Summary of Findings - Laguna Anones Sampling at UXO 4 Atlantic Fleet Weapons Training Area Former Vieques Naval Training Range, Vieques, Puerto Rico

PREPARED FOR:	Vieques ERP/MRP Technical Subcommittee
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DATE:	July 21, 2015

Introduction

This Technical Memorandum (TM) presents the surface water and sediment sampling results from the Remedial Investigation (RI) activities at Laguna Anones, part of Navy's ongoing cleanup of the Vieques Naval Training Range (VNTR) in Vieques, Puerto Rico (**Figures 1 and 2**). The TM is prepared under the United States Navy (Navy) Comprehensive Long-Term Environmental Action (CLEAN) Contract N62470-11-D-8012, Contract Task Order 0005, for submittal to Naval Facilities Engineering Command (NAVFAC) Atlantic, United States Environmental Protection Agency (EPA) Region 2, the Commonwealth of Puerto Rico Environmental Quality Board (PREQB), the United States Fish and Wildlife Service (USFWS), and the Puerto Rico Department of Natural and Environmental Resources (PRDNER). The Navy, EPA, PREQB, USFWS, and PRDNER work jointly as the Vieques Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Environmental Restoration Program (ERP) Technical Subcommittee.

In accordance with the *Final Master Sampling and Analysis Plan, East Vieques Terrestrial UXO Sites, Former Vieques Naval Training Range, Vieques, Puerto Rico* (CH2M HILL, 2013) (hereafter denoted as the Master SAP), Laguna Anones sampling activities were conducted in October 2013 and included the collection of sediment samples from 15 locations and surface water samples from 6 of these 15 locations for analysis of explosives and inorganic constituents. The Master SAP sets the framework for implementing the RI and provides additional details of the site history, physical characteristics, and the sampling rationale and methodology. Since the Laguna Anones sampling is part of the larger RI sampling across the former Live Impact Area (LIA), the data from Laguna Anones will ultimately be evaluated with the remaining data from the LIA and presented in an RI Report.

Site History

The LIA was established in 1965 for aerial bombing practice, and in the mid-1970s, targets were constructed for naval gunfire and marine artillery training. In February 1999, two Harrier (AV-8B) jets inadvertently fired 263 rounds of depleted uranium (DU) ammunition on the LIA during a training exercise. The area specifically affected was the North Convoy Target Area. This incident has been investigated and reports provided by independent inspections conducted by the Nuclear Regulatory Commission (NRC) and the Agency for Toxic Substances and Disease Registry (ATSDR). Based on the direct survey and environmental sample results, the NRC determined that there was no spread of DU contamination to areas outside of the LIA and that contamination from the DU inside the LIA was limited to the soil immediately surrounding the DU penetrators (NRC, 2000). The NRC shared their results with the Puerto Rico Radiation Health Division. Since Laguna Anones is close to the North

Convoy Target Area, the CERCLA Technical Subcommittee decided to include sampling and analysis of surface water and sediment for uranium in the current Master SAP.

Physical Characteristics

Laguna Anones, a lagoon that is approximately 22 acres in size, is located within the western portion of the LIA. Sediments within the lagoon originate from upgradient and adjacent surrounding areas; i.e., from surface runoff. These soils are primarily derived from limestone and dolomite bedrock. Laguna Anones is separated from the ocean by Playa Carucho (also referred to as Turtle Beach). Consequently, there is no appreciable tidal influence and the lagoon's surface water is primarily the result of direct precipitation and runoff from topographically upgradient areas. Thus, Laguna Anones is evaporative in nature and during dry conditions, evaporate-rich sediments make up the surface of the lagoon. During successive evaporative periods, naturally occurring inorganics accumulate in the lagoon area. Salinity measurements of the lagoon's surface water range from 40.3 to 68.8 parts per thousand (ppt); the average salinity of the nearby seawater is approximately 35 ppt.

Lagoon Analytical Results

In accordance with the Master SAP, Laguna Anones sediment and surface water samples were collected from areas (**Figure 2**) where the CERCLA Technical Subcommittee judged that contamination was most likely present. The location of one co-located surface water and sediment sample (10SW/SD04, as shown in **Figure 2**) was field adjusted due to dry conditions at the planned location; it was ultimately collected in a nearby area, which was approved in the field by EPA. Each surface water and sediment sample was analyzed for explosives and inorganic constituents. Since Laguna Anones is located topographically downgradient of the North Convoy Target Area, the samples from the lagoon were also analyzed for uranium.

The analytical results for the surface water and sediment samples are presented in **Tables 1 and 2**, respectively. No explosives were detected in surface water or sediment samples within Laguna Anones. This result is expected since explosive chemicals are consumed during the explosion, releasing gases that are normally part of the atmosphere. Similar results (i.e., low or no detections of explosive chemicals) have been reported at other ranges across the United States (EPA, 2012). The concentrations of inorganic constituents, including uranium, are consistent with naturally occurring levels and are not the result of former Navy activities. Additionally, there are no detections of depleted uranium in Laguna Anones. These findings confirm the conclusions of the NRC, who determined that contamination from DU inside the LIA was limited to the soil immediately surrounding the DU penetrators (NRC, 2000).

References

CH2M HILL, 2013. *Master Sampling and Analysis Plan, East Vieques Terrestrial UXO Sites, Former Vieques Naval Training Range, Puerto Rico.* January.

Nuclear Regulatory Commission (NRC), 2000. *NRC Inspection Report Concerning the Environmental Survey at Vieques Island, Puerto Rico*. September.

United States Environmental Protection Agency (EPA). 2012. *EPA Federal Facilities Forum Issue Paper: Site Characterization for Munitions Constituents*. EPA-505-S-11-001. January.

Tables

Table 1
Explosives and Inorganic Constituents in Surface Water
Summary of Findings – Laguna Anones Sampling at UXO 4
Former Vieques Naval Training Range
Vieques, Puerto Rico

Sample ID	VE-UXO04-10SW01-1013	VE-UXO04-10SW02-1013	VE-UXO04-10SW03-1013	VE-UXO04-10SW04-1013	VE-UXO04-10SW04P-1013	VE-UXO04-10SW05-1013	VE-UXO04-10SW06-1013
Station ID	10SDSW01	10SDSW02	10SDSW03	10SDSW04	10SDSW04	10SDSW05	10SDSW06
Sample Date	10/23/13	10/23/13	10/23/13	10/22/13	10/22/13	10/22/13	10/23/13
Chemical Name							
Explosives (UG/L)							
1,3,5-trinitrobenzene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
1,3-dinitrobenzene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
2,4,6-trinitrotoluene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
2,4-dinitrotoluene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
2,6-dinitrotoluene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
2-amino-4,6-dinitrotoluene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
2-nitrotoluene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
3-nitrotoluene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
4-amino-2,6-dinitrotoluene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
4-nitrotoluene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
HMX	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
nitrobenzene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
nitroglycerin	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
perchlorate	0.88 U	0.4 UJ	0.4 U	0.88 U	1.6 U	0.88 U	0.88 U
PETN	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
picric acid	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
RDX	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
tetryl	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Total Inorganic Constituents (UG/L)							
aluminum	1,940 J	436 J	1,550 J	402 J	411 J	141 J	881 J
antimony	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	1.3 J+
arsenic	4 J+	5.9 J+	3.8 J+	5.5 J+	5.8 J+	6.2 J+	3.5 J+
barium	104	89.5	109	82.9	81.1	62.1	99.7
beryllium	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.1 U
cadmium	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.21 J+
calcium	917,000	749,000	924,000	672,000	660,000	532,000	890,000
chromium	2.7 J+	1 U	1.8 J+	1 U	1 U	1 U	1.1 J+
chromium (hexavalent)	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
cobalt	1.3 J	2 U	0.92 J	2 U	2 U	2 U	0.55 J
copper	9.8 J-	4.5 J-	8.1 J-	3.1 J-	3.2 J-	1.3 J-	4.7 J-
Iron	2,610	521	2,090	460	463	143 J	1,100
lead	20 U	20 U	20 U	20 U	20 U	20 U	20 U
magnesium	1,270,000	1,990,000	1,290,000	1,790,000	1,750,000	1,500,000	1,240,000
manganese	53.9	20 U	47.7	20 U	20 U	25.5	8.8 J
nickel	15 U	15 U	15 U	15 U	15 U	15 U	15 U
potassium	344,000	571,000	350,000	513,000	500,000	436,000	336,000
selenium	2 U	2 U	2 U	2 U	2 U	2 U	0.37 J
silver	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.1 U
sodium	11,000,000	16,300,000	11,000,000	14,400,000	14,500,000	12,000,000	10,600,000
thallium	1 U	1 U	1 U	1 U	1 U	1 U	0.2 U
uranium	0.83	0.5	0.78	0.52	0.56	0.35	0.73
vanadium	20 U	20 U	20 U	20 U	20 U	20 U	20 U
zinc	100 U	100 U	100 U	100 U	100 U	100 U	100 U

Table 1
Explosives and Inorganic Constituents in Surface Water
Summary of Findings – Laguna Anones Sampling at UXO 4
Former Vieques Naval Training Range
Vieques, Puerto Rico

Sample ID	VE-UXO04-10SW01-1013	VE-UXO04-10SW02-1013	VE-UXO04-10SW03-1013	VE-UXO04-10SW04-1013	VE-UXO04-10SW04P-1013	VE-UXO04-10SW05-1013	VE-UXO04-10SW06-1013
Station ID	10SDSW01	10SDSW02	10SDSW03	10SDSW04	10SDSW04	10SDSW05	10SDSW06
Sample Date	10/23/13	10/23/13	10/23/13	10/22/13	10/22/13	10/22/13	10/23/13
Chemical Name							
Dissolved Inorganic Constituents (UG/L)							
aluminum	884	314 J	878	275 J	252 J	400 U	416 J
antimony	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	1.5 J+
arsenic	3.1 J+	5.3 J+	3.6 J+	5.5 J+	5.3 J+	6.3 J+	3.3 J+
barium	99.1	90.4	99.7	84	82.3	62.1	105
beryllium	0.5 U	0.5 U	0.5 U	0.5 J	0.37 J	0.5 U	0.1 U
cadmium	0.19 J	0.27 J	0.28 J	0.34 J	0.35 J	0.2 J	0.19 J
calcium	865,000	748,000	880,000	681,000	690,000	506,000	852,000
chromium	1.1 J	0.36 J	1.1 J	0.56 J	1 U	1 U	0.65
chromium (hexavalent)	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
cobalt	2 U	2 U	2 U	2 U	2 U	2 U	0.32 J
copper	7.8 J-	3.6 J-	6.2 J-	3.5 J-	3 J-	1.5 J-	3 J-
Iron	1,200	401	1,220	314	346	45 J	470
lead	20 U	20 U	20 U	20 U	20 U	20 U	20 U
magnesium	1,210,000	1,980,000	1,230,000	1,800,000	1,820,000	1,430,000	1,190,000
manganese	20 U	20 U	9.2 J	20 U	20 U	18.3 J	20 U
nickel	15 U	15 U	15 U	15 U	15 U	15 U	15 U
potassium	327,000	570,000	334,000	516,000	521,000	412,000	323,000
selenium	2 U	2 U	2 U	2 U	2 U	2 U	0.45 J
silver	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.1 U
sodium	10,600,000	16,200,000	10,600,000	14,500,000	14,900,000	11,300,000	10,300,000
thallium	1 U	1 U	1 U	1 U	1 U	1 U	0.2 U
uranium	0.76	0.57	0.73	0.51	0.54	0.37	0.64
vanadium	20 U	20 U	20 U	20 U	20 U	20 U	20 U
zinc	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Radionuclides (PCI/L)							
Uranium-234	0.29	0.15	0.22	0.39 J	0.24 J	0.21	0.36
Uranium-235	-0.006 U	0.034 U	0.052 U	0.031 U	0.077 U	0.049 U	0.016 U
Uranium-238	0.36	0.24	0.27	0.134	0.148	0.23	0.34
Dissolved Radionuclides (PCI/L)							
Uranium-234	0.38	0.19 U	0.31	0.23	0.22	0.123	0.22
Uranium-235	0 U	-0.027 U	-0.021 U	0.006 U	0.048	0.012 U	0.016 U
Uranium-238	0.28	0.33	0.32	0.15 J	0.25 J	0.082 U	0.133

Notes:
J- - Analyte present. Value may be biased low. Value may be higher
J - Analyte present. Value may or may not be accurate or precise
J+ - Analyte present. Value may be biased high. Actual value may be lower
U - Nondetect or not detected at a significantly greater value than that in an associated blank
UJ - Nondetect, quantitation limit may be inaccurate
PCI/L - Picocurie per liter
UG/L - Micrograms per liter

Table 2
Explosives and Inorganic Constituents in Sediment
Summary of Findings – Laguna Anones Sampling at UXO 4
Former Vieques Naval Training Range
Vieques, Puerto Rico

Sample ID	VE-UXO04-10SD01-000H	VE-UXO04-10SD02-000H	VE-UXO04-10SD03-000H	VE-UXO04-10SD04-000H	VE-UXO04-10SD04P-000H	VE-UXO04-10SD05-000H	VE-UXO04-10SD06-000H	VE-UXO04-10SD07-000H
Station ID	10SDSW01	10SDSW02	10SDSW03	10SDSW04	10SDSW04	10SDSW05	10SDSW06	10SD07
Sample Date	10/25/13	10/24/13	10/25/13	10/24/13	10/24/13	10/24/13	10/24/13	10/24/13
Chemical Name								
Explosives (MG/KG)								
1,3,5-trinitrobenzene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3-dinitrobenzene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2,4,6-trinitrotoluene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2,4-dinitrotoluene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2,6-dinitrotoluene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2-amino-4,6-dinitrotoluene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2-nitrotoluene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
3-nitrotoluene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
4-amino-2,6-dinitrotoluene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
4-nitrotoluene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
HMX	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
nitrobenzene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
nitroglycerin	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
perchlorate	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U
PETN	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
picric acid	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
RDX	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
tetryl	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Total Inorganic Constituents (MG/KG)								
aluminum	14,500	16,400	14,300	7,750	7,090	3,600	21,500	19,800
antimony	0.77	1.2	0.54	0.47	0.39	0.38	0.65	0.81
arsenic	16.4	9.7	8.8	5	4.5	3.2	9.5	11.6
barium	93.3 J-	32.3	40.5	17.6	16	8.1	57.9	44.9
beryllium	0.23 J	0.15 J	0.16 J	0.3 U	0.3 U	0.29 U	0.25 J	0.22 J
cadmium	0.83	0.76	0.25	1.1	0.93	1.1	0.27	0.34
calcium	80,700	65,600	49,900	219,000	194,000	222,000	88,300	65,700
chromium	27.7 J	28	24.8	11.5	10.4	8.1	28.7	28.5
chromium (hexavalent)	0.58 J	0.59 U	0.46 J	0.6 U	0.6 U	0.59 U	0.67 U	0.48 J
cobalt	14.1 J	10	7.8	4.2	3.9	2.1	10.9	10.3
copper	22 J	57.3	28.2	24.1	23.2	17.2	31.2	24.8
iron	31,700	34,700	21,800	11,800	11,000	5,030	31,100	34,700
lead	3.9 J-	8.1	2.8	4.1	3.2	3.5	3.7	2.3
magnesium	6,630 J	13,000	10,400	10,500	9,650	10,400	13,600	11,400
manganese	846	584	420	207	190	88.4	756	579
nickel	11.2 J	13.1	8.4	3.8	3.8	2.5	10.7	11
potassium	2,280 J	2,500	2,900	1,580	1,430	660	5,290	3,200
selenium	0.28	0.25 J	0.16 J	0.2 J	0.17 J	0.12 J	0.3 J	0.18 J
silver	0.056 J	0.041 J	0.038 J	0.047 J	0.036 J	0.05 J	0.083 U	0.073 J
sodium	4,770 J	9,970	7,100	13,900	12,700	9,990	9,850	6,930
thallium	0.031 J	0.073 U	0.066 U	0.075 U	0.075 U	0.074 U	0.083 U	0.069 U
uranium	0.19	0.3	0.19	1.6	1.7	2.2	0.3	0.22
vanadium	107 J	80	66.3	35	32.2	22.1	84.3	91
zinc	34.6 J	55.7	31	32.1 J	21.8 J	15	36.1	33.9
Radionuclide (PCI/G)								
Uranium-234	0.192	0.187	0.146	0.61	0.62	0.83	0.242	0.145
Uranium-235	0.028 U	0.016 U	0.016 U	0.044 J+	0.041 J+	0.058 U	0.003 U	0.007 U
Uranium-238	0.147	0.171	0.084	0.52	0.53	0.85	0.2	0.184

Notes:
J- - Analyte present. Value may be biased low. Value may be higher.
J+ - Analyte present. Value may be biased high. Value may be lower.
J - Analyte present. Value may or may not be accurate or precise.
NS - Not sampled
U - Nondetect or not detected at a significantly greater value than that in an associated blank
UJ - Nondetect, quantitation limit may be inaccurate
MG/KG - Milligrams per kilogram
PCI/G - Picocuire per gram

Table 2
Explosives and Inorganic Constituents in Sediment
Summary of Findings – Laguna Anones Sampling at UXO 4
Former Vieques Naval Training Range
Vieques, Puerto Rico

Sample ID	VE-UXO04-10SD08-000H	VE-UXO04-10SD09-000H	VE-UXO04-10SD10-000H	VE-UXO04-10SD11-000H	VE-UXO04-10SD12-000H	VE-UXO04-10SD13-000H	VE-UXO04-10SD14-000H	VE-UXO04-10SD15-000H
Station ID	10SD08	10SD09	10SD10	10SD11	10SD12	10SD13	10SD14	10SD15
Sample Date	10/24/13	10/24/13	10/24/13	10/25/13	10/25/13	10/25/13	10/24/13	10/24/13
Chemical Name								
Explosives (MG/KG)								
1,3,5-trinitrobenzene	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3-dinitrobenzene	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2,4,6-trinitrotoluene	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2,4-dinitrotoluene	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2,6-dinitrotoluene	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2-amino-4,6-dinitrotoluene	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2-nitrotoluene	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
3-nitrotoluene	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
4-amino-2,6-dinitrotoluene	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
4-nitrotoluene	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
HMX	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
nitrobenzene	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
nitroglycerin	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
perchlorate	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U
PETN	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	1 U
picric acid	0.12 U	0.12 UJ	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
RDX	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
tetryl	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Total Inorganic Constituents (MG/KG)								
aluminum	18,800	17,500	21,900	23,300	17,900	12,000	15,400	17,700
antimony	0.59	0.56	0.91	0.93	0.57	0.94	0.72	0.81
arsenic	9	6.3	10.8	16.5	8.8	34.3	8.9	13.3
barium	44.3	45.1	54.8	71.1	56.1	35.4	42.4	30.4
beryllium	0.2 J	0.2 J	0.23 J	0.27 J	0.18 J	0.25 J	0.18 J	0.19 J
cadmium	0.53	1.2	3.3	0.59	0.47	0.16	0.58	0.72
calcium	101,000	84,000	95,800	51,100	69,400	31,900	88,300	108,000
chromium	27.6	26	32.8	37.8	26.9	21.3	21.1	19.9
chromium (hexavalent)	0.74 U	0.97 U	0.94 U	0.43 J	0.6 J	0.4 J	0.66 U	0.58 U
cobalt	9.4	9	11.5	13	9.1	12.2	8.7	8.5
copper	31.1	68.7	75.9	37	30	19.3	35.9	37.6
iron	26,500	25,700	33,000	43,600	26,600	41,400	25,800	28,800
lead	3.5	8.3	8	4.8	3.6	8.1	5.6	6.8
magnesium	14,700	22,400	19,500	13,300	11,000	5,500	11,700	10,000
manganese	732	728	721	631	545	372	594	460
nickel	9.4	9.5	12.2	12.7	10	8.9	7.9	7.3
potassium	4,500	6,480	5,760	4,240	3,560	2,160	3,700	2,940
selenium	0.5	0.39 J	0.47	0.26 J	0.2 J	0.16 J	0.26 J	0.27 J
silver	0.074 J	0.11 J	0.14 J	0.051 J	0.042 J	0.066 U	0.043 J	0.072 U
sodium	22,100	86,200	40,300	8,940	10,800	5,400	11,700	9,810
thallium	0.092 U	0.12 U	0.12 U	0.038 J	0.076 U	0.066 U	0.082 U	0.072 U
uranium	0.5	0.25	0.58	0.33	0.24	0.13	0.41	0.31
vanadium	72.8	60.7	82.9	116	76.4	180	66.8	77.1
zinc	27.2	60	63.5	42.3	35.9	25.7	36.5	39.8
Radionuclide (PCI/G)								
Uranium-234	0.24	0.216	0.343	0.199	0.188	0.15	0.241	0.167
Uranium-235	0.036 U	0.005 U	0.035 U	0.014 J+	0.014 U	0.018 U	0.013 J+	0.018 U
Uranium-238	0.259	0.205	0.341	0.154	0.156	0.156	0.216	0.195

Notes:
J- - Analyte present. Value may be biased low. Value may be higher.
J+ - Analyte present. Value may be biased high. Value may be lower.
J - Analyte present. Value may or may not be accurate or precise.
NS - Not sampled
U - Nondetect or not detected at a significantly greater value than that in an associated blank
UJ - Nondetect, quantitation limit may be inaccurate
MG/KG - Milligrams per kilogram
PCI/G - Picocuire per gram

Figures

R:\USNAVFACENGCOM405450\VIEQUES\MAPFILES\SUMMARY_OF_FINDINGS_LAGUNA_ANONES_SAMPLING_AT_UXO_4_TM\FIGURE 1 - REGIONAL LOCATION MAP - EMBEDED.MXD CELEFTHERIADIS 3/25/2014 10:03:19 AM

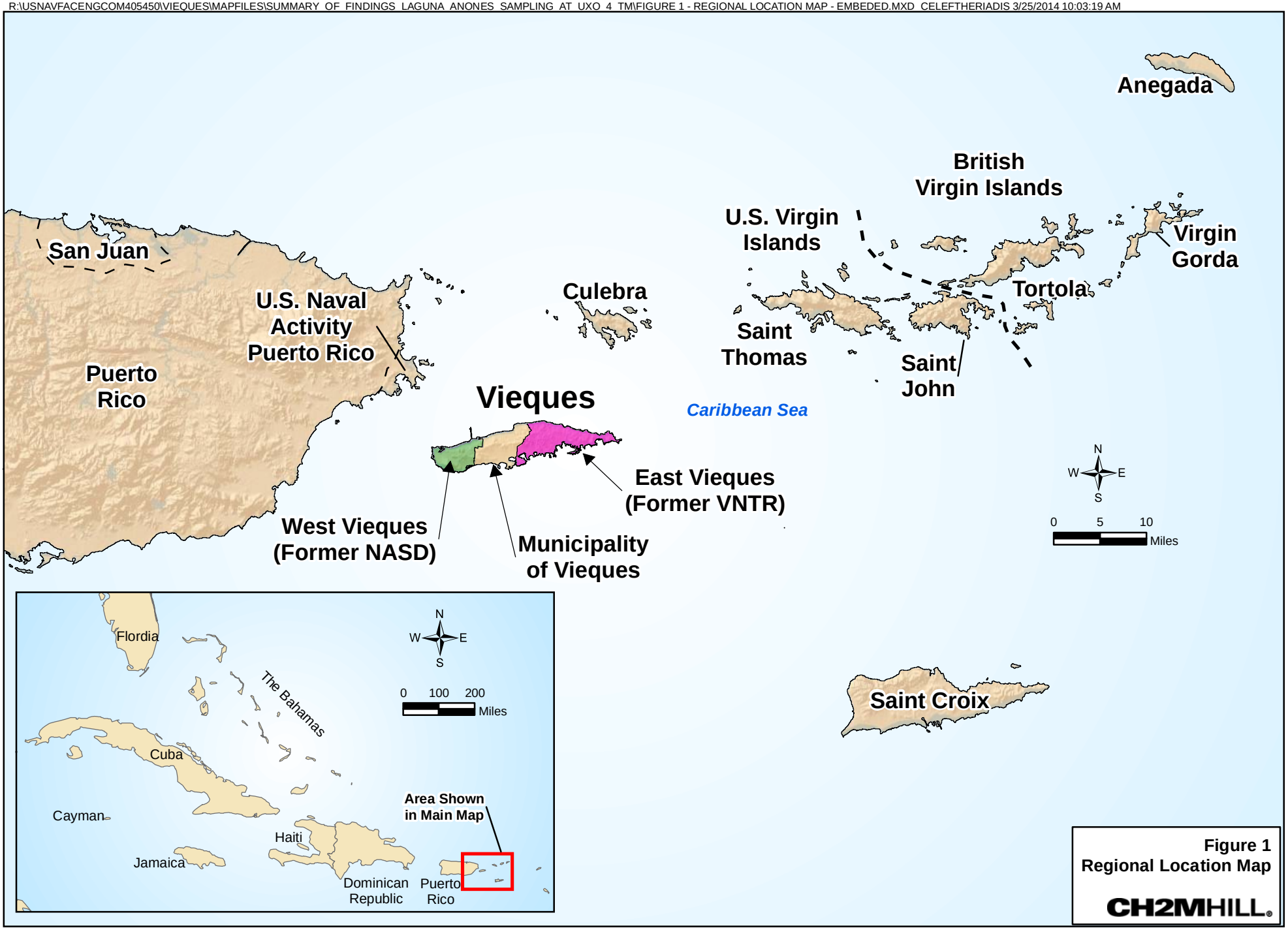

Figure 1
Regional Location Map

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(\\mnustrictgfs01\ctg$\projects) R:\USNavFacEngCom405450\Vieques\MapFiles\Summary_of_Findings_Laguna_Anones_Sampling_at_UXO_4_TM\Figure 2 - Laguna Anones Site Map - EMBEDEDV2.mxd8/12/2015fcain

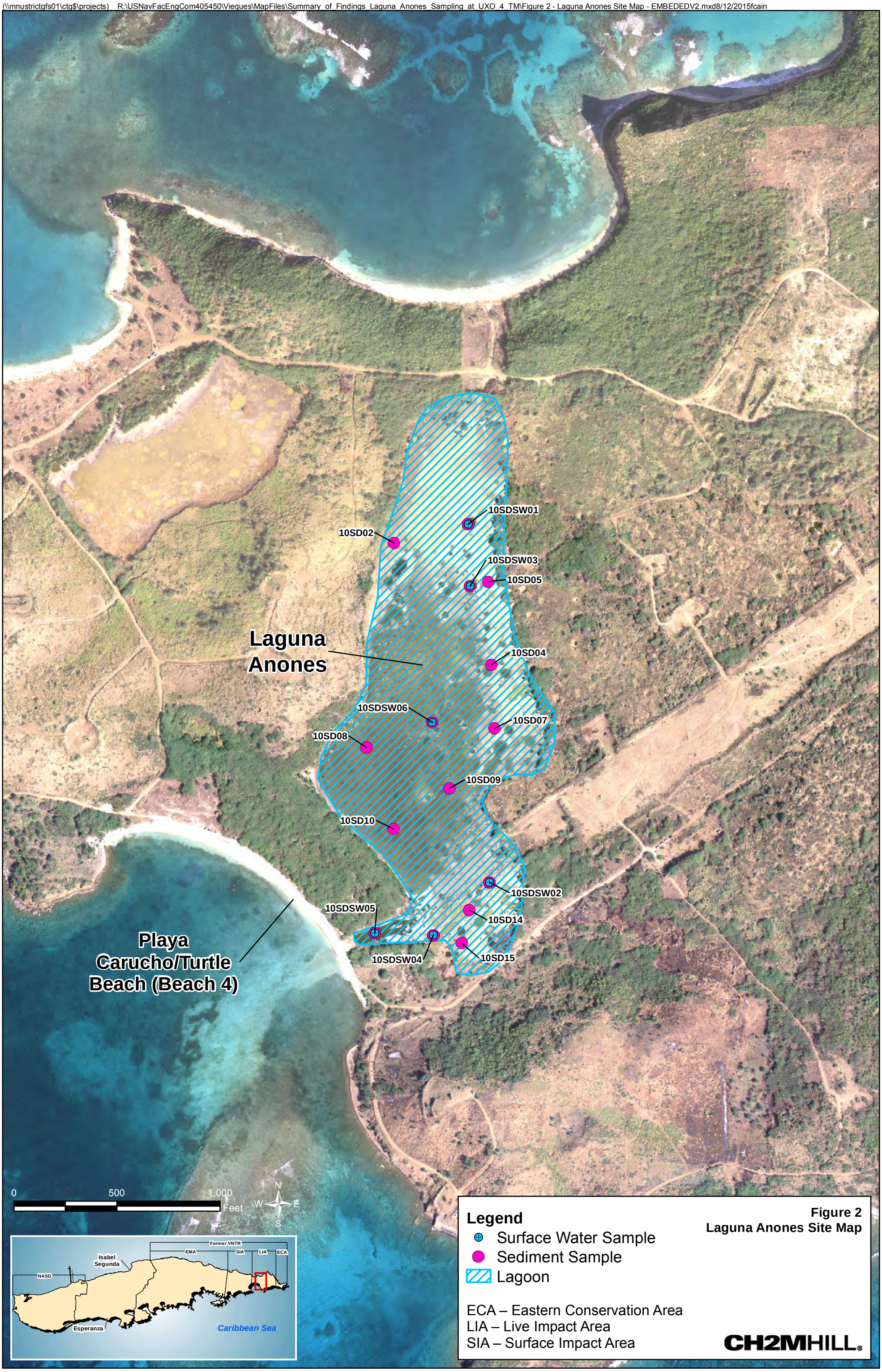

Figure 2
Laguna Anones Site Map