS-07
4-Ethyltoluene	----------	----------	ENCO VGCMS-07
Cyclohexane	EPA 8260B	EPA 8260B	ENCO VGCMS-07
1,1,1-Trichloroethane	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
1,1,2,2-Tetrachloroethane	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
1,1,2-Trichloro-1,2,2-trifluoroethane	EPA 8260B	EPA 8260B	EPA TO-14A
1,1,2-Trichloroethane	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
1,1-Dichloroethane	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
1,1-Dichloroethylene	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
1,2-Dichloro-1,1,2,2-tetrafluoroethane	----------	----------	EPA TO-14A
1,3-Butadiene	----------	----------	EPA TO-15
1,4-Dioxane	EPA 8260B	EPA 8260B	EPA TO-15
2,2,4-Trimethylpentane	----------	----------	EPA TO-15
Benzyl chloride	----------	----------	EPA TO-15
n-Hexane	----------	----------	EPA TO-15
2-Hydroxy isobutyric acid	ENCO VGC-13	----------	----------
Acetic acid	ENCO VGC-13	----------	----------
Butyric acid (Butanoic acid)	ENCO VGC-13	----------	----------
Hexanoic acid	ENCO VGC-13	----------	----------
Isohexanoic acid (4-methyl-pentanoic acid)	ENCO VGC-13	----------	----------
Isopentanoic acid (3-methyl-butanoic acid)	ENCO VGC-13	----------	----------
Lactic acid	ENCO VGC-13	----------	----------

Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste (Solid)	Air
Lactic acid/ HIBA (2-Hydroxyisobutyric acid)	ENCO VGC-13	----------	----------
Pentanoic acid	ENCO VGC-13	----------	----------
Propionic acid (Propanoic acid)	ENCO VGC-13	----------	----------
Pyruvic acid	ENCO VGC-13	----------	----------
Propylene glycol	EPA 8015C	EPA 8015C	----------
Diethylene glycol	EPA 8015C	EPA 8015C	----------
Ethyl acetate	EPA 8015C	EPA 8015C	ENCO VGCMS-07
Ethylene glycol	EPA 8015C	EPA 8015C	----------
Triethylene glycol	EPA 8015C	EPA 8015C	----------
Diesel range organics (DRO)	EPA 8015C	EPA 8015C	----------
Gasoline range organics (GRO)	EPA 8015C	EPA 8015C	----------
Isobutyl alcohol (2-Methyl-1-propanol)	EPA 8015C/8260B	EPA 8260B/8015C	----------
Methanol	EPA 8015C	EPA 8015C	----------
n-Butyl alcohol	EPA 8015C	----------	----------
n-Propanol	EPA 8015C	EPA 8015C	----------
1,2-Dibromo-3-chloropropane (DBCP)	8260B	EPA 8260B	----------
1,2-Dibromoethane (EDB, Ethylene dibromide)	8260B	EPA 8260B	EPA TO-14A/TO-15
1,2-Dichlorobenzene	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
1,2-Dichloroethane	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
1,2-Dichloropropane	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
1,3-Dichlorobenzene	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
1,4-Dichlorobenzene	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
2-Chloroethyl vinyl ether	EPA 624/8260B	EPA 8260B	----------
Acrolein (Propenal)	EPA 624/8260B	EPA 8260B	----------
Acrylonitrile	EPA 624/8260B	EPA 8260B	----------
Benzene	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
Bromodichloromethane	EPA 624/8260B	EPA 8260B	ENCO VGCMS-07
Bromoform	EPA 624/8260B	EPA 8260B	EPA TO-15
Carbon tetrachloride	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
Chlorobenzene	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
Chloroethane	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
Chloroform	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
cis-1,3-Dichloropropene	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
Dibromochloromethane	EPA 624/8260B	EPA 8260B	ENCO VGCMS-07
Ethylbenzene	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
Methyl bromide (Bromomethane)	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
Methyl chloride (Chloromethane)	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
Methylene chloride	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
Tetrachloroethylene	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
Toluene	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
trans-1,2-Dichloroethylene	EPA 624/8260B	EPA 8260B	EPA TO-15
trans-1,3-Dichloropropylene	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
Trichloroethene	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
Trichlorofluoromethane	EPA 624/8260B	EPA 8260B	EPA-TO-14A

Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste (Solid)	Air
Vinyl chloride	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
Xylene (total)	EPA 624/8260B	EPA 8260B	EPA TO-14A/TO-15
1,1,1,2-Tetrachloroethane	EPA 8260B	EPA 8260B	----------
1,1-Dichloropropene	EPA 8260B	EPA 8260B	----------
1,2,3-Trichlorobenzene	EPA 8260B	EPA 8260B	----------
1,2,3-Trichloropropane	EPA 8260B	EPA 8260B	----------
1,2,4-Trichlorobenzene	EPA 8260B	EPA 8260B	EPA TO-14A/TO-15
1,2,4-Trimethylbenzene	EPA 8260B	EPA 8260B	EPA TO-14A
1,3,5-Trimethylbenzene	EPA 8260B	EPA 8260B	EPA TO-14A
1,3-Dichloropropane	EPA 8260B	EPA 8260B	----------
2,2-Dichloropropane	EPA 8260B	EPA 8260B	----------
2-Butanone (Methyl ethyl ketone, MEK)	EPA 8260B/8015C	EPA 8260B/8015C	EPA TO-15
2-Chlorotoluene	EPA 8260B	EPA 8260B	----------
2-Hexanone	EPA 8260B	EPA 8260B/8015C	ENCO VGCMS-07
4-Chlorotoluene	EPA 8260B	EPA 8260B	----------
4-Methyl-2-pentanone (MIBK)	EPA 8260B/8015C	EPA 8260B/8015C	EPA TO-15
Acetone	EPA 8260B	EPA 8260B	ENCO VGCMS-07
Acetonitrile	EPA 8260B	EPA 8260B	----------
Allyl chloride (3-Chloropropene)	EPA 8260B	EPA 8260B	EPA TO-15
Bromobenzene	EPA 8260B	EPA 8260B	----------
Bromochloromethane	EPA 8260B	EPA 8260B	----------
Carbon disulfide	EPA 8260B	EPA 8260B	EPA TO-15
Chloroprene	EPA 8260B	EPA 8260B	----------
cis-1,2-Dichloroethylene	EPA 8260B	EPA 8260B	EPA TO-14A/TO-15
Dibromomethane	EPA 8260B	EPA 8260B	----------
Dichlorodifluoromethane	EPA 8260B	EPA 8260B	EPA TO-14A
Diethyl ether	EPA 8260B	EPA 8260B	----------
Ethanol	EPA 8260B/8015C	EPA 8260B/8015C	----------
Ethyl methacrylate	EPA 8260B	EPA 8260B	----------
Hexachlorobutadiene	EPA 8260B	EPA 8260B	EPA TO-14A/TO-15
Iodomethane (Methyl iodine)	EPA 8260B	EPA 8260B	----------
Isopropylbenzene	EPA 8260B	EPA 8260B	EPA TO-15
Isopropyl ether	EPA 8260B	EPA 8260B	----------
Methacrylonitrile	EPA 8260B	EPA 8260B	----------
Methyl Acetate	EPA 8260B	EPA 8260B	----------
Methyl Cyclohexane	EPA 8260B	EPA 8260B	----------
Methyl methacrylate	EPA 8260B	EPA 8260B	----------
Methyl tert-butyl ether (MTBE)	EPA 8260B	EPA 8260B	EPA TO-15
m.p-Xylene	EPA 8260B	EPA 8260B	EPA TO-14A/TO-15
Naphthalene	EPA 8260B	EPA 8260B	----------
n-Butyl benzene	EPA 8260B	EPA 8260B	----------
n-Propyl benzene	EPA 8260B	EPA 8260B	----------
o-Xylene	EPA 8260B	EPA 8260B	EPA TO-14A/TO-15
p-Isopropyltoluene	EPA 8260B	EPA 8260B	----------
Propionitrile (Ethyl cyanide)	EPA 8260B	EPA 8260B	----------
sec-Butylbenzene	EPA 8260B	EPA 8260B	----------
Styrene	EPA 8260B	EPA 8260B	EPA TO-14A/TO-15
tert-Amyl alcohol	EPA 8260B	EPA 8260B	----------

Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste (Solid)	Air
tert-Amyl methyl ether	EPA 8260B	EPA 8260B	----------
tert-Butyl alcohol	EPA 8260B	EPA 8260B	----------
tert-Butylbenzene	EPA 8260B	EPA 8260B	----------
tert-Butyl ethyl ether	EPA 8260B	EPA 8260B	----------
trans-1,4-Dichloro-2-butene	EPA 8260B	EPA 8260B	----------
Vinyl acetate	EPA 8260B	EPA 8260B	EPA TO-15
Total coliforms	SM9222B-1997	----------	----------
Fecal coliforms	SM9222D-1997	----------	----------
Aluminum	EPA 200.7/6010C	EPA 6010C	----------
Antimony	EPA 200.7/6010C	EPA 6010C	----------
Arsenic	EPA 200.7/6010C	EPA 6010C	----------
Barium	EPA 200.7/6010C	EPA 6010C	----------
Beryllium	EPA 200.7/6010C	EPA 6010C	----------
Boron	EPA 200.7/6010C	EPA 6010C	----------
Cadmium	EPA 200.7/6010C	EPA 6010C	----------
Calcium	EPA 200.7/6010C	EPA 6010C	----------
Chromium	EPA 200.7/6010C	EPA 6010C	----------
Cobalt	EPA 200.7/6010C	EPA 6010C	----------
Copper	EPA 200.7/6010C	EPA 6010C	----------
Hardness (calc.)	SM2340B-1997	----------	----------
Iron	EPA 200.7/6010C, SM3500-Fe B-1997	EPA 6010C	----------
Lead	EPA 200.7/6010C	EPA 6010C	----------
Lithium	EPA 200.7/6010C	EPA 6010C	----------
Magnesium	EPA 200.7/6010C	EPA 6010C	----------
Manganese	EPA 200.7/6010C	EPA 6010C	----------
Molybdenum	EPA 200.7/6010C	EPA 6010C	----------
Nickel	EPA 200.7/6010C	EPA 6010C	----------
Potassium	EPA 200.7/6010C	EPA 6010C	----------
Selenium	EPA 200.7/6010C	EPA 6010C	----------
Silica as SiO_2	EPA 200.7/6010C	----------	----------
Silver	EPA 200.7/6010C	EPA 6010C	----------
Sodium	EPA 200.7/6010C	EPA 6010C	----------
Strontium	EPA 200.7/6010C	EPA 6010C	----------
Thallium	EPA 200.7/6010C	EPA 6010C	----------
Tin	EPA 200.7/6010C	EPA 6010C	----------
Titanium	EPA 200.7/6010C	EPA 6010C	----------
Vanadium	EPA 200.7/6010C	EPA 6010C	----------
Zinc	EPA 200.7/6010C	EPA 6010C	----------
Mercury	EPA 245.1/7470A	EPA 7471B	----------
Sulfate	ASTM D516-90	----------	----------
Ignitability	EPA 1010A	EPA 1010A/1030	----------
Conductivity	EPA 120.1, SM2510B-1997	----------	----------
Turbidity	EPA 180.1, SM2130B-2001	----------	----------
Orthophosphate as P	EPA 365.3	----------	----------
Color	SM2120B-2001	----------	----------
Alkalinity as CaC03	SM2320B-1997	----------	----------
Hardness	SM2340C-1997	----------	----------
Residue-nonfilterable (TSS)	SM2540D-1997	----------	----------
Residue-total	SM2540B-1997	----------	----------
Residue-filterable (TDS)	SM2540C-1997	----------	----------

Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste (Solid)	Air
Chromium VI	SM3500-Cr B-2001 /UV-VIS SM 3500-Cr B-2009	----------	----------
Chloride	SM4500-Cl-C-1997	----------	----------
Total residual chlorine	SM4500-Cl-G-2000	----------	----------
pH	SM4500-H+-B-2000, EPA 9040C	EPA 9040C/9045D	----------
Corrosivity (pH)	----------	EPA 9040C	----------
Paint Filter Liquids Test	----------	EPA 9095B	----------
Nitrite	SM4500-NO2 B-2000	----------	----------
Biochemical oxygen demand	SM5210B-2001	----------	----------
Carbonaceous BOD (CBOD)	SM5210B-2001	----------	----------
Chemical oxygen demand	SM5220D-1997, EPA 410.4	----------	----------
Total Organic Carbon	SM5310B-2000, EPA 9060A	----------	----------
Total Petroleum Hydrocarbons (TPH)	FL-PRO	FL-PRO	----------
Oil & Grease (HEM)	EPA 1664A/1664B	EPA 9071B	----------
Total Petroleum Hydrocarbons (TPH) (HEM-SGT)	EPA 1664A/1664B	----------	----------
Carbon dioxide	RSK-175	----------	----------
Ethane	RSK-175	----------	----------
Ethylene	RSK-175	----------	----------
Methane	RSK-175	----------	----------
C9-C18 Aliphatic Hydrocarbons	MAEPH	MAEPH	----------
C19-C36 Aliphatic Hydrocarbons	MAEPH	MAEPH	----------
C11-C22 Aromatic Hydrocarbons	MAEPH	MAEPH	----------
C5-C8 Aliphatic Hydrocarbons	MAVPH	MAVPH	----------
C9-C12 Aliphatic Hydrocarbons	MAVPH	MAVPH	----------
C9-C10 Aromatic Hydrocarbons	MAVPH	MAVPH	----------
Toxicity Characteristic Leaching Procedure (TCLP)	EPA 1311	EPA 1311	----------
Synthetic Precipitation Leaching Procedure (SPLP)	EPA 1312	EPA 1312	----------

Analytical method	Prep Method			
	Soil	Water	Air	Waste
EPA 8260B	EPA 5035	EPA 5030B	----------	EPA 5035
EPA 624	----------	EPA 5030B	----------	----------
EPA 625*	----------	EPA 3510C	----------	----------
EPA 8270D*	EPA 3545A	EPA 3510C	----------	EPA 3580A
EPA 200.7	----------	EPA 200.7	----------	----------
EPA 6010C	EPA 3050B	EPA 3005A	----------	EPA 3050B
EPA 608*	----------	EPA 3510C	----------	----------
EPA 8081B*	EPA 3545A	EPA 3510C	----------	EPA 3580A

Analytical method	Prep Method			
	Soil	Water	Air	Waste
EPA 8082A*	EPA 3545A, 3540C	EPA 3510C	----------	EPA 3580A
EPA 9071B	EPA 3540C	----------	----------	EPA 3540C
MA VPH, May 2004 Revision 1.1	EPA 5035	EPA 5030B	----------	----------
MA EPH, May 2004 Revision 1.1	EPA 3545A	EPA 3510C	----------	----------
FLPRO	EPA 3545A	EPA 3510C	----------	----------
8015C – GRO	EPA 5035	EPA 5030B	----------	----------
8015C – DRO	EPA 3545A	EPA 3510C	----------	----------
TO14A	----------	----------	TO14A	----------
TO15	----------	----------	TO15	----------
SPLP	EPA 1312	EPA 1312	----------	EPA 1312
TCLP	EPA 1311	EPA 1311	----------	EPA 1311

*Determinative step performed at Orlando lab (Certificate number 3000.01).

American Association for Laboratory Accreditation

Accredited DoD ELAP Laboratory

A2LA has accredited

ENVIRONMENTAL CONSERVATION LABORATORIES - JACKSONVILLE

Jacksonville, FL

for technical competence in the field of

Environmental Testing

In recognition of the successful completion of the A2LA evaluation process that includes an assessment of the laboratory's compliance with ISO/IEC 17025:2005, the 2003 NELAC Chapter 5 Standard, and the requirements of the Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in version 5.0 of the DoD Quality System Manual for Environmental Laboratories (QSM); accreditation is granted to this laboratory to perform recognized EPA methods as defined on the associated A2LA Environmental Scope of Accreditation. This accreditation demonstrates technical competence for this defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009).

AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION
CORPORATE SEAL 1978
DISTRICT OF COLUMBIA
A2LA

Presented this 7th day of May 2014.

President & CEO
For the Accreditation Council
Certificate Number 3000.02
Valid to April 30, 2016

For the tests to which this accreditation applies, please refer to the laboratory's Environmental Scope of Accreditation.

State of Florida
Department of Health, Bureau of Public Health Laboratories
This is to certify that

E82277

ENVIRONMENTAL CONSERVATION LABORATORIES, INC. (ENCO) - JACKSONVILLE
4810 EXECUTIVE PARK COURT, SUITE 111
JACKSONVILLE, FL 32216

has complied with Florida Administrative Code 64E-1,
for the examination of environmental samples in the following categories

DRINKING WATER - MICROBIOLOGY, DRINKING WATER - PRIMARY INORGANIC CONTAMINANTS, NON-POTABLE WATER - EXTRACTABLE ORGANICS, NON-POTABLE WATER - GENERAL CHEMISTRY, NON-POTABLE WATER - METALS, NON-POTABLE WATER - MICROBIOLOGY, NON-POTABLE WATER - VOLATILE ORGANICS, SOLID AND CHEMICAL MATERIALS - EXTRACTABLE ORGANICS, SOLID AND CHEMICAL MATERIALS - GENERAL CHEMISTRY, SOLID AND CHEMICAL MATERIALS - METALS, SOLID AND CHEMICAL MATERIALS - VOLATILE ORGANICS, AIR AND EMISSIONS - VOLATILE ORGANICS

Continued certification is contingent upon successful on-going compliance with the NELAC Standards and FAC Rule 64E-1 regulations. Specific methods and analytes certified are cited on the Laboratory Scope of Accreditation for this laboratory and are on file at the Bureau of Public Health Laboratories, P. O. Box 210, Jacksonville, Florida 32231. Clients and customers are urged to verify with this agency the laboratory's certification status in Florida for particular methods and analytes.

Date Issued: July 01, 2014 Expiration Date: June 30, 2015

William H. Anderson, DHA, FACHE, Director
Division of Emergency Preparedness and Community Support
DH Form 1697, 7/04
NON-TRANSFERABLE E82277-36-07/01/2014
Supersedes all previously issued certificates

Laboratory Scope of Accreditation

Attachment to Certificate #: E82277-36, expiration date June 30, 2015. This listing of accredited analytes should be used only when associated with a valid certificate.

State Laboratory ID: **E82277** EPA Lab Code: **FL00357** **(904) 296-3007**

E82277
Environmental Conservation Laboratories, Inc. (ENCO) - Jacksonville
4810 Executive Park Court, Suite 111
Jacksonville, FL 32216

Matrix: **Drinking Water**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Escherichia coli	COLISURE	Microbiology	NELAP	5/7/2009
Heterotrophic plate count	SIMPLATE	Microbiology	NELAP	7/9/2010
pH	SM 4500-H+-B	Primary Inorganic Contaminants	NELAP	5/7/2009
Total coliforms	COLISURE	Microbiology	NELAP	5/7/2009

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Matrix: **Non-Potable Water**

Analyte	Method/Tech	Category	Certification Type	Effective Date
1,1,1,2-Tetrachloroethane	EPA 624	Volatile Organics	NELAP	4/23/2014
1,1,1,2-Tetrachloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,1,1-Trichloroethane	EPA 624	Volatile Organics	NELAP	1/9/2002
1,1,1-Trichloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,1,2,2-Tetrachloroethane	EPA 624	Volatile Organics	NELAP	1/9/2002
1,1,2,2-Tetrachloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	EPA 624	Volatile Organics	NELAP	4/23/2014
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	EPA 8260	Volatile Organics	NELAP	4/23/2014
1,1,2-Trichloroethane	EPA 624	Volatile Organics	NELAP	1/9/2002
1,1,2-Trichloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,1-Dichloroethane	EPA 624	Volatile Organics	NELAP	1/9/2002
1,1-Dichloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,1-Dichloroethylene	EPA 624	Volatile Organics	NELAP	1/9/2002
1,1-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,1-Dichloropropene	EPA 624	Volatile Organics	NELAP	4/23/2014
1,1-Dichloropropene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2,3-Trichlorobenzene	EPA 624	Volatile Organics	NELAP	4/23/2014
1,2,3-Trichlorobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2,3-Trichloropropane	EPA 624	Volatile Organics	NELAP	4/23/2014
1,2,3-Trichloropropane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2,4-Trichlorobenzene	EPA 624	Volatile Organics	NELAP	4/23/2014
1,2,4-Trichlorobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2,4-Trimethylbenzene	EPA 624	Volatile Organics	NELAP	4/23/2014
1,2,4-Trimethylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2-Dibromo-3-chloropropane (DBCP)	EPA 624	Volatile Organics	NELAP	4/23/2014
1,2-Dibromo-3-chloropropane (DBCP)	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 624	Volatile Organics	NELAP	4/23/2014
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2-Dichlorobenzene	EPA 624	Volatile Organics	NELAP	1/9/2002
1,2-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2-Dichloroethane	EPA 624	Volatile Organics	NELAP	1/9/2002
1,2-Dichloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2-Dichloropropane	EPA 624	Volatile Organics	NELAP	1/9/2002
1,2-Dichloropropane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,3,5-Trimethylbenzene	EPA 624	Volatile Organics	NELAP	4/23/2014
1,3,5-Trimethylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003

Laboratory Scope of Accreditation

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E82277
Environmental Conservation Laboratories, Inc. (ENCO) - Jacksonville
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Jacksonville, FL 32216

Matrix: **Non-Potable Water**

Analyte	Method/Tech	Category	Certification Type	Effective Date
1,3-Dichlorobenzene	EPA 624	Volatile Organics	NELAP	1/9/2002
1,3-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,3-Dichloropropane	EPA 624	Volatile Organics	NELAP	4/23/2014
1,3-Dichloropropane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,4-Dichlorobenzene	EPA 624	Volatile Organics	NELAP	1/9/2002
1,4-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,4-Dioxane (1,4-Diethyleneoxide)	EPA 624	Volatile Organics	NELAP	4/23/2014
2,2-Dichloropropane	EPA 624	Volatile Organics	NELAP	4/23/2014
2,2-Dichloropropane	EPA 8260	Volatile Organics	NELAP	7/1/2003
2-Butanone (Methyl ethyl ketone, MEK)	EPA 624	Volatile Organics	NELAP	4/23/2014
2-Butanone (Methyl ethyl ketone, MEK)	EPA 8015	Volatile Organics	NELAP	7/1/2003
2-Butanone (Methyl ethyl ketone, MEK)	EPA 8260	Volatile Organics	NELAP	7/1/2003
2-Chloroethyl vinyl ether	EPA 624	Volatile Organics	NELAP	1/9/2002
2-Chloroethyl vinyl ether	EPA 8260	Volatile Organics	NELAP	7/1/2003
2-Chlorotoluene	EPA 624	Volatile Organics	NELAP	4/23/2014
2-Chlorotoluene	EPA 8260	Volatile Organics	NELAP	7/1/2003
2-Hexanone	EPA 624	Volatile Organics	NELAP	4/23/2014
2-Hexanone	EPA 8260	Volatile Organics	NELAP	7/1/2003
4-Chlorotoluene	EPA 624	Volatile Organics	NELAP	4/23/2014
4-Chlorotoluene	EPA 8260	Volatile Organics	NELAP	7/1/2003
4-Isopropyltoluene	EPA 624	Volatile Organics	NELAP	4/23/2014
4-Methyl-2-pentanone (MIBK)	EPA 624	Volatile Organics	NELAP	4/23/2014
4-Methyl-2-pentanone (MIBK)	EPA 8015	Volatile Organics	NELAP	6/22/2010
4-Methyl-2-pentanone (MIBK)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Acetic acid	ENCO VGC-13/HPLC-UV	Extractable Organics	NELAP	5/7/2009
Acetone	EPA 624	Volatile Organics	NELAP	4/23/2014
Acetone	EPA 8260	Volatile Organics	NELAP	7/1/2003
Acetonitrile	EPA 624	Volatile Organics	NELAP	4/23/2014
Acetonitrile	EPA 8260	Volatile Organics	NELAP	10/3/2006
Acrolein (Propenal)	EPA 624	Volatile Organics	NELAP	1/9/2002
Acrolein (Propenal)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Acrylonitrile	EPA 624	Volatile Organics	NELAP	1/9/2002
Acrylonitrile	EPA 8260	Volatile Organics	NELAP	7/1/2003
Alkalinity as CaCO3	SM 2320 B	General Chemistry	NELAP	6/2/2008
Allyl chloride (3-Chloropropene)	EPA 624	Volatile Organics	NELAP	4/23/2014
Allyl chloride (3-Chloropropene)	EPA 8260	Volatile Organics	NELAP	10/3/2006

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Matrix: **Non-Potable Water**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Aluminum	EPA 200.7	Metals	NELAP	1/9/2002
Aluminum	EPA 6010	Metals	NELAP	7/1/2003
Antimony	EPA 200.7	Metals	NELAP	1/9/2002
Antimony	EPA 6010	Metals	NELAP	7/1/2003
Arsenic	EPA 200.7	Metals	NELAP	1/9/2002
Arsenic	EPA 6010	Metals	NELAP	1/9/2002
Barium	EPA 200.7	Metals	NELAP	1/9/2002
Barium	EPA 6010	Metals	NELAP	7/1/2003
Benzene	EPA 624	Volatile Organics	NELAP	1/9/2002
Benzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Beryllium	EPA 200.7	Metals	NELAP	1/9/2002
Beryllium	EPA 6010	Metals	NELAP	7/1/2003
Biochemical oxygen demand	SM 5210 B	General Chemistry	NELAP	10/22/2003
Boron	EPA 200.7	Metals	NELAP	1/9/2002
Boron	EPA 6010	Metals	NELAP	7/1/2003
Bromobenzene	EPA 624	Volatile Organics	NELAP	4/23/2014
Bromobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Bromochloromethane	EPA 624	Volatile Organics	NELAP	4/23/2014
Bromochloromethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Bromodichloromethane	EPA 624	Volatile Organics	NELAP	1/9/2002
Bromodichloromethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Bromoform	EPA 624	Volatile Organics	NELAP	1/9/2002
Bromoform	EPA 8260	Volatile Organics	NELAP	7/1/2003
Butyric acid (Butanoic acid)	ENCO VGC-13/HPLC-UV	Extractable Organics	NELAP	5/7/2009
Cadmium	EPA 200.7	Metals	NELAP	1/9/2002
Cadmium	EPA 6010	Metals	NELAP	1/9/2002
Calcium	EPA 200.7	Metals	NELAP	1/9/2002
Calcium	EPA 6010	Metals	NELAP	7/1/2003
Carbon dioxide	RSK-175	Volatile Organics	NELAP	5/7/2009
Carbon disulfide	EPA 624	Volatile Organics	NELAP	4/23/2014
Carbon disulfide	EPA 8260	Volatile Organics	NELAP	7/1/2003
Carbon tetrachloride	EPA 624	Volatile Organics	NELAP	1/9/2002
Carbon tetrachloride	EPA 8260	Volatile Organics	NELAP	7/1/2003
Carbonaceous BOD (CBOD)	SM 5210 B	General Chemistry	NELAP	1/9/2002
Chemical oxygen demand	EPA 410.4	General Chemistry	NELAP	1/9/2002
Chemical oxygen demand	SM 5220 D	General Chemistry	NELAP	6/2/2008

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E82277
Environmental Conservation Laboratories, Inc. (ENCO) - Jacksonville
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Jacksonville, FL 32216

Matrix: **Non-Potable Water**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Chloride	SM 4500-Cl^- C	General Chemistry	NELAP	10/22/2003
Chlorobenzene	EPA 624	Volatile Organics	NELAP	1/9/2002
Chlorobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Chloroethane	EPA 624	Volatile Organics	NELAP	1/9/2002
Chloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Chloroform	EPA 624	Volatile Organics	NELAP	1/9/2002
Chloroform	EPA 8260	Volatile Organics	NELAP	7/1/2003
Chloroprene	EPA 624	Volatile Organics	NELAP	4/23/2014
Chloroprene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Chromium	EPA 200.7	Metals	NELAP	1/9/2002
Chromium	EPA 6010	Metals	NELAP	7/1/2003
Chromium VI	SM 3500-Cr B (20th/21st Ed.)/UV-VIS	General Chemistry	NELAP	4/23/2014
Chromium VI	SM 3500-Cr D (18th/19th Ed.)/UV-VIS	General Chemistry	NELAP	10/22/2003
cis-1,2-Dichloroethylene	EPA 624	Volatile Organics	NELAP	4/23/2014
cis-1,2-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	7/1/2003
cis-1,3-Dichloropropene	EPA 624	Volatile Organics	NELAP	1/9/2002
cis-1,3-Dichloropropene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Cobalt	EPA 200.7	Metals	NELAP	1/9/2002
Cobalt	EPA 6010	Metals	NELAP	7/1/2003
Color	SM 2120 B	General Chemistry	NELAP	10/22/2003
Conductivity	EPA 120.1	General Chemistry	NELAP	1/22/2002
Conductivity	SM 2510 B	General Chemistry	NELAP	10/22/2003
Copper	EPA 200.7	Metals	NELAP	1/9/2002
Copper	EPA 6010	Metals	NELAP	1/9/2002
Cyclohexane	EPA 624	Volatile Organics	NELAP	4/23/2014
Cyclohexane	EPA 8260	Volatile Organics	NELAP	4/23/2014
Dibromochloromethane	EPA 624	Volatile Organics	NELAP	1/9/2002
Dibromochloromethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Dibromomethane	EPA 624	Volatile Organics	NELAP	4/23/2014
Dibromomethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Dichlorodifluoromethane	EPA 624	Volatile Organics	NELAP	4/23/2014
Dichlorodifluoromethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Diesel range organics (DRO)	EPA 8015	Extractable Organics	NELAP	9/3/2004
Diesel range organics (DRO)	MADEP-EPH (MA-EPH)	Extractable Organics	NELAP	7/1/2003
Diethyl ether	EPA 624	Volatile Organics	NELAP	4/23/2014

Laboratory Scope of Accreditation

Attachment to Certificate #: E82277-36, expiration date June 30, 2015. This listing of accredited analytes should be used only when associated with a valid certificate.

State Laboratory ID: **E82277** EPA Lab Code: **FL00357** **(904) 296-3007**

E82277
Environmental Conservation Laboratories, Inc. (ENCO) - Jacksonville
4810 Executive Park Court, Suite 111
Jacksonville, FL 32216

Matrix: **Non-Potable Water**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Diethyl ether	EPA 8260	Volatile Organics	NELAP	1/22/2008
Diethylene glycol	EPA 8015	Volatile Organics	NELAP	4/23/2014
Ethane	RSK-175	Volatile Organics	NELAP	7/23/2004
Ethanol	EPA 624	Volatile Organics	NELAP	4/23/2014
Ethanol	EPA 8015	Volatile Organics	NELAP	7/1/2003
Ethanol	EPA 8260	Volatile Organics	NELAP	7/1/2003
Ethyl acetate	EPA 8015	Volatile Organics	NELAP	7/1/2003
Ethyl methacrylate	EPA 624	Volatile Organics	NELAP	4/23/2014
Ethyl methacrylate	EPA 8260	Volatile Organics	NELAP	7/1/2003
Ethylbenzene	EPA 624	Volatile Organics	NELAP	1/9/2002
Ethylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Ethylene	RSK-175	Volatile Organics	NELAP	7/23/2004
Ethylene glycol	EPA 8015	Volatile Organics	NELAP	5/7/2009
Ethyl-t-butylether (ETBE)	EPA 8260	Volatile Organics	NELAP	4/23/2014
Fecal coliforms	SM 9222 D	Microbiology	NELAP	1/9/2002
Gasoline range organics (GRO)	EPA 8015	Volatile Organics	NELAP	9/3/2004
Gasoline range organics (GRO)	MADEP-VPH (MA-VPH)	Extractable Organics	NELAP	7/1/2003
Hardness	SM 2340 B	General Chemistry	NELAP	10/22/2003
Hexachlorobutadiene	EPA 624	Volatile Organics	NELAP	4/23/2014
Hexachlorobutadiene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Hexanoic acid	ENCO VGC-13/HPLC-UV	Extractable Organics	NELAP	5/7/2009
Ignitability	EPA 1010	General Chemistry	NELAP	7/1/2003
Iodomethane (Methyl iodide)	EPA 624	Volatile Organics	NELAP	4/23/2014
Iodomethane (Methyl iodide)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Iron	EPA 200.7	Metals	NELAP	1/9/2002
Iron	EPA 6010	Metals	NELAP	7/1/2003
Isobutyl alcohol (2-Methyl-1-propanol)	EPA 624	Volatile Organics	NELAP	4/23/2014
Isobutyl alcohol (2-Methyl-1-propanol)	EPA 8015	Volatile Organics	NELAP	7/1/2003
Isobutyl alcohol (2-Methyl-1-propanol)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Isohexanoic acid (4-methyl-pentanoic acid)	ENCO VGC-13/HPLC-UV	Extractable Organics	NELAP	5/7/2009
Isopentanoic acid (3-methyl-butanoic acid, Isovaleric acid)	ENCO VGC-13/HPLC-UV	Extractable Organics	NELAP	5/7/2009
Isopropyl alcohol (2-Propanol)	EPA 8015	Volatile Organics	NELAP	7/1/2003
Isopropyl ether	EPA 624	Volatile Organics	NELAP	4/23/2014
Isopropyl ether	EPA 8260	Volatile Organics	NELAP	4/23/2014
Isopropylbenzene	EPA 624	Volatile Organics	NELAP	4/23/2014
Isopropylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003

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Jacksonville, FL 32216

Matrix: **Non-Potable Water**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Lactic acid+2-Hydroxyisobutyric acid (coelute)	ENCO VGC-13/HPLC-UV	Extractable Organics	NELAP	4/23/2014
Lead	EPA 200.7	Metals	NELAP	1/9/2002
Lead	EPA 6010	Metals	NELAP	1/9/2002
Lithium	EPA 200.7	Metals	NELAP	1/9/2002
Lithium	EPA 6010	Metals	NELAP	7/1/2003
m/p-Xylenes	EPA 8260	Volatile Organics	NELAP	8/24/2011
m+p-Xylenes	EPA 624	Volatile Organics	NELAP	4/23/2014
Magnesium	EPA 200.7	Metals	NELAP	1/9/2002
Magnesium	EPA 6010	Metals	NELAP	7/1/2003
Manganese	EPA 200.7	Metals	NELAP	1/9/2002
Manganese	EPA 6010	Metals	NELAP	7/1/2003
Mercury	EPA 245.1	Metals	NELAP	1/9/2002
Mercury	EPA 7470	Metals	NELAP	1/9/2002
Methacrylonitrile	EPA 624	Volatile Organics	NELAP	4/23/2014
Methacrylonitrile	EPA 8260	Volatile Organics	NELAP	7/1/2003
Methane	RSK-175	Volatile Organics	NELAP	7/23/2004
Methanol	EPA 8015	Volatile Organics	NELAP	7/1/2003
Methyl acetate	EPA 624	Volatile Organics	NELAP	4/23/2014
Methyl acetate	EPA 8260	Volatile Organics	NELAP	4/23/2014
Methyl bromide (Bromomethane)	EPA 624	Volatile Organics	NELAP	5/21/2009
Methyl bromide (Bromomethane)	EPA 8260	Volatile Organics	NELAP	5/21/2009
Methyl chloride (Chloromethane)	EPA 624	Volatile Organics	NELAP	1/9/2002
Methyl chloride (Chloromethane)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Methyl methacrylate	EPA 624	Volatile Organics	NELAP	4/23/2014
Methyl methacrylate	EPA 8260	Volatile Organics	NELAP	7/1/2003
Methyl tert-butyl ether (MTBE)	EPA 624	Volatile Organics	NELAP	4/23/2014
Methyl tert-butyl ether (MTBE)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Methylcyclohexane	EPA 624	Volatile Organics	NELAP	4/23/2014
Methylcyclohexane	EPA 8260	Volatile Organics	NELAP	4/23/2014
Methylene chloride	EPA 624	Volatile Organics	NELAP	1/9/2002
Methylene chloride	EPA 8260	Volatile Organics	NELAP	7/1/2003
Molybdenum	EPA 200.7	Metals	NELAP	1/9/2002
Molybdenum	EPA 6010	Metals	NELAP	1/9/2002
Naphthalene	EPA 624	Volatile Organics	NELAP	4/23/2014
Naphthalene	EPA 8260	Volatile Organics	NELAP	7/1/2003
n-Butyl alcohol	EPA 8015	Volatile Organics	NELAP	10/22/2003

Laboratory Scope of Accreditation

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E82277
Environmental Conservation Laboratories, Inc. (ENCO) - Jacksonville
4810 Executive Park Court, Suite 111
Jacksonville, FL 32216

Matrix: **Non-Potable Water**

Analyte	Method/Tech	Category	Certification Type	Effective Date
n-Butylbenzene	EPA 624	Volatile Organics	NELAP	4/23/2014
n-Butylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Nickel	EPA 200.7	Metals	NELAP	1/9/2002
Nickel	EPA 6010	Metals	NELAP	1/9/2002
Nitrite	SM 4500-NO2-B	General Chemistry	NELAP	10/22/2003
n-Propanol	EPA 8015	Volatile Organics	NELAP	7/1/2003
n-Propylbenzene	EPA 624	Volatile Organics	NELAP	4/23/2014
n-Propylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Odor	SM 2150 B	General Chemistry	NELAP	7/9/2010
Oil & Grease	EPA 1664A	General Chemistry	NELAP	1/9/2002
Oil & Grease	EPA 1664B	General Chemistry	NELAP	4/23/2014
Orthophosphate as P	EPA 365.3	General Chemistry	NELAP	1/9/2002
o-Xylene	EPA 624	Volatile Organics	NELAP	4/23/2014
o-Xylene	EPA 8260	Volatile Organics	NELAP	5/7/2009
p-Dioxane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Pentanoic acid (Valeric acid)	ENCO VGC-13/HPLC-UV	Extractable Organics	NELAP	5/7/2009
pH	EPA 9040	General Chemistry	NELAP	6/2/2008
pH	SM 4500-H+-B	General Chemistry	NELAP	6/2/2008
p-Isopropyltoluene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Potassium	EPA 200.7	Metals	NELAP	1/9/2002
Potassium	EPA 6010	Metals	NELAP	7/1/2003
Propionic acid (Propanoic acid)	ENCO VGC-13/HPLC-UV	Extractable Organics	NELAP	5/7/2009
Propionitrile (Ethyl cyanide)	EPA 624	Volatile Organics	NELAP	4/23/2014
Propionitrile (Ethyl cyanide)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Propylene glycol	ENCO VGC-18/GC-FID	Extractable Organics	NELAP	5/7/2009
Propylene glycol	EPA 8015	Volatile Organics	NELAP	4/23/2014
Pyruvic acid	ENCO VGC-13/HPLC-UV	Extractable Organics	NELAP	5/7/2009
Residue-filterable (TDS)	SM 2540 C	General Chemistry	NELAP	10/22/2003
Residue-nonfilterable (TSS)	SM 2540 D	General Chemistry	NELAP	10/22/2003
Residue-total	SM 2540 B	General Chemistry	NELAP	10/22/2003
sec-Butylbenzene	EPA 624	Volatile Organics	NELAP	4/23/2014
sec-Butylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Selenium	EPA 200.7	Metals	NELAP	1/9/2002
Selenium	EPA 6010	Metals	NELAP	1/9/2002
Silica as SiO2	EPA 200.7	Metals	NELAP	4/23/2014
Silica as SiO2	EPA 6010	Metals	NELAP	4/23/2014

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Environmental Conservation Laboratories, Inc. (ENCO) - Jacksonville
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Jacksonville, FL 32216

Matrix: **Non-Potable Water**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Silver	EPA 200.7	Metals	NELAP	1/9/2002
Silver	EPA 6010	Metals	NELAP	7/1/2003
Sodium	EPA 200.7	Metals	NELAP	1/9/2002
Sodium	EPA 6010	Metals	NELAP	7/1/2003
Strontium	EPA 200.7	Metals	NELAP	10/3/2006
Strontium	EPA 6010	Metals	NELAP	7/1/2003
Styrene	EPA 624	Volatile Organics	NELAP	4/23/2014
Styrene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Sulfate	ASTM D516-90	General Chemistry	NELAP	6/2/2008
T-amylmethylether (TAME)	EPA 8260	Volatile Organics	NELAP	4/23/2014
tert-Amyl alcohol (2-methyl-2-butanol)	EPA 8260	Volatile Organics	NELAP	4/23/2014
tert-Butyl alcohol	EPA 8260	Volatile Organics	NELAP	4/23/2014
tert-Butylbenzene	EPA 624	Volatile Organics	NELAP	4/23/2014
tert-Butylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Tetrachloroethylene (Perchloroethylene)	EPA 624	Volatile Organics	NELAP	1/9/2002
Tetrachloroethylene (Perchloroethylene)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Thallium	EPA 200.7	Metals	NELAP	1/9/2002
Thallium	EPA 6010	Metals	NELAP	7/1/2003
Tin	EPA 200.7	Metals	NELAP	1/9/2002
Tin	EPA 6010	Metals	NELAP	7/1/2003
Titanium	EPA 200.7	Metals	NELAP	1/9/2002
Titanium	EPA 6010	Metals	NELAP	7/1/2003
Toluene	EPA 624	Volatile Organics	NELAP	1/9/2002
Toluene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Total coliforms	SM 9222 B	Microbiology	NELAP	1/9/2002
Total Petroleum Hydrocarbons (TPH)	EPA 1664A	General Chemistry	NELAP	1/9/2002
Total Petroleum Hydrocarbons (TPH)	EPA 1664B	General Chemistry	NELAP	4/23/2014
Total Petroleum Hydrocarbons (TPH)	FL-PRO	Extractable Organics	NELAP	7/1/2003
Total residual chlorine	SM 4500-Cl G	General Chemistry	NELAP	6/2/2008
trans-1,2-Dichloroethylene	EPA 624	Volatile Organics	NELAP	1/9/2002
trans-1,2-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	7/1/2003
trans-1,3-Dichloropropene	EPA 624	Volatile Organics	NELAP	1/9/2002
trans-1,3-Dichloropropene	EPA 8260	Volatile Organics	NELAP	7/1/2003
trans-1,4-Dichloro-2-butene	EPA 624	Volatile Organics	NELAP	4/23/2014
trans-1,4-Dichloro-2-butene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Trichloroethene (Trichloroethylene)	EPA 624	Volatile Organics	NELAP	1/9/2002

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Environmental Conservation Laboratories, Inc. (ENCO) - Jacksonville
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Jacksonville, FL 32216

Matrix: **Non-Potable Water**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Trichloroethene (Trichloroethylene)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Trichlorofluoromethane	EPA 624	Volatile Organics	NELAP	1/9/2002
Trichlorofluoromethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Triethylene glycol	EPA 8015	Volatile Organics	NELAP	4/23/2014
Turbidity	EPA 180.1	General Chemistry	NELAP	1/9/2002
Turbidity	SM 2130 B	General Chemistry	NELAP	10/22/2003
Vanadium	EPA 200.7	Metals	NELAP	1/9/2002
Vanadium	EPA 6010	Metals	NELAP	7/1/2003
Vinyl acetate	EPA 624	Volatile Organics	NELAP	4/23/2014
Vinyl acetate	EPA 8260	Volatile Organics	NELAP	7/1/2003
Vinyl chloride	EPA 624	Volatile Organics	NELAP	1/9/2002
Vinyl chloride	EPA 8260	Volatile Organics	NELAP	7/1/2003
Xylene (total)	EPA 624	Volatile Organics	NELAP	10/3/2006
Xylene (total)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Zinc	EPA 200.7	Metals	NELAP	1/9/2002
Zinc	EPA 6010	Metals	NELAP	1/9/2002

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E82277
Environmental Conservation Laboratories, Inc. (ENCO) - Jacksonville
4810 Executive Park Court, Suite 111
Jacksonville, FL 32216

Matrix: **Solid and Chemical Materials**

Analyte	Method/Tech	Category	Certification Type	Effective Date
1,1,1,2-Tetrachloroethane	EPA 8260	Volatile Organics	NELAP	1/9/2002
1,1,1-Trichloroethane	EPA 8260	Volatile Organics	NELAP	1/9/2002
1,1,2,2-Tetrachloroethane	EPA 8260	Volatile Organics	NELAP	1/9/2002
1,1,2-Trichloroethane	EPA 8260	Volatile Organics	NELAP	1/9/2002
1,1-Dichloroethane	EPA 8260	Volatile Organics	NELAP	1/9/2002
1,1-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	1/9/2002
1,1-Dichloropropene	EPA 8260	Volatile Organics	NELAP	1/9/2002
1,2,3-Trichlorobenzene	EPA 8260	Volatile Organics	NELAP	1/9/2002
1,2,3-Trichloropropane	EPA 8260	Volatile Organics	NELAP	1/9/2002
1,2,4-Trichlorobenzene	EPA 8260	Volatile Organics	NELAP	1/9/2002
1,2,4-Trimethylbenzene	EPA 8260	Volatile Organics	NELAP	1/9/2002
1,2-Dibromo-3-chloropropane (DBCP)	EPA 8260	Volatile Organics	NELAP	1/9/2002
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 8260	Volatile Organics	NELAP	1/9/2002
1,2-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	1/9/2002
1,2-Dichloroethane	EPA 8260	Volatile Organics	NELAP	1/9/2002
1,2-Dichloropropane	EPA 8260	Volatile Organics	NELAP	1/9/2002
1,3,5-Trimethylbenzene	EPA 8260	Volatile Organics	NELAP	1/9/2002
1,3-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	1/9/2002
1,3-Dichloropropane	EPA 8260	Volatile Organics	NELAP	1/9/2002
1,4-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	1/9/2002
2,2-Dichloropropane	EPA 8260	Volatile Organics	NELAP	1/9/2002
2-Butanone (Methyl ethyl ketone, MEK)	EPA 8260	Volatile Organics	NELAP	1/9/2002
2-Chloroethyl vinyl ether	EPA 8260	Volatile Organics	NELAP	1/9/2002
2-Chlorotoluene	EPA 8260	Volatile Organics	NELAP	1/9/2002
2-Hexanone	EPA 8260	Volatile Organics	NELAP	1/9/2002
4-Chlorotoluene	EPA 8260	Volatile Organics	NELAP	1/9/2002
4-Methyl-2-pentanone (MIBK)	EPA 8260	Volatile Organics	NELAP	1/9/2002
Acetone	EPA 8260	Volatile Organics	NELAP	1/9/2002
Acetonitrile	EPA 8260	Volatile Organics	NELAP	10/3/2006
Acrolein (Propenal)	EPA 8260	Volatile Organics	NELAP	1/9/2002
Acrylonitrile	EPA 8260	Volatile Organics	NELAP	1/9/2002
Allyl chloride (3-Chloropropene)	EPA 8260	Volatile Organics	NELAP	10/3/2006
Aluminum	EPA 6010	Metals	NELAP	1/9/2002
Antimony	EPA 6010	Metals	NELAP	1/9/2002
Arsenic	EPA 6010	Metals	NELAP	1/9/2002
Barium	EPA 6010	Metals	NELAP	1/9/2002

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Matrix: **Solid and Chemical Materials**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Benzene	EPA 8260	Volatile Organics	NELAP	1/9/2002
Beryllium	EPA 6010	Metals	NELAP	1/9/2002
Boron	EPA 6010	Metals	NELAP	1/9/2002
Bromobenzene	EPA 8260	Volatile Organics	NELAP	1/9/2002
Bromochloromethane	EPA 8260	Volatile Organics	NELAP	1/9/2002
Bromodichloromethane	EPA 8260	Volatile Organics	NELAP	1/9/2002
Bromoform	EPA 8260	Volatile Organics	NELAP	1/9/2002
Cadmium	EPA 6010	Metals	NELAP	1/9/2002
Calcium	EPA 6010	Metals	NELAP	1/9/2002
Carbon disulfide	EPA 8260	Volatile Organics	NELAP	1/9/2002
Carbon tetrachloride	EPA 8260	Volatile Organics	NELAP	1/9/2002
Chlorobenzene	EPA 8260	Volatile Organics	NELAP	1/9/2002
Chloroethane	EPA 8260	Volatile Organics	NELAP	1/9/2002
Chloroform	EPA 8260	Volatile Organics	NELAP	1/9/2002
Chloroprene	EPA 8260	Volatile Organics	NELAP	1/9/2002
Chromium	EPA 6010	Metals	NELAP	1/9/2002
cis-1,2-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	1/9/2002
cis-1,3-Dichloropropene	EPA 8260	Volatile Organics	NELAP	1/9/2002
Cobalt	EPA 6010	Metals	NELAP	1/9/2002
Copper	EPA 6010	Metals	NELAP	1/9/2002
Corrosivity (pH)	EPA 9040	General Chemistry	NELAP	10/22/2003
Dibromochloromethane	EPA 8260	Volatile Organics	NELAP	1/9/2002
Dibromomethane	EPA 8260	Volatile Organics	NELAP	1/9/2002
Dichlorodifluoromethane	EPA 8260	Volatile Organics	NELAP	1/9/2002
Diesel range organics (DRO)	EPA 8015	Extractable Organics	NELAP	9/3/2004
Diesel range organics (DRO)	MADEP-EPH (MA-EPH)	Extractable Organics	NELAP	1/9/2002
Diethyl ether	EPA 8260	Volatile Organics	NELAP	1/22/2008
Diethylene glycol	EPA 8015	Volatile Organics	NELAP	4/23/2014
Ethanol	EPA 8260	Volatile Organics	NELAP	1/9/2002
Ethyl methacrylate	EPA 8260	Volatile Organics	NELAP	1/9/2002
Ethylbenzene	EPA 8260	Volatile Organics	NELAP	1/9/2002
Ethylene glycol	EPA 8015	Volatile Organics	NELAP	4/23/2014
Ethyl-t-butylether (ETBE)	EPA 8260	Volatile Organics	NELAP	4/23/2014
Gasoline range organics (GRO)	EPA 8015	Volatile Organics	NELAP	9/3/2004
Gasoline range organics (GRO)	MADEP-VPH (MA-VPH)	Extractable Organics	NELAP	1/9/2002
Hexachlorobutadiene	EPA 8260	Volatile Organics	NELAP	1/9/2002

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Matrix: **Solid and Chemical Materials**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Ignitability	EPA 1010	General Chemistry	NELAP	1/25/2011
Ignitability	EPA 1030	General Chemistry	NELAP	1/25/2011
Iodomethane (Methyl iodide)	EPA 8260	Volatile Organics	NELAP	1/9/2002
Iron	EPA 6010	Metals	NELAP	1/9/2002
Isobutyl alcohol (2-Methyl-1-propanol)	EPA 8260	Volatile Organics	NELAP	1/9/2002
Isopropyl ether	EPA 8260	Volatile Organics	NELAP	1/9/2002
Isopropylbenzene	EPA 8260	Volatile Organics	NELAP	1/9/2002
Lead	EPA 6010	Metals	NELAP	1/9/2002
Lithium	EPA 6010	Metals	NELAP	1/9/2002
m/p-Xylenes	EPA 8260	Volatile Organics	NELAP	8/24/2011
Magnesium	EPA 6010	Metals	NELAP	1/9/2002
Manganese	EPA 6010	Metals	NELAP	1/9/2002
Mercury	EPA 7471	Metals	NELAP	1/9/2002
Methacrylonitrile	EPA 8260	Volatile Organics	NELAP	1/9/2002
Methanol	EPA 8015	Volatile Organics	NELAP	11/23/2011
Methyl bromide (Bromomethane)	EPA 8260	Volatile Organics	NELAP	1/9/2002
Methyl chloride (Chloromethane)	EPA 8260	Volatile Organics	NELAP	1/9/2002
Methyl methacrylate	EPA 8260	Volatile Organics	NELAP	1/9/2002
Methyl tert-butyl ether (MTBE)	EPA 8260	Volatile Organics	NELAP	1/9/2002
Methylene chloride	EPA 8260	Volatile Organics	NELAP	1/9/2002
Molybdenum	EPA 6010	Metals	NELAP	1/9/2002
Naphthalene	EPA 8260	Volatile Organics	NELAP	1/9/2002
n-Butylbenzene	EPA 8260	Volatile Organics	NELAP	1/9/2002
Nickel	EPA 6010	Metals	NELAP	1/9/2002
n-Propylbenzene	EPA 8260	Volatile Organics	NELAP	1/9/2002
Oil & Grease	EPA 9071	General Chemistry	NELAP	2/22/2010
o-Xylene	EPA 8260	Volatile Organics	NELAP	8/24/2011
Paint Filter Liquids Test	EPA 9095	General Chemistry	NELAP	1/9/2002
p-Dioxane	EPA 8260	Volatile Organics	NELAP	1/9/2002
pH	EPA 9040	General Chemistry	NELAP	10/22/2003
pH	EPA 9045	General Chemistry	NELAP	10/22/2003
p-Isopropyltoluene	EPA 8260	Volatile Organics	NELAP	3/22/2001
Potassium	EPA 6010	Metals	NELAP	1/9/2002
Propionitrile (Ethyl cyanide)	EPA 8260	Volatile Organics	NELAP	1/9/2002
Propylene glycol	EPA 8015	Volatile Organics	NELAP	4/23/2014
sec-Butylbenzene	EPA 8260	Volatile Organics	NELAP	1/9/2002

Laboratory Scope of Accreditation

Attachment to Certificate #: E82277-36, expiration date June 30, 2015. This listing of accredited analytes should be used only when associated with a valid certificate.

State Laboratory ID: **E82277** EPA Lab Code: **FL00357** **(904) 296-3007**

E82277
Environmental Conservation Laboratories, Inc. (ENCO) - Jacksonville
4810 Executive Park Court, Suite 111
Jacksonville, FL 32216

Matrix: **Solid and Chemical Materials**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Selenium	EPA 6010	Metals	NELAP	1/9/2002
Silver	EPA 6010	Metals	NELAP	1/9/2002
Sodium	EPA 6010	Metals	NELAP	1/9/2002
Strontium	EPA 6010	Metals	NELAP	1/9/2002
Styrene	EPA 8260	Volatile Organics	NELAP	1/9/2002
Synthetic Precipitation Leaching Procedure	EPA 1312	General Chemistry	NELAP	1/9/2002
T-amylmethylether (TAME)	EPA 8260	Volatile Organics	NELAP	4/23/2014
tert-Amyl alcohol (2-methyl-2-butanol)	EPA 8260	Volatile Organics	NELAP	4/23/2014
tert-Butyl alcohol	EPA 8260	Volatile Organics	NELAP	4/23/2014
tert-Butylbenzene	EPA 8260	Volatile Organics	NELAP	1/9/2002
Tetrachloroethylene (Perchloroethylene)	EPA 8260	Volatile Organics	NELAP	1/9/2002
Thallium	EPA 6010	Metals	NELAP	1/9/2002
Tin	EPA 6010	Metals	NELAP	1/9/2002
Titanium	EPA 6010	Metals	NELAP	1/9/2002
Toluene	EPA 8260	Volatile Organics	NELAP	1/9/2002
Total Petroleum Hydrocarbons (TPH)	FL-PRO	Extractable Organics	NELAP	1/9/2002
Toxicity Characteristic Leaching Procedure	EPA 1311	General Chemistry	NELAP	1/9/2002
trans-1,2-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	1/9/2002
trans-1,3-Dichloropropene	EPA 8260	Volatile Organics	NELAP	1/9/2002
trans-1,4-Dichloro-2-butene	EPA 8260	Volatile Organics	NELAP	1/9/2002
Trichloroethene (Trichloroethylene)	EPA 8260	Volatile Organics	NELAP	1/9/2002
Trichlorofluoromethane	EPA 8260	Volatile Organics	NELAP	1/9/2002
Triethylene glycol	EPA 8015	Volatile Organics	NELAP	4/23/2014
Vanadium	EPA 6010	Metals	NELAP	1/9/2002
Vinyl acetate	EPA 8260	Volatile Organics	NELAP	1/9/2002
Vinyl chloride	EPA 8260	Volatile Organics	NELAP	1/9/2002
Xylene (total)	EPA 8260	Volatile Organics	NELAP	1/9/2002
Zinc	EPA 6010	Metals	NELAP	1/9/2002

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E82277
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Matrix: **Air and Emissions**

Analyte	Method/Tech	Category	Certification Type	Effective Date
1,1,1-Trichloroethane	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
1,1,1-Trichloroethane	EPA TO-15	Volatile Organics	NELAP	10/3/2006
1,1,2,2-Tetrachloroethane	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
1,1,2,2-Tetrachloroethane	EPA TO-15	Volatile Organics	NELAP	10/3/2006
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
1,1,2-Trichloroethane	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
1,1,2-Trichloroethane	EPA TO-15	Volatile Organics	NELAP	10/3/2006
1,1-Dichloroethane	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
1,1-Dichloroethane	EPA TO-15	Volatile Organics	NELAP	10/3/2006
1,1-Dichloroethylene	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
1,1-Dichloroethylene	EPA TO-15	Volatile Organics	NELAP	10/3/2006
1,2,4-Trichlorobenzene	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
1,2,4-Trichlorobenzene	EPA TO-15	Volatile Organics	NELAP	10/3/2006
1,2,4-Trimethylbenzene	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA TO-15	Volatile Organics	NELAP	10/3/2006
1,2-Dichloro-1,1,2,2-tetrafluoroethane	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
1,2-Dichlorobenzene	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
1,2-Dichlorobenzene	EPA TO-15	Volatile Organics	NELAP	10/3/2006
1,2-Dichloroethane	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
1,2-Dichloroethane	EPA TO-15	Volatile Organics	NELAP	10/3/2006
1,2-Dichloropropane	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
1,2-Dichloropropane	EPA TO-15	Volatile Organics	NELAP	5/7/2009
1,3,5-Trimethylbenzene	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
1,3-Butadiene	EPA TO-15	Volatile Organics	NELAP	10/3/2006
1,3-Dichlorobenzene	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
1,3-Dichlorobenzene	EPA TO-15	Volatile Organics	NELAP	10/3/2006
1,4-Dichlorobenzene	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
1,4-Dichlorobenzene	EPA TO-15	Volatile Organics	NELAP	10/3/2006
1,4-Dioxane (1,4-Diethyleneoxide)	EPA TO-15	Volatile Organics	NELAP	5/7/2009
2,2,4-Trimethylpentane	EPA TO-15	Volatile Organics	NELAP	10/3/2006
2-Butanone (Methyl ethyl ketone, MEK)	EPA TO-15	Volatile Organics	NELAP	10/3/2006
2-Hexanone	ENCO VGCMS-07/GC-MS	Volatile Organics	NELAP	5/7/2009
2-Propanol	ENCO VGCMS-07/GC-MS	Volatile Organics	NELAP	5/7/2009
4-Ethyltoluene	ENCO VGCMS-07/GC-MS	Volatile Organics	NELAP	5/7/2009
Allyl chloride (3-Chloropropene)	EPA TO-15	Volatile Organics	NELAP	10/3/2006

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E82277
Environmental Conservation Laboratories, Inc. (ENCO) - Jacksonville
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Jacksonville, FL 32216

Matrix: **Air and Emissions**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Benzene	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
Benzene	EPA TO-15	Volatile Organics	NELAP	10/3/2006
Benzyl chloride	EPA TO-15	Volatile Organics	NELAP	5/7/2009
Bromodichloromethane	ENCO VGCMS-07/GC-MS	Volatile Organics	NELAP	5/7/2009
Bromoform	EPA TO-15	Volatile Organics	NELAP	10/3/2006
Carbon disulfide	EPA TO-15	Volatile Organics	NELAP	10/3/2006
Carbon tetrachloride	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
Carbon tetrachloride	EPA TO-15	Volatile Organics	NELAP	10/3/2006
Chlorobenzene	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
Chlorobenzene	EPA TO-15	Volatile Organics	NELAP	10/3/2006
Chloroethane	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
Chloroethane	EPA TO-15	Volatile Organics	NELAP	10/3/2006
Chloroform	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
Chloroform	EPA TO-15	Volatile Organics	NELAP	10/3/2006
cis-1,2-Dichloroethylene	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
cis-1,2-Dichloroethylene	EPA TO-15	Volatile Organics	NELAP	10/3/2006
cis-1,3-Dichloropropene	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
cis-1,3-Dichloropropene	EPA TO-15	Volatile Organics	NELAP	5/7/2009
Cyclohexane	ENCO VGCMS-07/GC-MS	Volatile Organics	NELAP	5/7/2009
Dibromochloromethane	ENCO VGCMS-07/GC-MS	Volatile Organics	NELAP	5/7/2009
Dichlorodifluoromethane	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
Ethyl acetate	ENCO VGCMS-07/GC-MS	Volatile Organics	NELAP	5/7/2009
Ethylbenzene	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
Ethylbenzene	EPA TO-15	Volatile Organics	NELAP	10/3/2006
Hexachlorobutadiene	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
Hexachlorobutadiene	EPA TO-15	Volatile Organics	NELAP	10/3/2006
Isopropylbenzene	EPA TO-15	Volatile Organics	NELAP	4/23/2014
Methyl bromide (Bromomethane)	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
Methyl bromide (Bromomethane)	EPA TO-15	Volatile Organics	NELAP	10/3/2006
Methyl chloride (Chloromethane)	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
Methyl chloride (Chloromethane)	EPA TO-15	Volatile Organics	NELAP	10/3/2006
Methyl isobutyl ketone (Hexone)	EPA TO-15	Volatile Organics	NELAP	10/3/2006
Methyl tert-butyl ether (MTBE)	EPA TO-15	Volatile Organics	NELAP	10/3/2006
Methylene chloride	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
Methylene chloride	EPA TO-15	Volatile Organics	NELAP	10/3/2006
n-Hexane	EPA TO-15	Volatile Organics	NELAP	10/3/2006

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Matrix: **Air and Emissions**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Styrene	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
Styrene	EPA TO-15	Volatile Organics	NELAP	10/3/2006
Tetrachloroethylene (Perchloroethylene)	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
Tetrachloroethylene (Perchloroethylene)	EPA TO-15	Volatile Organics	NELAP	10/3/2006
Toluene	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
Toluene	EPA TO-15	Volatile Organics	NELAP	10/3/2006
trans-1,2-Dichloroethylene	EPA TO-15	Volatile Organics	NELAP	10/3/2006
trans-1,3-Dichloropropene	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
trans-1,3-Dichloropropene	EPA TO-15	Volatile Organics	NELAP	10/3/2006
Trichloroethene (Trichloroethylene)	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
Trichloroethene (Trichloroethylene)	EPA TO-15	Volatile Organics	NELAP	10/3/2006
Trichlorofluoromethane	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
Vinyl acetate	EPA TO-15	Volatile Organics	NELAP	10/3/2006
Vinyl chloride	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
Vinyl chloride	EPA TO-15	Volatile Organics	NELAP	10/3/2006
Xylene (total)	EPA TO-14A	Volatile Organics	NELAP	1/9/2002
Xylene (total)	EPA TO-15	Volatile Organics	NELAP	10/3/2006

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

ENVIRONMENTAL CONSERVATION LABORATORIES – ORLANDO
10775 Central Port Drive
Orlando, FL 32824
Neil Christiana Phone: 407 826 5314
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ENVIRONMENTAL

Valid To: March 31, 2016 Certificate Number: 3000.01

In recognition of the successful completion of the A2LA evaluation process, (including an assessment of the laboratory's compliance with ISO IEC 17025:2005, the 2009 TNI Standard, and the requirements of the DoD Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in version 5.0 of the DoD Quality Systems Manual for Environmental Laboratories) accreditation is granted to this laboratory to perform recognized EPA methods using the following testing technologies and in the analyte categories identified below:

Testing Technologies

Analyte / Parameter	Non-Potable Water	Solid Hazardous Waste
Metals		
Aluminum	EPA 6020A/200.8	EPA 6020A
Antimony	EPA 6020A/200.8	EPA 6020A
Arsenic	EPA 6020A/200.8	EPA 6020A
Barium	EPA 6020A/200.8	EPA 6020A
Beryllium	EPA 6020A/200.8	EPA 6020A
Cadmium	EPA 6020A/200.8	EPA 6020A
Calcium	EPA 6020A/200.8	EPA 6020A
Chromium	EPA 6020A/200.8	EPA 6020A
Cobalt	EPA 6020A/200.8	EPA 6020A
Copper	EPA 6020A/200.8	EPA 6020A
Hardness	SM 2340 B-1997	----------
Iron	EPA 6020A/200.8	EPA 6020A
Lead	EPA 6020A/200.8	EPA 6020A
Magnesium	EPA 6020A/200.8	EPA 6020A
Manganese	EPA 6020A/200.8	EPA 6020A
Mercury	EPA 245.1/7470A	EPA 7471B
Molybdenum	EPA 6020A/200.8	EPA 6020A
Nickel	EPA 6020A/200.8	EPA 6020A
Potassium	EPA 6020A/200.8	EPA 6020A
Selenium	EPA 6020A/200.8	EPA 6020A
Silver	EPA 6020A/200.8	EPA 6020A
Sodium	EPA 6020A/200.8	EPA 6020A
Thallium	EPA 6020A/200.8	EPA 6020A
Tin	EPA 6020A/200.8	EPA 6020A
Titanium	EPA 6020A/200.8	EPA 6020A

Analyte / Parameter	Non-Potable Water	Solid Hazardous Waste
Vanadium	EPA 6020A/200.8	EPA 6020A
Zinc	EPA 6020A/200.8	EPA 6020A
Microbiology		
Total Coliforms	SM 9222B -1997	----------
Fecal Coliforms	SM 9222D-1997	----------
General Chemistry		
Acidity, as $CaCO_3$	EPA 305.1/SM 2310 B (4A) -1997	----------
Alkalinity as $CaCO_3$	EPA 310.1/SM 2320 B -1997	EPA 310.1/SM 2320 B-1997
Alkalinity as $CaCO_3$	EPA 310.2	EPA 310.2
Biochemical Oxygen Demand	EPA 405.1/SM 5210 B-2001	----------
Bromide	EPA 300.0/9056A	EPA 9056A
Carbonaceous BOD (CBOD)	SM 5210 B-2001	----------
Chemical oxygen demand	EPA 410.4/SM5220 D-1997	----------
Chloride	EPA 300.0/9056A	EPA 9056A
Chromium VI	EPA 7196/ SM 3500-Cr B-2001	EPA 7196
Conductivity	EPA 120.1	----------
Cyanide	SM 4500-CN E-1999	EPA 9014
Cyanide, Reactive	----------	SW-846 7.3.3
Ferric Iron (Calculated)	SM 3500-Fe B-1997	----------
Ferrous Iron	SM 3500-Fe B-1997	----------
Fluoride	EPA 300.0/9056A	EPA 9056A
Hardness	EPA 130.2/SM 2340 C-1997	----------
Kjeldahl Nitrogen -Total	EPA 351.2	EPA 351.2
Nitrate as N	EPA 300.0/353.1/9056A	EPA 353.1/9056A
Nitrate-Nitrite	EPA 300.0/353.1/9056A	EPA 353.1/9056A
Nitrite as N	EPA 300.0/354.1/9056A/ SM 4500-NO_2 B-2000	EPA 9056A/ SM 4500-NO_2 B-2000
Orthophosphate as P	EPA 365.1	----------
Orthophosphate as P	EPA 365.3	----------
pH	EPA 150.1/9040C/SM 4500-H^+-B-2000	EPA 9045D
Phosphorus, total	EPA 365.4	EPA 365.4
Residue-Filterable (TDS)	SM 2540 C-1997	----------
Residue-Nonfilterable (TSS)	SM 2540 D-1997	----------
Residue-total	SM 2540 B-1997/SM 2540 G-1997/ EPA 160.3	SM 2540G-1997/EPA 160.3
Residue-volatile	EPA 160.4	EPA 160.4
Sulfate	EPA 300.0/9056A	EPA 9056A
Sulfide	EPA 376.1/SM 4500-S F-2000	EPA 9030B/9034
Sulfide, Reactive	----------	SW-846 7.3.4
Surfactants -MBAS	SM 5540 C-2000	----------
Total Nitrate-Nitrite	EPA 9056 A/SM 4500-NO_3 H-2000	EPA 9056 A/SM 4500-$N0_3$ H-2000
Total Cyanide	EPA 9014	EPA 9014
Total Nitrogen	TKN + Total nitrate-nitrite	TKN + Total nitrate-nitrite
Total Organic Carbon	EPA 9060A/SM 5310B-2000	TOC Walkley Black
Total Phenolics	EPA 420.1/EPA 9065	EPA 9065
Total, Fixed, and Volatile residue	SM 2540 G-1997	SM 2540 G-1997
Turbidity	EPA 180.1	----------
Extractable Organics		

Analyte / Parameter	Non-Potable Water	Solid Hazardous Waste
1,2,4-Trichlorobenzene	EPA 8270D/625	EPA 8270D
1,2,4,5-Tetrachlorobenzene	EPA 8270D/625	EPA 8270D
1,2-Dichlorobenzene	EPA 8270D/625	EPA 8270D
1,2-Diphenylhydrazine as Azobenzene	EPA 8270D/625	EPA 8270D
1,3-Dichlorobenzene	EPA 8270D/625	EPA 8270D
1,4-Dichlorobenzene	EPA 8270D/625	EPA 8270D
1- Methylnaphthalene	EPA 8270D/625/Scan-Sim	EPA 8270D/Scan-Sim
2,3,4,6-Tetrachlorophenol	EPA 8270D/625	EPA 8270D
2,4,5-Trichlorophenol	EPA 8270D/625	EPA 8270D
2,4,6-Trichlorophenol	EPA 8270D/625	EPA 8270D
2,4-Dichlorophenol	EPA 8270D/625	EPA 8270D
2,4-Dimethylphenol	EPA 8270D/625	EPA 8270D
2,4-Dinitrophenol	EPA 8270D/625	EPA 8270D
2,4-Dinitrotoluene (2,4-DNT)	EPA 8270D/625/Scan-Sim	EPA 8270D
2,6-Dichlorophenol	EPA 8270D/625	EPA 8270D
2,6-Dinitrotoluene (2,6-DNT)	EPA 8270D/625	EPA 8270D
2-Chloronaphthalene	EPA 8270D/625	EPA 8270D
2-Chlorophenol	EPA 8270D/625	EPA 8270D
2·Methyl-4,6-dinitrophenol	EPA 8270D/625	EPA 8270D
2-Methylnaphthalene	EPA 8270D/625/Scan-Sim	EPA 8270D/Scan-Sim
2-Methylphenol (o-Cresol)	EPA 8270D/625	EPA 8270D
2-Nitroaniline	EPA 8270D/625	EPA 8270D
2-Nitrophenol	EPA 8270D/625	EPA 8270D
3,3'-Dichlorobenzidine	EPA 8270D/625	EPA 8270D
3/4-Methylphenols (m/p-Cresols)	EPA 8270D/625	EPA 8270D
3-Nitroaniline	EPA 8270D/625	EPA 8270D
4-Bromophenyl Phenyl Ether	EPA 8270D/625	EPA 8270D
4-Chloro-3-methylphenol	EPA 8270D/625	EPA 8270D
4-Chloroaniline	EPA 8270D/625	EPA 8270D
4-Chlorophenyl Phenyl Ether	EPA 8270D/625	EPA 8270D
4-Nitrophenol	EPA 8270D/625	EPA 8270D
Acenaphthene	EPA 8270D/625/Scan-Sim	EPA 8270D/Scan-Sim
Acenaphthylene	EPA 8270D/625/Scan-Sim	EPA 8270D/Scan-Sim
4-Melhylphenol (p-Cresol)	EPA 8270D/625	EPA 8270D
4-Nitroaniline	EPA 8270D/625	EPA 8270D
Acetophenone	EPA 8270D/625	EPA 8270D
Anthracene	EPA 8270D/625/Scan-Sim	EPA 8270D/Scan-Sim
Atrazine	EPA 8270D/625	EPA 8270D
Benzaldehyde	EPA 8270D/625	EPA 8270D
Benzidine	EPA 8270D/625	EPA 8270D
Benzo(a)anthracene	EPA 8270D/625/Scan-Sim	EPA 8270D/Scan-Sim
Benzo(a)pyrene	EPA 8270D/625/Scan-Sim	EPA 8270D/Scan-Sim
Benzo(b)fluoranthene	EPA 8270D/625/Scan-Sim	EPA 8270D/Scan-Sim
Benzo(g,h,i)perylene	EPA 8270D/625/Scan-Sim	EPA 8270D/Scan-Sim
Benzo(k)fluoranthene	EPA 8270D/625/Scan-Sim	EPA 8270D/Scan-Sim
Benzyl alcohol	EPA 8270D/625	EPA 8270D
1,1-Biphenyl	EPA 8270D/625	EPA 8270D
bis(2-Chloroethoxy) Methane	EPA 8270D/625	EPA 8270D
bis(2-Chloroethyl) Ether	EPA 8270D/625	EPA 8270D
bis(2-Chloroisopropyl)Ether (2,2'-Oxybis(1-Chloropropane))	EPA 8270D/625	EPA 8270D

Analyte / Parameter	Non-Potable Water	Solid Hazardous Waste
bis(2-Ethylhexyl) phthalate (DEHP)	EPA 8270D/625	EPA 8270D
Butyl benzyl phthalate	EPA 8270D/625	EPA 8270D
Caprolactam	EPA 8270D/625	EPA 8270D
Carbazole	EPA 8270D/625	EPA 8270D
Chrysene	EPA 8270D/625/Scan-Sim	EPA 8270D/Scan-Sim
Dibenz(a,h)anthracene	EPA 8270D/625/Scan-Sim	EPA 8270D/Scan-Sim
Dibenzofuran	EPA 8270D/625	EPA 8270D
Dibenzo(a,h)pyrene	EPA 8270D/625/Scan-Sim	EPA 8270D/Scan-Sim
Diethyl Phthalate	EPA 8270D/625	EPA 8270D
Dimethyl Phthalate	EPA 8270D/625/Scan-Sim	EPA 8270D
Di-n-butyl Phthalate	EPA 8270D/625	EPA 8270D
Di-n-octyl Phthalate	EPA 8270D/625	EPA 8270D
Fluoranthene	EPA 8270D/625/Scan-Sim	EPA 8270D/Scan-Sim
Fluorene	EPA 8270D/625/Scan-Sim	EPA 8270D/Scan-Sim
Hexachlorobenzene	EPA 8270D/625/Scan-Sim	EPA 8270D
Hexachlorobutadiene	EPA 8270D/625/Scan-Sim	EPA 8270D
Hexachlorocyclopentadiene	EPA 8270D/625	EPA 8270D
Hexachloroethane	EPA 8270D/625	EPA 8270D
Indeno(1,2,3-cd)pyrene	EPA 8270D/625/Scan-Sim	EPA 8270D/Scan-Sim
Isodrin	EPA 8270D/625	EPA 8270D
Isophorone	EPA 8270D/625	EPA 8270D
Naphthalene	EPA 8270D/625/Scan-Sim	EPA 8270D/Scan-Sim
Nitrobenzene	EPA 8270D/625	EPA 8270D
n-Nitrosodimethylamine	EPA 8270D/625	EPA 8270D
n-Nitrosodi-n-propylamine	EPA 8270D/625	EPA 8270D
n-Nitrosodiphenylamine	EPA 8270D/625	EPA 8270D
n-Nitrosopyrrolidine	EPA 8270D/625	EPA 8270D
Pentachlorophenol	EPA 8270D/625/Scan-Sim	EPA 8270D
Phenanthrene	EPA 8270D/625/Scan-Sim	EPA 8270D/Scan-Sim
Phenol	EPA 8270D/625	EPA 8270D
Pyrene	EPA 8270D/625/Scan-Sim	EPA 8270D/Scan-Sim
Pyridine	EPA 8270D/625	EPA 8270D
Total Petroleum Hydrocarbons (TPH)	FL·PRO	FL·PRO
Volatile Organics		
1,1,1,2-Tetrachloroethane	EPA 8260B/624	EPA 8260B
1,1,1-Trichloroethane	EPA 8260B/624	EPA 8260B
1,1,2,2-Tetrachloroethane	EPA 8260B/624	EPA 8260B
1,1,2-Trichloro-1,2,2-trifluoroethane	EPA 8260B/624	EPA 8260B
1,1,2-Trichloroethane	EPA 8260B/624	EPA 8260B
1,1-Dichloroethane	EPA 8260B/624	EPA 8260B
1,1-Dichloroethene	EPA 8260B/624	EPA 8260B
1,1-Dichloropropene	EPA 8260B/624	EPA 8260B
1,2,3-Trichlorobenzene	EPA8260B/624	EPA 8260B
1,2,3-Trichloropropane	EPA 8260B/624	EPA 8260B
1,2,4-Trichlorobenzene	EPA 8260B/624	EPA 8260B
1,2,4-Trimethylbenzene	EPA 8260B/624	EPA 8260B
1,2-Dibromo-3-chloropropane (DBCP)	EPA 504.1/8011/8260B	EPA 8260B
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 504.1/8011/8260B	EPA 8260B
1,2-Dichlorobenzene	EPA 8260B/624	EPA 8260B

Analyte / Parameter	Non-Potable Water	Solid Hazardous Waste
1,2-Dichloroethane	EPA 8260B/624	EPA 8260B
1,2-Dichloropropane	EPA 8260B/624	EPA 8260B
1,3,5-Trimethylbenzene	EPA 8260B/624	EPA 8260B
1,3-Dichlorobenzene	EPA 8260B/624	EPA 8260B
1,3-Dichloropropane	EPA 8260B/624	EPA 8260B
1,4-Dichlorobenzene	EPA 8260B/624	EPA 8260B
1,4-Dioxane (1,4-Diethylencoxide)	EPA 8260B/8260C/SIM/624	EPA 8260B/8260C SIM
2,2-Dichloropropane	EPA 8260B/624	EPA 8260B
2-Butanone (Methyl Ethyl Ketone, MEK)	EPA 8260B/624	EPA 8260B
2-Chloroethyl Vinyl Ether	EPA 8260B/624	EPA 8260B
2-Chlorotoluene	EPA 8260B/624	EPA 8260B
2-Hexanone	EPA 8260B/624	EPA 8260B
4-Chlorotoluene	EPA 8260B/624	EPA 8260B
4-Methyl-2-pentanone (MIBK)	EPA 8260B/624	EPA 8260B
Acetone	EPA 8260B/624	EPA 8260B
Acetonitrile	EPA 8260B/624	EPA 8260B
Acrolein (Propenal)	EPA 8260B/624	EPA 8260B
Acrylonitrile	EPA 8260B/624	EPA 8260B
Allyl chloride (3-Chloropropene)	EPA 8260B/624	EPA 8260B
Benzene	EPA 8260B/624	EPA 8260B
Bromobenzene	EPA 8260B/624	EPA 8260B
Bromochloromethane	EPA 8260B/624	EPA 8260B
Bromodichloromethane	EPA 8260B/624	EPA 8260B
Bromoform	EPA 8260B/624	EPA 8260B
Carbon tetrachloride	EPA 8260B/624	EPA 8260B
Carbon disulfide	EPA 8260B/624	EPA 8260B
Chlorobenzene	EPA 8260B/624	EPA 8260B
Chloroethane	EPA 8260B/624	EPA 8260B
Chloroform	EPA 8260B/624	EPA 8260B
Chloroprene	EPA 8260B/624	EPA 8260B
cis-1,2-Dichloroethene	EPA 8260B/624	EPA 8260B
cis-1,3-Dichloropropene	EPA 8260B/624	EPA 8260B
Cyclohexane	EPA 8260B/624	EPA 8260B
Dibromochloromethane	EPA 8260B/624	EPA 8260B
Dibromomethane	EPA 8260B/624	EPA 8260B
Dichlorodifluoromethane	EPA 8260B/624	EPA 8260B
Ethyl Methacrylate	EPA 8260B/624	EPA 8260B
Hexachlorobutadiene	EPA 8260B/624	EPA 8260B
Ethylbenzene	EPA 8260B/624	EPA 8260B
Iodomethane (Methyl Iodide)	EPA 8260B/624	EPA 8260B
Isobutyl Alcohol (2-Methyl-l-propanol)	EPA 8260B/624	EPA 8260B
Isopropylbenzene	EPA 8260B/624	EPA 8260B
m+p-Xylenes	EPA 8260B/624	EPA 8260B
Methacrylonitrile	EPA 8260B/624	EPA 8260B
Methyl Acetate	EPA 8260B/624	EPA 8260B
Methyl Bromide (Bromomethane)	EPA 8260B/624	EPA 8260B
Methyl Chloride (Chloromethane)	EPA 8260B/624	EPA 8260B
Methyl Methacrylate	EPA 8260B/624	EPA 8260B
Methyl Tert-Butyl Ether (MTBE)	EPA 8260B/624	EPA 8260B
Methylcyclohexane	EPA 8260B/624	EPA 8260B

Analyte / Parameter	Non-Potable Water	Solid Hazardous Waste
Methylene Chloride	EPA 8260B/624	EPA 8260B
Naphthalene	EPA 8260B/624	EPA 8260B
n-Butylbenzene	EPA 8260B/624	EPA 8260B
n-Propylbenzene	EPA 8260B/624	EPA 8260B
o-Xylene	EPA 8260B/624	EPA 8260B
p-Isopropyltoluene	EPA 8260B/624	EPA 8260B
Propionitrile (Ethyl cyanide)	EPA 8260B/624	EPA 8260B
sec-Butylbenzene	EPA 8260B/624	EPA 8260B
Styrene	EPA 8260B/624	EPA 8260B
tert-Butylbenzene	EPA 8260B/624	EPA 8260B
Tetrachloroethene (Perchloroethylene)	EPA 8260B/624	EPA 8260B
Toluene	EPA 8260B/624	EPA 8260B
trans-1,2-Dichloroethene	EPA 8260B/624	EPA 8260B
trans-1,3-Dichloropropene	EPA 8260B/624	EPA 8260B
trans-1,4-Dichloro-2-butene	EPA 8260B/624	EPA 8260B
Trichloroethene (Trichloroethylene)	EPA 8260B/624	EPA 8260B
Trichlorofluoromethane	EPA 8260B/624	EPA 8260B
Vinyl Acetate	EPA 8260B/624	EPA 8260B
Vinyl Chloride	EPA 8260B/624	EPA 8260B
Xylene (total)	EPA 8260B/624	EPA 8260B
Pesticides-Herbicides-PCBs		
2,4,5-T	EPA 8151A/615	EPA 8151A
2,4-D	EPA 8151A/615	EPA 8151A
2,4-DB	EPA 8151A/615	EPA 8151A
3,5-Dichlorobenzoic acid	EPA 8151A/615	EPA 8151A
4.4'-DDD	EPA 8081B/608	EPA 8081B
4.4'-DDE	EPA 8081B/608	EPA 8081B
4,4'·DDT	EPA 8081B/608	EPA 8081B
4-Nitrophenol	EPA 8151A/615	EPA 8151A
Acifluorfen	EPA 8151A/615	EPA 8151A
Aldrin	EPA 8081B/608	EPA 8081B
alpha-BHC (alpha-Hexachlorocyclohexane)	EPA 8081B/608	EPA 8081B
alpha-Chlordane	EPA 8081B/608	EPA 8081B
Aroclor-1016(PCB-1016)	EPA 8082A/608	EPA 8082A
Aroclor-1221 (PCB-1221)	EPA 8082A/608	EPA 8082A
Aroclor-1232 (PCB-1232)	EPA 8082A/608	EPA 8082A
Aroclor-1242 (PCB-1242)	EPA 8082A/608	EPA 8082A
Aroclor-1248 (PCB-1248)	EPA 8082A/608	EPA 8082A
Aroclor-1254 (PCB-1254)	EPA 8082A/608	EPA 8082A
Aroclor-1260 (PCB-1260)	EPA 8082A/608	EPA 8082A
Aroclor-1262 (PCB-1262)	EPA 8082A/608	EPA 8082A
Aroclor-1268 (PCB-1268)	EPA 8082A/608	EPA 8082A
Azinphos-methyl (Guthion)	EPA 8141B	EPA 8141B
Bentazon	EPA 8151A/615	EPA 8151A
beta-BHC (beta-Hexachlorocyclohexane)	EPA 8081B/608	EPA 8081B
Bolstar (Sulprofos)	EPA 8141B	EPA 8141B
Chloramben	EPA 8151A/615	EPA 8151A
Chlordane (tech.)	EPA 8081B/608	EPA 8081B

Analyte / Parameter	Non-Potable Water	Solid Hazardous Waste
Chlorpyrifos	EPA 8141B	EPA 8141B
Coumaphos	EPA 8141B	EPA 8141B
Dacthal (DCPA)	EPA 8151A/615	EPA 8151A
Dalapon	EPA 8151A/615	EPA 8151A
delta-BHC	EPA 8081B/608	EPA 8081B
Demeton, Total	EPA 8141B	EPA 8141B
Diazinon	EPA 8141B	EPA 8141B
Dicamba	EPA 8151A/615	EPA 8151A
Dichlorofenthion	EPA 8141B	EPA 8141B
Dichloroprop (Dichlorprop)	EPA 8151A/615	EPA 8151A
Dichlorovos (DDVP, Dichlorvos)	EPA 8141B	EPA 8141B
Dieldrin	EPA 8081B/608	EPA 8081B
Dimethoate	EPA 8141B	EPA 8141B
Dinoseb (2-sec-buty1-4 ,6-dinilrophenol, DNB P)	EPA 8151A/615	EPA 8151A
Disulfoton	EPA 8141B	EPA 8141B
Endosulfan I	EPA 8081B/608	EPA 8081B
Endosulfan II	EPA 8081B/608	EPA 8081B
Endosulfan Sulfate	EPA 8081B/608	EPA 8081B
Endrin	EPA 8081B/608	EPA 8081B
Endrin Aldehyde	EPA 8081B/608	EPA 8081B
Endrin Ketone	EPA 8081B/608	EPA 8081B
EPN	EPA 8141B	EPA 8141B
Ethion	EPA 8141B	EPA 8141B
Ethoprop	EPA 8141B	EPA 8141B
Fensulfothion	EPA 8141B	EPA 8141B
Fenthion	EPA 8141B	EPA 8141B
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	EPA 8081B/608	EPA 8081B
gamma-Chlordane	EPA 8081B/608	EPA 8081B
Heptachlor	EPA 8081B/608	EPA 8081B
Heptachlor Epoxide	EPA 8081B/608	EPA 8081B
Isodrin	EPA 8081B/608	EPA 8081B
Malathion	EPA 8141B	EPA 8141B
MCPA	EPA 8151A/615	EPA 8151A
MCPP	EPA 8151A/615	EPA 8151A
Merphos	EPA 8141B	EPA 8141B
Methoxychlor	EPA 8081B/608	EPA 8081B
Methyl Parathion (Parathion Methyl)	EPA 8141B	EPA 8141B
Mevinphos	EPA 8141B	EPA 8141B
Mirex	EPA 8081B/608	EPA 8081B
Monocrotophos	EPA 8141B	EPA 8141B
Naled	EPA 8141B	EPA 8141B
Parathion, Ethyl	EPA 8141B	EPA 8141B
Pentachlorophenol	EPA 8151A/615	EPA 8151A
Phorate	EPA 8141B	EPA 8141B
Picloram	EPA 8151A/615	EPA 8151A
Ronnel	EPA 8141B	EPA 8141B
Silvex (2,4,5-TP)	EPA 8151A/615	EPA 8151A
Stirofos	EPA 8141B	EPA 8141B
Sulfotepp	EPA 8141B	EPA 8141B

Analyte / Parameter	Non-Potable Water	Solid Hazardous Waste
Tetraethyl Pyrophosphate (TEPP)	EPA 8141B	EPA 8141B
Tokuthion (Prothiophos)	EPA 8141B	EPA 8141B
Toxaphene (Chlorinated camphene)	EPA 8081B/608	EPA 8081B

Preparation Methods

Fraction	Analytical Method	Preparation Method
Cyanide	EPA 9014/SM 4500-CN E-1999	EPA 9010C
TX	EPA 9056A	EPA 5050
Metal Water Prep	EPA 6020A/200.8	EPA 3005A
Metals Soil Prep	EPA 6020A	EPA 3050B
Metals TCLP prep	EPA 6020A/200.8	EPA 3010A
Extractable Organics and Pesticides Water Prep	EPA 8270D/625/8081B/8082A/608/ 8141B	EPA 3510C
Extractable Organics and Pesticides Waste Prep	EPA 8270D/625/8081B/8082A/608/ 8141B	EPA 3580A
Extractable Organics and Pesticides Soil Prep	EPA 8270D/625/8081B/8082A/608/ 8141B	EPA 3550C
Extractable Organics and Pesticides Soil Prep	EPA 8151A	EPA 8151A
Organics Water and Mid-level Soil Prep	EPA 8260B/624	EPA 5030B
Organics Low-level Soil Prep	EPA 8260B/624	EPA 5035
Soil/Water Leachate	Wets	ENCO WETS-88
SPLP	Wets, Organics, and Metals (6020A/8081B/8082A/8141B/8151A/ 8260B/8270D/7470A/7471B/9014)	EPA 1312
TCLP	Wets, Organics, and Metals (6020A/8081B/8082A/8141B/8151A/ 8260B/8270D/7470A/7471B/9014)	EPA 1311
Extractable Organics	EPA 8270D PAH SIM	EPA 3511

American Association for Laboratory Accreditation

Accredited DoD ELAP Laboratory

A2LA has accredited

ENVIRONMENTAL CONSERVATION LABORATORIES - ORLANDO

Orlando, FL

for technical competence in the field of

Environmental Testing

In recognition of the successful completion of the A2LA evaluation process that includes an assessment of the laboratory's compliance with ISO/IEC 17025:2005, the 2009 TNI Chapter 5 Standard, and the requirements of the Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in version 5.0 of the DoD Quality System Manual for Environmental Laboratories (QSM); accreditation is granted to this laboratory to perform recognized EPA methods as defined on the associated A2LA Environmental Scope of Accreditation. This accreditation demonstrates technical competence for this defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009).

AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION
CORPORATE SEAL 1978
DISTRICT OF COLUMBIA
A2LA

Presented this 9th day of April 2014.

President & CEO
For the Accreditation Council
Certificate Number 3000.01
Valid to March 31, 2016

For the tests to which this accreditation applies, please refer to the laboratory's Environmental Scope of Accreditation.

State of Florida
Department of Health, Bureau of Public Health Laboratories
This is to certify that

E83182

ENVIRONMENTAL CONSERVATION LABORATORIES, INC. (ENCO) - ORLANDO
10775 CENTRAL PORT DRIVE
ORLANDO, FL 32824-7009

has complied with Florida Administrative Code 64E-1,
for the examination of environmental samples in the following categories

DRINKING WATER - MICROBIOLOGY, DRINKING WATER - PRIMARY INORGANIC CONTAMINANTS, DRINKING WATER - SECONDARY INORGANIC CONTAMINANTS, NON-POTABLE WATER - EXTRACTABLE ORGANICS, NON-POTABLE WATER - GENERAL CHEMISTRY, NON-POTABLE WATER - METALS, NON-POTABLE WATER - MICROBIOLOGY, NON-POTABLE WATER - PESTICIDES-HERBICIDES-PCB'S, NON-POTABLE WATER - VOLATILE ORGANICS, SOLID AND CHEMICAL MATERIALS - EXTRACTABLE ORGANICS, SOLID AND CHEMICAL MATERIALS - GENERAL CHEMISTRY, SOLID AND CHEMICAL MATERIALS - METALS, SOLID AND CHEMICAL MATERIALS - PESTICIDES-HERBICIDES-PCB'S, SOLID AND CHEMICAL MATERIALS - VOLATILE ORGANICS

Continued certification is contingent upon successful on-going compliance with the NELAC Standards and FAC Rule 64E-1 regulations. Specific methods and analytes certified are cited on the Laboratory Scope of Accreditation for this laboratory and are on file at the Bureau of Public Health Laboratories, P. O. Box 210, Jacksonville, Florida 32231. Clients and customers are urged to verify with this agency the laboratory's certification status in Florida for particular methods and analytes.

Date Issued: July 01, 2014 Expiration Date: June 30, 2015

William H. Anderson, DHA, FACHE, Director
Division of Emergency Preparedness and Community Support
DH Form 1697, 7/04
NON-TRANSFERABLE E83182-36-07/01/2014
Supersedes all previously issued certificates

Laboratory Scope of Accreditation

Attachment to Certificate #: E83182-36, expiration date June 30, 2015. This listing of accredited analytes should be used only when associated with a valid certificate.

State Laboratory ID: E83182 EPA Lab Code: FL00288 (407) 826-5314

E83182
Environmental Conservation Laboratories, Inc. (ENCO) - Orlando
10775 Central Port Drive
Orlando, FL 32824-7009

Matrix: Drinking Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Bromide	EPA 300.0	Primary Inorganic Contaminants	NELAP	7/30/2009
Chloride	EPA 300.0	Secondary Inorganic Contaminants	NELAP	5/30/2013
Color	SM 2120 B	Secondary Inorganic Contaminants	NELAP	7/30/2009
Dissolved organic carbon (DOC)	SM 5310 B	Primary Inorganic Contaminants	NELAP	7/30/2009
Escherichia coli	COLISURE	Microbiology	NELAP	10/1/2008
Fluoride	EPA 300.0	Primary Inorganic Contaminants	NELAP	3/30/2010
Nitrate	EPA 300.0	Primary Inorganic Contaminants	NELAP	7/30/2009
Nitrite	EPA 300.0	Primary Inorganic Contaminants	NELAP	7/30/2009
Nitrite as N	SM 4500-NO2-B	Primary Inorganic Contaminants	NELAP	5/30/2013
Odor	SM 2150 B	Secondary Inorganic Contaminants	NELAP	7/30/2009
Orthophosphate as P	EPA 300.0	Primary Inorganic Contaminants	NELAP	7/30/2009
Orthophosphate as P	EPA 365.1	Primary Inorganic Contaminants	NELAP	7/30/2009
pH	SM 4500-H+-B	Secondary Inorganic Contaminants	NELAP	7/30/2009
Sulfate	EPA 300.0	Primary Inorganic Contaminants	NELAP	3/30/2010
Surfactants - MBAS	SM 5540 C	Secondary Inorganic Contaminants	NELAP	7/30/2009
Total coliforms	COLISURE	Microbiology	NELAP	10/1/2008
Total nitrate-nitrite	EPA 300.0	Primary Inorganic Contaminants	NELAP	7/30/2009
Total organic carbon	SM 5310 B	Primary Inorganic Contaminants	NELAP	7/30/2009

Laboratory Scope of Accreditation

Attachment to Certificate #: E83182-36, expiration date June 30, 2015. This listing of accredited analytes should be used only when associated with a valid certificate.

State Laboratory ID: E83182 EPA Lab Code: FL00288 (407) 826-5314

E83182
Environmental Conservation Laboratories, Inc. (ENCO) - Orlando
10775 Central Port Drive
Orlando, FL 32824-7009

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
1,1,1,2-Tetrachloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,1,1-Trichloroethane	EPA 624	Volatile Organics	NELAP	2/13/2002
1,1,1-Trichloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,1,2,2-Tetrachloroethane	EPA 624	Volatile Organics	NELAP	2/13/2002
1,1,2,2-Tetrachloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	EPA 8260	Volatile Organics	NELAP	11/17/2006
1,1,2-Trichloroethane	EPA 624	Volatile Organics	NELAP	2/13/2002
1,1,2-Trichloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,1-Dichloroethane	EPA 624	Volatile Organics	NELAP	2/13/2002
1,1-Dichloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,1-Dichloroethylene	EPA 624	Volatile Organics	NELAP	2/13/2002
1,1-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,1-Dichloropropene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2,3-Trichlorobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2,3-Trichloropropane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2,4,5-Tetrachlorobenzene	EPA 8270	Extractable Organics	NELAP	7/1/2003
1,2,4-Trichlorobenzene	EPA 625	Extractable Organics	NELAP	2/13/2002
1,2,4-Trichlorobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2,4-Trichlorobenzene	EPA 8270	Extractable Organics	NELAP	7/1/2003
1,2,4-Trimethylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2-Dibromo-3-chloropropane (DBCP)	EPA 504.1	Volatile Organics	NELAP	4/27/2006
1,2-Dibromo-3-chloropropane (DBCP)	EPA 8011	Volatile Organics	NELAP	7/1/2003
1,2-Dibromo-3-chloropropane (DBCP)	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 504.1	Volatile Organics	NELAP	4/27/2006
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 8011	Volatile Organics	NELAP	7/1/2003
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2-Dichlorobenzene	EPA 624	Volatile Organics	NELAP	2/13/2002
1,2-Dichlorobenzene	EPA 625	Extractable Organics	NELAP	2/13/2002
1,2-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2-Dichlorobenzene	EPA 8270	Extractable Organics	NELAP	7/1/2003
1,2-Dichloroethane	EPA 624	Volatile Organics	NELAP	2/13/2002
1,2-Dichloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2-Dichloropropane	EPA 624	Volatile Organics	NELAP	2/13/2002
1,2-Dichloropropane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2-Diphenylhydrazine	EPA 8270	Extractable Organics	NELAP	7/1/2003
1,3,5-Trimethylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003

Laboratory Scope of Accreditation

Attachment to Certificate #: E83182-36, expiration date June 30, 2015. This listing of accredited analytes should be used only when associated with a valid certificate.

State Laboratory ID: E83182 EPA Lab Code: FL00288 (407) 826-5314

E83182
Environmental Conservation Laboratories, Inc. (ENCO) - Orlando
10775 Central Port Drive
Orlando, FL 32824-7009

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
1,3,5-Trinitrobenzene (1,3,5-TNB)	EPA 8270	Extractable Organics	NELAP	6/18/2009
1,3-Dichlorobenzene	EPA 624	Volatile Organics	NELAP	2/13/2002
1,3-Dichlorobenzene	EPA 625	Extractable Organics	NELAP	2/13/2002
1,3-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,3-Dichlorobenzene	EPA 8270	Extractable Organics	NELAP	7/1/2003
1,3-Dichloropropane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,3-Dinitrobenzene (1,3-DNB)	EPA 8270	Extractable Organics	NELAP	7/1/2003
1,4-Dichlorobenzene	EPA 624	Volatile Organics	NELAP	2/13/2002
1,4-Dichlorobenzene	EPA 625	Extractable Organics	NELAP	2/13/2002
1,4-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,4-Dichlorobenzene	EPA 8270	Extractable Organics	NELAP	7/1/2003
1,4-Dioxane (1,4-Diethyleneoxide)	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,4-Naphthoquinone	EPA 8270	Extractable Organics	NELAP	7/1/2003
1,4-Phenylenediamine	EPA 8270	Extractable Organics	NELAP	7/1/2003
1-Methylnaphthalene	EPA 8270	Extractable Organics	NELAP	5/30/2013
1-Naphthylamine	EPA 8270	Extractable Organics	NELAP	7/1/2003
2,2-Dichloropropane	EPA 8260	Volatile Organics	NELAP	7/1/2003
2,3,4,6-Tetrachlorophenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
2,4,5-T	EPA 615	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
2,4,5-T	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
2,4,5-Trichlorophenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
2,4,6-Trichlorophenol	EPA 625	Extractable Organics	NELAP	2/13/2002
2,4,6-Trichlorophenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
2,4-D	EPA 615	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
2,4-D	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
2,4-DB	EPA 615	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
2,4-DB	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
2,4-Dichlorophenol	EPA 625	Extractable Organics	NELAP	2/13/2002
2,4-Dichlorophenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
2,4-Dimethylphenol	EPA 625	Extractable Organics	NELAP	2/13/2002
2,4-Dimethylphenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
2,4-Dinitrophenol	EPA 625	Extractable Organics	NELAP	2/13/2002
2,4-Dinitrophenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
2,4-Dinitrotoluene (2,4-DNT)	EPA 625	Extractable Organics	NELAP	2/13/2002
2,4-Dinitrotoluene (2,4-DNT)	EPA 8270	Extractable Organics	NELAP	7/1/2003
2,6-Dichlorophenol	EPA 8270	Extractable Organics	NELAP	7/1/2003

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E83182
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Orlando, FL 32824-7009

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
2,6-Dinitrotoluene (2,6-DNT)	EPA 625	Extractable Organics	NELAP	2/13/2002
2,6-Dinitrotoluene (2,6-DNT)	EPA 8270	Extractable Organics	NELAP	7/1/2003
2-Acetylaminofluorene	EPA 8270	Extractable Organics	NELAP	7/1/2003
2-Butanone (Methyl ethyl ketone, MEK)	EPA 8260	Volatile Organics	NELAP	7/1/2003
2-Chloroethyl vinyl ether	EPA 624	Volatile Organics	NELAP	2/13/2002
2-Chloroethyl vinyl ether	EPA 8260	Volatile Organics	NELAP	7/1/2003
2-Chloronaphthalene	EPA 625	Extractable Organics	NELAP	2/13/2002
2-Chloronaphthalene	EPA 8270	Extractable Organics	NELAP	7/1/2003
2-Chlorophenol	EPA 625	Extractable Organics	NELAP	2/13/2002
2-Chlorophenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
2-Chlorotoluene	EPA 8260	Volatile Organics	NELAP	7/1/2003
2-Hexanone	EPA 8260	Volatile Organics	NELAP	7/1/2003
2-Methyl-4,6-dinitrophenol	EPA 625	Extractable Organics	NELAP	2/13/2002
2-Methyl-4,6-dinitrophenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
2-Methylnaphthalene	EPA 8270	Extractable Organics	NELAP	7/1/2003
2-Methylphenol (o-Cresol)	EPA 625	Extractable Organics	NELAP	11/17/2006
2-Methylphenol (o-Cresol)	EPA 8270	Extractable Organics	NELAP	7/1/2003
2-Naphthylamine	EPA 8270	Extractable Organics	NELAP	7/1/2003
2-Nitroaniline	EPA 8270	Extractable Organics	NELAP	7/1/2003
2-Nitrophenol	EPA 625	Extractable Organics	NELAP	2/13/2002
2-Nitrophenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
2-Picoline (2-Methylpyridine)	EPA 8270	Extractable Organics	NELAP	7/1/2003
3,3'-Dichlorobenzidine	EPA 625	Extractable Organics	NELAP	2/13/2002
3,3'-Dichlorobenzidine	EPA 8270	Extractable Organics	NELAP	7/1/2003
3,3'-Dimethylbenzidine	EPA 8270	Extractable Organics	NELAP	7/1/2003
3,5-Dichlorobenzoic acid	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
3/4-Methylphenols (m/p-Cresols)	EPA 625	Extractable Organics	NELAP	5/30/2013
3/4-Methylphenols (m/p-Cresols)	EPA 8270	Extractable Organics	NELAP	11/17/2006
3-Methylcholanthrene	EPA 8270	Extractable Organics	NELAP	7/1/2003
3-Nitroaniline	EPA 8270	Extractable Organics	NELAP	7/1/2003
4,4'-DDD	EPA 608	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
4,4'-DDD	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
4,4'-DDE	EPA 608	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
4,4'-DDE	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
4,4'-DDT	EPA 608	Pesticides-Herbicides-PCB's	NELAP	9/17/2002
4,4'-DDT	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003

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E83182
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Orlando, FL 32824-7009

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
4-Aminobiphenyl	EPA 8270	Extractable Organics	NELAP	7/1/2003
4-Bromophenyl phenyl ether	EPA 625	Extractable Organics	NELAP	2/13/2002
4-Bromophenyl phenyl ether	EPA 8270	Extractable Organics	NELAP	7/1/2003
4-Chloro-3-methylphenol	EPA 625	Extractable Organics	NELAP	2/13/2002
4-Chloro-3-methylphenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
4-Chloroaniline	EPA 8270	Extractable Organics	NELAP	7/1/2003
4-Chlorophenyl phenylether	EPA 625	Extractable Organics	NELAP	2/13/2002
4-Chlorophenyl phenylether	EPA 8270	Extractable Organics	NELAP	7/1/2003
4-Chlorotoluene	EPA 8260	Volatile Organics	NELAP	7/1/2003
4-Dimethyl aminoazobenzene	EPA 8270	Extractable Organics	NELAP	7/1/2003
4-Methyl-2-pentanone (MIBK)	EPA 8260	Volatile Organics	NELAP	7/1/2003
4-Nitroaniline	EPA 8270	Extractable Organics	NELAP	7/1/2003
4-Nitrophenol	EPA 625	Extractable Organics	NELAP	2/13/2002
4-Nitrophenol	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
4-Nitrophenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
5-Nitro-o-toluidine	EPA 8270	Extractable Organics	NELAP	7/1/2003
7,12-Dimethylbenz(a) anthracene	EPA 8270	Extractable Organics	NELAP	7/1/2003
a,a-Dimethylphenethylamine	EPA 8270	Extractable Organics	NELAP	7/1/2003
Acenaphthene	EPA 625	Extractable Organics	NELAP	2/13/2002
Acenaphthene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Acenaphthylene	EPA 625	Extractable Organics	NELAP	2/13/2002
Acenaphthylene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Acetone	EPA 8260	Volatile Organics	NELAP	7/1/2003
Acetonitrile	EPA 8260	Volatile Organics	NELAP	7/1/2003
Acetophenone	EPA 8270	Extractable Organics	NELAP	7/1/2003
Acidity, as CaCO3	SM 2310 B	General Chemistry	NELAP	2/4/2008
Acifluorfen	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Acrolein (Propenal)	EPA 624	Volatile Organics	NELAP	2/13/2002
Acrolein (Propenal)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Acrylonitrile	EPA 624	Volatile Organics	NELAP	2/13/2002
Acrylonitrile	EPA 8260	Volatile Organics	NELAP	7/1/2003
Aldrin	EPA 608	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Aldrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Alkalinity as CaCO3	EPA 310.2	General Chemistry	NELAP	10/30/2002
Alkalinity as CaCO3	SM 2320 B	General Chemistry	NELAP	2/4/2008
Allyl chloride (3-Chloropropene)	EPA 8260	Volatile Organics	NELAP	7/1/2003

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Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
alpha-BHC (alpha-Hexachlorocyclohexane)	EPA 608	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
alpha-BHC (alpha-Hexachlorocyclohexane)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
alpha-Chlordane	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Aluminum	EPA 200.8	Metals	NELAP	4/14/2006
Aluminum	EPA 6020	Metals	NELAP	4/14/2006
Ammonia as N	EPA 350.1	General Chemistry	NELAP	2/13/2002
Aniline	EPA 8270	Extractable Organics	NELAP	7/1/2003
Anthracene	EPA 625	Extractable Organics	NELAP	2/13/2002
Anthracene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Antimony	EPA 200.8	Metals	NELAP	4/14/2006
Antimony	EPA 6020	Metals	NELAP	4/14/2006
Aramite	EPA 8270	Extractable Organics	NELAP	7/1/2003
Aroclor-1016 (PCB-1016)	EPA 608	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Aroclor-1016 (PCB-1016)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Aroclor-1221 (PCB-1221)	EPA 608	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Aroclor-1221 (PCB-1221)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Aroclor-1232 (PCB-1232)	EPA 608	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Aroclor-1232 (PCB-1232)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Aroclor-1242 (PCB-1242)	EPA 608	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Aroclor-1242 (PCB-1242)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Aroclor-1248 (PCB-1248)	EPA 608	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Aroclor-1248 (PCB-1248)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Aroclor-1254 (PCB-1254)	EPA 608	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Aroclor-1254 (PCB-1254)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Aroclor-1260 (PCB-1260)	EPA 608	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Aroclor-1260 (PCB-1260)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Aroclor-1262 (PCB-1262)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2013
Aroclor-1268 (PCB-1268)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2013
Arsenic	EPA 200.8	Metals	NELAP	4/14/2006
Arsenic	EPA 6020	Metals	NELAP	4/14/2006
Atrazine	EPA 8270	Extractable Organics	NELAP	10/1/2008
Azinphos-methyl (Guthion)	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Barium	EPA 200.8	Metals	NELAP	4/14/2006
Barium	EPA 6020	Metals	NELAP	4/14/2006
Bentazon	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Benzaldehyde	EPA 8270	Extractable Organics	NELAP	5/30/2013

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E83182
Environmental Conservation Laboratories, Inc. (ENCO) - Orlando
10775 Central Port Drive
Orlando, FL 32824-7009

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Benzene	EPA 624	Volatile Organics	NELAP	2/13/2002
Benzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Benzidine	EPA 625	Extractable Organics	NELAP	2/13/2002
Benzidine	EPA 8270	Extractable Organics	NELAP	7/1/2003
Benzo(a)anthracene	EPA 625	Extractable Organics	NELAP	2/13/2002
Benzo(a)anthracene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Benzo(a)pyrene	EPA 625	Extractable Organics	NELAP	2/13/2002
Benzo(a)pyrene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Benzo(b)fluoranthene	EPA 625	Extractable Organics	NELAP	2/13/2002
Benzo(b)fluoranthene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Benzo(g,h,i)perylene	EPA 625	Extractable Organics	NELAP	2/13/2002
Benzo(g,h,i)perylene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Benzo(k)fluoranthene	EPA 625	Extractable Organics	NELAP	2/13/2002
Benzo(k)fluoranthene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Benzoic acid	EPA 8270	Extractable Organics	NELAP	7/1/2003
Benzyl alcohol	EPA 8270	Extractable Organics	NELAP	7/1/2003
Beryllium	EPA 200.8	Metals	NELAP	4/14/2006
Beryllium	EPA 6020	Metals	NELAP	4/14/2006
beta-BHC (beta-Hexachlorocyclohexane)	EPA 608	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
beta-BHC (beta-Hexachlorocyclohexane)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Biochemical oxygen demand	SM 5210 B	General Chemistry	NELAP	2/4/2008
Biphenyl	EPA 8270	Extractable Organics	NELAP	5/30/2013
bis(2-Chloroethoxy)methane	EPA 625	Extractable Organics	NELAP	2/13/2002
bis(2-Chloroethoxy)methane	EPA 8270	Extractable Organics	NELAP	7/1/2003
bis(2-Chloroethyl) ether	EPA 625	Extractable Organics	NELAP	2/13/2002
bis(2-Chloroethyl) ether	EPA 8270	Extractable Organics	NELAP	7/1/2003
bis(2-Chloroisopropyl) ether (2,2'-Oxybis(1-chloropropane))	EPA 625	Extractable Organics	NELAP	2/13/2002
bis(2-Chloroisopropyl) ether (2,2'-Oxybis(1-chloropropane))	EPA 8270	Extractable Organics	NELAP	7/1/2003
bis(2-Ethylhexyl) phthalate (DEHP)	EPA 625	Extractable Organics	NELAP	2/13/2002
bis(2-Ethylhexyl) phthalate (DEHP)	EPA 8270	Extractable Organics	NELAP	7/1/2003
Bolstar (Sulprofos)	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Bromide	EPA 300.0	General Chemistry	NELAP	2/13/2002
Bromide	EPA 9056	General Chemistry	NELAP	7/1/2003
Bromobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Bromochloromethane	EPA 8260	Volatile Organics	NELAP	7/1/2003

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Analyte	Method/Tech	Category	Certification Type	Effective Date
Bromodichloromethane	EPA 624	Volatile Organics	NELAP	2/13/2002
Bromodichloromethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Bromoform	EPA 624	Volatile Organics	NELAP	2/13/2002
Bromoform	EPA 8260	Volatile Organics	NELAP	7/1/2003
Butyl benzyl phthalate	EPA 625	Extractable Organics	NELAP	2/13/2002
Butyl benzyl phthalate	EPA 8270	Extractable Organics	NELAP	7/1/2003
Cadmium	EPA 200.8	Metals	NELAP	4/14/2006
Cadmium	EPA 6020	Metals	NELAP	4/14/2006
Calcium	ENCO SOP MET/15.0/ICP-MS	Metals	NELAP	11/17/2006
Calcium	EPA 6020	Metals	NELAP	4/14/2006
Caprolactam	EPA 8270	Extractable Organics	NELAP	5/30/2013
Carbazole	EPA 8270	Extractable Organics	NELAP	7/1/2003
Carbon disulfide	EPA 8260	Volatile Organics	NELAP	7/1/2003
Carbon tetrachloride	EPA 624	Volatile Organics	NELAP	2/13/2002
Carbon tetrachloride	EPA 8260	Volatile Organics	NELAP	7/1/2003
Carbonaceous BOD (CBOD)	SM 5210 B	General Chemistry	NELAP	2/13/2002
Chemical oxygen demand	EPA 410.4	General Chemistry	NELAP	2/13/2002
Chemical oxygen demand	SM 5220 D	General Chemistry	NELAP	5/30/2013
Chloramben	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Chlordane (tech.)	EPA 608	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Chlordane (tech.)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Chloride	EPA 300.0	General Chemistry	NELAP	2/13/2002
Chloride	EPA 9056	General Chemistry	NELAP	7/1/2003
Chlorobenzene	EPA 624	Volatile Organics	NELAP	2/13/2002
Chlorobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Chlorobenzilate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Chloroethane	EPA 624	Volatile Organics	NELAP	2/13/2002
Chloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Chloroform	EPA 624	Volatile Organics	NELAP	2/13/2002
Chloroform	EPA 8260	Volatile Organics	NELAP	7/1/2003
Chlorophylls	SM 10200 H	General Chemistry	NELAP	10/1/2008
Chloroprene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Chlorpyrifos	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Chromium	EPA 200.8	Metals	NELAP	4/14/2006
Chromium	EPA 6020	Metals	NELAP	4/14/2006
Chromium VI	EPA 7196	General Chemistry	NELAP	7/1/2003

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Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Chromium VI	SM 3500-Cr B (20th/21st Ed.)/UV-VIS	General Chemistry	NELAP	5/30/2013
Chrysene	EPA 625	Extractable Organics	NELAP	2/13/2002
Chrysene	EPA 8270	Extractable Organics	NELAP	7/1/2003
cis-1,2-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	7/1/2003
cis-1,3-Dichloropropene	EPA 624	Volatile Organics	NELAP	2/13/2002
cis-1,3-Dichloropropene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Cobalt	EPA 200.8	Metals	NELAP	4/14/2006
Cobalt	EPA 6020	Metals	NELAP	4/14/2006
Color	SM 2120 B	General Chemistry	NELAP	2/4/2008
Conductivity	EPA 120.1	General Chemistry	NELAP	2/13/2002
Copper	EPA 200.8	Metals	NELAP	4/14/2006
Copper	EPA 6020	Metals	NELAP	4/14/2006
Coumaphos	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Cyanide	SM 4500-CN E	General Chemistry	NELAP	2/4/2008
Cyclohexane	EPA 8260	Volatile Organics	NELAP	5/30/2013
Dacthal (DCPA)	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Dalapon	EPA 615	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Dalapon	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
delta-BHC	EPA 608	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
delta-BHC	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Diallate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Diazinon	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Dibenz(a,h)anthracene	EPA 625	Extractable Organics	NELAP	2/13/2002
Dibenz(a,h)anthracene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Dibenzofuran	EPA 8270	Extractable Organics	NELAP	7/1/2003
Dibromochloromethane	EPA 624	Volatile Organics	NELAP	2/13/2002
Dibromochloromethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Dibromomethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Dicamba	EPA 615	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Dicamba	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Dichlorodifluoromethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Dichlorofenthion	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Dichloroprop (Dichlorprop)	EPA 615	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Dichloroprop (Dichlorprop)	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Dichlorovos (DDVP, Dichlorvos)	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Dieldrin	EPA 608	Pesticides-Herbicides-PCB's	NELAP	2/13/2002

Laboratory Scope of Accreditation

Attachment to Certificate #: E83182-36, expiration date June 30, 2015. This listing of accredited analytes should be used only when associated with a valid certificate.

State Laboratory ID: E83182 EPA Lab Code: FL00288 (407) 826-5314

E83182
Environmental Conservation Laboratories, Inc. (ENCO) - Orlando
10775 Central Port Drive
Orlando, FL 32824-7009

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Dieldrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Diethyl phthalate	EPA 625	Extractable Organics	NELAP	2/13/2002
Diethyl phthalate	EPA 8270	Extractable Organics	NELAP	7/1/2003
Dimethoate	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Dimethoate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Dimethyl phthalate	EPA 625	Extractable Organics	NELAP	2/13/2002
Dimethyl phthalate	EPA 8270	Extractable Organics	NELAP	7/1/2003
Di-n-butyl phthalate	EPA 625	Extractable Organics	NELAP	2/13/2002
Di-n-butyl phthalate	EPA 8270	Extractable Organics	NELAP	7/1/2003
Di-n-octyl phthalate	EPA 625	Extractable Organics	NELAP	2/13/2002
Di-n-octyl phthalate	EPA 8270	Extractable Organics	NELAP	7/1/2003
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	EPA 615	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Disulfoton	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Disulfoton	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	10/1/2008
Endosulfan I	EPA 608	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Endosulfan I	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Endosulfan II	EPA 608	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Endosulfan II	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Endosulfan sulfate	EPA 608	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Endosulfan sulfate	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Endrin	EPA 608	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Endrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Endrin aldehyde	EPA 608	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Endrin aldehyde	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Endrin ketone	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
EPN	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Ethion	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Ethoprop	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Ethyl methacrylate	EPA 8260	Volatile Organics	NELAP	7/1/2003
Ethyl methanesulfonate	EPA 8270	Extractable Organics	NELAP	7/1/2003
Ethylbenzene	EPA 624	Volatile Organics	NELAP	2/13/2002
Ethylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Famphur	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Fecal coliforms	SM 9222 D	Microbiology	NELAP	7/30/2009

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Analyte	Method/Tech	Category	Certification Type	Effective Date
Fensulfothion	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Fenthion	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Ferric iron (calc.)	SM 3500-Fe B (20th/21st Ed.)/UV-VIS	General Chemistry	NELAP	5/30/2013
Ferrous iron	SM 3500-Fe B (20th/21st Ed.)/UV-VIS	General Chemistry	NELAP	5/30/2013
Fluoranthene	EPA 625	Extractable Organics	NELAP	2/13/2002
Fluoranthene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Fluorene	EPA 625	Extractable Organics	NELAP	2/13/2002
Fluorene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Fluoride	EPA 300.0	General Chemistry	NELAP	2/13/2002
Fluoride	EPA 9056	General Chemistry	NELAP	7/1/2003
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	EPA 608	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
gamma-Chlordane	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Hardness	SM 2340 B	General Chemistry	NELAP	2/4/2008
Hardness	SM 2340 C	General Chemistry	NELAP	7/30/2009
Heptachlor	EPA 608	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Heptachlor	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Heptachlor epoxide	EPA 608	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Heptachlor epoxide	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Hexachlorobenzene	EPA 625	Extractable Organics	NELAP	2/13/2002
Hexachlorobenzene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Hexachlorobutadiene	EPA 625	Extractable Organics	NELAP	2/13/2002
Hexachlorobutadiene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Hexachlorobutadiene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Hexachlorocyclopentadiene	EPA 625	Extractable Organics	NELAP	2/13/2002
Hexachlorocyclopentadiene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Hexachloroethane	EPA 625	Extractable Organics	NELAP	2/13/2002
Hexachloroethane	EPA 8270	Extractable Organics	NELAP	7/1/2003
Hexachlorophene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Hexachloropropene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Indeno(1,2,3-cd)pyrene	EPA 625	Extractable Organics	NELAP	2/13/2002
Indeno(1,2,3-cd)pyrene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Iodomethane (Methyl iodide)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Iron	ENCO SOP MET/15.0/ICP-MS	Metals	NELAP	11/17/2006

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Iron	EPA 6020	Metals	NELAP	4/14/2006
Isobutyl alcohol (2-Methyl-1-propanol)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Isodrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Isodrin	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Isophorone	EPA 625	Extractable Organics	NELAP	2/13/2002
Isophorone	EPA 8270	Extractable Organics	NELAP	7/1/2003
Isopropylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Isosafrole	EPA 8270	Extractable Organics	NELAP	7/1/2003
Kepone	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Kjeldahl nitrogen - total	EPA 351.2	General Chemistry	NELAP	2/13/2002
Lead	EPA 200.8	Metals	NELAP	4/14/2006
Lead	EPA 6020	Metals	NELAP	4/14/2006
m+p-Xylenes	EPA 8260	Volatile Organics	NELAP	10/1/2008
Magnesium	ENCO SOP MET/15.0/ICP-MS	Metals	NELAP	11/17/2006
Magnesium	EPA 6020	Metals	NELAP	4/27/2006
Malathion	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Manganese	EPA 200.8	Metals	NELAP	4/14/2006
Manganese	EPA 6020	Metals	NELAP	4/14/2006
MCPA	EPA 615	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
MCPA	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
MCPP	EPA 615	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
MCPP	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Mercury	EPA 245.1	Metals	NELAP	8/28/2006
Mercury	EPA 7470	Metals	NELAP	4/27/2006
Merphos	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Methacrylonitrile	EPA 8260	Volatile Organics	NELAP	7/1/2003
Methapyrilene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Methoxychlor	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/30/2013
Methoxychlor	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Methyl acetate	EPA 8260	Volatile Organics	NELAP	5/30/2013
Methyl bromide (Bromomethane)	EPA 624	Volatile Organics	NELAP	2/13/2002
Methyl bromide (Bromomethane)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Methyl chloride (Chloromethane)	EPA 624	Volatile Organics	NELAP	2/13/2002
Methyl chloride (Chloromethane)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Methyl methacrylate	EPA 8260	Volatile Organics	NELAP	7/1/2003
Methyl methanesulfonate	EPA 8270	Extractable Organics	NELAP	7/1/2003

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Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Methyl parathion (Parathion, methyl)	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Methyl parathion (Parathion, methyl)	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Methyl tert-butyl ether (MTBE)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Methylcyclohexane	EPA 8260	Volatile Organics	NELAP	5/30/2013
Methylene chloride	EPA 624	Volatile Organics	NELAP	2/13/2002
Methylene chloride	EPA 8260	Volatile Organics	NELAP	7/1/2003
Mevinphos	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Mirex	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Molybdenum	EPA 200.8	Metals	NELAP	4/14/2006
Molybdenum	EPA 6020	Metals	NELAP	4/14/2006
Monocrotophos	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Naled	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Naphthalene	EPA 625	Extractable Organics	NELAP	2/13/2002
Naphthalene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Naphthalene	EPA 8270	Extractable Organics	NELAP	7/1/2003
n-Butylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Nickel	EPA 200.8	Metals	NELAP	4/14/2006
Nickel	EPA 6020	Metals	NELAP	4/14/2006
Nitrate	EPA 9056	General Chemistry	NELAP	7/1/2003
Nitrate as N	EPA 300.0	General Chemistry	NELAP	2/13/2002
Nitrate-nitrite	EPA 300.0	General Chemistry	NELAP	2/13/2002
Nitrite	EPA 9056	General Chemistry	NELAP	7/1/2003
Nitrite	SM 4500-NO2-B	General Chemistry	NELAP	2/4/2008
Nitrite as N	EPA 300.0	General Chemistry	NELAP	2/13/2002
Nitrobenzene	EPA 625	Extractable Organics	NELAP	2/13/2002
Nitrobenzene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Nitroquinoline-1-oxide	EPA 8270	Extractable Organics	NELAP	7/1/2003
n-Nitrosodiethylamine	EPA 8270	Extractable Organics	NELAP	7/1/2003
n-Nitrosodimethylamine	EPA 625	Extractable Organics	NELAP	2/13/2002
n-Nitrosodimethylamine	EPA 8270	Extractable Organics	NELAP	7/1/2003
n-Nitroso-di-n-butylamine	EPA 8270	Extractable Organics	NELAP	7/1/2003
n-Nitrosodi-n-propylamine	EPA 625	Extractable Organics	NELAP	2/13/2002
n-Nitrosodi-n-propylamine	EPA 8270	Extractable Organics	NELAP	7/1/2003
n-Nitrosodiphenylamine	EPA 625	Extractable Organics	NELAP	10/30/2002
n-Nitrosodiphenylamine/Diphenylamine (analyte pair)	EPA 8270	Extractable Organics	NELAP	5/30/2013
n-Nitrosomethylethylamine	EPA 8270	Extractable Organics	NELAP	7/1/2003

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Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
n-Nitrosomorpholine	EPA 8270	Extractable Organics	NELAP	7/1/2003
n-Nitrosopiperidine	EPA 8270	Extractable Organics	NELAP	7/1/2003
n-Nitrosopyrrolidine	EPA 8270	Extractable Organics	NELAP	7/1/2003
n-Propylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
o,o,o-Triethyl phosphorothioate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Organic nitrogen	EPA 351.2 - EPA 350.1	General Chemistry	NELAP	2/13/2002
Orthophosphate as P	EPA 365.1	General Chemistry	NELAP	10/30/2002
Orthophosphate as P	EPA 365.3	General Chemistry	NELAP	2/13/2002
o-Toluidine	EPA 8270	Extractable Organics	NELAP	7/1/2003
o-Xylene	EPA 8260	Volatile Organics	NELAP	11/17/2006
Parathion, ethyl	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Parathion, ethyl	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	3/12/2010
Pentachlorobenzene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Pentachloroethane	EPA 8270	Extractable Organics	NELAP	5/30/2013
Pentachloronitrobenzene (Quintozene)	EPA 8270	Extractable Organics	NELAP	7/1/2003
Pentachlorophenol	EPA 625	Extractable Organics	NELAP	2/13/2002
Pentachlorophenol	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Pentachlorophenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
pH	EPA 9040	General Chemistry	NELAP	7/1/2003
pH	SM 4500-H+-B	General Chemistry	NELAP	2/4/2008
Phenacetin	EPA 8270	Extractable Organics	NELAP	7/1/2003
Phenanthrene	EPA 625	Extractable Organics	NELAP	2/13/2002
Phenanthrene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Phenol	EPA 625	Extractable Organics	NELAP	2/13/2002
Phenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
Phorate	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Phorate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Phosphorus, total	EPA 365.4	General Chemistry	NELAP	2/13/2002
Picloram	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
p-Isopropyltoluene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Potassium	ENCO SOP MET/15.0/ICP-MS	Metals	NELAP	11/17/2006
Potassium	EPA 6020	Metals	NELAP	4/14/2006
Pronamide (Kerb)	EPA 8270	Extractable Organics	NELAP	7/1/2003
Propionitrile (Ethyl cyanide)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Pyrene	EPA 625	Extractable Organics	NELAP	2/13/2002
Pyrene	EPA 8270	Extractable Organics	NELAP	7/1/2003

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Analyte	Method/Tech	Category	Certification Type	Effective Date
Pyridine	EPA 625	Extractable Organics	NELAP	5/30/2013
Pyridine	EPA 8270	Extractable Organics	NELAP	7/1/2003
Reactive cyanide	Sec. 7.3 SW-846	General Chemistry	NELAP	5/30/2013
Reactive sulfide	Sec. 7.3 SW-846	General Chemistry	NELAP	5/30/2013
Residue-filterable (TDS)	SM 2540 C	General Chemistry	NELAP	2/4/2008
Residue-nonfilterable (TSS)	SM 2540 D	General Chemistry	NELAP	2/4/2008
Residue-total	SM 2540 B	General Chemistry	NELAP	2/4/2008
Residue-total	SM 2540 G	General Chemistry	NELAP	11/17/2006
Residue-volatile	EPA 160.4	General Chemistry	NELAP	2/13/2002
Ronnel	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Safrole	EPA 8270	Extractable Organics	NELAP	7/1/2003
sec-Butylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Selenium	EPA 200.8	Metals	NELAP	4/14/2006
Selenium	EPA 6020	Metals	NELAP	4/14/2006
Silver	EPA 200.8	Metals	NELAP	4/14/2006
Silver	EPA 6020	Metals	NELAP	4/14/2006
Silvex (2,4,5-TP)	EPA 615	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Silvex (2,4,5-TP)	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Sodium	ENCO SOP MET/15.0/ICP-MS	Metals	NELAP	11/17/2006
Sodium	EPA 6020	Metals	NELAP	4/27/2006
Stirofos	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Styrene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Sulfate	EPA 300.0	General Chemistry	NELAP	2/13/2002
Sulfate	EPA 9056	General Chemistry	NELAP	7/1/2003
Sulfide	EPA 9030/9034	General Chemistry	NELAP	5/30/2013
Sulfide	SM 4500-S F	General Chemistry	NELAP	5/30/2013
Sulfotepp	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Sulfotepp	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Surfactants - MBAS	SM 5540 C	General Chemistry	NELAP	2/4/2008
tert-Butylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Tetrachloroethylene (Perchloroethylene)	EPA 624	Volatile Organics	NELAP	2/13/2002
Tetrachloroethylene (Perchloroethylene)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Tetraethyl pyrophosphate (TEPP)	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Thallium	EPA 200.8	Metals	NELAP	4/14/2006
Thallium	EPA 6020	Metals	NELAP	4/14/2006
Thionazin (Zinophos)	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	7/1/2003

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Analyte	Method/Tech	Category	Certification Type	Effective Date
Tin	ENCO SOP MET/15.0/ICP-MS	Metals	NELAP	11/17/2006
Tin	EPA 6020	Metals	NELAP	4/14/2006
Titanium	EPA 6020	Metals	NELAP	10/1/2008
Tokuthion (Prothiophos)	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Toluene	EPA 624	Volatile Organics	NELAP	2/13/2002
Toluene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Total coliforms	SM 9222 B	Microbiology	NELAP	7/30/2009
Total cyanide	EPA 9010/9014	General Chemistry	NELAP	7/1/2003
Total demeton	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	5/30/2013
Total nitrate-nitrite	EPA 9056	General Chemistry	NELAP	7/1/2003
Total nitrate-nitrite	SM 4500-NO3 H	General Chemistry	NELAP	2/4/2008
Total nitrogen	TKN + Total nitrate-nitrite	General Chemistry	NELAP	7/30/2009
Total organic carbon	EPA 9060	General Chemistry	NELAP	11/17/2006
Total organic carbon	SM 5310 B	General Chemistry	NELAP	2/4/2008
Total Petroleum Hydrocarbons (TPH)	FL-PRO	Extractable Organics	NELAP	7/1/2003
Total phenolics	EPA 420.1	General Chemistry	NELAP	2/13/2002
Total, fixed, and volatile residue	SM 2540 G	General Chemistry	NELAP	10/30/2002
Toxaphene (Chlorinated camphene)	EPA 608	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Toxaphene (Chlorinated camphene)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
trans-1,2-Dichloroethylene	EPA 624	Volatile Organics	NELAP	2/13/2002
trans-1,2-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	7/1/2003
trans-1,3-Dichloropropene	EPA 624	Volatile Organics	NELAP	2/13/2002
trans-1,3-Dichloropropene	EPA 8260	Volatile Organics	NELAP	7/1/2003
trans-1,4-Dichloro-2-butene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Trichloroethene (Trichloroethylene)	EPA 624	Volatile Organics	NELAP	2/13/2002
Trichloroethene (Trichloroethylene)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Trichlorofluoromethane	EPA 624	Volatile Organics	NELAP	2/13/2002
Trichlorofluoromethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Turbidity	EPA 180.1	General Chemistry	NELAP	2/13/2002
Un-ionized Ammonia	DEP SOP 10/03/83	General Chemistry	NELAP	2/13/2002
Vanadium	EPA 200.8	Metals	NELAP	4/14/2006
Vanadium	EPA 6020	Metals	NELAP	4/14/2006
Vinyl acetate	EPA 8260	Volatile Organics	NELAP	7/1/2003
Vinyl chloride	EPA 624	Volatile Organics	NELAP	2/13/2002
Vinyl chloride	EPA 8260	Volatile Organics	NELAP	7/1/2003
Xylene (total)	EPA 624	Volatile Organics	NELAP	10/30/2002

Laboratory Scope of Accreditation

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State Laboratory ID: E83182 EPA Lab Code: FL00288 (407) 826-5314

E83182
Environmental Conservation Laboratories, Inc. (ENCO) - Orlando
10775 Central Port Drive
Orlando, FL 32824-7009

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Xylene (total)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Zinc	EPA 200.8	Metals	NELAP	4/14/2006
Zinc	EPA 6020	Metals	NELAP	4/14/2006

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Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
1,1,1,2-Tetrachloroethane	EPA 8260	Volatile Organics	NELAP	2/13/2002
1,1,1-Trichloroethane	EPA 8260	Volatile Organics	NELAP	2/13/2002
1,1,2,2-Tetrachloroethane	EPA 8260	Volatile Organics	NELAP	2/13/2002
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	EPA 8260	Volatile Organics	NELAP	11/17/2006
1,1,2-Trichloroethane	EPA 8260	Volatile Organics	NELAP	2/13/2002
1,1-Dichloroethane	EPA 8260	Volatile Organics	NELAP	2/13/2002
1,1-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	2/13/2002
1,1-Dichloropropene	EPA 8260	Volatile Organics	NELAP	2/13/2002
1,2,3-Trichlorobenzene	EPA 8260	Volatile Organics	NELAP	2/13/2002
1,2,3-Trichloropropane	EPA 8260	Volatile Organics	NELAP	2/13/2002
1,2,4,5-Tetrachlorobenzene	EPA 8270	Extractable Organics	NELAP	2/13/2002
1,2,4-Trichlorobenzene	EPA 8260	Volatile Organics	NELAP	2/13/2002
1,2,4-Trichlorobenzene	EPA 8270	Extractable Organics	NELAP	2/13/2002
1,2,4-Trimethylbenzene	EPA 8260	Volatile Organics	NELAP	2/13/2002
1,2-Dibromo-3-chloropropane (DBCP)	EPA 8260	Volatile Organics	NELAP	10/30/2002
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 8260	Volatile Organics	NELAP	2/13/2002
1,2-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	2/13/2002
1,2-Dichlorobenzene	EPA 8270	Extractable Organics	NELAP	2/13/2002
1,2-Dichloroethane	EPA 8260	Volatile Organics	NELAP	2/13/2002
1,2-Dichloropropane	EPA 8260	Volatile Organics	NELAP	2/13/2002
1,2-Diphenylhydrazine	EPA 8270	Extractable Organics	NELAP	10/30/2002
1,3,5-Trimethylbenzene	EPA 8260	Volatile Organics	NELAP	2/13/2002
1,3,5-Trinitrobenzene (1,3,5-TNB)	EPA 8270	Extractable Organics	NELAP	6/18/2009
1,3-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	2/13/2002
1,3-Dichlorobenzene	EPA 8270	Extractable Organics	NELAP	2/13/2002
1,3-Dichloropropane	EPA 8260	Volatile Organics	NELAP	2/13/2002
1,3-Dinitrobenzene (1,3-DNB)	EPA 8270	Extractable Organics	NELAP	6/18/2009
1,4-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	2/13/2002
1,4-Dichlorobenzene	EPA 8270	Extractable Organics	NELAP	2/13/2002
1,4-Dioxane (1,4-Diethyleneoxide)	EPA 8260	Volatile Organics	NELAP	10/30/2002
1,4-Naphthoquinone	EPA 8270	Extractable Organics	NELAP	2/13/2002
1,4-Phenylenediamine	EPA 8270	Extractable Organics	NELAP	2/13/2002
1-Methylnaphthalene	EPA 8270	Extractable Organics	NELAP	5/30/2013
1-Naphthylamine	EPA 8270	Extractable Organics	NELAP	2/13/2002
2,2-Dichloropropane	EPA 8260	Volatile Organics	NELAP	2/13/2002
2,3,4,6-Tetrachlorophenol	EPA 8270	Extractable Organics	NELAP	2/13/2002

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Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
2,4,5-T	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
2,4,5-Trichlorophenol	EPA 8270	Extractable Organics	NELAP	2/13/2002
2,4,6-Trichlorophenol	EPA 8270	Extractable Organics	NELAP	2/13/2002
2,4-D	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
2,4-DB	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
2,4-Dichlorophenol	EPA 8270	Extractable Organics	NELAP	2/13/2002
2,4-Dimethylphenol	EPA 8270	Extractable Organics	NELAP	2/13/2002
2,4-Dinitrophenol	EPA 8270	Extractable Organics	NELAP	2/13/2002
2,4-Dinitrotoluene (2,4-DNT)	EPA 8270	Extractable Organics	NELAP	2/13/2002
2,6-Dichlorophenol	EPA 8270	Extractable Organics	NELAP	2/13/2002
2,6-Dinitrotoluene (2,6-DNT)	EPA 8270	Extractable Organics	NELAP	2/13/2002
2-Acetylaminofluorene	EPA 8270	Extractable Organics	NELAP	2/13/2002
2-Butanone (Methyl ethyl ketone, MEK)	EPA 8260	Volatile Organics	NELAP	2/13/2002
2-Chloroethyl vinyl ether	EPA 8260	Volatile Organics	NELAP	2/13/2002
2-Chloronaphthalene	EPA 8270	Extractable Organics	NELAP	2/13/2002
2-Chlorophenol	EPA 8270	Extractable Organics	NELAP	2/13/2002
2-Chlorotoluene	EPA 8260	Volatile Organics	NELAP	2/13/2002
2-Hexanone	EPA 8260	Volatile Organics	NELAP	2/13/2002
2-Methyl-4,6-dinitrophenol	EPA 8270	Extractable Organics	NELAP	2/13/2002
2-Methylnaphthalene	EPA 8270	Extractable Organics	NELAP	2/13/2002
2-Methylphenol (o-Cresol)	EPA 8270	Extractable Organics	NELAP	10/30/2002
2-Naphthylamine	EPA 8270	Extractable Organics	NELAP	2/13/2002
2-Nitroaniline	EPA 8270	Extractable Organics	NELAP	2/13/2002
2-Nitrophenol	EPA 8270	Extractable Organics	NELAP	2/13/2002
2-Picoline (2-Methylpyridine)	EPA 8270	Extractable Organics	NELAP	2/13/2002
3,3'-Dichlorobenzidine	EPA 8270	Extractable Organics	NELAP	2/13/2002
3,3'-Dimethylbenzidine	EPA 8270	Extractable Organics	NELAP	10/30/2002
3,5-Dichlorobenzoic acid	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	10/30/2002
3/4-Methylphenols (m/p-Cresols)	EPA 8270	Extractable Organics	NELAP	11/17/2006
3-Methylcholanthrene	EPA 8270	Extractable Organics	NELAP	10/30/2002
3-Nitroaniline	EPA 8270	Extractable Organics	NELAP	2/13/2002
4,4'-DDD	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
4,4'-DDE	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
4,4'-DDT	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
4-Aminobiphenyl	EPA 8270	Extractable Organics	NELAP	2/13/2002
4-Bromophenyl phenyl ether	EPA 8270	Extractable Organics	NELAP	2/13/2002

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Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
4-Chloro-3-methylphenol	EPA 8270	Extractable Organics	NELAP	2/13/2002
4-Chloroaniline	EPA 8270	Extractable Organics	NELAP	2/13/2002
4-Chlorophenyl phenylether	EPA 8270	Extractable Organics	NELAP	2/13/2002
4-Chlorotoluene	EPA 8260	Volatile Organics	NELAP	2/13/2002
4-Dimethyl aminoazobenzene	EPA 8270	Extractable Organics	NELAP	10/30/2002
4-Methyl-2-pentanone (MIBK)	EPA 8260	Volatile Organics	NELAP	10/30/2002
4-Nitroaniline	EPA 8270	Extractable Organics	NELAP	2/13/2002
4-Nitrophenol	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
4-Nitrophenol	EPA 8270	Extractable Organics	NELAP	2/13/2002
5-Nitro-o-toluidine	EPA 8270	Extractable Organics	NELAP	2/13/2002
7,12-Dimethylbenz(a) anthracene	EPA 8270	Extractable Organics	NELAP	2/13/2002
a,a-Dimethylphenethylamine	EPA 8270	Extractable Organics	NELAP	10/30/2002
Acenaphthene	EPA 8270	Extractable Organics	NELAP	2/13/2002
Acenaphthylene	EPA 8270	Extractable Organics	NELAP	2/13/2002
Acetone	EPA 8260	Volatile Organics	NELAP	2/13/2002
Acetonitrile	EPA 8260	Volatile Organics	NELAP	10/30/2002
Acetophenone	EPA 8270	Extractable Organics	NELAP	2/13/2002
Acifluorfen	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Acrolein (Propenal)	EPA 8260	Volatile Organics	NELAP	2/13/2002
Acrylonitrile	EPA 8260	Volatile Organics	NELAP	2/13/2002
Aldrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Alkalinity as CaCO3	EPA 310.2	General Chemistry	NELAP	11/17/2006
Alkalinity as CaCO3	SM 2320 B	General Chemistry	NELAP	7/30/2009
Allyl chloride (3-Chloropropene)	EPA 8260	Volatile Organics	NELAP	10/30/2002
alpha-BHC (alpha-Hexachlorocyclohexane)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
alpha-Chlordane	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	10/30/2002
Aluminum	EPA 6020	Metals	NELAP	4/14/2006
Ammonia as N	EPA 350.1	General Chemistry	NELAP	11/17/2006
Aniline	EPA 8270	Extractable Organics	NELAP	2/13/2002
Anthracene	EPA 8270	Extractable Organics	NELAP	2/13/2002
Antimony	EPA 6020	Metals	NELAP	4/14/2006
Aramite	EPA 8270	Extractable Organics	NELAP	10/30/2002
Aroclor-1016 (PCB-1016)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Aroclor-1221 (PCB-1221)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Aroclor-1232 (PCB-1232)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Aroclor-1242 (PCB-1242)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/13/2002

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Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
Aroclor-1248 (PCB-1248)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Aroclor-1254 (PCB-1254)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Aroclor-1260 (PCB-1260)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Aroclor-1262 (PCB-1262)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2013
Aroclor-1268 (PCB-1268)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2013
Arsenic	EPA 6020	Metals	NELAP	4/14/2006
Atrazine	EPA 8270	Extractable Organics	NELAP	10/1/2008
Azinphos-methyl (Guthion)	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Barium	EPA 6020	Metals	NELAP	4/14/2006
Bentazon	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Benzaldehyde	EPA 8270	Extractable Organics	NELAP	5/30/2013
Benzene	EPA 8260	Volatile Organics	NELAP	2/13/2002
Benzidine	EPA 8270	Extractable Organics	NELAP	2/13/2002
Benzo(a)anthracene	EPA 8270	Extractable Organics	NELAP	2/13/2002
Benzo(a)pyrene	EPA 8270	Extractable Organics	NELAP	2/13/2002
Benzo(b)fluoranthene	EPA 8270	Extractable Organics	NELAP	2/13/2002
Benzo(g,h,i)perylene	EPA 8270	Extractable Organics	NELAP	2/13/2002
Benzo(k)fluoranthene	EPA 8270	Extractable Organics	NELAP	2/13/2002
Benzoic acid	EPA 8270	Extractable Organics	NELAP	10/30/2002
Benzyl alcohol	EPA 8270	Extractable Organics	NELAP	2/13/2002
Beryllium	EPA 6020	Metals	NELAP	4/14/2006
beta-BHC (beta-Hexachlorocyclohexane)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Biphenyl	EPA 8270	Extractable Organics	NELAP	5/30/2013
bis(2-Chloroethoxy)methane	EPA 8270	Extractable Organics	NELAP	2/13/2002
bis(2-Chloroethyl) ether	EPA 8270	Extractable Organics	NELAP	2/13/2002
bis(2-Chloroisopropyl) ether (2,2'-Oxybis(1-chloropropane))	EPA 8270	Extractable Organics	NELAP	2/13/2002
bis(2-Ethylhexyl) phthalate (DEHP)	EPA 8270	Extractable Organics	NELAP	2/13/2002
Bolstar (Sulprofos)	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Bromide	EPA 9056	General Chemistry	NELAP	2/13/2002
Bromobenzene	EPA 8260	Volatile Organics	NELAP	2/13/2002
Bromochloromethane	EPA 8260	Volatile Organics	NELAP	10/30/2002
Bromodichloromethane	EPA 8260	Volatile Organics	NELAP	2/13/2002
Bromoform	EPA 8260	Volatile Organics	NELAP	2/13/2002
Butyl benzyl phthalate	EPA 8270	Extractable Organics	NELAP	2/13/2002
Cadmium	EPA 6020	Metals	NELAP	4/14/2006
Calcium	EPA 6020	Metals	NELAP	4/27/2006

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Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
Caprolactam	EPA 8270	Extractable Organics	NELAP	5/30/2013
Carbazole	EPA 8270	Extractable Organics	NELAP	10/30/2002
Carbon disulfide	EPA 8260	Volatile Organics	NELAP	2/13/2002
Carbon tetrachloride	EPA 8260	Volatile Organics	NELAP	2/13/2002
Chloramben	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Chlordane (tech.)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Chloride	EPA 9056	General Chemistry	NELAP	2/13/2002
Chlorobenzene	EPA 8260	Volatile Organics	NELAP	2/13/2002
Chlorobenzilate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	10/30/2002
Chloroethane	EPA 8260	Volatile Organics	NELAP	2/13/2002
Chloroform	EPA 8260	Volatile Organics	NELAP	2/13/2002
Chloroprene	EPA 8260	Volatile Organics	NELAP	10/30/2002
Chlorpyrifos	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Chromium	EPA 6020	Metals	NELAP	4/14/2006
Chromium VI	EPA 7196	General Chemistry	NELAP	10/7/2002
Chrysene	EPA 8270	Extractable Organics	NELAP	2/13/2002
cis-1,2-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	2/13/2002
cis-1,3-Dichloropropene	EPA 8260	Volatile Organics	NELAP	2/13/2002
Cobalt	EPA 6020	Metals	NELAP	4/14/2006
Copper	EPA 6020	Metals	NELAP	4/14/2006
Coumaphos	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Cyclohexane	EPA 8260	Volatile Organics	NELAP	5/30/2013
Dacthal (DCPA)	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Dalapon	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
delta-BHC	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Diallate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	10/30/2002
Diazinon	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Dibenz(a,h)anthracene	EPA 8270	Extractable Organics	NELAP	2/13/2002
Dibenzofuran	EPA 8270	Extractable Organics	NELAP	2/13/2002
Dibromochloromethane	EPA 8260	Volatile Organics	NELAP	2/13/2002
Dibromomethane	EPA 8260	Volatile Organics	NELAP	10/30/2002
Dicamba	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Dichlorodifluoromethane	EPA 8260	Volatile Organics	NELAP	2/13/2002
Dichlorofenthion	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Dichloroprop (Dichlorprop)	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Dichlorovos (DDVP, Dichlorvos)	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002

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Analyte	Method/Tech	Category	Certification Type	Effective Date
Dieldrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Diethyl phthalate	EPA 8270	Extractable Organics	NELAP	2/13/2002
Dimethoate	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Dimethoate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	10/30/2002
Dimethyl phthalate	EPA 8270	Extractable Organics	NELAP	2/13/2002
Di-n-butyl phthalate	EPA 8270	Extractable Organics	NELAP	2/13/2002
Di-n-octyl phthalate	EPA 8270	Extractable Organics	NELAP	2/13/2002
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	10/30/2002
Disulfoton	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	3/11/2004
Disulfoton	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	5/5/2010
Endosulfan I	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Endosulfan II	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Endosulfan sulfate	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Endrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Endrin aldehyde	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Endrin ketone	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
EPN	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Ethion	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Ethoprop	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Ethyl methacrylate	EPA 8260	Volatile Organics	NELAP	10/30/2002
Ethyl methanesulfonate	EPA 8270	Extractable Organics	NELAP	2/13/2002
Ethylbenzene	EPA 8260	Volatile Organics	NELAP	2/13/2002
Famphur	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	10/30/2002
Fensulfothion	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Fenthion	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Fluoranthene	EPA 8270	Extractable Organics	NELAP	2/13/2002
Fluorene	EPA 8270	Extractable Organics	NELAP	2/13/2002
Fluoride	EPA 9056	General Chemistry	NELAP	2/13/2002
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
gamma-Chlordane	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	10/30/2002
Heptachlor	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Heptachlor epoxide	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Hexachlorobenzene	EPA 8270	Extractable Organics	NELAP	2/13/2002
Hexachlorobutadiene	EPA 8260	Volatile Organics	NELAP	10/30/2002
Hexachlorobutadiene	EPA 8270	Extractable Organics	NELAP	2/13/2002

Laboratory Scope of Accreditation

Attachment to Certificate #: E83182-36, expiration date June 30, 2015. This listing of accredited analytes should be used only when associated with a valid certificate.

State Laboratory ID: E83182 EPA Lab Code: FL00288 (407) 826-5314

E83182
Environmental Conservation Laboratories, Inc. (ENCO) - Orlando
10775 Central Port Drive
Orlando, FL 32824-7009

Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
Hexachlorocyclopentadiene	EPA 8270	Extractable Organics	NELAP	2/13/2002
Hexachloroethane	EPA 8270	Extractable Organics	NELAP	2/13/2002
Hexachlorophene	EPA 8270	Extractable Organics	NELAP	2/13/2002
Hexachloropropene	EPA 8270	Extractable Organics	NELAP	2/13/2002
Indeno(1,2,3-cd)pyrene	EPA 8270	Extractable Organics	NELAP	2/13/2002
Iodomethane (Methyl iodide)	EPA 8260	Volatile Organics	NELAP	10/30/2002
Iron	EPA 6020	Metals	NELAP	4/14/2006
Isobutyl alcohol (2-Methyl-1-propanol)	EPA 8260	Volatile Organics	NELAP	10/30/2002
Isodrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Isodrin	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	10/30/2002
Isophorone	EPA 8270	Extractable Organics	NELAP	2/13/2002
Isopropylbenzene	EPA 8260	Volatile Organics	NELAP	2/13/2002
Isosafrole	EPA 8270	Extractable Organics	NELAP	2/13/2002
Kepone	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	10/30/2002
Kjeldahl nitrogen - total	EPA 351.2	General Chemistry	NELAP	11/17/2006
Lead	EPA 6020	Metals	NELAP	4/14/2006
m+p-Xylenes	EPA 8260	Volatile Organics	NELAP	11/17/2006
Magnesium	EPA 6020	Metals	NELAP	4/14/2006
Malathion	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Manganese	EPA 6020	Metals	NELAP	4/14/2006
MCPA	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
MCPP	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Mercury	EPA 7471	Metals	NELAP	8/28/2006
Merphos	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Methacrylonitrile	EPA 8260	Volatile Organics	NELAP	10/30/2002
Methapyrilene	EPA 8270	Extractable Organics	NELAP	2/13/2002
Methoxychlor	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Methyl acetate	EPA 8260	Volatile Organics	NELAP	5/30/2013
Methyl bromide (Bromomethane)	EPA 8260	Volatile Organics	NELAP	2/13/2002
Methyl chloride (Chloromethane)	EPA 8260	Volatile Organics	NELAP	2/13/2002
Methyl methacrylate	EPA 8260	Volatile Organics	NELAP	10/30/2002
Methyl methanesulfonate	EPA 8270	Extractable Organics	NELAP	2/13/2002
Methyl parathion (Parathion, methyl)	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Methyl parathion (Parathion, methyl)	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	10/30/2002
Methyl tert-butyl ether (MTBE)	EPA 8260	Volatile Organics	NELAP	2/13/2002
Methylcyclohexane	EPA 8260	Volatile Organics	NELAP	5/30/2013

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Methylene chloride	EPA 8260	Volatile Organics	NELAP	2/13/2002
Mevinphos	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Mirex	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Molybdenum	EPA 6020	Metals	NELAP	4/14/2006
Monocrotophos	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	10/30/2002
Naled	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Naphthalene	EPA 8260	Volatile Organics	NELAP	2/13/2002
Naphthalene	EPA 8270	Extractable Organics	NELAP	2/13/2002
n-Butylbenzene	EPA 8260	Volatile Organics	NELAP	2/13/2002
Nickel	EPA 6020	Metals	NELAP	4/14/2006
Nitrate	EPA 9056	General Chemistry	NELAP	2/13/2002
Nitrite	EPA 9056	General Chemistry	NELAP	2/13/2002
Nitrite	SM 4500-NO2-B	General Chemistry	NELAP	7/30/2009
Nitrobenzene	EPA 8270	Extractable Organics	NELAP	2/13/2002
Nitroquinoline-1-oxide	EPA 8270	Extractable Organics	NELAP	10/30/2002
n-Nitrosodiethylamine	EPA 8270	Extractable Organics	NELAP	10/30/2002
n-Nitrosodimethylamine	EPA 8270	Extractable Organics	NELAP	2/13/2002
n-Nitroso-di-n-butylamine	EPA 8270	Extractable Organics	NELAP	2/13/2002
n-Nitrosodi-n-propylamine	EPA 8270	Extractable Organics	NELAP	2/13/2002
n-Nitrosodiphenylamine/Diphenylamine (analyte pair)	EPA 8270	Extractable Organics	NELAP	5/30/2013
n-Nitrosomethylethylamine	EPA 8270	Extractable Organics	NELAP	10/30/2002
n-Nitrosomorpholine	EPA 8270	Extractable Organics	NELAP	10/30/2002
n-Nitrosopiperidine	EPA 8270	Extractable Organics	NELAP	2/13/2002
n-Nitrosopyrrolidine	EPA 8270	Extractable Organics	NELAP	2/13/2002
n-Propylbenzene	EPA 8260	Volatile Organics	NELAP	2/13/2002
o,o,o-Triethyl phosphorothioate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	10/30/2002
Organic nitrogen	TKN minus AMMONIA	General Chemistry	NELAP	11/17/2006
o-Toluidine	EPA 8270	Extractable Organics	NELAP	2/13/2002
o-Xylene	EPA 8260	Volatile Organics	NELAP	11/17/2006
Parathion, ethyl	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Parathion, ethyl	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	5/5/2010
Pentachlorobenzene	EPA 8270	Extractable Organics	NELAP	2/13/2002
Pentachloroethane	EPA 8270	Extractable Organics	NELAP	5/30/2013
Pentachloronitrobenzene (Quintozene)	EPA 8270	Extractable Organics	NELAP	10/30/2002
Pentachlorophenol	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	10/30/2002
Pentachlorophenol	EPA 8270	Extractable Organics	NELAP	2/13/2002

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Analyte	Method/Tech	Category	Certification Type	Effective Date
pH	EPA 9045	General Chemistry	NELAP	2/13/2002
Phenacetin	EPA 8270	Extractable Organics	NELAP	2/13/2002
Phenanthrene	EPA 8270	Extractable Organics	NELAP	2/13/2002
Phenol	EPA 8270	Extractable Organics	NELAP	2/13/2002
Phorate	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Phorate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	5/5/2010
Phosphorus, total	EPA 365.4	General Chemistry	NELAP	11/17/2006
Picloram	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
p-Isopropyltoluene	EPA 8260	Volatile Organics	NELAP	2/13/2002
Potassium	EPA 6020	Metals	NELAP	4/14/2006
Pronamide (Kerb)	EPA 8270	Extractable Organics	NELAP	10/30/2002
Propionitrile (Ethyl cyanide)	EPA 8260	Volatile Organics	NELAP	10/30/2002
Pyrene	EPA 8270	Extractable Organics	NELAP	2/13/2002
Pyridine	EPA 8270	Extractable Organics	NELAP	2/13/2002
Reactive cyanide	Sec. 7.3 SW-846	General Chemistry	NELAP	5/30/2013
Reactive sulfide	Sec. 7.3 SW-846	General Chemistry	NELAP	5/30/2013
Residue-total	EPA 160.3	General Chemistry	NELAP	11/17/2006
Residue-total	SM 2540 G	General Chemistry	NELAP	11/17/2006
Residue-volatile	EPA 160.4	General Chemistry	NELAP	11/17/2006
Ronnel	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Safrole	EPA 8270	Extractable Organics	NELAP	2/13/2002
sec-Butylbenzene	EPA 8260	Volatile Organics	NELAP	10/30/2002
Selenium	EPA 6020	Metals	NELAP	4/14/2006
Silver	EPA 6020	Metals	NELAP	4/14/2006
Silvex (2,4,5-TP)	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Sodium	EPA 6020	Metals	NELAP	4/27/2006
Stirofos	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Styrene	EPA 8260	Volatile Organics	NELAP	10/30/2002
Sulfate	EPA 9056	General Chemistry	NELAP	2/13/2002
Sulfide	EPA 9030/9034	General Chemistry	NELAP	5/30/2013
Sulfotepp	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Sulfotepp	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	10/30/2002
Synthetic Precipitation Leaching Procedure	EPA 1312	General Chemistry	NELAP	2/13/2002
tert-Butylbenzene	EPA 8260	Volatile Organics	NELAP	10/30/2002
Tetrachloroethylene (Perchloroethylene)	EPA 8260	Volatile Organics	NELAP	2/13/2002
Tetraethyl pyrophosphate (TEPP)	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002

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Thallium	EPA 6020	Metals	NELAP	4/14/2006
Thionazin (Zinophos)	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	10/30/2002
Tin	EPA 6020	Metals	NELAP	4/14/2006
Titanium	EPA 6020	Metals	NELAP	4/14/2006
Tokuthion (Prothiophos)	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Toluene	EPA 8260	Volatile Organics	NELAP	2/13/2002
Total cyanide	EPA 9010/9014	General Chemistry	NELAP	2/13/2002
Total demeton	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	5/30/2013
Total nitrate-nitrite	EPA 9056	General Chemistry	NELAP	2/13/2002
Total nitrate-nitrite	SM 4500-NO3 H	General Chemistry	NELAP	7/30/2009
Total nitrogen	TKN + Total nitrate-nitrite	General Chemistry	NELAP	11/17/2006
Total organic carbon	WALKLEY-BLACK	General Chemistry	NELAP	5/5/2010
Total Petroleum Hydrocarbons (TPH)	FL-PRO	Extractable Organics	NELAP	10/30/2002
Total phenolics	EPA 9065	General Chemistry	NELAP	5/30/2013
Toxaphene (Chlorinated camphene)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/13/2002
Toxicity Characteristic Leaching Procedure	EPA 1311	General Chemistry	NELAP	2/13/2002
trans-1,2-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	2/13/2002
trans-1,3-Dichloropropene	EPA 8260	Volatile Organics	NELAP	2/13/2002
trans-1,4-Dichloro-2-butene	EPA 8260	Volatile Organics	NELAP	10/30/2002
Trichloroethene (Trichloroethylene)	EPA 8260	Volatile Organics	NELAP	2/13/2002
Trichlorofluoromethane	EPA 8260	Volatile Organics	NELAP	2/13/2002
Vanadium	EPA 6020	Metals	NELAP	4/14/2006
Vinyl acetate	EPA 8260	Volatile Organics	NELAP	2/13/2002
Vinyl chloride	EPA 8260	Volatile Organics	NELAP	2/13/2002
Xylene (total)	EPA 8260	Volatile Organics	NELAP	2/13/2002
Zinc	EPA 6020	Metals	NELAP	4/27/2006