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June 21, 2010

U.S. Environmental Protection Agency – Region II
290 Broadway – 22nd Floor
New York, NY 10007-1866

Attn: Mr. Adolf Everett, P.E.
Chief, RCRA Programs Branch

Re: Contract N62470-10-D-3000
IQC for A/E Services for Multi-Media
Environmental Compliance Engineering Support
Delivery Order JM01
U.S. Naval Activity Puerto Rico (NAPR)
EPA I.D. No. PR2170027203
Final Sampling Strategy for Disturbed Soil Sampling, SWMU 69-Aircraft Parking Area

Dear Mr. Everett:

Michael Baker, Jr., Inc. (Baker), on behalf of the Navy, is pleased to present you with the subject Sampling Strategy for SWMU 69. This strategy has been modified to address Environmental Protection Agency (EPA) comments dated May 11, 2010 and Puerto Rico Environmental Quality Board (EQB) comments dated May 17, 2010. Navy responses to these comments are attached for your review. This strategy has been prepared as a consequence of the retraction of the Draft Corrective Measures Study (CMS) Report for Solid Waste Management Unit (SWMU) 69 on December 3, 2008. This strategy provides a brief site background, the activities during 2008 that resulted in alterations to the site conditions before the implementation of the corrective measure; and the consequent need for the recharacterization of the site because of its current altered conditions. Sampling location figures and tables are also provided to support the discussion. This sampling strategy provides an outline of the sample collection and analysis of the disturbed surface soil at the site; whereas the details of the field investigation activities and the technical approach for conducting the CMS are presented in the Final CMS Work Plan for SWMU 69 submitted by Baker on December 6, 2007. Data collected from this field investigation will be incorporated in the CMS in accordance with that work plan.

Site Background

SWMU 69 is located in the northern portion of former Naval Activity Puerto Rico (NAPR), Ceiba, Puerto Rico, within Airfield Parcel 33 that was transferred to Puerto Rico Ports Authority on February 8, 2008. On September 12, 2008, the Navy submitted a Draft Corrective Measures Study report for SWMU 69. The Draft CMS for SWMU 69 evaluated the data collected for organic constituents (Appendix IX Volatile Organic Compounds [VOCs] and Semi-Volatile Organic Compounds [SVOCs]) and inorganic constituents (Appendix IX metals) in surface soil and subsurface soil; and Appendix IX VOCs, SVOCs, and total and dissolved metals in groundwater. A human health and ecological risk assessment was conducted. The following list of Contaminants of Concern (COCs) was developed for Corrective Action Objectives (CAOs): barium, cadmium, lead and zinc in surface soil (i.e., 0 to 1.0 foot below ground

surface [bgs]). Two areas of contamination, one foot deep were proposed for excavation as the selected alternative for corrective measures implementation (CMI) in the draft CMS.

During the summer of 2008, in support of the conversion of the airfield to a commercial facility by the Puerto Rico Ports Authority (PRPA), significant areas of soil associated with SWMU 69 were disturbed by contractors. During August 6 through August 8, 2008, it was reported that one of the contractors excavated a trench (approximately 12 inches in width and approximately 24 inches in depth) for the installation of 2-inch PVC conduits for most of the taxiway lighting system. The trench was offset about 10 feet from the edge of the concrete or asphalt pavement. Baker, unaware of the trenching activities arrived on September 22, 2008 to conduct pre-excavation sampling activities in support of the CMI and found that the site was extensively disturbed. On October 2, 2008, Baker conducted a follow-up site visit and made more detailed observations as follows: (1) the vegetation along the eastern, and southern sides of the apron were disturbed; (2) a trench was dug approximately 10 feet off the eastern and southern edges of the concrete; (2) it appeared that some of the surface soils (ranging from approximately one inch to a maximum of up to 12 inches) were scraped; (3) some of the scraped soils were pushed down slope away from the apron towards the drainage ditch which parallels the southern edge of the apron; and (4) scraped soil piles were present at various locations within the site.

Therefore the following conclusions are being drawn by the Navy regarding the site conditions and the necessity for this investigation. The soil that had been previously characterized as part of SWMU 69 was disturbed as observed by Baker personnel; thereby resulting in a significant alteration of the physical conditions of the site as well as a potential redistribution of the COCs. In particular, the area adjacent to the southern portion of the expanded apron which was observed to have been disturbed included two areas which were proposed for excavation as part of the CMI. Consequently, the areas of contamination exceeding corrective action objectives, as shown on Figure 1, are no longer accurate. As discussed previously, subsurface soil to a depth of approximately 24 inches below ground surface (bgs) is likely to have been disturbed. Although soil disturbance beyond the 2-foot depth interval was not apparent during the October 2, 2008 site visit, this sampling strategy has been developed for sampling and analysis of soil to a maximum depth of 3 feet bgs to characterize the site under its altered conditions. Sampling to a maximum depth of 3 feet bgs will be conducted as a measure of conservatism since the depth of soil disturbance is an approximation. Furthermore, erosion and previously observed lack of vegetation on surface soil has potentially caused the migration of soil into the drainage ditches and downgradient possibly into the culvert; therefore, this sampling strategy includes sampling of sediment in the southern and eastern drainage ditches. Finally this sampling strategy includes sampling and analysis of the soil piles that were likely created during grading operations at the site to confirm the similarity of the nature of its contamination to the rest of the soil at the site.

Project Objectives and Methodology

Based on the background information presented above, this sampling strategy proposes the sampling of surface soil (0 to 1 foot bgs) and subsurface soil (1 to 2 feet bgs and 2 to 3 feet bgs) adjacent to the southern expanded apron in two rows on a 50-foot by 50-foot grid pattern at 52 grid locations (SB-101 through SB-152) as shown on Figure 2. One biased sample will be collected from each grid cell based on visual observations of contaminated surface soil such as staining, presence of debris, etc. If visual observations of the surface soil do not suggest locations for selecting biased sample locations, the

approximate centers of each sampling grid cell will be selected to provide an unbiased sample. Each sample will be collected using a direct-push technique (DPT), which will simultaneously yield both the surface soil (0 to 1 foot bgs) and subsurface soil (1 to 2 feet bgs and 2 to 3 feet bgs) samples. For each depth interval sampled, soil will be transferred to disposable aluminum pie pans and homogenized using disposable stainless steel spoons before being apportioned into sample containers.

It is anticipated that ten soil piles (SO-01 through SO-10) will be encountered at various locations within the grid cells. These soil piles are anticipated to be approximately 2 feet in height, 3 to 4 feet in width at the base, and variable in length. One composite soil sample will be prepared from each soil pile using individual aliquots collected from the surface to a depth of 1 to 3 feet (depending on the size of the pile) by pushing Macro-Cores® tubes in a generally vertical direction to the face of each pile at each evenly-spaced location along its perimeter. Each aliquot will consist of a representative portion of homogenized sample of a one to three foot length of core sample, depending on the size of the pile. A minimum of four and a maximum of ten evenly-spaced locations will be selected along the perimeter of each soil pile for collecting the samples to make up each composite. The composite sample for each pile will be prepared by homogenizing individual aliquots in disposable aluminum pans, using disposable stainless steel spoons.

Soil/sediment samples will be collected within the southern drainage ditch at eleven locations (SD-01 through SD-11) and within the eastern drainage ditch adjacent to the disturbed soil area at one location (SD-12). Soil/sediment samples (SD-13 and SD-14) are proposed to be collected from the downgradient locations of the convergence of the southern and eastern drainage ditches. The presence or absence of a culvert downgradient of the point of convergence of these two drainage ditches will be determined in the field and the coordinates of its inlet will be recorded using a global positioning system (GPS). Locations of the sediment samples within the culvert will be determined in relation to the inlet of the culvert. The sampling depths for soil/sediment samples from the drainage ditch or culvert locations will be 0 to 6 inches and these samples will be collected using disposable stainless steel spoons, and mixed using disposable aluminum pans to obtain homogeneous samples before being transferred into sample containers.

The analytical program for soil will include the complete list of Appendix IX metals that will yield data to conduct a comprehensive screening against the Airfield soil background data set. The analytical program for sediment samples will also include the complete list of Appendix IX metals to provide an indication of potential migration of soil contaminants into the drainage ditches and culvert from SWMU 69 soil. The soil and sediment samples will be analyzed for Appendix IX metals, as shown on Table 1, following the analytical methods and detection limits presented on Tables 2A and 2B. Included within Tables 2A and 2B are the media-specific screening values that will be used to evaluate potential human health and ecological risks. It is noted that non-detected results will be reported and evaluated at the reporting limit. Quality Assurance/Quality Control (QA/QC) and IDW samples will be collected and analyzed for the parameters as shown in Table 3.

The sampling locations within the sampling grid, perimeters of waste soil piles, and sediment sample locations will be surveyed for horizontal coordinates and vertical elevations. All field activities including utility clearance, health and safety procedures, sampling, investigation derived waste (IDW) management, decontamination, surveying, chain of custody, and quality assurance/quality control procedures, will

follow the EPA-approved Final CMS Work Plan for SWMU 69 submitted on December 6, 2007. The data will be validated as described in that work plan.

If you have questions regarding this submittal, please contact Mr. Mark Davidson at (843) 743-2124.

Sincerely,

MICHAEL BAKER JR., INC.

Mark E. Kimes, P.E.
Activity Coordinator

MEK/lp
Attachments

cc: Ms. Debra Evans-Ripley, BRAC PMO SE (letter only)
Mr. David Criswell, BRAC PMO SE (letter only)
Mr. Mark E. Davidson, BRAC PMO SE (1 hard copy)
Mr. Pedro Ruiz, NAPR (1 hard copy)
Mr. Tim Gordon, USEPA Region II (1 hard copy)
Mr. Carl Soderberg, US EPA Caribbean Office (1 hard copy)
Mr. Felix Lopez, US F&WS (1 hard copy)
Mr. Jonathan Flewelling, TechLaw, Inc. (1 hard copy)
Ms. Wilmarie Rivera, PREQB (1 hard copy)
Ms. Gloria Toro, PREQB (1 hard copy)

NAVY RESPONSE TO EPA COMMENT LETTER DATED MAY 11, 2010 AND PREQB COMMENT LETTER DATED MAY 17, 2010 ON THE DRAFT SOIL SAMPLING STRATEGY FOR DISTURBED SOIL, SWMU 69 – AIRCRAFT PARKING AREA DATED APRIL 20, 2010

(EPA and PRERQB comments are provided in italics while the Navy responses are provided in regular print.)

EPA COMMENTS DATED MAY 11, 2010

EPA Comment: *EPA concurs with the proposed sampling strategy. However, no schedule was given with the April 20, 2010 letter for implementation of this sampling or for incorporating the results into a revised Draft CMS Report for SWMU 69, and submitting the revised CMS report to EPA. Therefore, within 30 days of your receipt of this letter, please submit a schedule for implementation of this sampling and incorporating the results into a revised Draft CMS Report for SWMU 69, and submitting the draft report to EPA.*

Navy Response to EPA Comment: The proposed schedule for implementation of the sampling and reporting tasks for SWMU 69 is attached to this response as Figure 1.

PREQB COMMENTS DATED MAY 17, 2010

GENERAL COMMENTS

1. *Based on observations made by Baker personnel, the limit of soil disturbance at SWMU 69 is two feet in depth. Therefore, please collect the subsurface soil samples in one-foot increments (1- to 2-feet and 2- to 3-feet below grade) as opposed to collecting one two-foot increment. This would minimize the potential of dilution of the 1- to 2-foot interval soils with the presumably cleaner 2- to 3-foot interval soils. Further, as a cost-saving measure, the laboratory can analyze the 1- to 2-foot interval as soon as the samples are submitted and archive the deeper interval for potential analysis at a later date pending the results of the first analyses and evaluation of the data relative to the CAOs. If the results of an upper interval sample analysis exceed the CAOs, the laboratory could then analyze the sample from the lower interval. This approach would allow for better vertical definition and it may also prove to be cost-effective during the implementation of the corrective measures, i.e., soils may only have to be excavated to depths of 2 feet as opposed to 3 feet.*

Navy Response to PREQB General Comment 1: The Navy agrees with this comment. Subsurface soil samples at each sampling location will be collected in one-foot increments (1.0 to 2.0-feet below ground surface and 2.0 to 3.0-feet below ground surface. In lieu of holding samples from the 2.0 to 3.0-foot depth interval until analytical results are available for samples collected from the 2.0 to 3.0-foot depth interval, both depth intervals will be analyzed and reported. This will serve to confirm observations that soil disturbance activities were limited to the top two feet. It is noted that future field investigations will still collect subsurface soil samples from the 1.0 to 3.0-foot depth interval. The Navy has agreed to collected soil in one-foot increments to a depth of 3 feet at SWMU 69 based on the soil disturbance activities conducted by the Puerto Rico Ports Authority.

PAGE-SPECIFIC COMMENTS

1. *<u>Table 1</u>:*
    a. *Please correct the sample identification number for the 1-3 foot sample collected at 69SB118-01. It is currently listed as 69SB108-01.*

b. *Please collect a matrix spike/matrix spike duplicate sample from one of the soil pile samples in order to properly assess the matrix effects on this particular matrix. Please revise the table accordingly.*

Navy Response to PREQB Page-Specific Comment 1a: The referenced sample number for the 1 to 3 foot depth interval will be changed from 69SB108-01 to 69SB118-01 as suggested by this comment.

Navy Response to PREQB Page-Specific Comment 1b: The matrix spike/matrix spike duplicate originally specified for sample 69SB151-00 will be deleted and replaced by a matrix spike/matrix spike duplicate collected from soil pile sample 69SO01MS/MSD.

2. *<u>Table 2</u>:*
   a. *Some of the listed quantitation limits (QL) exceed soil screening levels. Please evaluate the use of ICP/MS (SW-846 method 6020A) in order to achieve these screening levels.*
      i. *The QL of arsenic (1.0 mg/kg) exceeds the EPA Regional Screening level for residential soil (0.39 mg/kg).*
      ii. *The QL of chromium (1.0 mg/kg) exceeds the EPA Regional Screening level for hexavalent chromium in residential soil (0.29 mg/kg).*
      iii. *The QL of tin (5.0 mg/kg) exceeds the NAPR basewide background value (3.76 mg/kg).*
   b. *Please clarify to what criteria the sediment sample results will be compared.*
   c. *Please provide a revised Table 2 showing the criteria being used for soil and sediment samples in addition to the QLs.*
   d. *Please confirm that the QLs will be used in the evaluation of nondetect results and not the method detection limits, as this has been an issue in previous reports submitted for this SWMU.*

Navy Response to PREQB Page-Specific Comment 2a on Table 2: ICP/MS (SW-846 Method 6020A will be used for the analysis of Appendix IX metals. Table 2 has been revised to Tables 2A and 2B for soil and sediment, respectively. Tables 2A and 2B present the QLs for Method 6020A, as well as the screening criteria that will be used for soil and sediment samples.

(i) Note that while the Method 6020A QL for arsenic exceeds the Regional Screening Level for residential soil, it meets the NAPR background screening value.

(ii) The Method 6020A QL for chromium is less than all applicable screening levels. Based on a review of site-specific history, hexavalent chromium is not a chemical of concern at this SWMU. Therefore, Regional Screening Levels for trivalent chromium are used for soil and sediment samples.

(iii) The Method 6020A QL for tin is less than all applicable screening levels.

Navy Response to PREQB Page-Specific Comment 2b on Table 2: Table 2B has been revised to present the criteria to which sediment samples will be compared.

Navy Response to PREQB Page-Specific Comment 2c on Table 2: Table 2 has been revised to Tables 2A and 2B. Tables 2A and 2B present the QLs for Method 6020A, as well as the screening criteria that will be used for soil and sediment samples. It is noted that the CMS will include an ecological risk assessment. Potential risks to upper trophic level receptors will be evaluated by comparing estimated dietary doses to literature-based toxicity reference values. Therefore, the ecological soil and sediment

screening values presented in Table 2B are specific to terrestrial and aquatic receptor groups, respectively (i.e., terrestrial and aquatic plants and invertebrates).

Navy Response to PREQB Page-Specific Comment 2d on Table 2: Non-detect results will be reported to the QLs (or reporting limits [RLs]) and not the method detection limits (MDLs) for this SWMU.

3. *Table 3:*
    a. *The document stated that the field activities including the quality assurance/quality control procedures will follow the EPA-approved Final CMS Work Plan for SWMU 69 submitted on December 6, 2007. Please revise Table 3 in order to be in accordance with Section 3.5 of CMS Work Plan. Specifically to proposed to use trip blanks at a frequency of one per shipped cooler.*

Navy Response to PREQB Page-Specific Comment 3 on Table 3: The referenced Table 3 is in accordance with the CMS Work Plan. Trip blanks are only required for samples that are to be analyzed for VOCs or TPH GRO. Soil and/or sediment samples that will be collected as part of the Sampling Strategy for Disturbed Soil for SWMU 69 will not be analyzed for VOCs or TPH GRO; consequently, trip blanks are not required.

TABLE 1

SUMMARY OF PROPOSED SOIL SAMPLING AND ANALYTICAL PROGRAM
SAMPLING STRATEGY FOR DISTURBED SOILS
SWMU 69 - AIRCRAFT PARKING AREA
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO

Sample Identification Number	Sample Depth (ft bgs)	Appendix IX Metals	Comment
Soil Samples:			
69SB101-00	0 to 1	X	
69SB101-00D	0 to 1	X	Duplicate
69SB101-00MS/MSD	0 to 1	X	Matrix Spike/Matrix Spike Duplicate
69SB101-01	1 to 2	X	
69SB101-02	2 to 3	X	
69SB102-00	0 to 1	X	
69SB102-01	1 to 2	X	
69SB102-02	2 to 3	X	
69SB103-00	0 to 1	X	
69SB103-01	1 to 2	X	
69SB103-02	2 to 3	X	
69SB104-00	0 to 1	X	
69SB104-01	1 to 2	X	
69SB104-01D	1 to 2	X	Duplicate
69SB104-02	2 to 3	X	
69SB105-00	0 to 1	X	
69SB105-01	1 to 2	X	
69SB105-02	2 to 3	X	
69SB106-00	0 to 1	X	
69SB106-01	1 to 2	X	
69SB106-02	2 to 3	X	
69SB107-00	0 to 1	X	
69SB107-01	1 to 2	X	
69SB107-02	2 to 3	X	
69SB107-02D	2 to 3	X	Duplicate
69SB107-02MS/MSD	2 to 3	X	Matrix Spike/Matrix Spike Duplicate
69SB108-00	0 to 1	X	
69SB108-01	1 to 2	X	
69SB108-02	2 to 3	X	
69SB109-00	0 to 1	X	
69SB109-01	1 to 2	X	
69SB109-02	2 to 3	X	
69SB110-00	0 to 1	X	
69SB110-01	1 to 2	X	
69SB110-02	2 to 3	X	
69SB111-00	0 to 1	X	

TABLE 1

SUMMARY OF PROPOSED SOIL SAMPLING AND ANALYTICAL PROGRAM
SAMPLING STRATEGY FOR DISTURBED SOILS
SWMU 69 - AIRCRAFT PARKING AREA
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO

Sample Identification Number	Sample Depth (ft bgs)	Appendix IX Metals	Comment
Soil Samples:			
69SB111-00D	0 to 1	X	Duplicate
69SB111-01	1 to 2	X	
69SB111-02	2 to 3	X	
69SB112-00	0 to 1	X	
69SB112-01	1 to 2	X	
69SB112-02	2 to 3	X	
69SB113-00	0 to 1	X	
69SB113-01	1 to 2	X	
69SB113-02	2 to 3	X	
69SB114-00	0 to 1	X	
69SB114-01	1 to 2	X	
69SB114-01D	1 to 2	X	Duplicate
69SB114-01MS/MSD	1 to 2	X	Matrix Spike/Matrix Spike Duplicate
69SB114-02	2 to 3	X	
69SB115-00	0 to 1	X	
69SB115-01	1 to 2	X	
69SB115-02	2 to 3	X	
69SB116-00	0 to 1	X	
69SB116-01	1 to 2	X	
69SB116-02	2 to 3	X	
69SB117-00	0 to 1	X	
69SB117-01	1 to 2	X	
69SB117-02	2 to 3	X	
69SB117-02D	2 to 3	X	Duplicate
69SB118-00	0 to 1	X	
69SB118-01	1 to 2	X	
69SB118-02	2 to 3	X	
69SB119-00	0 to 1	X	
69SB119-01	1 to 2	X	
69SB119-02	2 to 3	X	
69SB120-00	0 to 1	X	
69SB120-01	1 to 2	X	
69SB120-02	2 to 3	X	
69SB121-00	0 to 1	X	
69SB121-00D	0 to 1	X	Duplicate
69SB121-00MS/MSD	0 to 1	X	Matrix Spike/Matrix Spike Duplicate

TABLE 1

SUMMARY OF PROPOSED SOIL SAMPLING AND ANALYTICAL PROGRAM
SAMPLING STRATEGY FOR DISTURBED SOILS
SWMU 69 - AIRCRAFT PARKING AREA
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO

Sample Identification Number	Sample Depth (ft bgs)	Appendix IX Metals	Comment
Soil Samples:			
69SB121-01	1 to 2	X	
69SB121-02	2 to 3	X	
69SB122-00	0 to 1	X	
69SB122-01	1 to 2	X	
69SB122-02	2 to 3	X	
69SB123-00	0 to 1	X	
69SB123-01	1 to 2	X	
69SB123-02	2 to 3	X	
69SB124-00	0 to 1	X	
69SB124-01	1 to 2	X	
69SB124-01D	1 to 2	X	Duplicate
69SB124-02	2 to 3	X	
69SB125-00	0 to 1	X	
69SB125-01	1 to 2	X	
69SB125-02	2 to 3	X	
69SB126-00	0 to 1	X	
69SB126-01	1 to 2	X	
69SB126-02	2 to 3	X	
69SB127-00	0 to 1	X	
69SB127-01	1 to 2	X	
60SB127-02	2 to 3	X	
60SB127-02D	2 to 3	X	Duplicate
60SB127-02MS/MSD	2 to 3	X	Matrix Spike/Matrix Spike Duplicate
69SB128-00	0 to 1	X	
69SB128-01	1 to 2	X	
69SB128-02	2 to 3	X	
69SB129-00	0 to 1	X	
69SB129-01	1 to 2	X	
69SB129-02	2 to 3	X	
69SB130-00	0 to 1	X	
69SB130-01	1 to 2	X	
69SB130-02	2 to 3	X	
69SB131-00	0 to 1	X	
69SB131-00D	0 to 1	X	Duplicate
69SB131-01	1 to 2	X	
69SB131-02	2 to 3	X	

TABLE 1

SUMMARY OF PROPOSED SOIL SAMPLING AND ANALYTICAL PROGRAM
SAMPLING STRATEGY FOR DISTURBED SOILS
SWMU 69 - AIRCRAFT PARKING AREA
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO

Sample Identification Number	Sample Depth (ft bgs)	Appendix IX Metals	Comment
Soil Samples:			
69SB132-00	0 to 1	X	
69SB132-01	1 to 2	X	
60SB132-02	2 to 3	X	
69SB133-00	0 to 1	X	
69SB133-01	1 to 2	X	
69SB133-02	2 to 3	X	
69SB134-00	0 to 1	X	
69SB134-01	1 to 2	X	
69SB134-01D	1 to 2	X	Duplicate
69SB134-01MS/MSD	1 to 2	X	Matrix Spike/Matrix Spike Duplicate
69SB134-02	2 to 3	X	
69SB135-00	0 to 1	X	
69SB135-01	1 to 2	X	
69SB135-02	2 to 3	X	
69SB136-00	0 to 1	X	
69SB136-01	1 to 2	X	
69SB136-02	2 to 3	X	
69SB137-00	0 to 1	X	
69SB137-01	1 to 2	X	
69SB137-02	2 to 3	X	
69SB137-02D	2 to 3	X	Duplicate
69SB138-00	0 to 1	X	
69SB138-01	1 to 2	X	
69SB138-02	2 to 3	X	
69SB139-00	0 to 1	X	
69SB139-01	1 to 2	X	
69SB139-02	2 to 3	X	
69SB140-00	0 to 1	X	
69SB140-01	1 to 2	X	
69SB140-02	2 to 3	X	
69SB141-00	0 to 1	X	
69SB141-00D	0 to 1	X	Duplicate
69SB141-00MS/MSD	0 to 1	X	Matrix Spike/Matrix Spike Duplicate
69SB141-01	1 to 2	X	
69SB141-02	2 to 3	X	
69SB142-00	0 to 1	X	

TABLE 1

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SAMPLING STRATEGY FOR DISTURBED SOILS
SWMU 69 - AIRCRAFT PARKING AREA
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO

Sample Identification Number	Sample Depth (ft bgs)	Appendix IX Metals	Comment
Soil Samples:			
69SB142-01	1 to 2	X	
69SB143-02	2 to 3	X	
69SB143-00	0 to 1	X	
69SB143-01	1 to 2	X	
69SB143-02	2 to 3	X	
69SB144-00	0 to 1	X	
69SB144-01	1 to 2	X	
69SB144-01D	1 to 2	X	Duplicate
69SB144-02	2 to 3	X	
69SB145-00	0 to 1	X	
69SB145-01	1 to 2	X	
69SB145-02	2 to 3	X	
69SB146-00	0 to 1	X	
69SB146-01	1 to 2	X	
69SB146-02	2 to 3	X	
69SB147-00	0 to 1	X	
69SB147-01	1 to 2	X	
69SB147-02	2 to 3	X	
69SB147-02D	2 to 3	X	Duplicate
69SB147-02MS/MSD	2 to 3	X	Matrix Spike/Matrix Spike Duplicate
69SB148-00	0 to 1	X	
69SB148-01	1 to 2	X	
69SB148-02	2 to 3	X	
69SB149-00	0 to 1	X	
69SB149-01	1 to 2	X	
69SB149-02	2 to 3	X	
69SB150-00	0 to 1	X	
69SB150-01	1 to 2	X	
69SB150-02	2 to 3	X	
69SB151-00	0 to 1	X	
69SB151-00D	0 to 1	X	Duplicate
69SB151-01	1 to 2	X	
69SB151-02	2 to 3	X	
69SB152-00	0 to 1	X	
69SB152-01	1 to 2	X	
69SB152-02	2 to 3	X	

TABLE 1

SUMMARY OF PROPOSED SOIL SAMPLING AND ANALYTICAL PROGRAM
SAMPLING STRATEGY FOR DISTURBED SOILS
SWMU 69 - AIRCRAFT PARKING AREA
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO

Sample Identification Number	Sample Depth (ft bgs)	Appendix IX Metals	Comment
Soil Pile Samples:			
69SO01	0 to ?	X	Depth is dependent on size of pile
69SO01D	0 to ?	X	Duplicate
69SO01MS/MSD	0 to ?	X	Matrix Spike/Matrix Spike Duplicate
69SO02	0 to ?	X	Depth is dependent on size of pile
69SO03	0 to ?	X	Depth is dependent on size of pile
69SO04	0 to ?	X	Depth is dependent on size of pile
69SO05	0 to ?	X	Depth is dependent on size of pile
69SO06	0 to ?	X	Depth is dependent on size of pile
69SO07	0 to ?	X	Depth is dependent on size of pile
69SO08	0 to ?	X	Depth is dependent on size of pile
69SO09	0 to ?	X	Depth is dependent on size of pile
69SO10	0 to ?	X	Depth is dependent on size of pile
Sediment Samples:			
69SD01	0 to 0.5	X	
69SD01D	0 to 0.5	X	Duplicate
69SD01MS/MSD	0 to 0.5	X	Matrix Spike/Matrix Spike Duplicate
69SD02	0 to 0.5	X	
69SD03	0 to 0.5	X	
69SD04	0 to 0.5	X	
69SD05	0 to 0.5	X	
69SD06	0 to 0.5	X	
69SD07	0 to 0.5	X	
69SD08	0 to 0.5	X	
69SD09	0 to 0.5	X	
69SD10	0 to 0.5	X	
69SD11	0 to 0.5	X	
69SD11D	0 to 0.5	X	Duplicate
69SD12	0 to 0.5	X	
69SD13	0 to 0.5	X	
69SD14	0 to 0.5	X	

Notes:

ft bgs = feet below ground surface

TABLE 2A

METHOD PERFORMANCE LIMITS
QUANTITATION LIMITS AND SCREENING VALUES FOR SOIL
SAMPLING STRATEGY FOR DISTURBED SOILS
SWMU 69 - AIRCRAFT PARKING AREA
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO

Metals (mg/kg)	Quantitation Limits*		Regional Screening Levels	Regional Screening Levels	Ecological Soil	NAPR
	Low Soil	Method Number	Residential	Industrial	Screening Values	Background [1]
Antimony	1.0	6020A (ICP/MS)	3.1 [2]	41 [2]	78 [5]	2.43
Arsenic	0.5	6020A (ICP/MS)	0.39	1.6	18 [6]	2.34
Barium	5.0	6020A (ICP/MS)	1,500 [2]	19,000 [2]	330 [5]	231.22
Beryllium	0.5	6020A (ICP/MS)	16 [2]	200 [2]	40 [5]	0.65
Cadmium	0.5	6020A (ICP/MS)	7 [2]	80 [2]	32 [6]	0.65
Chromium	1.0	6020A (ICP/MS)	12,000 [2][3]	150,000 [2][3]	57 [7]	68.81
Cobalt	0.5	6020A (ICP/MS)	2.3 [2]	30 [2]	13 [6]	46.43
Copper	1.0	6020A (ICP/MS)	310 [2]	4,100 [2]	70 [6]	223.05
Lead	0.5	6020A (ICP/MS)	400 [4]	800 [4]	120 [6]	16.86
Mercury	0.20	7470A/7471A (Cold Vapor AA)	2.3 [2]	31 [2]	0.1 [8]	0.1
Nickel	0.5	6020A (ICP/MS)	150 [2]	2,000 [2]	38 [6]	22.97
Selenium	2.5	6020A (ICP/MS)	39 [2]	510 [2]	0.52 [6]	1.85
Silver	0.5	6020A (ICP/MS)	39 [2]	510 [2]	560 [6]	NA
Thallium	0.5	6020A (ICP/MS)	NA	NA	1 [9]	0.77
Tin	0.5	6020A (ICP/MS)	4,700 [2]	61,000 [2]	50 [9]	3.66
Vanadium	2.5	6020A (ICP/MS)	0.55 [2]	7.2 [2]	10 [10]	367.18
Zinc	1.0	6020A (ICP/MS)	2,300 [2]	31,000 [2]	120 [5]	112.16

TABLE 2A

METHOD PERFORMANCE LIMITS
QUANTITATION LIMITS AND SCREENING VALUES FOR SOIL
SAMPLING STRATEGY FOR DISTURBED SOILS
SWMU 69 - AIRCRAFT PARKING AREA
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO

Notes:

* Quantitation limits listed for solid are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis, will be higher.

mg/kg - miligrams per kilogram
NAPR - Naval Activity Puerto Rico
ICP/MS - Inductively Coupled Plasma/Mass Spectrometry
AA - Atomic Absorption
NA - Not Available
USEPA - United States Environmental Protection Agency
MATC - Maximum Acceptance Toxicant Concentration
LOAEC - Lowest Observed Adverse Effect Concentration

(1) NAPR airfield soil background screening value (upper limit of the means concentration [mean plus two standard deviations]) (Baker, 2010)

(2) Noncarcinogenic Regional Screening Levels based on a target hazard quotient of 0.1 for conservative screening purposes

(3) Value for trivalent chromium used as a surrogate.

(4) USEPA Action Level for lead in soils

(5) Ecological soil screening level for soil invertebrates (USEPA, 2005a [antimony]; USEPA, 2005c [barium]; USEPA, 2005d [beryllium]; USEPA, 2007f [zinc])

(6) Ecological soil screening level for plants (USEPA 2005b [arsenic]; USEPA 2005e [cadmium]; USEPA 2005f [cobalt]; USEPA 2007c [copper]; USEPA 2005g [lead]; USEPA 2007d [nickel]; USEPA 2007e [selenium]; USEPA 2006 [silver])

(7) Reproduction-based MATC for *Eisenia andrei* (earthworm) (USEPA 2008)

(8) Toxicological threshold for earthworms (Efroymson et al. 1997a)

(9) Toxicological threshold for plants (Efroymson et al. 1997b)

(10) Growth-based LOAEC for *Brassica oleracea* (broccoli) with a safety factor of 10

TABLE 2A

METHOD PERFORMANCE LIMITS
QUANTITATION LIMITS AND SCREENING VALUES FOR SOIL
SAMPLING STRATEGY FOR DISTURBED SOILS
SWMU 69 - AIRCRAFT PARKING AREA
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO

Table References:

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USEPA. 2007c. Ecological Soil Screening Levels for Copper (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-68.

USEPA. 2007d. Ecological Soil Screening Levels for Nickel (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-76.

USEPA. 2007e. Ecological Soil Screening Levels for Selenium (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-72.

USEPA. 2007f. Ecological Soil Screening Levels for Zinc (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-72.

USEPA. 2006. Ecological Soil Screening Levels for Silver (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-77.

USEPA. 2005a. Ecological Soil Screening Levels for Antimony (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-61.

TABLE 2A

METHOD PERFORMANCE LIMITS
QUANTITATION LIMITS AND SCREENING VALUES FOR SOIL
SAMPLING STRATEGY FOR DISTURBED SOILS
SWMU 69 - AIRCRAFT PARKING AREA
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO

Table References (continued):

USEPA. 2005b. Ecological Soil Screening Levels for Arsenic (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C.

USEPA. 2005c. Ecological Soil Screening Levels for Barium (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-63.

USEPA. 2005d. Ecological Soil Screening Levels for Beryllium (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-63.

USEPA. 2005e. Ecological Soil Screening Levels for Cadmium (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-62.

USEPA. 2005f. Ecological Soil Screening Levels for Cobalt (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-67

USEPA. 2005g. Ecological Soil Screening Levels for Lead (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-70.

TABLE 2B

METHOD PERFORMANCE LIMITS
QUANTITATION LIMITS AND SCREENING VALUES FOR SEDIMENT
SAMPLING STRATEGY FOR DISTURBED SOILS
SWMU 69 - AIRCRAFT PARKING AREA
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO

Metals (mg/kg)	Quantitation Limits*		Regional Screening Levels	Regional Screening Levels	Ecological Freshwater Sediment	NAPR
	Low Soil	Method Number	Residential	Industrial	Screening Values	Background [1]
Antimony	1.0	6020A (ICP/MS)	3.1 [2]	41 [2]	2 [5]	8.62
Arsenic	0.5	6020A (ICP/MS)	0.39	1.6	9.79 [6]	2.83
Barium	5.0	6020A (ICP/MS)	1,500 [2]	19,000 [2]	20 [7]	208
Beryllium	0.5	6020A (ICP/MS)	16 [2]	200 [2]	NA	0.36
Cadmium	0.5	6020A (ICP/MS)	7 [2]	80 [2]	0.99 [6]	0.22
Chromium	1.0	6020A (ICP/MS)	12,000 [2][3]	150,000 [2][3]	43.4 [6]	63.41
Cobalt	0.5	6020A (ICP/MS)	2.3 [2]	30 [2]	50 [7]	45.07
Copper	1.0	6020A (ICP/MS)	310 [2]	4,100 [2]	31.6 [6]	159.81
Lead	0.5	6020A (ICP/MS)	400 [4]	800 [4]	35.8 [6]	19.38
Mercury	0.02	7470A/7471A (Cold Vapor AA)	2.3 [2]	31 [2]	0.18 [6]	0.17
Nickel	0.5	6020A (ICP/MS)	150 [2]	2,000 [2]	22.7 [6]	18.12
Selenium	2.5	6020A (ICP/MS)	39 [2]	510 [2]	2 [8]	3.69
Silver	0.5	6020A (ICP/MS)	39 [2]	510 [2]	1 [7]	NA
Thallium	0.5	6020A (ICP/MS)	NA	NA	NA	1.3
Tin	0.5	6020A (ICP/MS)	4,700 [2]	61,000 [2]	3.4 [9][10]	7.72
Vanadium	2.5	6020A (ICP/MS)	0.55 [2]	7.2 [2]	57 [10][11]	241.1
Zinc	1.0	6020A (ICP/MS)	2,300 [2]	31,000 [2]	121 [6]	148.46

TABLE 2B

METHOD PERFORMANCE LIMITS
QUANTITATION LIMITS AND SCREENING VALUES FOR SEDIMENT
SAMPLING STRATEGY FOR DISTURBED SOILS
SWMU 69 - AIRCRAFT PARKING AREA
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO

Notes:

* Quantitation limits listed for solid are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis, will be higher.

mg/kg - miligrams per kilogram
NAPR - Naval Activity Puerto Rico
ICP/MS - Inductively Coupled Plasma/Mass Spectrometry
AA - Atomic Absorption
NA - Not Available
USEPA - United States Environmental Protection Agency
BTAG - Biological Technical Assistance Group

(1) NAPR freshwater drainage ditch background screening value (upper limit of the means concentration [mean plus two standard deviations]) (Baker, 2010)

(2) Noncarcinogenic Regional Screening Levels based on a target hazard quotient of 0.1 for conservative screening purposes

(3) Value for trivalent chromium used as a surrogate.

(4) USEPA Action Level for lead in soils

(5) Effects Range-Low (Long and Morgan, 1991)

(6) Concensus-based Threshold Effect Concentration (MacDonald et al. 2000)

(7) Threshold Effect Concentration (MacDonald et al. 2003)

(8) USEPA Region 3 BTAG screening value (Lemley 2002 [as cited in USEPA 2007)

(9) Minimum Apparent Effects Threshold for tributyl tin (Neanthes bioassay) (Buchman 2008)

(10) The chemical lacks a literature-based freshwater bulk sediment screening value/toxicological benchmark. The value shown is a literature-based marine/estuarine bulk sediment screening value/toxicological benchmark.

(11) Minimum Apparent Effects Threshold (Neanthes bioassay) (Buchman 2008)

TABLE 2B

METHOD PERFORMANCE LIMITS
QUANTITATION LIMITS AND SCREENING VALUES FOR SEDIMENT
SAMPLING STRATEGY FOR DISTURBED SOILS
SWMU 69 - AIRCRAFT PARKING AREA
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO

Table References:

Baker Environmental, Inc, (2010). Revised Final II Summary Report for Environmental Background Concentrations of Inorganic Compounds, Addendum C, Naval Activity Puerto Rico, Ceiba, Puerto Rico. February 29, 2008.

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Lemley, A.D. 2002. Selenium Assessment in Aquatic Ecosystems. U.S. Forest Service, Blacksburg, VA.

MacDonald, D.D, C.G. Ingersoll, D.E. Smorong, R.A. Lindskoog, G. Sloane, and T. Biernacki. 2003. Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters. Prepared for Florida Department of Environmental Protection, Tallahassee, Florida. January 2003.

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TABLE 3

SUMMARY OF PROPOSED SAMPLING AND ANALYTICAL PROGRAM
QA/QC and IDW SAMPLES
SAMPLING STRATEGY FOR DISTURBED SOILS
SWMU 69 - AIRCRAFT PARKING AREA
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO

	Aqueous	Solid	
Media	Appendix IX Metals	RCRA Metals	**Comment**
Equipment Rinsate Samples- Collect one per day of field work			
69ER01	X		Macro Core Liner
69ER02	X		Stainless steel spoon
69ER03	X		Aluminum pie pan
69ER04	X		Macro Core Liner
Field Blank Samples			
69FB01	X		Lab Grade Deionized Water
69FB02	X		Store Bought Distilled Water
IDW Samples			
69IDW01		X	Aqueous
69IDW02		X	Solid

119197_69CMS_24

~CONCRETE~

~CONCRETE~

APRON/ AIRCRAFT PARKING AREA

~CONCRETE~

~CONCRETE~

~CONCRETE~

SQFT=8703.53
ACRES=0.1998048
LENGTH=133.90'
WIDTH=65.00'

15E-01
69SB24
69SB23
15E-02
69SB21
69SB22
69SB20
69SB19
69SB18
69SB17
69SB16
69SB15
69SB14
69SB11
15E-03
69SB09
69SB13
69SB07
15E-04
69SB05
69SB04
69SB10
69SB12
69SB08
69SB06
69SB26
69SB27

15E-05
EXPANDED APRON
69SB01
69SB02
69SB25
69SB03

SQFT=30951.65
ACRES=0.7105493
LENGTH=619.03'
WIDTH=50.00'

APPROXIMATE LOCATION
OF FORMER UST 794 AND
UST MONITORING WELLS

DRAINAGE DITCH
FORMER BUILDING 794

150 0 75 150
1 inch = 150 ft.

Baker

AREAS DELINEATED BEFORE SITE DISTURBANCE ACTIVITIES OCCURED IN AUGUST-OCTOBER 2008

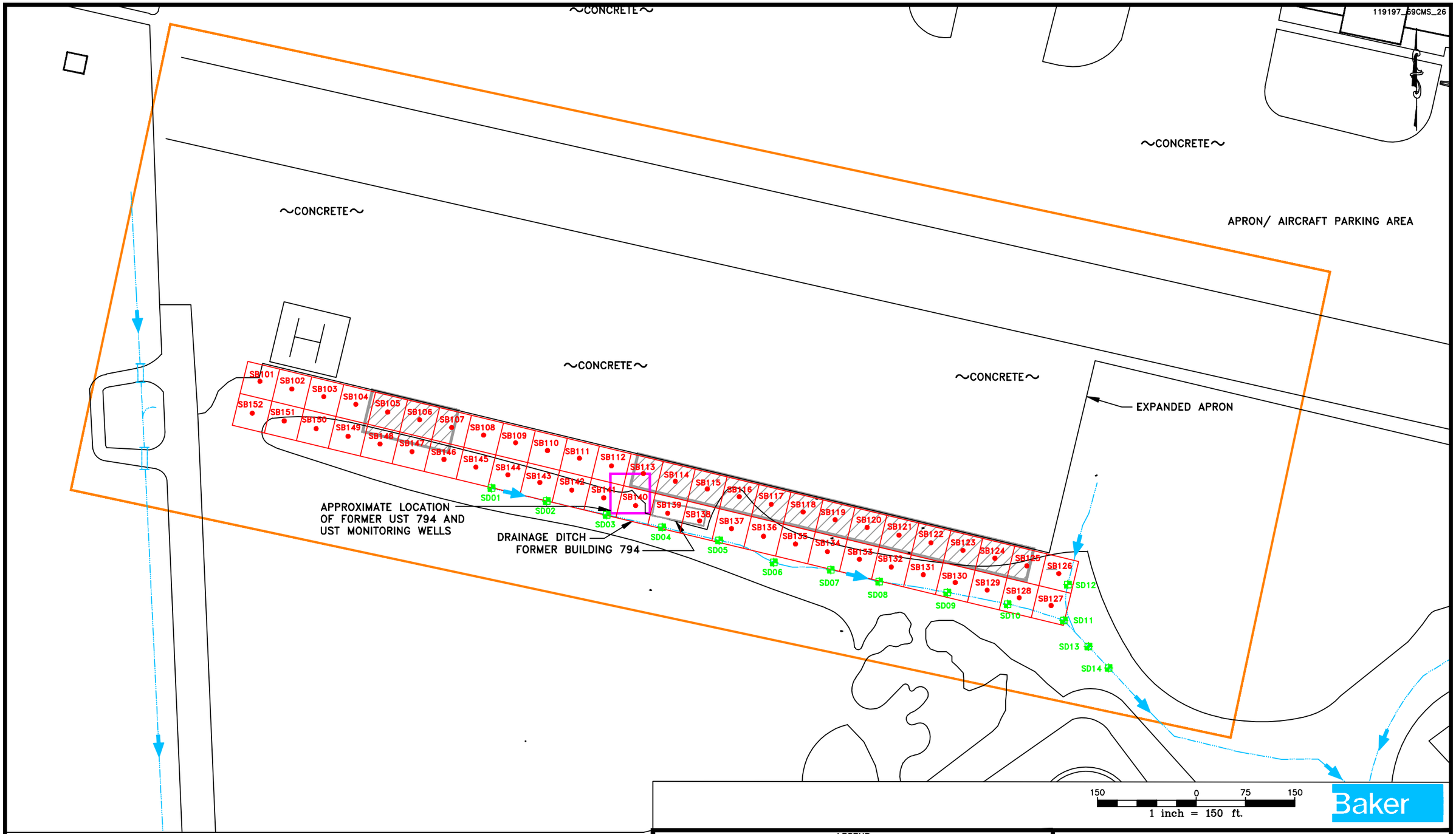
- -Estimated Extent of Barium Concentrations Exceeding CAO of 330mg/kg
- -Estimated Extent of Lead Concentrations Exceeding CAO of 87mg/kg
- -Estimated Extent of Cadmium Concentrations Exceeding CAO of 4.25mg/kg
- -Estimated Extent of Zinc Concentrations Exceeding CAO of 120 mg/kg
- -Estimated Maximum Limit of surface soil Contamination
- -Surface Soil Area Proposed for Excavation in CMS Prior to Site Disturbance

SOURCE: GEO-MARINE, INC., SEPTEMBER 6, 2000.

LEGEND

- -CURRENT DRAINAGE DITCH
- -CURRENT DRAINAGE CULVERT
- -PREVIOUS SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (ECP 2004)
- -CMS INVESTIGATION TEMPORARY MONITORING WELL LOCATION
- -CMS INVESTIGATION SURFACE AND SUBSURFACE SOIL SAMPLE AND TEMPORARY MONITORING WELL LOCATION
- -CMS INVESTIGATION SURFACE SOIL SAMPLING LOCATION
- -CMS INVESTIGATION SURFACE AND SUBSURFACE SOIL SAMPLE AND MONITORING WELL LOCATIONS
- -SWMU BOUNDARY
- -STORMWATER FLOW DIRECTION (TYPICAL)

FIGURE 1
ESTIMATED MAXIMUM LIMIT OF
SURFACE SOIL CONTAMINATION
[PRIOR TO SITE DISTURBANCE (2008) AT SWMU 69]
SAMPLING STRATEGY FOR DISTURBED SOILS
SWMU 69-AIRCRAFT PARKING AREA
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO



SOURCE: GEO-MARINE, INC., SEPTEMBER 6, 2000.

LEGEND

- CURRENT DRAINAGE DITCH
- CURRENT DRAINAGE CULVERT
- SWMU BOUNDARY
- Surface Soil Area Proposed for Excavation in CMS Prior to Site Disturbance
- SD01 Proposed Sediment Sample Location
- SB101 Proposed Soil Sampling Grid Cell (50' X 50')
- Stormwater Flow Direction (Typical)

FIGURE 2
PROPOSED SOIL AND SEDIMENT SAMPLING LOCATIONS
SAMPLING STRATEGY FOR DISTURBED SOILS
SWMU 69-AIRCRAFT PARKING AREA

CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO

FIGURE 3
SCHEDULE FOR IMPLEMENTATION OF DISTURBED SOIL SAMPLING
SWMU 69 - AIRCRAFT PARKING AREA
CORRECTIVE MEASURES STUDY (CMS) INVESTIGATION
NAVAL ACTIVITY PUERTO RICO

ID	Task Name	Duration	Start	Finish
1	CMS Field Investigation	88 edays	6/21/10	9/17/10
2	Draft CMS Report Development	60 edays	9/17/10	11/16/10
3	Regualtor Review	90 edays	11/16/10	2/14/11
4	Final CMS Report Development	61 edays	2/14/11	4/16/11
5	Regulator Review and Approval	90 edays	4/16/11	7/15/11