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OPERATIONAL PLAN
FOR
PSC 18 REMEDIATION
FOR
NAVAL AIR STATION
JACKSONVILLE, FLORIDA

Prepared for
DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
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Prepared

L. D. Valverde
Senior Scientist

10/13/95
Date

Approved:

CRISTO SEALE FOR V.H. BAUER
Project Manager

10/31/95
Date

Approved:

John Tumbarello
RPM SOUTH DIV NAVFAC

11/2/95
Date

Approved:

SEE ATTACHED Letter Ser 02/10/95.
RASO

1/10/96
Date

Approved:

[Signature]
Contracting Officer

12/6/95
Date

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1.0 INTRODUCTION

Remediation of potential source of contamination (PSC) 18 will involve the sampling, analysis, and removal of Radium-226 (Ra^{226}) contaminated soils. PSC 18 is an approximately 15 acre area located on Naval Air Station (NAS) Jacksonville, Florida along the St. Johns River that is used primarily for recreation. Walkover radiation surveys accompanied by select soil sampling and analyses have identified that specific locations on this site contain soils that have Ra^{226} concentrations that exceed the Environmental Protection Agency (EPA) regulated limit of 5 pico curies per gram ($\mu Ci/gm$). Remediation efforts will involve the removal and disposal of these soils, analytical verification of the remediated areas, characterization of waste products, and soil backfilling to restore the site to original condition.

2.0 PURPOSE

The purpose of this document is to define the assumptions used to identify the extent of remediation, describe the remedial tasks involved, specify required analytical support for clean up verification, and related restoration efforts. Prior to initiating the tasks defined in the following sections, the Bechtel Environmental, Inc. (BEI) Project Manager, the Southern Division Remedial Project Manager and the Radiology Affairs Support Office (RASO) shall concur with this task description as necessary for completing the remediation of PSC 18.

3.0 NAS JACKSONVILLE SUPPORT REQUIREMENTS

3.1 SURFACE PREPARATION

PSC 18 shall be properly fenced to prevent public access to the construction site and organized with site roadways to permit control of both on-site construction traffic and Birmingham Road general traffic. Operations affecting normal naval base conditions shall be reviewed, approved and arranged by the ROICC.

3.2 LOCATION OF UNDERGROUND STRUCTURES

Prior to initiation of remedial construction activities the designated areas will be checked for existing utilities and other potential interferences. Relevant information will be provided by the ROICC.

4.0 ASSUMPTIONS FOR REMEDIAL ACTIVITIES

Radiological surveys and analytical investigations at PSC 18 have provided limited information from which remedial actions can be defined. Radiological monitoring consisted of a 100 percent walkover gamma survey in which potential areas of elevated radiation were detected (i.e. greater than two times background levels) followed by detailed characterization of these isolated residuals radioactivity (IRR) locations. These surveys were supported by analytical determinations of radioisotopic concentrations in surface soil samples, taken from several IRR locations with the highest radioactivity. Additionally, boreholes were generated in IRR locations from which both surface and subsurface soil samples were collected and analyzed for isotopic content. Basically, radiation values greater than background measured with a 2" x 2" NaI detector, plus 4750 counts per minute (cpm) were considered to be representative of soil with Ra ²²⁶ concentrations greater than 5 pCi/gm. Soil samples were collected in areas exceeding this value.

While the radiation surveys and analytical studies conducted are not sufficiently extensive to precisely quantify radiological conditions, the results are sufficient basis for assumptions from which remedial operations can be planned. The planning assumptions for PSC 18 are as follows:

- Soil removal from surface IRR locations shall be taken 5 meters in all horizontal directions from the peak radiation reading and to a depth of 1 foot.
- Soil removal from IRR locations with known subsurface contamination shall be taken 5 meters in all horizontal directions from the known location and to a depth of 4 feet or to the water table, whichever is less.
- Soil removal from areas with multiple IRR locations shall be determined from the hot spot characterization data to a depth of 1 foot.

The use of these assumptions will permit an estimation of the volume of soil removal required for the remediation of PSC 18 as characterized. However, little is known of the radiological status of underlying soil and fill materials and it is possible that removal of considerably greater volumes of material may be required to meet the clean up criteria.

5.0 SOIL REMOVAL ESTIMATES

The assumptions in Section 4.0 have been applied to the radiological data generated from the survey efforts from which a volume of soil removal for PSC 18 has been estimated. This information is provided in Table 5-1. As noted in the table, the removal of approximately 6130 cubic yards of material may be required to achieve clean up, provided subsurface radiological conditions are not significantly greater than indicated.

TABLE 5-1

PSC 18 SOIL REMOVAL ESTIMATIONS

LOCATION	AREA ft ²	AVERAGE DEPTH ft	VOLUME ft ³
B-C/1-2	845	1.0	845
B-C/42-43	800	1.0	800
A-B/47-48	1,065	1.0	1,065
M-P/46-50	9,690	1.0	9,690
O-T/45-48	3,770	1.0	3,770
E-M/8-23	72,656	1.5	108,984
D-I/33-45	40,365	1.0	40,365
TOTAL	~ 129,200 ft ²		~ 165,520 ft ³
		Total Volume:	~ 6130 yd ³

6.0 MAJOR WORK FUNCTIONS

The following are the major work items required to remediate PSC 18:

- Mobilize equipment, supplies and staff to PSC 18.
- Perform pre-construction radiological surveys to re-establish the specific areas to be remediated.
- Delineate the areas.
- Arrange equipment in a logical array for ease of operation.
- Compositing soil samples shall be collected prior to excavation and submitted to a laboratory for TCLP analyses (except herbicides and pesticides) to characterize the waste for eventual disposal.
- Remove surface layers of contaminated soil in one foot lifts.
- Place contaminated soil in dump trucks and transport to PSC 26.
- Secure each dump truck containing contaminated soil with tarpaulin for transport to PSC 26.
- Perform walkover radiation surveys (gamma surveys) after removal of each layer of soil in a given area.
- Continue surface removal, radiation surveying and waste disposal until the response of the 2" x 2" NaI detector is less than 4750 cpm plus background.
- Obtain surface soil samples from remediated areas for radiological analyses: approximately one composited sample for each 10 m² of excavation or about 55 samples.
- When each remediated area has been declared clean by both analytical and radiological survey results, backfill the area with clean borrow soil to restore original conditions.
- Decontaminate equipment and demobilize the work site at PSC 18.

7.0 OPERATIONS

The following is a proposed method of operation that will be implemented in the PSC 18 remediation efforts:

- Develop the background radiation level of PSC 18 by obtaining about seven one-minute radiation readings along the northern border of this area (i.e. in locations away from potential radiation sources). Average these readings (taken with a 2" x 2" NaI detector) and use as the background level for remediation.
- Use the background radiation level plus 4750 counts per minute (5pCi/g Ra²²⁶ equivalence) as the clean up criteria based on the response of a 2" x 2" detector to Ra²²⁶ uniformly distributed in soil of large excavations (radius > 3 ft).
- Set up an equipment decontamination area and establish radiation controls to prevent spread of contaminated soils during operation.
- Resurvey each area to be remediated to establish the boundaries of excavation. Delineate the boundaries.
- Using appropriate equipment, remove contaminated surface soil in 1 foot lifts in the remediation areas.
- Place the contaminated soils in dump trucks and transport to PSC 26.
- Secure each dump truck containing contaminated soil with tarpaulin for transport to PSC 26.
- Perform a walkover gamma survey of the excavated surface to determine if the clean up criteria has been satisfied.
- Continue the sequence of soil removal, waste transport, and radiation monitoring until the clean up criteria has been satisfied.
- When radiation levels at each remediation area have been reduced to below clean up criteria, perform final radiation surveys and document the results.
- Collect soil samples in each remediated area for verification analyses. Five surface samples are to be randomly collected from each 10 m² of area and composited into one sample. It is estimated that about 55 radiological samples will be required (i.e. 275 random samples will be needed to generate the composited radiological samples).

- Submit the samples for radioisotopic analyses. The analyses shall be requested on a two-day turnaround schedule to minimize the duration of open excavation. Ra²²⁶ concentrations will be estimates only due to the short in-growth duration. A more precise estimate will be provided after a 14-day decay.
- If analytical results verify that remediated areas are below radiological acceptance criteria, each area shall be backfilled with borrow soil previously characterized as clean.

NOTE: Backfill decisions will be based on the estimated Ra²²⁶ concentrations to minimize the duration of open excavation.

- If analytical results do not verify areas as being radiologically acceptable, the surface removal and survey/analyses operations shall continue until acceptable conditions result.
- Decontaminate equipment, process waste products and demobilize the PSC 18 area.
- Prepare a report documenting the original radiological status of each remediation area of PSC 18, the remedial activities performed and the final radiological conditions of the remediated area.

In support of the remediation activities, the relationship between in situ gamma measurements and isotopic analysis of soil samples will be continually evaluated. Based upon these evaluation results, correlation factors applied to in situ readings will be modified as appropriate.

8.0 WASTE MANAGEMENT

Low level radioactive waste storage, transportation, and disposal will be coordinated through the ROICC as appropriate. Excavated soil will be placed in dump trucks and other low level radioactive waste (instrumentation dials, glass containers etc.) will be packaged in approved 55 gallon drums. Bechtel will place all low level radioactive waste materials at PSC 26 as directed by the ROICC. Appropriate labeling of containers will be performed as necessary. Waste minimization practices will be implemented to minimize the generation of solid waste as a result of operations. These practices will include, but not be limited to:

- No extraneous materials taken into contaminated controlled zones.
- Decontamination and free release of equipment used to support onsite activities, to the extent practicable.

- Use of consumables that can be compacted or otherwise reduced in volume.
- Redepositing uncontaminated soils that may be removed to assist clean up activities (i.e. generation of equipment roads and ramps).