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MCRD PARRIS ISLAND
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EMAIL OF TRANSMITTAL AND U S EPA REGION IV COMMENTS ON U S NAVY
RESPONSES TO COMMENTS ON SAMPLING AND ANALYSIS PLAN FOR FISH TISSUE AT
SITE 3 WITH ATTACHMENTS MCRD PARRIS ISLAND SC
10/16/2009
U S EPA REGION IV

From: Llamas.Lila@epamail.epa.gov
To: [Sladic, Mark](#)
Cc: [Jupin, Bob](#); [Cook, Charles CIV NAVFAC SE](#); [heber pittman](#); [Zimmerman, Greg](#); [mac mcrae](#); [Churchill, Peggy](#); [tim harrington \(email\) \(timothy.j.harrington@usmc.mil\)](#); llamas.lila@epa.gov
Subject: RE: MCRD PI Site 3 SAP Redline NET Meeting
Date: Friday, October 16, 2009 3:55:05 PM
Attachments: [32 EPA Redline and Feedback for RTCs for Fish SAP D1 \(3\).doc](#)
[32 An SOP for Field Fish Sampling\(512\)_AF.R1](#)
[32 Draft Tissue Processing SESDPROC-602-R0.doc](#)
[UFP SAP for Fish Tissue D1 EPA+DHEC RTC \(4\).doc](#)

Thanks for the file Mark.

As promised, here's my working file with feedback to your RTCs. Make sure you check each little change I have in there. I may have skipped over one or two small ones that were similar to ones already discussed. Also attached is the Processing SOP for the comment regarding dry ice. Also attached is EPA's Field Procedures SOP for Fish Sampling for your information.

(See attached file: 32 EPA Redline and Feedback for RTCs for Fish SAP D1 (3).doc)(See attached file: 32 An SOP for Field Fish Sampling (512)_AF.R1)(See attached file: 32 Draft Tissue Processing SESDPROC-602-R0.doc)

Greg, feel free to call me as you work through the SAP revisions if need be.

Thanks,
Lila

From: "Sladic, Mark" <Mark.Sladic@tetrattech.com>

To: "Jupin, Bob" <Bob.Jupin@tetrattech.com>, "Zimmerman, Greg" <Greg.Zimmerman@tetrattech.com>, "Churchill, Peggy" <Peggy.Churchill@tetrattech.com>, "Cook, Charles CIV NAVFAC SE" <charles.cook2@navy.mil>, heber pittman <darrel.pittman@usmc.mil>, Lila Llamas/R4/USEPA/US@EPA, mac mcrae <mmcrae@TechLawInc.com>, "tim harrington (email) (timothy.j.harrington@usmc.mil)" <timothy.j.harrington@usmc.mil>

Date: 10/16/2009 02:19 PM

Subject: RE: MCRD PI Site 3 SAP Redline NET Meeting

No one but Greg might need this, but just in case, here is the RTC working version from net-meeting. thanks. Have a good weekend. MS

From: Sladic, Mark
Sent: Friday, October 16, 2009 11:39 AM

To: Jupin, Bob; Zimmerman, Greg; Churchill, Peggy; Cook, Charles CIV NAVFAC SE; heber pittman; Lila Llamas; mac mcrae; tim harrington (email) (timothy.j.harrington@usmc.mil)
Cc: 'Meredith Amick'; Susan Byrd
Subject: RE: MCRD PI Site 3 SAP Redline NET Meeting

Hi everyone. EPA confirms an interest in still having the call, as scheduled. Talk to you all at 1:00. For those who plan to follow along with real-time document changes, we'll have the SAP up on the NET portion of the call, viewable on your PC or laptop. thanks. MS

From: Sladic, Mark
Sent: Friday, October 16, 2009 6:21 AM
To: Jupin, Bob; Zimmerman, Greg; Churchill, Peggy; Cook, Charles CIV NAVFAC SE; heber pittman; Lila Llamas; mac mcrae; tim harrington (email) (timothy.j.harrington@usmc.mil)
Cc: 'Meredith Amick'; Susan Byrd
Subject: RE: MCRD PI Site 3 SAP Redline NET Meeting

Hi Lila. Please confirm that we still need to have this call. When we talked early Tuesday, I believe that it seemed that EPA's remaining objections were pretty much in two buckets: (1) The sediment/model-based risk assessment, and (2) use of PCBs analytical results from the reference location in screening of the Site 3 results. I believe that you said that generally, if SCDHEC supported the PCBs response (RTC letter), EPA could go along. I think you were going to peruse (1) with attorney David Buxbaum (and hopefully, Tim Frederick). We are optimistic that the issue has been resolved, but I'm not aware EPA has provided any updates since Tuesday AM.

For (1), EPA's request was for a second risk assessment, using the sediment to model a tissue concentration (instead of the measured tissue concentration). I don't believe that NAVFAC, SCDHEC, or Tetra Tech thought that this approach would be appropriate because it would not be representative of any known or hypothetical receptor, mostly because it is agreed (I think) that it is impossible to isolate only post-remedy fish whose home range is limited to the edge of the landfill cover. (There were also other concerns with the approach.) Although we think the technical defensibility is dubious, as a way to 'meet in the middle' and provide a solution, we proposed a tabular comparison of modeled tissue concentrations compared to measured tissue concentrations, with a narrative. It appears that this might now be more than SCDHEC will accept, but maybe there is hope, if we can agree on the appropriate qualifications for the tabular comparison. We're optimistic that you and Tim Frederick were able to convey the facts to Mr. Buxbaum. Obviously, I believe that most any of us copied above would be willing to support EPA in the discussion with Mr. Buxbaum, which may be more productive the planned net meeting. Please advise. thanks. MS

-----Original Appointment-----

From: Sladic, Mark
Sent: Tuesday, October 13, 2009 10:36 AM
To: Jupin, Bob; Zimmerman, Greg; Churchill, Peggy; Cook, Charles CIV NAVFAC SE; heber pittman; Lila Llamas; mac mcrae; tim harrington (email) (timothy.j.harrington@usmc.mil)
Subject: MCRD PI Site 3 SAP Redline NET Meeting
When: Friday, October 16, 2009 1:00 PM-2:30 PM (GMT-05:00) Eastern Time

(US & Canada).

Where: MeetingPlace: 1-866-270-2016 ID: 5260

Please join us to resolve outstanding issues on the fish tissue SAP, via internet meeting, meaning that one will need to participate via PC to see the real-time document changes. In talking to EPA this AM, I believe that the remaining issues are linked to (1) how to use the model, and how to present that output data; and (2) use of the reference location data. EPA planned to consult with legal to determine if the approach suggested in the RTC regarding model output was adequate to support post-remedy conditions. Lila - please forward this invite, as appropriate, to Tim Frederick (or others). Tetra Tech does plan to have risk assessor Bob Jupin participating on the call. thanks.

Mark Sladic has invited you to a Cisco MeetingPlace e-Conference

Date/Time: OCT 16, 2009 at 1:00 PM America/New_York
Length: 90
Frequency: 1

Meeting ID: 5260
Meeting Password:

Phone Number(s): 1-866-270-2016 (US Toll Free)
1-650-260-9020 (Local/Int'l)

TO ATTEND THE WEB CONFERENCE AND THEN JOIN WITH AUDIO:

1. Go to:
<http://gc9gw1.meetingplace.net/a/c90a6de4bc534f4c942d9a2d91b58f72>
2. Sign in as a Guest or with your Cisco MeetingPlace User ID, and click on Attend Meeting.
- Accept any security warnings you receive and wait for the Meeting Room to initialize.
3. Click on CONNECT and enter your phone and click OK. The system will now call you.

TEST YOUR BROWSER BEFORE YOU ATTEND YOUR FIRST WEB CONFERENCE

Visit <http://gc9gw1.meetingplace.net/test/> to test your web browser for compatibility with the web conference.

For more information about Cisco MeetingPlace including Meeting Tips and FAQ's, please visit the Reference Center at <http://gc9gw1.meetingplace.net/infocenter/>

(See attached file: UFP SAP for Fish Tissue D1 EPA+DHEC RTC (4).doc)

**Response to SCDHEC Comments on
Quality Assurance Project Plan
Site 3 – Causeway Landfill Fish Tissue Risk Assessment (QAPP) for the Marine Corps Recruit
Depot (MCRD), Parris Island, South Carolina
(September 2009)**

General Comments

1. **Comment:** Please discuss the impact of UXO 4 and the golf course on the reference location.

Response: For the target parameters (mercury, copper, PCBs, DDT) we don't expect any significant impact. The reference location drains a significant geographical area, of which only a small part of the golf course intrudes - although most of UXO 4 would drain through here. For the key contaminant, mercury, we wouldn't expect mercury to occur on the UXO site or golf course. PCBs would also not likely result from a munitions site or operation of a golf course. Copper would be anticipated to occur on a golf course, and copper use as copper jacketing on certain munitions was not common until after World War II, by which time MCRD has quit using UXO 4 (1937). DDT might have had a slightly higher application rate on the golf course, but across the entire drainage area, the application on average should provide pretty fair anthropogenic data. Our fish expert, Mike Whitten, has discussed the area with Dr. Warren from our TRC. Dr. Warren has sampled sediment in the area, and has not found and widespread copper contamination. No modifications to the SAP are proposed based on this response.

Specific Comments

2. Page 45 of 91 Fish Tissue Sampling

This section states, "The right fillet of one fish from each target species (both from the pond and from the reference location) will be submitted as a duplicate," which seems to indicate 4 duplicate samples will be taken. However, SAP Worksheet #18 (page 57 of 91) only shows three duplicate sample numbers. Please clarify.

Response: Based on comments from USEPA and from the Navy Chemist (given the range of motion of fish and difference in ages, the concept of having field duplicates does not apply), field duplicates will not be collected from either the 3rd Battalion Pond or from General's Landing Creek (reference location). The QAPP has been revised accordingly.

**Response to USEPA Comments on
Quality Assurance Project Plan
Site 3 – Causeway Landfill Fish Tissue Risk Assessment (QAPP) for the Marine Corps Recruit
Depot (MCRD), Parris Island, South Carolina
(September 2009)**

Lila Llamas
USEPA Region 4
Federal Facilities Branch
Superfund Division
Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, Georgia 30303-8960

General Comments

1. **Comment:** Given the extensive detail in the document, including the appendices, it was not reasonable to expect complete review within the limited accelerated review timeframe requested. In order to meet the timeframe, comments are being submitted now, in an attempt to address any major obvious issues, however, please recognize a detailed technical review was not possible in the timeframe allotted. This is especially true, given submittal of the document during the fiscal year end activities. Since EPA understands the Navy intends to move forward with the field work to meet their deadlines, at this time EPA does not intend to complete the detailed review. However, as the process is implemented, issues may arise. At that point EPA expects the Navy will still address any concerns raised by EPA. In the future, in order to avoid proceeding at such risk, EPA requests the Navy submit documents early enough to allow for the allotted review times established and agreed upon by all parties in the Site Management Plan.

Response: The Navy appreciates U.S. EPA's willingness to submit comments on the Site 3 QAPP in an attempt to meet the accelerated review timeframe and understands that additional issues may arise as the process is implemented.

Specific Comments

2. **Comment:** Executive Summary, Page 2, paragraph 4 – EPA believes the term “estimate” is more representative of what modeling does, as opposed to “calculate”. Please modify the next to last sentence to read “... sediment-to-fish models used to estimate fish tissue concentrations...” or “... sediment-to-fish models used to calculate estimated fish tissue concentrations”. EPA would prefer this same change be made throughout the document. Please do a search and replace for all occurrences where models are referred to as being used to “calculate” fish tissue concentrations.

Response: The QAPP has been revised throughout to indicate that the sediment-to-fish models are used to estimate fish tissue concentrations.

3. **Comment:** Executive Summary, Page 3, last paragraph – To better reflect the agreement reached by consensus please modify the paragraph to replace the word “also” with “only”. To the end of the paragraph add the following sentence: “Since fishers may take fish from the pond which were present prior to implementation of the interim remedy, or which may have come into the pond after being exposed to contamination elsewhere, the sampling plan has been designed to reflect that potential consumption, as opposed to consumption of fish exposed only to post-remedy conditions. This is appropriate for determination of risk from fish consumption. However, since the sampling has not been designed to reflect only post-remedy conditions, and may reflect

contaminants that are not Site 3 related, or that are not post-remedy chemicals of potential concern, the data will not be used to require any further action for Site 3 sediment, surface water, etc.”

Response: The word “also” in the second sentence of this paragraph has been changed to “only”. In addition, the following text has been added to the end of the paragraph (with changes from EPA’s proposed language indicated in *regular italics font*):

“*EPA’s concern is that s*Since fishers may take fish from the pond which were present prior to implementation of the interim remedy, or which may have come into the pond after being exposed to contamination elsewhere, the sampling plan has been designed to reflect that type of potential consumption, as opposed to consumption of fish exposed only to post-remedy conditions. This is appropriate for determination of risk from fish consumption. However, since the sampling has not been designed to reflect only post-remedy conditions, and may reflect contaminants that are not Site 3 related, or that are not post-remedy chemicals of potential concern *for sediment or surface water*, USEPA will not support the use of the data to require any further remedial action *other than IC’s* for Site 3 sediment, surface water, etc.”

4. **Comment:** SAP Worksheet #3 – Distribution List, page 12 - Please change the EPA RPM’s email address to delete “Koroma-”. Please do this everywhere the email address is listed throughout the document. This same comment was made on the draft MMRP SAP. Therefore it appears a master list is generating this same error repeatedly. Please update the master list(s) as well.

Response: The QAPP has been revised as requested. The only master list is that maintained by the Team facilitator.

5. **Comment:** SAP Worksheet #3 – Distribution List on Page 12 of 91 indicate that some of the project roles (i.e., field operations leader and site safety officer) have yet to be determined (TBD). To ensure completeness and accuracy, revise the Quality Assurance Project Plan Site 3 – Causeway Landfill Fish Tissue Risk Assessment dated 2009, herein referred to as the Uniform Federal Policy SAP (UFP SAP), by updating the TBD designation in the relevant worksheets of the final revision by identifying the appropriate staff personnel as needed.

Response: Due to the period of time between submittal of the Draft QAPP and finalization of the QAPP, it is not uncommon for the draft documents to indicate TBD for field staff. In this case, we can now confirm that Mike Whitten of TtNUS’s Aiken, South Carolina office will serve as both FOL and SSO and the QAPP has been revised accordingly.

6. **Comment:** SAP Worksheet #6, Procedure column – First row - Please add to the end “The TtNUS TOM must first get approval from the PI Team, unless otherwise noted in the SAP or agreed to via consensus up front.” Third row- Please add to the end “Navy inform PI Team immediately.” Fourth row – Please add to the last sentence “...change, after consulting with the PI Team for consensus, except where already approved in the SAP.” Fifth row – Please add to the end “Navy to notify the PI Team immediately.” Sixth row – Please add to the end “TtNUS to notify the PI Team immediately.”

Response: For the first row, the following has been added:

“The TtNUS TOM will make immediate email notification to the PI Team. To the extent practical, Navy/TtNUS will work with the Team if any objections or concerns are identified

by Team Members prior to implementation.” O.K. but as written my approval letter will state that Tt and the Navy should be aware they will be proceeding at risk if consensus approval is not obtained from the PI team for any deviations from the SAP.

All other WS 6 revisions have been made as suggested.

7. **Comment:** SAP Worksheet#7, Page 18 – Please provide the names and corresponding Education and/or Experience Qualifications for both positions. Page 19 – Please correct typos in the last two rows to be “... Navy RPM...”.

Response: Mike Whitten of TtNUS’s Aiken, South Carolina office will serve as both FOL and SSO. Mr. Whitten has an M.S. in Environmental Science and 20 years of environmental experience. The QAPP has been revised accordingly.

The typo in the last two rows has been corrected to read “...Navy RPM...”.

8. **Comment:** SAP Worksheet #9.1, Page 21, Consensus Decisions, First Bullet – Please add to the end “EPA agreed to the study goal and COPCs provided the results would only be used to make decisions regarding the need for ICs in the form of fish restrictions and risk communication. The results are not to be used to require any further action on Site 3 sediments, surface water, etc.”

Response: The following language has been added at the end of the first bullet:

“USEPA agreed to the study goal and COPCs provided the results would only be used to make decisions regarding the need for ICs in the form of fish restrictions and for risk communication. USEPA will not support use of the data to require any further remedial action other than IC’s on Site 3 sediments, surface water, etc, because the investigation is not being developed in a way which would to support these other goals.”

9. **Comment:** SAP Worksheet #9.1, Page 22, Consensus Decisions, Last Sentence – Please add the word “draft” before minutes. In future SAPs, finalize the minutes before drafting the SAP and ensure consensus items are captured in the minutes so they can be included as written and agreed upon at the time. Also see comment above regarding email.

Response: The QAPP has been revised as requested.

10. **Comment:** SAP Worksheet #9.2, page 23 – See comment above regarding email.

Response: The QAPP has been revised as requested.

11. **Comment:** SAP Worksheet #9.2, page 24 – Modify the Title line to read “Comments/Decisions Cont’d”. Modify this section to read as follows:

“Sediment-to-fish tissue models were used in the development of the draft Technical Memorandum (TtNUS, July 2008) to estimate fish tissue concentrations resulting from exposure of fish to measured contaminant concentrations in post-remedy sediment samples. Results indicated potentially unacceptable risk. Comments were received on the models used and an

alternative model for determining mercury concentrations in fish was recommended by USEPA. DHEC recommended sampling 3rd Battalion Pond.

The EPA recommended model and other changes to the modeling procedures will be implemented and the results presented in the revised Tech Memo. The estimated fish tissue concentrations derived by the use of these models and based on post-remedy sediment samples will be used in calculating risks as would be generated by post remedy conditions and reported as such. The associated uncertainties will be discussed in the uncertainties section of the revised Tech Memo.

Once fish tissue sampling has been completed, the measured fish tissue concentrations will be used to calculate potential risks to human receptors resulting from consumption of fish from the 3rd Battalion Pond, which may contain fish exposed to pre-remedy conditions, as well as conditions and contaminants external to the pond and removed from Site 3.

The draft minutes of the conference call are included in this SAP as Appendix A.”

Response: The title on the Top of Page 24 will be changed as requested and the missing Action Items will be added is correct as is “Consensus Decisions. It is separated from the Comments/Decisions section by the Action Items Section (none were identified).

The subject section has been modified as follows (with changes from EPA's proposed language indicated in *regular italics font*):

“Sediment-to-fish tissue models were used in the development of the draft Technical Memorandum (TtNUS, July 2008) to estimate fish tissue concentrations resulting from exposure of fish to measured contaminant concentrations in post-remedy sediment samples. Draft R results indicated potentially unacceptable—slightly elevated risk. Comments were received on the models used and an alternative model for estimating~~determining~~ mercury concentrations in fish was recommended by USEPA. DHEC recommended sampling 3rd Battalion Pond.

The USEPA recommended model and other changes to the modeling procedures will be implemented and the results presented in the revised Tech Memo. The estimated fish tissue concentrations derived by the use of these models and based on post-remedy sediment samples will be compared to the same screening values indicated in this SAP to meet CERCLA requirements. If the screening values are exceeded, the Navy will take a conservative position and state that post-remedy sediment concentrations could be contributing to unacceptable levels of contamination in fish with respect to human consumption and decide to accept actual fish tissue sample results for the purpose of making decisions pertaining to IC's and for the purpose of risk communication, in tabular format to the actual tissue sample results and reported as an indicator that is potentially more representative of post-remedy conditions. The associated uncertainties will be discussed in the uncertainties section of the revised Tech Memo.

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Once fish tissue sampling has been completed, the measured fish tissue concentrations will be used to calculate potential risks to human receptors resulting from consumption of fish from the 3rd Battalion Pond, which may contain fish exposed to pre-remedy conditions, as well as conditions and contaminants external to the pond and removed from Site 3.

In the uncertainties section of the revised Risk Assessment Tech Memo the estimated fish tissue concentrations will be compared against actual fish tissue concentrations in a tabular form and the uncertainties associated with both approaches will be discussed.

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The draft minutes of the conference call are included in this SAP as Appendix A.”

The Table of Contents has been revised to indicate that Appendix A is Draft Meeting Minutes.

12. **Comment:** SAP Worksheet #10, page27, Last paragraph and Page 28 first full paragraph – Delete these two paragraphs and replace them with the three main paragraphs in the comment above. Page 29 – Modify the last sentence to read “... decision pertaining to ICs that would be presented in the Final ROD for Site 3 and to communicate risk to the local fishers.”

Response: The last sentence in the next to last paragraph and the entire last two paragraphs in Section 10.2 have been deleted, and replaced with the four~~three~~ main paragraphs in the response above. The recommended change on Page 29 has been made.

13. **Comment:** SAP Worksheet #10, page 35, Table 10-2 – There is a more current version of the EPA Regional Screening Levels (RSLs) than the June 2008 version referenced in Footnote 2. The footnote also incorrectly cites Oak Ridge National Laboratory as the source of the data. EPA should be cited as the source for the RSLs, and the correct citation should be April 2009. Please update the SAP accordingly.

Response: Both Table 10-1 and Table 10-2 have been revised to show that the source of the Regional Screening Levels is USEPA, May 2009. As always, the most current Regional Screening Levels available will be used in preparation of the Final Technical memorandum, which may be a different version than that available during QAPP generation.

14. **Comment:** SAP Worksheet #11, page 36, Section 11.2, Bullet number 1 – Modify the last sentence to read “... sediment-to-fish tissue modeling to estimate fish tissue concentration which will be used to generate a risk associated with post remedy conditions and can be further discussed in the uncertainties section.” Page 37, Bullet number 5 – Modify the last sentence to read “... collected at 3rd Battalion Pond can be contributed to local background/anthropogenic conditions.”

Response: Bullet number 1 in Section 11.2 has been revised as follows:

...Add “post remedy” before “sediment data (Ttnus, July 2008).” (The last sentence was deleted.) sediment-to-fish tissue modeling to estimate fish tissue concentrations which will be compared to actual measured fish tissue concentrations as an indicator that is potentially more representative of post-remedy conditions, which can be discussed further in the uncertainties section.

The fifth bullet on Page 37 has been revised to read “...collected from the 3rd Battalion Pond can be attributed to local background/anthropogenic conditions.”

If the fifth bullet changes from what you have proposed here, EPA will not accept any statement that anything above background would be attributed to Site 3, You may choose

[to simply state that the results will be screened against background, and not try to clarify what that means.](#)

15. **Comment:** SAP Worksheet #11, page 38, Section 11.4 – The section describes the method for screening of site data against the reference concentration. The reference location screening should not include screening of PCBs, since there should not be any background and/or anthropogenic component of PCB contamination that is related to widespread common uses. Please clarify this point in the text. (However, the analysis of reference locations and duplicates for PCBs may still provide information which could be discussed in the uncertainties section of the HHRA if there is a presence in the reference samples. Blanks will also clarify these are not lab contaminants. So, although PCBs will not be screened against for the reference locations, it would still be beneficial to analyze for them.)

Response: We believe that the background screening for PCBs should remain. Parris Island has a history of applying oil to dirt roads (Site 2), which would be a widespread, common use, and could have also occurred at Site 3. In addition, whether site related (i.e., MCRD common use) or not, PCBs can be widespread in the environment and should not be discounted from anthropogenic measurement. We propose making no revisions to WS 11 on this issue.

[This response does not indicate any text changes. Make your case for including PCBs in the text of the SAP. Do not mention Sites 2/15. Please note, as a result, EPA will be asking for PCB analysis at the Site 14 Outfalls investigation.](#)

16. **Comment:** SAP Worksheet #11, page 39, Section 11.5 – A target number of fish (samples) to be collected was discussed agreed upon by the PI Team and should be accepted as sufficient, regardless of outcome. The use of VSP should have occurred up front (as suggested numerous times by EPA for development of SAPs) if it were to be used to determine acceptance criteria. Decisions should be made based on the results from this SAP, regardless of whether statistical assumptions 1-4 hold true or not and regardless of whether the reference location and pond results have the same standard deviations.

Response: The results of the VSP were included to confirm the development of a sampling plan derived from other methods. The results of the fish tissue sampling agreed to by the PI Team will be used to make decisions. No changes to the QAPP are proposed.

It is not apparent that the entire Team would support the application of VSP as a primary mechanism for sampling plan design. EPA has offered to provide the Team with an introduction/presentation to VSP, we have accepted, but no activity has yet occurred.

17. **Comment:** SAP Worksheet #s 12 & 14 – The Navy may decide field duplicates are not necessary, since there is really no opportunity for variation in the taking of fish in the field. EPA recognizes in SAP Worksheet #12 the lab has QC samples for all analytical groups to validate laboratory analysis. If it is decided to not take field duplicates, a confirmation should be made that sufficient fish are being collected from both the pond and the reference location to perform all the analysis being required. With respect to QC analysis, please explain whether or not any of the QC analysis will be conducted on fish tissues from the reference location, or how those 8 field samples count in the mix of 16 pond samples and 8 reference samples with respect to the 1 per 20 QC samples. Also, explain if QC samples need to specify top feeders or bottom feeders for comparison purposes in the 1 per 20 count.

Response: Based on comments from USEPA and from the Navy Chemist (given the range of motion of fish and difference in ages, the concept of having field duplicates does not apply), field duplicates will not be collected from either the 3rd Battalion Pond or from General's Landing Creek (reference location). The QAPP has been revised accordingly.

Worksheet #12 has been revised to indicate that the Matrix Spike and Matrix Spike Duplicate Samples listed in the worksheet will be performed on 1 per 20 field samples collected (1 per 16 3rd Battalion Pond Samples and 1 per 8 Reference Location Samples). There is no distinction as to whether the samples will be top predators or bottom feeders.

18. **Comment:** SAP Worksheet #14, Fish Tissue Sampling, page 44, first sentence – Modify the sentence to read "...collected at 3rd Battalion Pond can be contributed to local background/anthropogenic conditions."

Response: The first sentence on page 44 of Worksheet #14 has been revised to read "...collected from the 3rd Battalion Pond can be attributed to local background/anthropogenic conditions."

[See feedback to RTC # 14.](#)

19. **Comment:** SAP Worksheet #14 – In the text for Summary of Project Tasks, Fish Sampling, the first paragraph on Page 45 of 91 indicates once the whole fish arrives at the laboratory, the fish will be filleted, with the left fillet submitted for laboratory analysis. The text further states the right fillet of one fish from each target species (both from the pond and from the reference location) will be submitted as a duplicate. Since two (2) target species (top predator and bottom feeder) each will be collected from both the pond and the reference location, the worksheet implies a total of four (4) right fillets, two (2) from the pond and two (2) from the reference locations will be submitted as duplicates. However, SAP Worksheet #18 – Sampling Locations and Methods/SOP Requirements Table on Page 57 of 91 and SAP Worksheet #20 – Field Quality Control Sample Summary Table on Page 59 of 91 indicate a total of three (3) field duplicates will be collected. Given this comment and the comment pertaining to Worksheet #12, revise the UFP SAP to address the discrepancy in the reported number of duplicate samples to be collected.

Response: Based on comments from USEPA and from the Navy Chemist (given the range of motion of fish and difference in ages, the concept of having field duplicates does not apply), field duplicates will not be collected from either the 3rd Battalion Pond or from General's Landing Creek (reference location). The QAPP has been revised accordingly.

20. **Comment:** SAP Worksheet #16 – The Project Schedule/Timeframe Table (optional format) on Page 50 of 91 does not present the most current project schedule. During the most recent MCRD Parris Island Project Team Meeting held in Columbia, South Carolina on September 15-16, 2009 it was agreed upon by the project team to accelerate the schedule based upon Tier II requests for an accelerated project schedule. To ensure completeness and accuracy revise the UFP SAP by updating the worksheet of the final version with the project schedule as agreed to by the Project Team.

Response: The schedule was developed and the QAPP distributed prior to the generation of the accelerated schedule. The Final QAPP revision will include up-to-date schedule information.

21. **Comment:** SAP Worksheet #17, page 53, first paragraph – Please modify the last sentence to read "... whether COPCs in fish collected from the 3rd Battalion Pond can be contributed to local background/anthropogenic conditions."

Response: The last sentence in the first paragraph on page 53 of Worksheet #17 has been revised to read "...collected from the 3rd Battalion Pond can be attributed to local background/anthropogenic conditions."

[See feedback to Comment #14.](#)

22. **Comment:** SAP Worksheet #19 – In the text of Sampling Design and Rationale, the first sentence in the first paragraph in the subsection titled Sampling Locations on Page 53 of 91 states "Figure 17-1 shows that there are two fishing piers located along the Site 3 Causeway Landfill (one in each lobe of the pond near the culverts) and boat launches are located in the northern portion of each lobe". A review of Figure 17.1, Sampling Locations, revealed that the two fishing piers are not shown in the figure as indicated in the worksheet however, the culverts are depicted. Also, the boat launches referenced in the worksheet are not shown to be located in the northern portion of each lobe. To provide a point of reference relative to the four (4) sample lobes of the 3rd Battalion Pond revise the figure to include the locations of the two fishing piers and boat launches.

Response: MCRD Parris Island pointed out during the revision of Figure 17-1 that there are actually 3 fishing piers and 2 boat launches along the shores of the 3rd Battalion Pond. Figure 17-1 has been revised to show the locations of all of the fishing piers and boat launches. The first sentence of this section of the QAPP has been revised to read as follows:

Figure 17-1 shows that there are two fishing piers located along the Site 3 Causeway Landfill (one in each lobe of the pond near the culverts) and one pier in the northern portion of the eastern lobe. Boat launches are located in the northern portion of each lobe.

23. **Comment:** SAP Worksheet #30 – EPA Region 4 is familiar with the SGS lab selected for PCB analysis, their procedures and abilities. However, Katahdin is not a familiar lab to EPA Region 4. The Navy NFESC certification letter in Appendix F indicates the approval period expires September 30, 2008. EPA suggests requesting the most recent MDL study be reviewed as an indicator of their recent experience and capabilities with respect to the services they will be providing, prior to the initiation of field work.

Response: Katahdin is currently certified by NFESC as indicated in the e-mail that is included in Appendix F. The letter accompanying the e-mail was inadvertently included in Appendix F and will be removed from the Final QAPP.

24. **Comment:** Appendix B, page B-1 – Please modify the last sentence of the third paragraph to read as follows, "... by recreational and subsistence fishers will be included in the risk assessment to represent potential risk contributed to post remedy conditions, and may be further discussed in the uncertainties section.

Response: The last sentence of the third paragraph on page B-1 has been revised to read as follows:

"Theoretical partitioning of post-remedy sediment contaminants to fish and subsequent consumption of fish by recreational and subsistence users using the USEPA

recommended models will be conducted. The estimated fish tissue concentrations derived by the use of these models and based on post-remedy samples will be compared to the same screening values indicated in this SAP to meet CERCLA requirements. If the screening values are exceeded, the Navy will take a conservative position and state that post-remedy sediment concentrations could be contributing to unacceptable levels of contamination in fish with respect to human consumption and decide to accept actual fish tissue sample results for the purpose of making decisions pertaining to IC's and for the purpose of risk communication.

Once fish tissue sampling has been completed, the measured fish tissue concentrations will be used to calculate potential risks to human receptors resulting from consumption of fish from the 3rd Battalion Pond, which may contain fish exposed to pre-remedy conditions, as well as conditions and contaminants external to the pond and removed from Site 3.

In the uncertainties section of the revised Risk Assessment Tech Memo the estimated fish tissue concentrations will be compared against actual fish tissue concentrations in a tabular form and the uncertainties associated with both approaches will be discussed in tabular format to the actual tissue sample results and reported as an indicator that is potentially more representative of post-remedy conditions. The associated uncertainties will be discussed in the uncertainties section."

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25. **Comment:** Appendix B, page B-2, Section B.1 – In the last paragraph delete the word "Sediment". It is assumed this was a typo. No sediment samples are to be taken.

Response: The word sediment was a typo and was changed to "Fish". Note that this entire section was rewritten in response to the next comment.

26. **Comment:** Appendix B, Section B.1 – The discussion in this Appendix does not appear to address how screening site data against the reference data will be conducted. Discussion should be added to Section B.1— Selection of COPCs.

Response: Section B.1 – Selection of COPCs has been revised to read as follows:

The selection of COPCs is a qualitative screening process used to limit the number of chemicals quantitatively evaluated in the baseline HHRA to those site-related constituents that dominate overall potential risks.

Post-remedy sediment data were used to select sediment COPCs that were then analyzed for in the fish tissue samples collected in October 2009. If fish tissue samples had not been collected, the post-remedy sediment data would have been used to evaluate the risks associated with fish consumption via the theoretical partitioning of contaminants found in the sediment into fish tissue and the ultimate consumption of fish by recreational users. Because fish that exist in the pond would be expected to be exposed to sediment in all areas of the pond, data compiled from sediment samples collected from the pond during the 2001 and 2003 field investigations were used in the selection of sediment COPCs. To determine risks associated with releases from the site and not from background/anthropogenic sources, the 2001/2003 sediment data were screened against background/typical facility pesticide concentrations in sediment (Appendix D). If the maximum concentration detected in the sediment samples exceeded the background/typical facility pesticide concentration, the chemical was then screened against the screening level.

In general, a chemical was initially selected as a sediment COPC and ultimately identified as a parameter for the fish tissue analytical program if the maximum detected sediment concentration exceeded the background/typical facility pesticide concentration in sediment and the calculated fish tissue concentration exceeded the screening level.

U.S. EPA Region 4 considers bioaccumulative chemicals to include those designated in Bioaccumulation Testing and Interpretation for the Purpose of Sediment Quality Assessment (U.S. EPA, February 2000), except for PAHs. U.S. EPA Region 4 considers the potential toxicity of PAHs via bioaccumulation in the food web to be generally negligible unless PAHs are present at extremely high concentrations [i.e., percent levels (10,000 mg/kg)] in soil or sediment. Since PAHs were not detected at such high concentrations in the Pond Side Area 1 sediments at Site 3, and PAH concentrations in fish are usually low because fish rapidly metabolize PAHs (Eisler, April 2000), PAHs were not evaluated for the consumption of fish by recreational users pathway.

Maximum fish tissue concentrations for each parameter analyzed in the 2009 fish tissue samples will be compared to the appropriate fish tissue screening level to select COPCs that will be evaluated in this HHRA. To determine risks associated with releases from Site 3 and not from background/anthropogenic sources, the maximum concentrations from the 2009 3rd Battalion Pond fish tissue data will be compared to two times the mean concentrations of the fish tissue data collected from General's Landing Creek (reference location). In general, a chemical will be selected as a fish tissue COPC and retained for further quantitative risk evaluation if the maximum detected fish tissue concentrations in the 3rd Battalion Pond fish tissue samples exceed two times the mean reference fish tissue concentrations and the appropriate screening levels. Chemicals present in the 3rd Battalion Pond fish tissue samples at concentrations greater than the screening levels but less than two times the mean reference location fish tissue concentrations will not be considered to be representative of risks associated with Site 3 sediment.

Fish tissues samples will be analyzed for PCB congeners, which are described in PCBs: Cancer Dose-Response Assessment and Application to Environmental Mixtures (EPA, September 1996). PCB congeners are classified as either dioxin-like or nondioxin-like. The following methodology will be used to evaluate PCB congeners and dioxin-like PCB congeners in this HHRA:

- The concentrations reported for the PCB congeners will be summed for each sample and the maximum total concentration will be compared to the screening criteria for total PCBs.
- To evaluate the dioxin-like PCB congeners, it will be first necessary to apply toxicity equivalency factors (TEFs) to the individual dioxin-like PCB congener concentrations as specified in the EPA guidance. The individual dioxin-like PCB congener concentrations will multiplied by the TEFs to produce a dioxin-like toxic equivalent concentration (TEQ). The individual TEQs will be summed for each sample and the maximum total dioxin-like TEQ will be compared to the screening criteria for 2,3,7,8-TCDD.

[Make sure you note the one minor change above.](#)

27. **Comment:** Appendix B, Table B-2 – This table presents the exposure parameters to be used in the risk calculations. EPA previously submitted comments pertaining to this Table. However, a record of the resolution to those comments cannot be located. Therefore, EPA is still investigating the appropriateness of the contents of the table, especially with respect to Exposure Duration and averaging time for non-carcinogens. It seems apparent the averaging time for the adult military recreational fisher should be 2,190 days. EPA hopes to be prepared to address the

remainder at question by the time the RTC/redline meeting is held. Please make the necessary changes.

Response: The averaging time for the adult military recreational fisher was incorrect and should be 2,190 days. Table B-2 has been corrected.

The exposure duration of 70 years for the Adult Recreational and Subsistence Users is based on Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories. EPA-823-B-00-007, Office of Water, Washington, DC. Note that the screening values that are presented for use in the Final Technical Memorandum are based on this Exposure Duration of 70 years.

28. **Comment:** Appendices D and E – Insufficient time was allowed to fully review these Appendices. Therefore, it is unclear exactly what will be done to prepare samples at Katahdin before shipment to SGS, and whether the appropriate coordination has occurred between the two labs. While field SOPs indicate the fish can be shipped in ice or dry ice, EPA recommends once the samples have been prepared, resulting in a powder form, shipment occur with dry ice only. It is unclear what requirements SGS has for accepting samples. Since SGS works closely with EPA, they may also require shipment with dry ice only. Therefore, the labs should coordinate SOPs to clearly indicate what level of sample prep Katahdin will perform before shipment to SGS, and based on that level of sample prep, what shipping requirements SGS has in order for Katahdin samples to meet acceptance criteria. This should be accomplished before field work begins.

Response: The following information (based on State's Bureau of Water sampling protocol and discussion with the laboratories) has been added to Site-Specific Fish Tissue Sampling SOP included in Appendix D of the QAPP and will be provided to the laboratories (along with schedule, etc.) before sampling begins:

“Standard fillets will be taken from the left side of each fish for contaminant analysis. Standard fillets are skin on and scales off with the belly flap included. When filleting, care must be taken to ensure fish entrails are not punctured and visible bones are removed. Fish are filleted on clean, decontaminated surfaces (cleaned and rinsed first with deionized water and then with isopropyl alcohol when the species or the station changes).

The sex of each fish is determined during filleting and recorded.

Fat deposits, visible bones, and viscera are removed from the fillet with a stainless steel knife and deionized water. This stainless steel knife is cleaned and rinsed first with deionized water and then with isopropyl alcohol when the species or the station changes.

The fillets from each fish are weighed and the weights recorded. The stainless steel platform scale pan is cleaned and rinsed first with deionized water and then with isopropyl alcohol when the species or the station changes. Fillets are weighed to the nearest gram with the platform scales.

After weighing, the individual fillets are homogenized in a stainless steel blender [in accordance with EPA Region 4 Standard Operating Procedure \(SOP\) for Tissue Sample handling and Processing, May 31, 2007 \(SESDPROC-602-R0\)](#). [Dry ice will be used as needed in accordance with the SOP to prepare the homogenized sample.](#) 50 grams of the processed fillet will be frozen and shipped to SGS North America, Inc. within 2 days of processing for PCB analysis. [Please note that the SOP states “Shipped samples shall conform to all U.S. Department of Transportation \(DOT\) and/or International Air Transportation Association \(IATA\) hazardous](#)

materials shipping requirements. Tissue samples are shipped on dry ice unless otherwise noted. The container should have as little air space as possible. The remaining processed fillet will be analyzed by Katahdin Analytical Services for copper, mercury, 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT. Any excess of each fillet should be kept frozen by Katahdin in case the samples arrive at SGS in a manner which renders them unacceptable. In addition, the Quality Control procedures in the SOP should be noted and followed, addressing a variety of blanks which should be processed.”

Comment [EPA1]: (These requirements may include the following: use of a container designed and intended for shipping with dry ice, one that will be strong and sturdy during shipment but will not become brittle when subjected to dry ice temperatures. The container must be vented to allow for the release of carbon dioxide gas. The container must be labeled with the courier's specified label as well as in accordance with DOT and/or IATA and must show the total weight of dry ice in kilograms, with the label properly placed on the side of the container. Most couriers will require special paper work for packages shipped with dry ice.

Comment [EPA2]: The package should have as little air space as possible.

Comment [EPA3]: If for some reason the samples cannot be shipped by dry ice and only regular ice is used, a temperature blank (bottle with some water in it) is to be included in each package shipped.

**Response to SCDHEC Comments on
Quality Assurance Project Plan
Site 3 – Causeway Landfill Fish Tissue Risk Assessment (QAPP) for the Marine Corps
Recruit Depot (MCRD), Parris Island, South Carolina
(September 2009)**

General Comments

1. **Comment:** Please discuss the impact of UXO 4 and the golf course on the reference location.

Response: For the target parameters (mercury, copper, PCBs, DDT) we don't expect any significant impact. The reference location drains a significant geographical area, of which only a small part of the golf course intrudes - although most of UXO 4 would drain through here. For the key contaminant, mercury, we wouldn't expect mercury to occur on the UXO site or golf course. PCBs would also not likely result from a munitions site or operation of a golf course. Copper would be anticipated to occur on a golf course, and copper use as copper jacketing on certain munitions was not common until after World War II, by which time MCRD has quit using UXO 4 (1937). DDT might have had a slightly higher application rate on the golf course, but across the entire drainage area, the application on average should provide pretty fair anthropogenic data. Our fish expert, Mike Whitten, has discussed the area with Dr. Warren from our TRC. Dr. Warren has sampled sediment in the area, and has not found and widespread copper contamination. No modifications to the SAP are proposed based on this response.

Specific Comments

2. Page 45 of 91 Fish Tissue Sampling

This section states, "The right fillet of one fish from each target species (both from the pond and from the reference location) will be submitted as a duplicate," which seems to indicate 4 duplicate samples will be taken. However, SAP Worksheet #18 (page 57 of 91) only shows three duplicate sample numbers. Please clarify.

Response: Based on comments from USEPA and from the Navy Chemist (given the range of motion of fish and difference in ages, the concept of having field duplicates does not apply), field duplicates will not be collected from either the 3rd Battalion Pond or from General's Landing Creek (reference location). The QAPP has been revised accordingly.

**Response to USEPA Comments on
Quality Assurance Project Plan
Site 3 – Causeway Landfill Fish Tissue Risk Assessment (QAPP) for the Marine Corps
Recruit Depot (MCRD), Parris Island, South Carolina
(September 2009)**

Lila Llamas
USEPA Region 4
Federal Facilities Branch
Superfund Division
Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, Georgia 30303-8960

General Comments

1. **Comment:** Given the extensive detail in the document, including the appendices, it was not reasonable to expect complete review within the limited accelerated review timeframe requested. In order to meet the timeframe, comments are being submitted now, in an attempt to address any major obvious issues, however, please recognize a detailed technical review was not possible in the timeframe allotted. This is especially true, given submittal of the document during the fiscal year end activities. Since EPA understands the Navy intends to move forward with the field work to meet their deadlines, at this time EPA does not intend to complete the detailed review. However, as the process is implemented, issues may arise. At that point EPA expects the Navy will still address any concerns raised by EPA. In the future, in order to avoid proceeding at such risk, EPA requests the Navy submit documents early enough to allow for the allotted review times established and agreed upon by all parties in the Site Management Plan.

Response: The Navy appreciates U.S. EPA's willingness to submit comments on the Site 3 QAPP in an attempt to meet the accelerated review timeframe and understands that additional issues may arise as the process is implemented.

Specific Comments

2. **Comment:** Executive Summary, Page 2, paragraph 4 – EPA believes the term "estimate" is more representative of what modeling does, as opposed to "calculate". Please modify the next to last sentence to read "... sediment-to-fish models used to estimate fish tissue concentrations..." or "... sediment-to-fish models used to calculate estimated fish tissue concentrations". EPA would prefer this same change be made throughout the document. Please do a search and replace for all occurrences where models are referred to as being used to "calculate" fish tissue concentrations.

Response: The QAPP has been revised throughout to indicate that the sediment-to-fish models are used to estimate fish tissue concentrations.

3. **Comment:** Executive Summary, Page 3, last paragraph – To better reflect the agreement reached by consensus please modify the paragraph to replace the word "also" with "only". To the end of the paragraph add the following sentence: "Since fishers may take fish from the pond which were present prior to implementation of the interim remedy, or which may have come into the pond after being exposed to contamination elsewhere, the sampling plan has been designed to reflect that potential consumption, as opposed to consumption of fish exposed only to post-remedy conditions. This is appropriate for

determination of risk from fish consumption. However, since the sampling has not been designed to reflect only post-remedy conditions, and may reflect contaminants that are not Site 3 related, or that are not post-remedy chemicals of potential concern, the data will not be used to require any further action for Site 3 sediment, surface water, etc.”

Response: The word “also” in the second sentence of this paragraph has been changed to “only”. In addition, the following text has been added to the end of the paragraph (with changes from EPA’s proposed language indicated in *regular italics font*):

“EPA’s concern is that since fishers may take fish from the pond which were present prior to implementation of the interim remedy, or which may have come into the pond after being exposed to contamination elsewhere, the sampling plan has been designed to reflect that type of potential consumption, as opposed to consumption of fish exposed only to post-remedy conditions. This is appropriate for determination of risk from fish consumption. However, since the sampling has not been designed to reflect only post-remedy conditions, and may reflect contaminants that are not Site 3 related, or that are not post-remedy chemicals of potential concern *for sediment or surface water*, USEPA will not support the use of the data to require any further remedial action *other than ICs* for Site 3 sediment, surface water, etc.”

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- 4. Comment:** SAP Worksheet #3 – Distribution List, page 12 - Please change the EPA RPM’s email address to delete “Koroma-“. Please do this everywhere the email address is listed throughout the document. This same comment was made on the draft MMRP SAP. Therefore it appears a master list is generating this same error repeatedly. Please update the master list(s) as well.

Response: The QAPP has been revised as requested. The only master list is that maintained by the Team facilitator.

- 5. Comment:** SAP Worksheet #3 – Distribution List on Page 12 of 91 indicate that some of the project roles (i.e., field operations leader and site safety officer) have yet to be determined (TBD). To ensure completeness and accuracy, revise the Quality Assurance Project Plan Site 3 – Causeway Landfill Fish Tissue Risk Assessment dated 2009, herein referred to as the Uniform Federal Policy SAP (UFP SAP), by updating the TBD designation in the relevant worksheets of the final revision by identifying the appropriate staff personnel as needed.

Response: Due to the period of time between submittal of the Draft QAPP and finalization of the QAPP, it is not uncommon for the draft documents to indicate TBD for field staff. In this case, we can now confirm that Mike Whitten of TtNUS’s Aiken, South Carolina office will serve as both FOL and SSO and the QAPP has been revised accordingly.

- 6. Comment:** SAP Worksheet #6, Procedure column – First row - Please add to the end “The TtNUS TOM must first get approval from the PI Team, unless otherwise noted in the SAP or agreed to via consensus up front.” Third row- Please add to the end “Navy inform PI Team immediately.” Fourth row – Please add to the last sentence “...change, after consulting with the PI Team for consensus, except where already approved in the SAP.” Fifth row – Please add to the end “Navy to notify the PI Team immediately.” Sixth row – Please add to the end “TtNUS to notify the PI Team immediately.”

Response: For the first row, the following has been added:

“The TtNUS TOM will make immediate email notification to the PI Team. To the extent practical, Navy/TtNUS will work with the Team if any objections or concerns are identified by Team Members prior to implementation.”

All other WS 6 revisions have been made as suggested.

7. **Comment:** SAP Worksheet#7, Page 18 – Please provide the names and corresponding Education and/or Experience Qualifications for both positions. Page 19 – Please correct typos in the last two rows to be “... Navy RPM...”.

Response: Mike Whitten of TtNUS’s Aiken, South Carolina office will serve as both FOL and SSO. Mr. Whitten has an M.S. in Environmental Science and 20 years of environmental experience. The QAPP has been revised accordingly.

The typo in the last two rows has been corrected to read “...Navy RPM...”.

8. **Comment:** SAP Worksheet #9.1, Page 21, Consensus Decisions, First Bullet – Please add to the end “EPA agreed to the study goal and COPCs provided the results would only be used to make decisions regarding the need for ICs in the form of fish restrictions and risk communication. The results are not to be used to require any further action on Site 3 sediments, surface water, etc.”

Response: The following language has been added at the end of the first bullet:

“USEPA agreed to the study goal and COPCs provided the results would only be used to make decisions regarding the need for ICs in the form of fish restrictions and for risk communication. USEPA will not support use of the data to require any further remedial action other than ICs on Site 3 sediments, surface water, etc, because the investigation is not being developed in a way which would ~~to~~ support these other goals.”

9. **Comment:** SAP Worksheet #9.1, Page 22, Consensus Decisions, Last Sentence – Please add the word “draft” before minutes. In future SAPs, finalize the minutes before drafting the SAP and ensure consensus items are captured in the minutes so they can be included as written and agreed upon at the time. Also see comment above regarding email.

Response: The QAPP has been revised as requested.

10. **Comment:** SAP Worksheet #9.2, page 23 – See comment above regarding email.

Response: The QAPP has been revised as requested.

11. **Comment:** SAP Worksheet #9.2, page 24 – Modify the Title line to read “Comments/Decisions Cont’d”. Modify this section to read as follows:

“Sediment-to-fish tissue models were used in the development of the draft Technical Memorandum (TtNUS, July 2008) to estimate fish tissue concentrations resulting from exposure of fish to measured contaminant concentrations in post-remedy sediment samples. Results indicated potentially unacceptable risk. Comments were received on the models used and an alternative model for determining mercury concentrations in fish was recommended by USEPA. DHEC recommended sampling 3rd Battalion Pond.

The EPA recommended model and other changes to the modeling procedures will be implemented and the results presented in the revised Tech Memo. The estimated fish tissue concentrations derived by the use of these models and based on post-remedy sediment samples will be used in calculating risks as would be generated by post remedy conditions and reported as such. The associated uncertainties will be discussed in the uncertainties section of the revised Tech Memo.

Once fish tissue sampling has been completed, the measured fish tissue concentrations will be used to calculate potential risks to human receptors resulting from consumption of fish from the 3rd Battalion Pond, which may contain fish exposed to pre-remedy conditions, as well as conditions and contaminants external to the pond and removed from Site 3.

The draft minutes of the conference call are included in this SAP as Appendix A.”

Response: The title on the Top of Page 24 ~~is correct as is~~ “**Consensus Decisions will be updated as requested, and the missing action items will be added.**” It is separated from the Comments/Decisions section by the Action Items Section (none were identified).

The subject section has been modified as follows (with changes from EPA’s proposed language indicated in *regular italics font*):

The USEPA recommended model and other changes will be implemente other changes in tech memeo. Esti tissue conce will be compared to same values in this SAP. IF screening values exceed, navy take conservative position...and will decide to accept actual fish tisseresults for purposes of

“Sediment-to-fish tissue models were used in the development of the draft Technical Memorandum (TtNUS, July 2008) to estimate fish tissue concentrations resulting from exposure of fish to measured contaminant concentrations in post-remedy sediment samples. **Preliminary r**Results indicated **potentially unacceptablelightly elevated** risk. Comments were received on the models used and an alternative model for **estimatingdetermining** mercury concentrations in fish was recommended by USEPA. **DHEC-recommended-sampling-3rd-Battalion Pond.**

The USEPA recommended model and other changes to the modeling procedures will be implemented and the results presented in the revised Tech Memo. The estimated fish tissue concentrations derived by the use of these models and based on post-remedy sediment samples will be *compared in tabular format to the actual tissue sample results and reported as an indicator that is potentially more representative of post-remedy conditions.* The associated uncertainties will be discussed in the uncertainties section of the revised Tech Memo.

Once fish tissue sampling has been completed, the measured fish tissue concentrations will be used to calculate potential risks to human receptors resulting from consumption of fish from the 3rd Battalion Pond, which may contain fish exposed to pre-remedy conditions, as well as conditions and contaminants external to the pond and removed from Site 3.

The draft minutes of the conference call are included in this SAP as Appendix A.”

The Table of Contents has been revised to indicate that Appendix A is Draft Meeting Minutes.

Formal Consensus

12. **Comment:** SAP Worksheet #10, page27, Last paragraph and Page 28 first full paragraph – Delete these two paragraphs and replace them with the three main paragraphs in the comment above. Page 29 – Modify the last sentence to read “... decision pertaining to ICs that would be presented in the Final ROD for Site 3 and to communicate risk to the local fishers.”

Response: The last **sentence in the next to last paragraph and the entire last paragraph two paragraphs in Section 10.2 have been deleted, and replaced with the fourthree main paragraphs in the response above. The recommended change on Page 29 has been made.**

13. **Comment:** SAP Worksheet #10, page 35, Table 10-2 – There is a more current version of the EPA Regional Screening Levels (RSLs) than the June 2008 version referenced in Footnote 2. The footnote also incorrectly cites Oak Ridge National Laboratory as the source of the data. EPA should be cited as the source for the RSLs, and the correct citation should be April 2009. Please update the SAP accordingly.

Response: Both Table 10-1 and Table 10-2 have been revised to show that the source of the Regional Screening Levels is USEPA, May 2009. As always, the most current Regional Screening Levels available will be used in preparation of the Final Technical memorandum, which may be a different version than that available during QAPP generation.

14. **Comment:** SAP Worksheet #11, page 36, Section 11.2, Bullet number 1 – Modify the last sentence to read “... sediment-to-fish tissue modeling to estimate fish tissue concentration which will be used to generate a risk associated with post remedy conditions and can be further discussed in the uncertainties section.” Page 37, Bullet number 5 – Modify the last sentence to read “... collected at 3rd Battalion Pond can be contributed to local background/anthropogenic conditions.”

Comment [ms1]: See dhec comment

Response: Bullet number 1 in Section 11.2 has been revised as follows:

The last sentence will be deleted...sediment-to-fish tissue modeling to estimate fish tissue concentrations which will be compared to actual measured fish tissue concentrations as an indicator that is potentially more representative of post-remedy conditions, which can be discussed further in the uncertainties section. (add 'post-remedy' between draft tech momo and sediment).

The fifth bullet on Page 37 has been revised to read “...collected from the 3rd Battalion Pond can be attributed to local background/anthropogenic conditions.”

15. **Comment:** SAP Worksheet #11, page 38, Section 11.4 – The section describes the method for screening of site data against the reference concentration. The reference location screening should not include screening of PCBs, since there should not be any background and/or anthropogenic component of PCB contamination that is related to widespread common uses. Please clarify this point in the text. (However, the analysis of

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reference locations and duplicates for PCBs may still provide information which could be discussed in the uncertainties section of the HHRA if there is a presence in the reference samples. Blanks will also clarify these are not lab contaminants. So, although PCBs will not be screened against for the reference locations, it would still be beneficial to analyze for them.)

Comment [ms2]: Background and 18, 21, 14 just compare to BG, no details later

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Response: We believe that the background screening for PCBs should remain. The following text will be added into Section 11.4: Parris Island has a history of applying oil to dirt roads (Site 2), which would be a widespread, common use, and could have also occurred at Site 3. In addition, whether site related (i.e., MCRD common use) or not, PCBs can be widespread in the environment and should not be discounted from anthropogenic measurement.

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We propose making no revisions to WS 11 on this issue.

16. **Comment:** SAP Worksheet #11, page 39, Section 11.5 – A target number of fish (samples) to be collected was discussed agreed upon by the PI Team and should be accepted as sufficient, regardless of outcome. The use of VSP should have occurred up front (as suggested numerous times by EPA for development of SAPs) if it were to be used to determine acceptance criteria. Decisions should be made based on the results from this SAP, regardless of whether statistical assumptions 1-4 hold true or not and regardless of whether the reference location and pond results have the same standard deviations.

Response: The results of the VSP were included to confirm the development of a sampling plan derived from other methods. The results of the fish tissue sampling agreed to by the PI Team will be used to make decisions. No changes to the QAPP are proposed.

It is not apparent that the entire Team would support the application of VSP as a primary mechanism for sampling plan design. EPA has offered to provide the Team with an introduction/presentation to VSP, we have accepted, but no activity has yet occurred.

17. **Comment:** SAP Worksheet #s 12 & 14 – The Navy may decide field duplicates are not necessary, since there is really no opportunity for variation in the taking of fish in the field. EPA recognizes in SAP Worksheet #12 the lab has QC samples for all analytical groups to validate laboratory analysis. If it is decided to not take field duplicates, a confirmation should be made that sufficient fish are being collected from both the pond and the reference location to perform all the analysis being required. With respect to QC analysis, please explain whether or not any of the QC analysis will be conducted on fish tissues from the reference location, or how those 8 field samples count in the mix of 16 pond samples and 8 reference samples with respect to the 1 per 20 QC samples. Also, explain if QC samples need to specify top feeders or bottom feeders for comparison purposes in the 1 per 20 count.

Response: Based on comments from USEPA and from the Navy Chemist (given the range of motion of fish and difference in ages, the concept of having field duplicates does not apply), field duplicates will not be collected from either the 3rd Battalion Pond or from General's Landing Creek (reference location). The QAPP has been revised accordingly.

Worksheet #12 has been revised to indicate that the Matrix Spike and Matrix Spike Duplicate Samples listed in the worksheet will be performed on 1 per 20 field samples collected (1 per 16 3rd Battalion Pond Samples and 1 per 8 Reference Location Samples). There is no distinction as to whether the samples will be top predators or bottom feeders.

18. **Comment:** SAP Worksheet #14, Fish Tissue Sampling, page 44, first sentence – Modify the sentence to read “...collected at 3rd Battalion Pond can be contributed to local background/anthropogenic conditions.”

Response: The first sentence on page 44 of Worksheet #14 has been revised to read “...collected from the 3rd Battalion Pond can be attributed to local background/anthropogenic conditions.”

19. **Comment:** SAP Worksheet #14 – In the text for Summary of Project Tasks, Fish Sampling, the first paragraph on Page 45 of 91 indicates once the whole fish arrives at the laboratory, the fish will be filleted, with the left fillet submitted for laboratory analysis. The text further states the right fillet of one fish from each target species (both from the pond and from the reference location) will be submitted as a duplicate. Since two (2) target species (top predator and bottom feeder) each will be collected from both the pond and the reference location, the worksheet implies a total of four (4) right fillets, two (2) from the pond and two (2) from the reference locations will be submitted as duplicates. However, SAP Worksheet #18 – Sampling Locations and Methods/SOP Requirements Table on Page 57 of 91 and SAP Worksheet #20 – Field Quality Control Sample Summary Table on Page 59 of 91 indicate a total of three (3) field duplicates will be collected. Given this comment and the comment pertaining to Worksheet #12, revise the UFP SAP to address the discrepancy in the reported number of duplicate samples to be collected.

Response: Based on comments from USEPA and from the Navy Chemist (given the range of motion of fish and difference in ages, the concept of having field duplicates does not apply), field duplicates will not be collected from either the 3rd Battalion Pond or from General's Landing Creek (reference location). The QAPP has been revised accordingly.

20. **Comment:** SAP Worksheet #16 – The Project Schedule/Timeframe Table (optional format) on Page 50 of 91 does not present the most current project schedule. During the most recent MCRD Parris Island Project Team Meeting held in Columbia, South Carolina on September 15-16, 2009 it was agreed upon by the project team to accelerate the schedule based upon Tier II requests for an accelerated project schedule. To ensure completeness and accuracy revise the UFP SAP by updating the worksheet of the final version with the project schedule as agreed to by the Project Team.

Response: The schedule was developed and the QAPP distributed prior to the generation of the accelerated schedule. The Final QAPP revision will include up-to-date schedule information.

21. **Comment:** SAP Worksheet #17, page 53, first paragraph – Please modify the last sentence to read “... whether COPCs in fish collected from the 3rd Battalion Pond can be contributed to local background/anthropogenic conditions.”

Response: The last sentence in the first paragraph on page 53 of Worksheet #17 has been revised to read "...collected from the 3rd Battalion Pond can be attributed to local background/anthropogenic conditions."

22. **Comment:** SAP Worksheet #19 – In the text of Sampling Design and Rationale, the first sentence in the first paragraph in the subsection titled Sampling Locations on Page 53 of 91 states "Figure 17-1 shows that there are two fishing piers located along the Site 3 Causeway Landfill (one in each lobe of the pond near the culverts) and boat launches are located in the northern portion of each lobe". A review of Figure 17.1, Sampling Locations, revealed that the two fishing piers are not shown in the figure as indicated in the worksheet however, the culverts are depicted. Also, the boat launches referenced in the worksheet are not shown to be located in the northern portion of each lobe. To provide a point of reference relative to the four (4) sample lobes of the 3rd Battalion Pond revise the figure to include the locations of the two fishing piers and boat launches.

Response: MCRD Parris Island pointed out during the revision of Figure 17-1 that there are actually 3 fishing piers and 2 boat launches along the shores of the 3rd Battalion Pond. Figure 17-1 has been revised to show the locations of all of the fishing piers and boat launches. The first sentence of this section of the QAPP has been revised to read as follows:

Figure 17-1 shows that there are two fishing piers located along the Site 3 Causeway Landfill (one in each lobe of the pond near the culverts) and one pier in the northern portion of the eastern lobe. Boat launches are located in the northern portion of each lobe.

23. **Comment:** SAP Worksheet #30 – EPA Region 4 is familiar with the SGS lab selected for PCB analysis, their procedures and abilities. However, Katahdin is not a familiar lab to EPA Region 4. The Navy NFESC certification letter in Appendix F indicates the approval period expires September 30, 2008. EPA suggests requesting the most recent MDL study be reviewed as an indicator of their recent experience and capabilities with respect to the services they will be providing, prior to the initiation of field work.

Response: Katahdin is currently certified by NFESC as indicated in the e-mail that is included in Appendix F. The letter accompanying the e-mail was inadvertently included in Appendix F and will be removed from the Final QAPP.

24. **Comment:** Appendix B, page B-1 – Please modify the last sentence of the third paragraph to read as follows, "... by recreational and subsistence fishers will be included in the risk assessment to represent potential risk contributed to post remedy conditions, and may be further discussed in the uncertainties section.

Response: The last sentence of the third paragraph on page B-1 has been revised to read as follows: [SEE COMMENT 11](#).

"Theoretical partitioning of post-remedy sediment contaminants to fish and subsequent consumption of fish by recreational and subsistence users using the USEPA recommended models will be conducted. The estimated fish tissue concentrations derived by the use of these models and based on post-remedy samples will be compared in tabular format to the actual tissue sample results and reported as an indicator that is potentially more representative of post-remedy conditions. The associated uncertainties will be discussed in the uncertainties section."

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25. **Comment:** Appendix B, page B-2, Section B.1 – In the last paragraph delete the word “Sediment”. It is assumed this was a typo. No sediment samples are to be taken.

Response: The word sediment was a typo and was changed to “Fish”. Note that this entire section was rewritten in response to the next comment.

26. **Comment:** Appendix B, Section B.1 – The discussion in this Appendix does not appear to address how screening site data against the reference data will be conducted. Discussion should be added to Section B.1— Selection of COPCs.

Response: Section B.1 – Selection of COPCs has been revised to read as follows:

The selection of COPCs is a qualitative screening process used to limit the number of chemicals quantitatively evaluated in the baseline HHRA to those site-related constituents that dominate overall potential risks.

Post-remedy sediment data were used to select sediment COPCs that were then analyzed for in the fish tissue samples collected in October 2009. If fish tissue samples had not been collected, the post-remedy sediment data would have been used to evaluate the risks associated with fish consumption via the theoretical partitioning of contaminants found in the sediment into fish tissue and the ultimate consumption of fish by recreational users. Because fish that exist in the pond would be expected to be exposed to sediment in all areas of the pond, data compiled from sediment samples collected from the pond during the 2001 and 2003 field investigations were used in the selection of sediment COPCs. To determine risks associated with releases from the site and not from background/anthropogenic sources, the 2001/2003 sediment data were screened against background/typical facility pesticide concentrations in sediment (Appendix D). If the maximum concentration detected in the sediment samples exceeded the background/typical facility pesticide concentration, the chemical was then screened against the screening level.

In general, a chemical was initially selected as a sediment COPC and ultimately identified as a parameter for the fish tissue analytical program if the maximum detected sediment concentration exceeded the background/typical facility pesticide concentration in sediment and the calculated fish tissue concentration exceeded the screening level.

U.S. EPA Region 4 considers bioaccumulative chemicals to include those designated in Bioaccumulation Testing and Interpretation for the Purpose of Sediment Quality Assessment (U.S. EPA, February 2000), except for PAHs. U.S. EPA Region 4 considers the potential toxicity of PAHs via bioaccumulation in the food web to be generally negligible unless PAHs are present at extremely high concentrations [i.e., percent levels (10,000 mg/kg)] in soil or sediment. Since PAHs were not detected at such high concentrations in the Pond Side Area 1 sediments at Site 3, and PAH concentrations in fish are usually low because fish rapidly metabolize PAHs (Eisler, April 2000), PAHs were not evaluated for the consumption of fish by recreational users pathway.

Maximum fish tissue concentrations for each parameter analyzed in the 2009 fish tissue samples will be compared to the appropriate fish tissue screening level to select COPCs that will be evaluated in this HHRA. To determine risks associated with releases from Site 3 and not from background/anthropogenic sources, the

maximum concentrations from the 2009 3rd Battalion Pond fish tissue data will be compared to two times the mean concentrations of the fish tissue data collected from General's Landing Creek (reference location). In general, a chemical will be selected as a fish tissue COPC and retained for further quantitative risk evaluation if the maximum detected fish tissue concentrations in the 3rd Battalion Pond fish tissue samples exceed two times the mean reference fish tissue concentrations and the appropriate screening levels. Chemicals present in the 3rd Battalion Pond fish tissue samples at concentrations greater than the screening levels but less than two times the mean reference location fish tissue concentrations will not be considered to be representative of risks associated with Site 3 sediment.

Fish tissues samples will be analyzed for PCB congeners, which are described in PCBs: Cancer Dose-Response Assessment and Application to Environmental Mixtures (EPA, September 1996). PCB congeners are classified as either dioxin-like or nondioxin-like. The following methodology will be used to evaluate PCB congeners and dioxin-like PCB congeners in this HHRA:

- The concentrations reported for the PCB congeners will be summed for each sample and the maximum total concentration will be compared to the screening criteria for total PCBs.
- To evaluate the dioxin-like PCB congeners, it will be first necessary to apply toxicity equivalency factors (TEFs) to the individual dioxin-like PCB congener concentrations as specified in the EPA guidance. The individual dioxin-like PCB congener concentrations will multiplied by the TEFs to produce a dioxin-like toxic equivalent concentration (TEQ). The individual TEQs will be summed for each sample and the maximum total dioxin-like TEQ will be compared to the screening criteria for 2,3,7,8-TCDD.

27. **Comment:** Appendix B, Table B-2 – This table presents the exposure parameters to be used in the risk calculations. EPA previously submitted comments pertaining to this Table. However, a record of the resolution to those comments cannot be located. Therefore, EPA is still investigating the appropriateness of the contents of the table, especially with respect to Exposure Duration and averaging time for non-carcinogens. It seems apparent the averaging time for the adult military recreational fisher should be 2,190 days. EPA hopes to be prepared to address the remainder at question by the time the RTC/redline meeting is held. Please make the necessary changes.

Response: The averaging time for the adult military recreational fisher was incorrect and should be 2,190 days. Table B-2 has been corrected.

The exposure duration of 70 years for the Adult Recreational and Subsistence Users is based on Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories. EPA-823-B-00-007, Office of Water, Washington, DC. Note that the screening values that are presented for use in the Final Technical Memorandum are based on this Exposure Duration of 70 years.

28. **Comment:** Appendices D and E – Insufficient time was allowed to fully review these Appendices. Therefore, it is unclear exactly what will be done to prepare samples at Katahdin before shipment to SGS, and whether the appropriate coordination has occurred between the two labs. While field SOPs indicate the fish can be shipped in ice or dry ice, EPA recommends once the samples have been prepared, resulting in a powder form, shipment occur with dry ice only. It is unclear what requirements SGS has for accepting samples. Since SGS works closely with EPA, they may also require

shipment with dry ice only. Therefore, the labs should coordinate SOPs to clearly indicate what level of sample prep Katahdin will perform before shipment to SGS, and based on that level of sample prep, what shipping requirements SGS has in order for Katahdin samples to meet acceptance criteria. This should be accomplished before field work begins.

Response: The following information (based on State's Bureau of Water sampling protocol and discussion with the laboratories has been added to Site-Specific Fish Tissue Sampling SOP included in Appendix D of the QAPP and will be provided to the laboratories (along with schedule, etc.) before sampling begins:

“Standard fillets will be taken from the left side of each fish for contaminant analysis. Standard fillets are skin on and scales off with the belly flap included. When filleting, care must be taken to ensure fish entrails are not punctured and visible bones are removed. Fish are filleted on clean, decontaminated surfaces (cleaned and rinsed first with deionized water and then with isopropyl alcohol when the species or the station changes).

The sex of each fish is determined during filleting and recorded.

Fat deposits, visible bones, and viscera are removed from the fillet with a stainless steel knife and deionized water. This stainless steel knife is cleaned and rinsed first with deionized water and then with isopropyl alcohol when the species or the station changes.

The fillets from each fish are weighed and the weights recorded. The stainless steel platform scale pan is cleaned and rinsed first with deionized water and then with isopropyl alcohol when the species or the station changes. Fillets are weighed to the nearest gram with the platform scales.

After weighing, the individual fillets are homogenized in a stainless steel blender. 50 grams of the processed fillet will be frozen and shipped to SGS North America, Inc. within 2 days of processing for PCB analysis. The remaining processed fillet will be analyzed by Katahdin Analytical Services for copper, mercury, 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT.”

Comment [ms3]: Dry ice

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**Region 4
U.S. Environmental Protection Agency
Science and Ecosystem Support Division
Athens, Georgia**

OPERATING PROCEDURE

Title: Standard Operating Procedure (SOP) for Tissue Sample Handling and Processing

Effective Date: May 31, 2007

Number: SESDPROC-602-R0

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Revision History

This table shows changes to this controlled document over time. The most recent version is presented in the top row of the table. Previous versions of the document are maintained by the SESD Quality Manager.

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Contents

1 General Information

1.1 Purpose

The purpose of this procedure is to document both general and specific procedures, methods and considerations to be used and observed when conducting tissue preparation for chemical analysis. This tissue preparation procedure is useful in providing a homogenous mixture that allows for ease of use and a sub-sample representative of the whole for the analytical chemists.

1.2 Scope/Application

Tissue samples typically received by SESD include fish, mollusk, arthropod, reptile, amphibian, and avian, however, other tissues may be processed using this method. Tissue samples should be ground or homogenized prior to analysis in order to facilitate extraction and digestion of tissue and to ensure that a representative sample is analyzed. This method provides guidance on handling and processing (grinding and homogenizing) of tissue samples in the laboratory.

This document describes specific methods to be used when preparing tissues for analysis. On the occasion that laboratory personnel determine any of the procedures described in this section are inappropriate, inadequate or impractical and that another procedure must be used to obtain the desired data, the alternative procedure will be documented in the laboratory log book, along with a description of the circumstances requiring its use.

1.3 Documentation/Verification

This procedure was prepared by persons deemed technically competent by SESD management, based on their knowledge, skills and abilities. The procedure has been tested in practice and reviewed in print by a subject matter expert. A master copy of this procedure is kept in a central file by the SESD Quality Manager, along with documentation of the review conducted prior to its issuance.

1.4 General Precautions

1.4.1 Safety

Proper safety precautions must be observed when preparing tissue samples for analysis. Refer to the SESD Safety, Health and Environmental Management Program (SHEMP) Manual and any pertinent site-specific Health and Safety

Plans (HASPs) for guidelines on safety precautions. These guidelines, however, should only be used to complement the judgment of an experienced professional. Address chemicals that pose specific toxicity or safety concerns and follow any other relevant requirements, as appropriate.

Material Safety Data Sheets (MSDSs) for all reagents utilized in the laboratory are currently located at www.epachemwatch.us. The ID for this site is epauser and the password is 12021970.

1.4.2 Procedural Precautions

The following precautions should be considered when conducting tissue preparation and shipping. Care must be taken not to contaminate samples.

- Appropriate personal protective equipment should be used including safety glasses, hearing protection, dust masks (when appropriate), clean gloves and lab coats.
- Dry ice is extremely cold and can cause extensive skin damage if not handled in an appropriate manner.
- Samples should be kept frozen while being prepared, therefore, samples must be cut into portions that can be placed in the blender for processing. Cutting of frozen material with knives and cleavers is very dangerous and must be handled in as safe a manner as possible.
- The fume hood should be operational during processing of tissue samples.
- Shipped samples shall conform to all U.S. Department of Transportation (DOT) and/or International Air Transportation Association (IATA) hazardous materials shipping requirements. Tissue samples are shipped on dry ice unless otherwise noted.

2 Tissue Processing

2.1 Sample Receipt and Inspection

Samples must be accompanied by the appropriate sample receipt/chain-of-custody documentation. Tissue samples received by the preparation laboratory should be

unwrapped and inspected carefully to ensure that they have not been compromised in any way. Any sample not properly packaged or preserved or any sample exceeding the recommended holding time will be flagged and a remark will appear on the final report describing inconsistencies with recommended handling procedures.

2.2 Equipment/Laboratory Decontamination

Sample processing (i.e., filleting, homogenizing, compositing) should be done in an appropriate laboratory facility under clean conditions. Clean rooms or work areas should be free of metals and organic contaminants. To avoid cross-contamination of tissues, all equipment used in sample processing (i.e., resectioning, homogenizing, and compositing) should be cleaned thoroughly before each individual or composite sample is prepared. All equipment should be washed with suitable detergent solution (Luminox®), rinsed with hot water to remove any detergent residue, and rinsed with laboratory pure water between each sample. All blenders must have the blades removed and thoroughly cleaned before each use. Gloves must be changed between the handling of different samples. Work surfaces should be rinsed with pesticide-grade isopropanol and then rinsed with laboratory pure water. Verification of the efficacy of cleaning procedures should be documented through the analysis of processing blanks or rinse blanks.

2.3 Materials Required

- Dry Ice.
- Glass or stainless steel blender jars and motorized base.
- Stainless steel knives, and meat cleavers.
- Aluminum foil.
- Cutting boards.

2.4 Tissue Processing Procedure

Depending on the study objectives and the degree of field processing, samples may require some preparation before freezing, grinding, and homogenization occurs. For example, whole body fish may require scaling, skinning, or filleting, mollusks may require removal of soft tissues from the shell, or specific internal organs may need to be excised, etc.

Tissue samples may be ground or homogenized using a hand grinder or a high speed blender with stainless steel blades. Large pieces of tissue can be cut into smaller cubes, on an aluminum covered cutting board, with high quality stainless steel knives to facilitate the grinding or homogenization. If high speed blenders are used, they should be chilled by grinding dry ice in the blender until the blending jar is frosted, then small quantities of tissue are added, along with additional dry ice as needed to keep the tissues frozen, and blended until complete homogenization occurs. The ground sample is then placed on a clean piece of aluminum foil, or directly into a pre-cleaned jar according to specified analysis. Refer to Region 4 Analytical Support Branch Laboratory Operations and Quality Assurance Manual (ASBLOQAM), Most Recent Version for sample containers and preservation. Upon completion of tissue preparation, the foil covering the sample is loosely sealed or the jar lid loosely closed, and the sample placed in an unsealed plastic bag, labeled appropriately and placed in the freezer for approximately 48 hours to allow sublimation of the dry ice. After 48 hours, foil and jar lids are tightened and plastic bags are sealed.

Individual samples may be ground and homogenized separately, or composited depending on the study objectives and analytical requirements (i.e., lower detection requires more gram weight of tissue). Composite samples should all be the same species, should satisfy any legal requirements of harvestable size or weight, and must be of similar size so that the smallest individual in a composite is no less than 75 percent of the total length of the largest individual (USEPA 2000). Homogenates must be re-homogenized prior to weighing and dividing. Samples should be kept frozen at all times and any associated liquid from partial thawing should be kept as a part of the sample.

2.5 Interferences

The predominant metal contaminants from stainless steel are chromium and nickel. If these metals are a concern, then use of stainless steel in processing should be limited and/or appropriate equipment and rinse blanks procured. If aluminum is of concern, the tissue samples should be placed in glass jars. Equipment rinse blanks and blender blanks may be used to evaluate the possibility of contamination. If chromium and nickel are not a concern, the use of high-quality, corrosion-resistant stainless steel for sample processing equipment is acceptable.

2.6 Quality Control

1. Each analyst must demonstrate their ability to use frozen tissues and obtain a consistently uniform product that can easily be homogenized by

the chemists for analysis. This procedure should be conducted by, or under the supervision of analysts experienced in tissue processing.

2. An assessment of laboratory performance is demonstrated by the analysis of quality control samples, and laboratory reagent blanks.
3. Dry Ice Blanks: A sample of dry ice will be placed in a 125 ml Erlenmeyer flask that is loosely covered, allowed to sublime, then tightly covered and submitted for appropriate analysis (1 for metals; 1 for organics; and 1 for mercury). A dry ice blank should be collected at the beginning of each day of tissue preparation and for each new container of dry ice.
4. Blender Blanks: At the end of the sample processing day, a sample of dry ice will be blended in a blender, transferred to a standard 8 oz. pre-cleaned sample container or Erlenmeyer flask that is loosely covered, allowed to sublime, tightly covered, and submitted for appropriate analysis (1 for metals, 1 for organics, and one for mercury).
5. Rinsate Blanks: A water sample collected from rinsing the equipment will be collected in bottles appropriate for the requested analysis and submitted for analysis.
6. Preservative Blank: If preservatives are used in sample collection, a preservative blank will be submitted for analysis.

2.7 Records

Information generated or obtained by SESD personnel will be organized and accounted for in accordance with SESD records management procedures found in SESD Operating Procedure for Project File Management (SESDPROC-004-R0). Lab notes, recorded in a bound logbook, will be generated, as well as chain-of-custody documentation in accordance with SESD Operating Procedure for Field Records (Logbooks) (SESDPROC-010-R0) and SESD Procedure for Sample and Evidence Management (SESDPROC-005-R0).

2.8 References

SESD Safety, Health and Environmental Management Program (SHEMP) Manual, Most Recent Version.

USEPA Region 4, Analytical Support Branch Laboratory Operations and Quality Assurance Manual (ASBLOQAM), January 2007.

USEPA 2000. Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volume 1: Fish Sampling and Analysis, Third Edition. Office of Water, USEPA, Washington, DC. EPA-823-B-00-007.

DRAFT