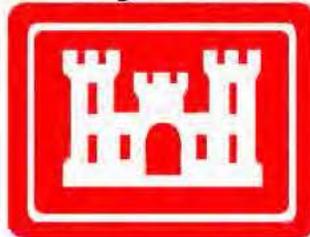


**FINAL
TECHNICAL PROJECT PLANNING
MEMORANDUM**

**for the
REMEDIAL INVESTIGATION / FEASIBILITY STUDY
at the
FORMER RAMEY AIR FORCE BASE
AQUADILLA, PUERTO RICO (I02PR0879)**

Prepared for:



**U.S. Engineering & Support Center, Huntsville
4820 University Square
Huntsville, Alabama 35816-1822**

**CONTRACT: W912DY-10-D-0016
TASK ORDER: 0005**

Prepared by:



**2229 Old Highway 95
Lenoir City, TN 37771**

June 20, 2013

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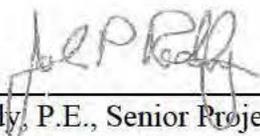
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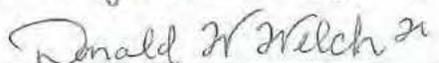
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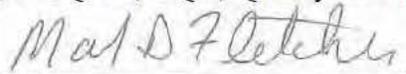
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John P. Reddy, P.E., Senior Project Manager



Don Welch, CMQ/OE, CQA, Quality Control Manager



Mark Fletcher, CSP, Director of MR Programs

June 20, 2013



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ACRONYMS

AFB	Air Force Base
bgs	below ground surface
COPC	contaminants of potential concern
CSM	conceptual site model
DoD	Department of Defense
DQO	data quality objective
E&E	Ecology and Environment, Inc.
EODT	EOD Technology, Inc.
EPA	Environmental Protection Agency
EVS	Environmental Visualization Software
FAA	Federal Aviation Administration
FS	feasibility study
GIS	geographic information system
FUDS	Formerly Used Defense Sites
MCL	maximum contaminant level
PDT	Project Delivery Team
PRIDC	Puerto Rican Industrial Development Company
PRPA	Puerto Rico Port Authority
PREQB	Puerto Rico Environmental Quality Board
PWS	Performance Work Statement
RI	remedial investigation
SI	site investigation
RSL	Regional Screening Level
TCE	trichloroethene
TPH	total petroleum hydrocarbons
TPP	Technical Project Planning
U.S.	United States
USACE	United States Army Corp of Engineers



**TECHNICAL PROJECT PLANNING MEETING #1
FORMER RAMEY AIR FORCE BASE
18 OCTOBER 2012**

SUBJECT: Formerly Used Defense Site (FUDS) documentation of the initial Technical Project Planning (TPP) team meeting for the Remedial Investigation/Feasibility Study (RI/FS) for Landfill 1 and Landfill 2 at the former Ramey Air Force Base (AFB), Aguadilla, Puerto Rico.

MEETING LOCATION, TIME, AND PARTICIPANTS: The TPP meeting #1 was held on 18 October 2012 at the United States Army Corp of Engineers (USACE) Antilles office, 400 Fernández Juncos Avenue, San Juan, Puerto Rico from 1300 hrs to 1800 hrs Eastern Standard Time. The Project Delivery Team (PDT) is comprised of representatives from the USACE Huntsville Center and Jacksonville District; the Puerto Rico Environmental Quality Board (PREQB); the Puerto Rico Port Authority; and Sterling Operations, Inc. (Sterling) (formerly known as EOD Technology, Inc. which purchased Sterling and assumed its corporate name) and its teaming partner ARCADIS U.S. Inc. All PDT members were present (sign-in sheet attached). Meeting participants introduced themselves.

1. Ms. Becky Terry, Project Manager, USACE Huntsville
2. Ms. Sarah Dyer, Chemical Engineer, USACE Huntsville
3. Mr. Tom Freeman, Project Manager, USACE Jacksonville
4. Mr. Sal Resurrecion, Environmental Engineer, USACE Jacksonville
5. Ms. Marie Lopez, Chemist, USACE Jacksonville
6. Mr. Jose Mendez, Project Manager, USACE Puerto Rico
7. Mr. Roland Belew, Project Manager, USACE Huntsville
8. Ms. Ivelisse Lorenzoe, Environmental Inspector, Puerto Rico Port Authority
9. Ms. Wilmarie Rivera, Federal Facilities Coordinator, PREQB
10. Mr. John Reddy, Project Manager, Sterling
11. Mr. Scott Starr, Assistant Project Manager, ARCADIS
12. Mr. Orlando Sanchez, Site Supervisor, ARCADIS

SITE HISTORY: Between 1939 and 1963, the United States (U.S.) acquired for the DoD (Department of Defense), a total of 4,357.33 acres (USACE 93) for Ramey Air Force Base. Sometime during the operational period of Ramey AFB and prior to deactivation in 1973, two unlined sanitary landfills were operated in an area covering approximately 30-acres to the south of the airfield.

The base was used during World War II by the Caribbean Air Command. In 1949, the facility was transferred to the Strategic Air Command. In 1971, the base was transferred to the Military Airlift Command. Between 1939 and site deactivation in 1973, the base was under the complete control of the DoD. On 1 March 1974, the Air Force granted a license to the Commonwealth of Puerto Rico, Puerto Rican Industrial Development Company (PRIDC) granting it development and use rights over 3,328 acres at Ramey AFB. In 1978, the property associated with the airfield,

including the area of Landfill 1 and Landfill 2, was conveyed to the Puerto Rico Port Authority (PRPA) under a 30-year lease. The purpose of this supplemental remedial investigation is to assess the potential environmental impacts associated with DoD operation of the two landfills located south of the airport runway, covering approximately 30 acres and situated on and adjacent to a sinkhole.

Landfill Area 1 is comprised of approximately 6 acres of an 18-acre tract leased by the PRPA to a local farmer located south of the airfield runway complex, as shown on Figure 1. During the period that DoD maintained operations at the former Ramey AFB, actual landfilling activities appear to have been conducted across an approximately 6-acre portion of the site adjacent to a sinkhole, according to the 2001 Site Investigation Report prepared by Ecology and Environment, Inc. (E&E). The exact period that landfilling activities occurred could not be determined.

Landfill Area 2 is comprised of approximately 11 acres of a 65-acre tract leased by the PRPA to a local farmer for cattle grazing and row crops located to the west of Landfill 1, as shown on Figure 1. During the period that DoD maintained operations at the former Ramey AFB, actual landfilling activities appear to have been conducted across an approximately 20-acre portion of the site, according to the 2001 Site Investigation Report prepared by E&E. Landfill 2 reportedly received municipal, household waste from a former adjacent Air Force housing development, "Tropical Acres". The exact period that landfilling activities occurred could not be determined.

Unconsolidated soils encountered during the drilling activities conducted by E&E in 1996 at Landfill 1 and 2 were visually characterized and consisted primarily of brown to orange-brown silty sandy clay and sandy clay. At Landfill 2, where agricultural crops are grown, a thin (1- to 2-foot thick) veneer of brown silt loam overlay the orange-brown silty sandy clays and sandy clays. Bedrock was encountered in the landfills at depths ranging from 8 to 66 feet below ground surface (bgs).

The site overlies a limestone aquifer system comprised of three hydrogeologic units: an upper water table aquifer, a middle confining unit, and a lower confined aquifer. The water table aquifer consists of the Aymamon Limestone and the Aguada Limestone. The water table aquifer is contained in karst limestone bedrock. Most of the permeability of the aquifer is the result of secondary porosity caused by the dissolution of the bedrock along joints, fractures, and bedding planes. Because of the karst nature of the aquifer, water levels may fluctuate greatly (plus or minus 10's of feet), thereby affecting groundwater flow direction and velocity. The water table aquifer is encountered at depths ranging from approximately 210 to 240 feet bgs in the vicinity of Landfill 1 and Landfill 2, according to 2012 data package completed by Shaw Environmental, Inc.

MEETING DISCUSSION SUMMARY: The purpose of the meeting was to establish the PDT and to begin the TPP process for the RI/FS for Landfill 1 and Landfill 2 at the Ramey AFB FUDS. The proposed strategy of the RI/FS is to assess impacts contributed by government actions from operation of the two landfill through base deactivation in 1973 and start consideration for appropriate closure. Mr. Reddy and Mr. Starr opened the meeting with a

presentation highlighting the RI/FS project objectives, tasks, known site history and information, proposed technical approach, and summary of proposed field activities to complete the RI/FS.

The project objectives include investigation of the soil, sediment, groundwater, and surface water to characterize contaminants of potential concern (COPC) sufficient to assess potential risks/hazards/toxicity to human health and the environment and complete a FS to address remedy selection/acceptance of Decision Document, and site closure for Landfill 1 and Landfill 2. In addition, the project objectives include the evaluation of the sinkhole adjacent to Landfill 1 to evaluate potential requirements for stabilization of Landfill 1. Also, a dye-tracer study is proposed to assess the existing monitoring wells and the interconnectivity of Landfill 1 and Landfill 2 with the groundwater, which is located at over 200 feet below ground surface. If the USACE elects to include this optional task, the project may also include development of a three-dimensional model using Environmental Visualization Software (EVS) to provide visualization of the subsurface conditions.

The presentation and general discussions about the Landfill 1 and Landfill 2 RI/FS project led to several questions and additional discussion points. These discussion points are highlighted below.

As part of the TPP meeting, the PDT reviewed the pre-work plan documents. These included the preliminary conceptual site model (CSM), draft data quality objectives (DQO), draft RI Work Plan outline, preliminary project schedule, and draft TPP worksheets. The pre-work plan documents were developed based on the proposed technical approach; the documents are included as attachments to this memorandum. The pre-work plan documents included a PowerPoint slide presentation which was subsequently revised to address the discussion points and comments resulting from the October 18, 2012 TPP meeting. The Memorandum for Record included as part of the TPP worksheets was also revised to amend the Site Closeout Statement and Site Constraints and Dependencies.

Summary of Key Discussion Points:

1. Sterling (formerly known as EOD Technology, Inc. which purchased Sterling International Group) and ARCADIS presented the technical approach. The technical approach is to use all available information and analytical data that are applicable and technically representative, identify data gaps and fill those gaps to the extent possible (excluding sampling of U.S Customs and Ramey AF water supply wells) using a phased approach to environmental media sampling to prepare the supplemental RI report, and address all PREQB comments as specified in the Performance Work Statement (PWS). Obtaining access to the U.S. Customs well for sampling may be problematic. An inquiry to the PREQB to obtain potential sampling results may be an appropriate approach for addressing this request by PREQB. With regard to Ramey supply wells, the 2001 Site Investigation Report prepared by E&E, Inc. does not indicate the presence of other operable supply wells and reports that water is supplied by the Puerto Rico Aqueduct and Sewer Authority from a surface water source.

2. Mr. Starr noted that a key objective in RI/FS Work Plan development will be to reduce the number of COPCs that are further assessed by screening against the proposed regulatory criteria presented in the PowerPoint presentation.
3. During the presentation of the current and future use of the site, there was discussion as to whether some of the land at Landfill 2 was used by the University of Puerto Rico to grow sugar cane. Apparently, the only agriculture on or near the site is grown by the farmer who leases the property from the Puerto Rico Port Authority (PRPA). However, based on consideration of potential future land owners, the University of Puerto Rico and Federal Aviation Administration (FAA) are identified as interested parties.
4. In presentation of the historical RI sampling data, it was noted that an extensive suite of analyses were performed to identify COPCs. Based upon a preliminary review of data, there are only a few COPCs in soil that exceed human health screening criteria. Ecological screening has not been completed yet but Mr. Starr noted that typically, ecological screening criteria for many of the potential contaminants are higher than the human health criteria; therefore, the identified human health COPCs may not present an ecological concern. For groundwater, it was noted that trichloroethene (TCE) and chloroform were the only identified COPCs. Monitoring wells in the areas of both Landfill 1 and Landfill 2 indicated detectable concentrations of TCE. However, the maximum detected concentration of TCE observed at Landfill 1 area was 6.5 µg/L which is slightly above the maximum contaminant level (MCL) of 5 µg/L and at Landfill 2, TCE was not detected above the MCL in the sampling events in July and December 2010. During the sampling events at Landfill 1 and Landfill 2, potential degradation by-products (cis-1,2 dichloroethene and vinyl chloride) of TCE were not detected. The detection of chloroform was likely associated with the disinfection process of the public water supply system and resulted from area-wide leaks in the system or use of public supplied water in the decontamination of sampling equipment. There are no reported public water supply wells. The source of drinking water is surface water. The concentrations of chloroform were significantly below its 70 µg/L MCL but above the Regional Screening Level (RSL) of 0.19 µg/L. It was also discussed during the presentation that the TCE concentrations detected across Landfill 1 and Landfill 2 were low (only one well slightly exceeded the MCL of 5 µg/L) and similar which may suggest that it is associated with regional contamination in the karst geology from other sources (i.e., maintenance activities at airport, dry cleaners) since no direct connection to the landfills has been established. The question was raised by Mr. Reddy whether regional groundwater data from previously installed wells in and around the airport were available. No information was available at the time of the meeting. If necessary, based on the finding of the karst investigation (landfills not shown to be source of TCE), Sterling and ARCADIS will review available groundwater quality data from monitoring wells in the area of the airport to provide supporting documentation on off-site source(s).

5. It was noted that total petroleum hydrocarbons (TPH) was identified in soil and retained as a COPC since no Environmental Protection Agency (EPA) regulatory screening criteria was available. It was noted that the observance of TPH in shallow soils may be the result of recent releases from farming equipment and surface water runoff. Sterling and ARCADIS recommended potential speciation of TPH to refine potential sources and determine risk using regulatory guidance such as Florida Department of Environmental Protection Chapter 62-777, FAC. Ms. Rivera indicated that speciation is not new to the PREQB and it should be considered during development of the Work Plan. Subsequent to the October 18, 2012 meeting, the EPA added generic standards for TPH to the RSLs in November 2012. These screening levels will be used in the RI/FS Work Plan to provide guidance. The new RSLs are based on carbon chain fractions of TPH. Speciation may be applied to identify the carbon fraction for application of appropriate RSL if required.

6. Sterling and ARCADIS discussed the proposed regulatory screening criteria and proposed that the samples collected within the drainage swales and sinkhole adjacent to Landfill 1 be evaluated as soil rather than sediment after obtaining concurrence from the PREQB, since there is intermittent flow within the system and standing water is only periodically observed. In addition, it was noted that contamination within the drainage swales which discharge into the sinkhole likely carry the COPCs (metals, petroleum hydrocarbons, and polycyclic aromatic hydrocarbons) observed in the sinkhole as a result of draining the area of the up gradient airport runway.

A discussion of storm water runoff from the airport into the sinkhole was centered on the capacity of the geology to collect the volume from a design storm. Mr. Mendez stated he had never seen the sinkhole full of water. It was noted by Mr. Starr that previous reports indicated that approximately 12 feet of standing water was observed.

7. A summary table of the area-wide background concentrations for inorganics, as established in the April 2004 Installation-Wide Background Soil Study Report Former Ramey Air Force Base prepared by Shaw Environmental, Inc., was presented. It was noted that these data and proposed reference values by Shaw will be used to screen the metals for identification of COPCs.

8. During presentation of the site investigation (SI) and RI findings, it was noted that groundwater was over 200 feet bgs and the site is located within a complex karst setting. The unconsolidated material at the site ranges in thickness from zero to 70 feet and is silty sandy clay to sandy clay. Underlying this material is soft, weathered limestone to 150 to 200 feet bgs where secondary porosity and void space increase in the limestone. Groundwater movement within karst is controlled by conduits which violate the assumption of continuity applied to most porous medium. Therefore, flow patterns cannot be understood by contouring groundwater levels. In addition, investigating potential contaminants by installing monitoring wells in karst has a high degree of uncertainty because the well must be screened across or very near a particular conduit where contaminant transport is occurring and there is no feasible method to locate conduits and

ensure that a well would intercept a particular conduit. Regional groundwater flow for the area has been reported to the north and northwest toward the ocean based upon observed locations of springs where karst groundwater discharges.

9. Given the complex karst setting and depth to groundwater over 200 feet bgs, Sterling and ARCADIS presented their technical approach to evaluate groundwater based upon the review of existing information which indicated that there is no conclusive evidence that the landfills are a source of constituents detected in the deep monitoring wells which are screened over 150 feet below the waste materials. The discussed approach will be implemented in phases to first determine if the existing monitoring wells are connected to the landfills. Initially, a dye-tracer test will be conducted and then subsequent evaluate the leachate quality at each landfill, if necessary.
10. A question was raised if a pump test was being considered rather than dye-tracer study to assist in determining connectivity between the groundwater and the adjacent monitoring wells. This will be further considered during the development of the Work Plan for the data collection phase of the project; however, it was noted that it would be costly to implement pumping test due to pump requirements to extract groundwater from over 200 feet bgs, potential high flow rates required which would result in a significant volume of extracted water to manage, and power source for the pump.
11. Another question was raised on the approach to dye trace studies. The idea is to include all the wells from the site, regardless of which landfill is nearby, when trying to detect the dye from either landfill. A detailed discussion of the methodology will be included in the Work Plan which will explain the strategy and execution inclusive of data quality measures that will be implemented during the study for the data collection phase of the project.
12. The Sterling Team discussed the landfill cap assessments using topographic survey data with 2-ft contour intervals, soil borings, geotechnical testing, and a geophysical survey to create a representative CSM. Any intrusive assessment work that breaches the landfill cap will be properly backfilled with grout. The existing CSM developed for this meeting will be refined as new data become available. The PDT noted that topographical data should be collected from a large enough area to identify contours that can impact the site, including the area associated with the airport property.
13. Speciation of TPH to refine potential sources and determine risk is not new to PREQB and should be considered during development of the Work Plan. Age-dating of petroleum hydrocarbons is not recommended since this evaluation is highly variable and may be less cost efficient. Given the relatively low concentrations in existing data and limited number of detections, the more efficient management approach recommended is speciation and risk analysis.



14. The PDT discussed the Community Relations Plan and Mr. Freeman indicated that the USACE Jacksonville District has developed a template that he will provide.
15. The PDT identified the Puerto Rico Department of Natural Resources as an additional project stakeholder that should be included in future TPP meetings and project discussions. The team also noted that the University of Puerto Rico should not be considered as a project stakeholders but rather as an interested party. The U.S. EPA Region 2 should remain as a stakeholder.
16. The PDT also discussed tools and protocols for communication and noted that TPP meeting #2 should take place in January 2013.

ACTION ITEMS:

1. Data validation to be conducted on 100% of the data collected.
2. The USACE will provide electronic copies of the working files of summary tables and reports, and geographic information system (GIS) data and laboratory results database, if available to facilitate Work Plan preparation and COPC screening.
3. The USACE will provide the RI subsurface sampling laboratory data and summary tables for Landfill 2.

There were no additional questions, discussion topics, or action items noted. The meeting ended at 1800 hrs.

MEMORANDUM ATTACHMENTS:	A	Meeting Agenda
	B	Sign-in Sheet
	C	PowerPoint Presentation
	D	Preliminary Conceptual Site Model
	E	Draft Data Quality Objectives
	F	Draft Work Plan Outline
	G	Preliminary Project Schedule
	H	TPP1 Worksheets (EM 200-1-2)

