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July 26, 2002

Project No. 3994

Mr. William Gates (Code 1864)
Commander, Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive, P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order No. 0166

Subject: Final Quality Assurance Project Plan (QAPP) for Mine Fill A (SWMU 12), Mine Fill B (SWMU 13), Cast High Explosives Fill/B-146 Incinerator (SWMU 16), and Pyrotechnic Test Area (SWMU 19) RCRA Facility Investigation (RFI)

Dear Mr. Gates:

The subject final QAPP is enclosed. This QAPP has been revised in response to U.S. EPA Region 5 comments. Attachment 1 contains the responses to U.S. EPA Region 5 comments. The responses have been revised in accordance with Navy comments received via e-mail and telephone conversations.

Please contact Ralph Basinski at (412) 921-8308 (e-mail basinskir@ttnus.com) regarding any questions or comments.

Sincerely,

Ralph R. Basinski

Ralph R. Basinski
Task Order Manager

Enclosures

cc: Mr. Tom Brent, NSWC Crane (letter, attachment, 5 copies of QAPP)
Ms. Debbie Wroblewski, TtNUS, Inc. (letter only)
Mr. Mark Perry, TtNUS, Inc. (1 copy of letter, attachment, and unbound QAPP)
Mr. Ralph Basinski. TtNUS, Inc. (1 copy of letter, attachment, and QAPP)
Crane Library (1 copy of QAPP)
File Copy – CTO 0166 (letter and attachment)

ATTACHMENT I

RESPONSE TO US EPA COMMENTS ON
THE QUALITY ASSURANCE PROJECT PLAN (QAPP) FOR
THE RCRA RFI INVESTIGATION AT
SWMUs 12, 13, 16, & 19 - REVISION 0 - DATED FEBRUARY 2002
NAVALSURFACEWARFARECENTERCRANE
CRANE, INDIANA

"Comment 1: Where was the NPDES outfall mentioned in the first full sentence at the top of Page 1-2 located and why is it no longer monitored or needed?"

Response: The NPDES outfall mentioned in the 4th paragraph of Section 1.0 was not actually at the OTA. This outfall was actually an in-stream monitoring point established in 1984 below the OTA (i.e., above Lake Gallimore) as a checkpoint for monitoring runoff from the majority of NSWC Crane. As this outfall also monitored non-point sources, this type of monitoring point was contrary to the scope of the NPDES program because the NPDES program only regulated point-source discharges. Because this outfall was not actually at the OTA, references to this outfall have been removed from the Quality Assurance Project Plan for Mine Fill A (SWMU 12), Mine Fill B (SWMU 13), Cast High Explosives Fill/B146 Incinerator (SWMU 16). and Pyrotechnic Test Area (SWMU 19) RCRA FRI Investigation (QAPP).

The 3rd sentence in the 4'" paragraph of Section 1 .01 has been revised as follows to remove all reference of this outfall from the QAPP:

"No analytical data are available *for the Pyrotechnic Test Area."*

"Comment 2: **The first bullet point in Section 1.1.1. refers to spring water. Is this a reference to spring water screening levels or actual springs present at the SWMUs? If the latter, where are these springs located?"**

Response: The reference is to spring water screening levels and not to actual springs at these sources.

No changes have been made to the QAPP in response to this comment.

"Comment **3: Should the first sentence of the 2nd Paragraph in Section 1.1.3. read pre-pre-QAPP?"**

Response: The Navy agrees. The 1st sentence of the 2nd paragraph of Section 1 .1.3 has been revised as follows:

"Additional guidance regarding development of this QAPP was obtained through a pre-pre-QAPP meeting held on July 11, 2001 via conference call."

"Comment 4: The second full paragraph on page 1-15 refers to an "existing closed pit" receiving wash-out water at Mine Fill A. Is this being checked for integrity? Also, the following paragraph references a the No. 2 fuel oil tank. Have there been any releases from this tank?"

Response: This pit is no longer "existing." This pit was removed when the building and equipment at the B-31 10 treatment plant was installed in 1984 and 1985. The No. 2 fuel oil tank no longer exists, and there is no record of any leaks from this tank.

For clarification, the 13th sentence in the 12th paragraph of Section 1.3.2 has been revised as follows:

"Overflow from the baffled tank then f/owed via floor drains to a pit outside of the building, which has since been removed."

Additionally, for further clarification, the 13'" paragraph of Section 1.32 has been revised as follows:

"Heat used to generate the steam for the melting and steam-out operations was generated by boilers that burned No. 2 fuel oil. These boilers were located in Building 150 outside MFA. The No. 2 fuel oil tank no longer exists. There are no records of any leaks from the No. 2 fuel oil tank. "

***"Comment 5:* What is the integrity of the sumps collecting scrubber wastewater mentioned on page 1-16?"**

Response: The scrubber wastewater collection sumps are contained within Building B-31 11. Sump integrity is checked whenever steam-out operations occur. The sumps have not shown signs of leakage.

For clarification, the following text has been added after the 12'" sentence of the 16th paragraph of Section 1.3.2:

"The sumps are checked for integrity whenever steam-out operations occur. The sumps have not shown signs of leakage. "

"Comment *6:* The 3rd paragraph on page 1-17 seems to be incomplete. The 4th paragraph refers to the asphalt pad at the southern end of MFA. Is sediment/surface water sample 12SW/SD09 located at the drainage ditch which originates at the outfall of the pump system at the pad? If so, it should be analyzed for the same constituents as soil boring 12SB01."

Response: First, the 19'" paragraph of Section 1.3.2 was a typographical error that has been removed from the QAPP.

Next, the unidentified asphalt pad (UAP) pump system outfall could not be found during the site visit. However, there is a narrow topographic depression that slopes along a straight line from the UAP towards the swale to the west of the UAP. To address the potential for contaminant migration from the UAP, sample 12SW/SD09 was located in the area from the UAP toward the swale.

The Navy agrees that, with the exception of VOCs, sample 12SW/SD09 should be analyzed for the same constituents as soil boring 12SB01. Therefore, explosives and semivolatiles analyses have been added to the existing analytical suite for this sample. Because the potential for VOCs to exist in surface water and shallow sediment is low, due to volatilization, VOCs analyses are not recommended for this sample.

For clarification, the 4'" bullet in THE 4th paragraph in Section 1.4.1 Subsection SWMU 12 has been revised as follows:

- *"SVOCs (surface and subsurface soils, surface water, and sediments) SVOCs, including polycyclic aromatic hydrocarbons (PAHs), may have been released into soils and accumulated near the UAP. The potential exists for migration toward downstream surface water conveyances."*

Finally, Tables 3-11 through 3-14 have been modified to reflect the semivolatile organic compound (SVOC) analysis for sample 12SW/SD09.

"Comment 7: Has the Navy discovered any futher information on the surface ponds and/or settling basins mentioned by Halliburton NUS at MFA & MFB?"

Response: The Navy and Crane Army Ammunition Activity (CAAA) has no additional information on these surface ponds or settling basins for the MFA (SWMU 12-Mine Fill A) and MFB (SWMU 13—Mine Fill B).

No changes have been made to the QAPP in response to this comment,

***"Comment 8:* Page l-15 Section 1.3.3. mentions that some of the pollution control equipment added to MFA was not added to MFB. What areas/buildings/processes do not have this equipment and are there any consequences? What are spill potentials (current or historical) at areas like Building 173 (mine degreasing) mentioned on pg 1-18? Were any inspections done on these areas to look for evidence of releases?"**

Response: The **MFA** has pollution control equipment on B-160 that included the "pinkwater" treatment plant (B-31 10), the wet scrubbers (B-31 1 1), and an electrostatic precipitator (ESP) (B-155) to control tar emissions during bomb loading. Because there is no current bomb loading nor are there any future plans to do bomb loading at MFB, a "pinkwater" treatment plant, wet scrubbers, and ESP are not necessary.

For clarification, the following text has been added to the end of the 1st paragraph of Section 1.3.3:

"Some pollution control equipment to control air and water emissions installed at the MFA was not added at the MFB. This equipment included pinkwater treatment, wet scrubbers, and an electrostatic precipitator (ESP). This equipment controls emissions from bomb loading. The MFB does not have the capabilities for bomb loading and there are no plans to use MFB for bomb loading. Therefore, the lack of fhis equipment is not viewed to result in chemical release to the environment."

Building B-173 is no longer active (e.g., no treatment activities occur at Building B-173). Therefore, currently, there is no spill potential at Building B-173.

For clarification, the 12'" sentence in the 5'" paragraph of Section 1.3.3 has been revised as follows:

"Building 173 former/y used to degrease mines is no longer used. There are no records of historical spills in this area."

CAAA has no records of historical spills in this area.

No changes have been made to the QAPP in response to this portion of this comment.

"Comment 9: Referring to Page 1-19, top half of page, to what levels were PCBs remediated?"

Response: During the remediation process for explosives-contaminated soils at MFB. soils containing polychlorinated biphenyls (PCBs) in addition to explosives were also removed. No specific PCB remediation goals were established. Confirmation sampling indicated that the remaining soils contained PCBs in excess of 10 milligrams per kilogram (mg/kg).

Additionally, the reference in the last sentence of the 7'" paragraph in Section 1.3.3 to Building 177 should have been to Building 171.

The last sentence of the 7'" paragraph in Section 1.3.3 has been replaced as follows:

"During the course of the remediation of explosive-contaminafed soils at the MFB, soils containing PCBs were removed. No specific remediation goal for PCB was established for fhis soil removal. Confirmation sampling indicated that the remaining soils contained PCBs in excess of 10 mg/kg. Some residual PCB contamination still remains near Buildings 166 and 171 (Halliburton NUS, 1992a)."

"Comment 10: **Why isn't VOC included in the MFB constituent list bullets on page 1-39 due to the degreasing operations? Note that naphtha is mentioned at the top of page l-38. Although it is stated in Table 1-3, p. 1 of 2 that VOCs will be analyzed in samples for SWMU 13, discussion of VOCs sampling isn't found on pp. l-39 to l-39. This is perhaps a minor oversight."**

Response: Similarly to MFA. there were no known pathways of release from the building where the operations took place. Therefore, volatile organic compounds (VOCs) were not included in the MFB constituent list.

No changes have been made to the QAPP in response to this comment

"Comment 71: The last sentence of the 2nd paragraph on page 1-21 mentions TCE at high concentrations in settling basins - are these the same as the sumps that were addressed under the Interim Measure for SWMU 16?"

Response: Yes, these settling basins are the same as the sumps that were addressed under the Interim Measures for SWMU 16.

No changes have been made to the QAPP in response to this comment

***"Comment 12:* There is a reference to chromium VI on page *1-21* (as well as in other places), which suggests that use of an analytical test for hexavalent chromium would be appropriate for certain specific objectives (i.e. as opposed to only using methods for reporting total chromium, such as methods based on SW-646 - 6020)."**

Response: Analytical methods for chromium will only involve testing for total chromium. The reference to hexavalent chromium could not located in the QAPP. A search of the QAPP was conducted to determine whether the referenced page number (1-21) could be incorrect. An electronic search of the entire QAPP text and Table 1-7 could not locate the existence of a reference to hexavalent chromium.

No changes were made to the QAPP to address this comment

"Comment 13: Referring *to* page l-36, please note that if metals will be reported in sediments the AVS-SEM data would be of most significance to ecologists (as indicated on page l-37). Does Crane indeed propose to report both total metals as welt as AVS-SEM metals separately on SWMU 12 sediments samples?"

Response: Yes, Acid Volatile Sulfide/Simultaneously Extracted Metals (AVS-SEM) metals will be reported separately from total metals. For clarification, the following text has been added at the end of Section 1.4.1 Subsection SWMU 12, 3rd paragraph, 8th bullet; Subsection SWMU 13, 3rd paragraph, 10th bullet; Subsection SWMU 16, 3rd paragraph, 12" bullet; and Subsection SWMU 19, 3rd paragraph, 12'" bullet:

"A VS/SEM metals will be reported separately from total metals. "

"Comment 14: Referring to the first bullet on page l-36, it is mentioned that metals are not of concern based on IM sampling. How do the IM residential cleanup levels compare to the RBTLs noted in Table 1-7 and background soil metals levels? Would levels of metals detected during the IM trigger inclusion as a COPC under the decision diagram of Figure 1-13? If so, will the Navy consider these values when performing risk assessment? This would also be true for MFA."

Response: First it should be noted that some of the risk-based target levels (RBTLs) listed on Table 1-7 are ecological values and; therefore, cannot be directly compared to the interim measures (IM) residential cleanup levels which are based on human health. However, the ecological values are generally lower than the IM cleanup levels. A comparison of the human health proposed RBTLs for residential soil presented in Appendix B of the QAPP with the IM residential cleanup levels indicates that the values are approximately the same, Any differences are due to the RBTLs being obtained from the most recent United States Environmental Protection Agency (U.S. EPA) Region 9 PRG table whereas the IM cleanup levels were taken from an older US EPA Region 9 PRG table.

It is correct that the levels of metals detected during the IM would trigger the metal's inclusion as a chemical of potential **concern** (COPC) in the decision diagram and the values for that metal would be considered in the risk assessment. An examination of the post-excavation data indicates that only arsenic would exceed its RBTL. However, this initial examination indicates that the concentrations of arsenic appear to be within background levels. This conclusion will be tested by more rigorous statistical testing that will be performed in the risk assessment. A description of the background comparison methodology is address in Appendix C, Section C.1.2.1 of the QAPP.

No changes have been made to the QAPP in response to this comment.

"Comment 75: Referring to the SVOC bullet on page 1-38 what is meant by "integrators of contamination"?"

Response: Sediments often have finer grain size than soils and represent surface soils that have been transported to and mixed in the surface drainages. The fine grain size enhances adsorption of contaminates, Hence, sediments represent contamination that comes **from** a wider area than an individual soils sample location.

For clarification, the last sentence of the 3rd bullet in the 3" paragraph of Section 1.4.1 Subsection SWMU 13 has been revised as follows:

- ***"SVOCs (surface and subsurface soils, sediments, surface*** water, ***and ground water) – SVOCs, including PAHs, may have been released directly to surface or subsurface soils near the therminol boilers. Sediments will be used as integrators of contamination*** to ***determine whether further investigation is necessary because they represent the accumulation of surface water runoff from a relatively large area."***

"Comment 16: **Referring to the PCB bullet on page l-40, it is stated that PCBs "may have been released directly to surface or subsurface soils with subsequent migration to sediments." Will sediments at SWMU 16 be analyzed for PCBs? If so, this should be noted in the parenthesis for the PCS bullet."**

Response: Sediment will not be analyzed for PCBs. Should PCBs be found in soil samples at levels that could indicate potential sediment PCB contamination, a case-by-case determination will be made as to whether or not it is necessary to collect additional sediment samples for PCBs analysis in selected areas.

No changes were made to the QAPP in response to this comment.

"Comment 17: **Please clarify the phrase, "..and potentially surface water and ground water.)" found in the 3rd bullet on page l-42. When will this be known, definitively?"**

Response: Surface water was inadvertently included in the VOCs analytical scheme. Therefore, the 3rd bullet of the 2nd paragraph of Section 1.4.1 Subsection SWMU 19 has been revised as follows:

- ***"VOCs (surface and subsurface soils and potentially ground water) – These compounds may have been released directly to surface or subsurface soils near the cook-off testing areas with potential migration to other media."***

"Comment 18: The term 'laboratory threshold value - 'TV's', appearing in Table l-7 should be defined. Furthermore the definition of 'TV' and how it relates to other detection limits should be explained in Sections 1.4, and 1.4.1.2."

Response: The laboratory commonly does not report analyte concentrations that are less than the laboratory reporting limits (RLs) on practical quantitation limits (PQLs). Because the risk-based target levels are so low, the Navy requested that the laboratory report to concentrations that are less than the RLs. At first, the request was for the laboratory to report to the method detection limits (MDLs), as currently described in this QAPP. Upon reflection the laboratory decided that the MDLs were not necessarily realistic for the matrices to be analyzed for this project. However, the laboratory agreed that the concentrations less than reporting limits could generally be detected. Therefore, the laboratory agreed to compromise by reporting analyte concentrations as low as threshold values that fall between the MDLs and the RLs. The threshold values are intended to replace the laboratory MDLs, but the description of their origin was inadvertently omitted from the text. Therefore, the 2nd paragraph of Section 1.4 has been rewritten into two paragraphs as follows:

"A// field parameter results greater than or equal to method detection limits (MDLs) will be reported. Field parameters not detected will be reported at the MDL. MDLs for field parameters are based on method or test kit capabilities and specifications. A// laboratory results greater than or **equal** *to threshold values (TVs) will be reported. Target parameters not detected will be reported at the TV. TVs for laboratory parameters are based on method capabilities and specifications. They reflect the computed method detection limit that has been adjusted to reflect what the laboratory realistically can expect to achieve on a routine basis for the environmental matrices to be analyzed. This accounts* for *day-to-day variations in MDLs that the laboratory has experienced in the past, plus other factors such as the recognition that MDLs were computed from data generated in matrices other than those at SWMUs 12, 13, 16, and 19.*

Analytical results for analytes that are less than applicable MDLs (or TV) will be reported with a 'U' flag. The 'U' flag signifies that the parameter was analyzed for but was not detected at a concentration greater than or equal to the MDL (or 7V). Analytical results that are between the MDL (or TV) and the reporting limit (RL) will be reported with a *'J'* flag. Laboratory *TVs* are based in part on best professional judgment and on statistical *computations in accordance with 40 Code of Federal Regulations (CFR) Part 136, Appendix B. The CFR requires the MDL to be computed as the standard deviation of replicate analyses, with results multiplied by the appropriate Student's t-value. Refer to Laucks SOP LTL-1011 for a mathematical computation of instrument detection limit (IDL)/ MDL. Sample-specific laboratory TVs will be computed for each sample to account for variations in the TV that are caused by factors such as sample moisture content, the size of the sample aliquot used in the analysis, and dilutions. The actual TV used will be an estimate of the MDL achievable in actual sample matrices. This estimate will be based on the laboratory's computed MDLs and the laboratory's best estimate of the effect of actual sample matrices on these computed values. This approach will frequent/y result in a TV that is greater than the computed MDL but less than the practical quantitation limit (PQL). It is viewed to be a reasonable compromise between using MDLs that are* unrealistically low and *PQLs* that reflect the quality of the concentration estimate rather than the ability to *detect the presence of an analyte in a sample."*

"Comment *19:* **In the first paragraph on page I-48, please clarify for which COPCs background comparisons will be made to investigational data (metals only)?"**

Response: The 23 U.S. EPA Target Analyte Metals plus lithium, strontium, thorium, and tin were analyzed under NSWC Crane Basewide Background Soil Investigation (TtNUS, 2001a). The metals to be analyzed under this CTO 166 investigation are a subset of those 27 metals; therefore, all metals analyzed under this CTO 166 investigation will undergo background comparisons as described in the 2nd paragraph of Section 1.4.4.2 of this QAPP. The "background investigation report," provides additional detail on the identification of various NSWC Crane soil groups, statistical treatment of the metals concentration data and how data comparisons may be made to the background data. It should be noted that COPCs are not technically compared to background concentrations because COPCs are selected only after the background comparisons are made. Organic contaminants are assumed not to occur naturally for the purpose of COPC selection so the concentrations in background media are assumed to equal zero. The 2nd paragraph of Section 1.4.4.2 establishes, prior to the start of the investigation, the background data that will be used as the background comparisons for metals.

For clarification. the 4th sentence of the 2nd paragraph of Section 1.4.4.2 has been revised as follows:

"For metals, the background concentrations will be represented by soil data from the NSWC Crane Basewide Background Soil Investigation (TtNUS, 2001a)."

***"Comment 20:* In Table 1-3, p. 1 of 2, what doss the term, "select spls (i.e. samples)" mean? What might be the rationale for the second footnote of this table where it is stated that "ground water samples will be analyzed for dissolved metals if NTUs less than 10 cannot be achieved during sampling"?"**

Response: The term "select spls" means select samples. "Select spls" indicates that not all the samples that are collected for an environmental medium will be analyzed for every parameter. For clarification, a footnote has been added to Table I-3 that defines "spls." For further terminology clarification, an acronym list has been added to the QAPP.

The 2nd footnote in Table I-3 refers to ground water samples that are filtered to remove suspended solids prior to sample collection. All ground water samples are analyzed for total metals. However, turbidity [as measured by nephelometric turbidity units (NTUs)] is an indicator of the amount of suspended solids that are present in ground water. A high turbidity indicates that the ground water collected from a well has not yet reached equilibrium with the formation water. If a sample is highly turbid (e.g., above a 10 NTU), a significant portion of the metals present may be attributable to the solids in the ground water. In these cases, a filtered sample is collected to determine whether the metals are present in the dissolved or solid form.

No change has been made to the QAPP in response to this comment.

***"Comment* 21: Should use of an U.S. EPA method for measuring hexavalent chromium in site media of concern be added to Table 1-7? The note "TBD" should be updated in the case of Laucks' HPLC method for picric acid and picramic acid, as indicated in Table 1-7. What is the meaning of a "TV" in Table 1-7, and which will be reported as a detection limit (i.e. a "TV" or a "AL")?"**

Response: Regarding hexavalent chromium, please refer to the Comment 12 response. In Table 1-7, the to be determined (TBD) items for picric and picramic acid have been revised for the Laboratory TV to 0.5 micrograms per liter (µg/L) for the aqueous matrix and to 17 µg/kg for the solid matrix. Additionally, in Table I-7, the TBD items for picric and picramic acid have been revised for the Laboratory RL to 1 µg/L for the aqueous matrix and to 33 µg/kg for the solid matrix.

Please refer to the response to Comment 18 for a discussion of the threshold value (TV) and the meaning of "TV."

***"Comment 22:* Expand on what is meant by "soil replacement areas that are part of the bioremediation facility" mentioned in the second paragraph of page 3-6. Are these the compost backfilled areas? If so, are these sampled for nitrates?"**

Response: Backfill composted material was used for the "soil replacement areas that are part of the bioremediation facility." The composted backfill material was analyzed for cyclotrimethylenetrinitramine *(RDX), cyclotetramethylenetetranitramine* (HMX), and *trinitrotoluene* (TNT) prior to being returned to the site. No analysis was conducted for nitrates. A further discussion of nitrate analyses is contained in the response to Comment 27.

No changes have been made to the QAPP in response to this comment.

***"Comment* 23: Referring to the settling basins noted in the third paragraph on page 3-6, have there**

been any overflows which might require surface samples here?"

Response: There were several releases of explosives contaminated water to surface soil in the late 1980s and early 1990s. Therefore, there is a potential for energetics and nitrates to be present at the settling basins. To determine impacts, if any, from settling basin overflows, the following changes have been made to the QAPP:

1. **Tables 3-2 and 3-3 have been modified lo include eight additional surface soil samples (12SS04, 12SS05, 12SS06, 12SS07, 12SS08, 12SS09, 12SS10, and 12SSII) for SWMU 12.**

2. **The last paragraph of Section 3.4.1.1 has been revised as follows:**

"Four *soil* **borings each** *will be installed along the edges of settling basins located at structures 3110 (12SB04 through 12SB07) and 3037 (12SB08 through 12SB11) to evaluate whether leakage may have occurred. Each boring will be sampled at one surface and two subsurface depth intervals above the water table; specific subsurface depths will be determined in the field based on encountering waste or obvious contamination during drilling. If no waste or obvious contamination is encountered during drilling, then the shallow subsurface sample will be collected from a depth that is representative of the middle depth of the settling basin. The deep subsurface sample will be collected from a depth that is representative of the bottom of the settling basin, but not below the water table."*

3. **The 3rd sentence of the 2nd bullet of the 4th paragraph of Section 1.4.1 Subsection SWMU 12 has been revised as follows:**

"Soils near the UAP and settling basins will be sampled and tested for explosives."

"Comment *24:* **For Cast High soil samples (Section 3.4.1.3.), expand on why subsurface depth is "to be determined"."**

Response: Because the depth at which contamination occurs varies for each sample location, a preset sampling depth cannot be established. Therefore, during drilling, it is necessary to make a field determination at each sample location based upon encountering wastes or obvious contamination where the subsurface soil sample is to be collected (e.g., the "to be determined" subsurface soil sampling depth).

For clarification, the 1st paragraph of Section 3.4.1.3 has been revised as follows:

"As previously discussed in Section 1, soil contamination exists in the incineration ash disposal areas south of Building 146, and she// casings are present on the ground surface in the parking areas surrounding Building 146. Some of the ash has been removed; however, contamination may still be present. Therefore, 39 additionalsoil borings (165801 through 16SB39) are proposed to be installed within and immediately outside these areas to determine whether any residual contamination is present. One surface soil sample (0 to 2 feet bgs) and one subsurface soil sample (depth to be determined based on encountering waste or obvious contamination during drilling) will be collected from each boring. If no waste or obvious contamination is encountered during drilling, then the subsurface soil sample will be collected immediate/y above the water table."

For additional clarification, a sentence has been added to the end of 2nd paragraph of Section 3.4.1.3 as follows:

'The shallow soil sample will be collected from a depth that is representative of the middle depth of each sump **and the** *deep* **sample will be collected from** *a* **depth** *that* **is** *representative* **of the** *bottom* **of each** *sump,* **but** *not below the water tab/e."*

"Comment 25: Referring to the second paragraph of section 3.4.1.3., the sediment and soil samples are very close to one another as shown on Figure 3-3 (e.g., 16SB40 and 16SW/SD07). EPA suggests adding another sediment sample further down the ditches after the sump discharge because of long term historical discharges to those ditches."

Response: To determine long-term historical discharges to these ditches after the sump discharge, the following changes have been made to the QAPP:

1. Figure 3-3 has been modified with the addition of four sediment samples (16SD08, 16SD09, 16SD10, and 16SD11).

2. Tables 3-13 and 3-14 have been modified to include four additional sediment samples.

3. A 3rd sentence has been added to the 1st paragraph of 3.4.3.3 as follows:

"A total of seven surface water/sediment samples (16SW/SD01 through 16SW/SD07) are proposed for this SWMU in the ditches that exit this SWMU. Two of the sample locations (16SW/SD02 and 16SW/SD07) are located at the discharge point of the sumps located at the SWMU. A total of four sediment samples (16SD08 through 16SD1 1) will be collected to determine the impact of long-term historical discharges, if any. This SWMU is a/so located at a typographic high and the contamination results will be evaluated in respect to background in the same manner as Mine Fills A and B. A// surface water/sediment at the SWMU is derived from within the SWMU boundary, and the collection of SWMU-specific background samples and associated evaluation is not appropriate."

"Comment 26: Referring to section 3.4.1.4., why are there no subsurface borings near saltwater wave tank at the rocket range? Why is boring 19SB01 not located near fast-cook off tank as is 19SB02 (underground brine tank)?"

Response: The exclusion of a soil boring at the saltwater wave tank located at the rocket range was an oversight. An additional boring (19SB07) will be added to the scope of work. The boring will be sampled for the same depth intervals and analytical suites as boring 19SB02. The following changes have been made to the QAPP:

4. Figure 3-4 has been modified with the addition of boring 19SB07 at the Rocket Range.

5. Tables 3-2 and 3-3 have been modified to include sampling boring 19SB07. Additionally, Table 3-2 has been revised to indicate that the depth for the subsurface soil sample in boring 19SB02 is to be determined.

6. The 4th paragraph of 3.4.1.4 has been revised as follows:

'Both surface and subsurface soil samples will be collected during Round 1 from soil borings at seven locations (19SB01 through 19SB07). One of the soil borings (19SB01) will be located in the vicinity of the fast cook-off tank where burnable fuel is pumped underground from a remote tank to the cook-off tank, then ignited. Soil borings 19SB02 and 19SB07 will be located adjacent to an underground brine tank (not identified on Figure 3-4) and saltwater wave tank, respective/y, that are used to test underwater signal flares. The subsurface soil samples from these borings will be collected at a depth representing the tank bottoms, but not below the water tab/e. Soil borings 19SB03 through 19SB06 will be located in a sand trap area that was the landing area for the rocket range."

Additionally, Boring 19SB01 that had been located near the fast cook off tank sampling perimeter, has been re-located to near the cook off tank as detailed on Figure 3-4.

"Comment 27: For MFA/MFB groundwater sampling (Table 3-4), there is no mention of nitrates sampling. It may be good to be consistent between what is identified in tables 1-3 to 1-5 and tables 3-2 though 3-5 and 3-11 through 3-14."

Response: Table 3-4 contains a summary of ground water samples to be collected for laboratory analysis. Nitrate analysis for ground water is addressed in Table 3-1 (Field Screening and Measurements). Nitrates will be analyzed in the field.

No changes have been made to the QAPP in response to this comment.

"Comment 28: In sections 3.4.3.1 & 3.4.3.2. referring to MFA/MFB sediment sampling, EPA suggests taking samples further off the SWMU (i.e., downstream sediment) to assess any impacts from the long term historical discharges to these drainage ditches."

Response: To determine long-term historical discharges to these drainage ditches from SWMUs 12 and 13, the following changes have been made to the QAPP:

For SWMU 12:

1. **Figure 3-1 has been modified with the addition of eight sediment samples (12SD16, 12SD17, 12SD18, 125019, 12SD20, 12SD21, 12SD22, and 12SD23) to determine the impacts, if any, of long-term historical discharges associated with SWMU 12 to these drainage ditches.**

2. Tables 3-13 and 3-14 have been modified to include eight additional sediment samples.

3. A 2nd sentence has been added to the 1st paragraph of 3.4.3.1 as follows:

   "A total of 15 surface water/sediment samples (12SW/SD01 through 12SW/SD15) areproposed for this SWMU. A total of eight sediment samples (12SD16 through 12SD23) will be collected to determine the impacts, if any, of long-term historical discharges. This SWMU is located at a topographic high point and all surface water that exists at the SWMU originated within the SWMU boundary. The surface water/sediment samples are located in all apparent surface water conveyances at the SWMU along the SWMU boundary to address the majority of surface water runoff. A// of these samples are intended to address SWMU related contamination. Therefore, it will be concluded that organic contamination, if present in this medium would be site related. Organic contamination results would be subject to comparison to regional background data sets to determine site related contamination."

For SWMU 13:

1. Figure 3-2 has been modified with the addition of nine sediment samples (13SD14, 13SD15, 13SD16, 13SD17, 13SD18, 13SD19, 13SD20, 13SD21, and 13SD22) to determine impacts, if any, of the long-term historical discharges associated with SWMU 13 to these drainage ditches.

2. Tables 3-13 and 3-14 have been modified to include nine additional sediment samples.

3. A 3rd sentence has been added to the end of the 1st paragraph of 3.4.3.2 as follows:

   "The sampling approach at Mine Fill B is similar to the approach taken at Mine Fill A. A total of 13 surface water/sediment samples (13SW/SD01 through 13SW/SD13) are proposed for this SWMU. Background will be evaluated in the same manner as the Mine Fill A. A total of nine sediment samples (13SD14 through 13SD22) will be collected to determine the impacts, if any, of long-term historical discharges, "

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"Comment 29: **For SWMU #19, EPA suggests adding 2 SW/SD samples to creeks running into Boggs Creek from the "Alternate Site" noted on Figure 3-4."**

Response: To determine impacts, if any, of long-term historical discharges to these drainage ditches, the following changes have been made to the QAPP:

1. Figure 3-4 has been modified with the addition of two surface water / sediment samples (19SW/SD26 and 19SW/SD27).

2. Tables 3-11, 3-12, 3-16, and 3-14 have been modified to include two additional surface water / sediment samples.

3. The 1st paragraph of 3.4.3.4 has been revised as follows:

   "As previous/y discussed, the Pyrotechnic Test Area lies within and along both sides of the floodplain of Boggs Creek. A total of 29 surface water/sediment samples (19SW/SD01 through 16SW/SD27) are proposed for this SWMU, which includes sampling in ditches which are tributaries to Boggs Creek located in proximity to treatment areas. Upstream samples are also proposed, including samples 19SW/SD01 and 19SW/SD06 for background comparison."

"Comment *30:* **For SWMU #19, has the highest flood elevation been determined and are the flood plain soils samples placed appropriately?"**

Response: Information is not available for the highest flood elevation at SWMU 19 including the Rocket Range. However, according to information obtained from site personnel, all of the lowland areas are subject to flooding. The number and placement of flood plain soil samples was based on this information.

No changes have been made to the QAPP in response to this comment.

"Comment *31:* **The Navy should consider using the Encore samplers for analysis of VOCs in sediments per method 5035."**

Response: Regarding Table 3-15, soil and sediment samples collected for volatile organic compound (VOCs) analysis will be collected and containerized in EnCores™ samplers. Footnote 2 has been added to Table 3-l 5 as follows:

"Sediment samples collected from areas with no standing water will be collected **and** *containerized in this manner. Sediment samples collected from areas under standing water will be containerized using a using a 4 ounce clear wide mouth glass jar and cooled to 4°C. "*

Additionally, a 7th sentence has been added to the 4th paragraph of Section 3.4.3 and to the Table 3-15 footnotes as follows:

"For volatile fractions on/y, sediment samples collected from areas with no standing water will be collected and containerized in EnCore™ samplers as noted in Table 3- 15. *"*

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Miscellaneous changes to the QAPP not directly associated with response to U.S. EPA comments are as follows:

I. Technical changes:

Analytical laboratory standard operating procedures (SOPs) that have been revised since the draft QAPP was issued have been included as follows:

LABORATORY STANDARD OPERATING PROCEDURES (SOPs)

LAUCKS TESTING LABORATORIES

SOP NUMBER	REV #	QAPP	TITLE
LTL-1020	2	126[1]	Integration of IC, GC, HPLC and GCMS Peaks
LTL-2001	6	126[1]	Waste Segregation and Disposal
LTL-3011	2	126[1]	Extraction Method for Chlorinated Herbicides in Soil (8151A by 35508)
LTL-3161	5	166[2]	Extraction Method for Ordnance Compounds in Soils (6330)
LTL-6019	4	166[2]	Determination of Non-Halogenated Volatile Organics by SW 8015B
LTL-6064	5	166[2]	Analysis of Organochlorine Pesticides and PCBs by SW 646 Methods SW 8081A and 6062
LTL-6151	4	126[1]	Analysis of Chlorinated Herbicides by 6151A
LTI-6265	4	166[2]	Determination of Volatile Organic Compounds by Method 8260B
LTL-6277	2	166[2]	Determination of Polynuclear Aromatic Hydrocarbon Compounds by Selective Ion Monitoring (SIM) Method 8270C
LTL-6279	3	166[2]	Determination of Semivolatile Organic Compounds by Method 6270C and 6270D
LTL-6303	5	166[2]	Determination of Picric and Picramic Acid
LTL-6330	11	126[2]	Determination of Nitroaromatics and Nitramines by SW-646 Method 6330
LTL-9104	3	166'''	Preparation and Analysis of Total and Amenable Cyanide According to EPA Methods 335.1, 335.3, and SW 646 9012A
LTL-9110	6	166[2]	Determination of Anions by Ion Chromatography by Method 300.0A or 9056
LTL-9113	2	166[2]	pH in Soil and Waste Samples Using SW646 Method 90450
LTL-9116	6	166[2]	The Determination of Total Organic Carbon in Soil/Sediment Samples Using Modified SW-646 Method 9060

TRIANGLE LABORATORY

SOP NUMBER	REV #	QAPP	TITLE
2.04	6	126[2]	Nonconformance
5.01	10	126'''	Sample Receipt, Identification, Handling, and Storage
DSP 105	16	126[2]	Extraction of PCDD/PCDF from Solids (not tissue) - 6290
DSP 161	19	166[1]	Extraction of PCDD/PCDF from Water for Methods 1613, 6290, and 551
DHR 162	9	126[2]	PCDDs and PCDFs by HRGC/HRMS - Method 6290
DPA 104	12	126[2]	Data Package Assembly and Shipping

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LABORATORY STANDARD OPERATING PROCEDURES (SOPs)

NSWC CRANE LABORATORY

SOP NUMBER	REV #	Q A P P	TITLE
CR4052-PD-0100	3	166[1]	Document Control
CR4052-PD-0150	4	166[2]	Record Retention
CR4052-PD-0200	3	166[1]	Preventive Maintenance
CR4052-PD-0600	2	166[2]	Customer Reports

1 "Quality Assurance Project Plan for Mine Fill A (SWMU 12), Mine Fill B (SWMU 13), Cast High Explosives Fill/B146 Incinerator (SWMU 16), and Pyrotechnic Test Area (SWMU 19) RCRA FRI Investigation," NSWC Crane, February 2002.

2 "Quality Assurance Project Plan for Ammunition Burning Grounds Little Sulphur Creek and Jeep Trail Resource Conservation and Recovery Act Phase III RCRA Facility Investigation," NSWC Crane, April 2001.

II. **Non-technical changes:**

A. An Acronym List has been added to the QAPP.
0. Various punctuation and capitalization errors have been corrected throughout the QAPP.
C. Various acronym definitions have been added to the first usage of a term in the QAPP.
D. Various redundant acronym definitions have been eliminated from the QAPP.