APPENDIX A. EPA-LWG COMMUNICATIONS

APPENDIX A CONTENTS

Lower Willamette Group (LWG). 2006. Letter from LWG to EPA et al. (from J McKenna and B Wyatt to Chip Humphrey et al.) regarding Lamprey/Sturgeon Studies. June 2, 2006.

Environment International, Ltd. 2006. E-mail from Environment International to Trustees et al. (from C Thompson to J Baker and R Gouguet et al.) regarding source options for ammocoete testing. August 7, 2006.

Environment International, Ltd. 2006. E-mail from Environment International to Windward Environmental LLC (from C Thompson to H Andersen) regarding PDF files for references. August 10, 2006.

US Environmental Protection Agency (EPA). 2006. Letter from EPA to Lower Willamette Group (from E Blischke and C Humphrey to J McKenna and R Wyatt) regarding Portland Harbor RI/FS Round 3 data gaps – lamprey and sturgeon. August 29, 2006.

Windward Environmental LLC (Windward). 2007. E-mail from Windward to EPA (from H Andersen to E Blischke) regarding lamprey toxicity testing. September 27, 2006.

US Environmental Protection Agency (EPA). 2006. E-mail from EPA to Windward Environmental LLC (from E Blischke to H Andersen and L Saban) regarding lamprey toxicity testing FSP. October 2, 2006.

US Environmental Protection Agency (EPA). 2006. E-mail from EPA to Windward Environmental LLC (from E Blischke to A Rodriquez) regarding the designated Siletz biologist and lamprey sampling. October 4, 2006.

US Environmental Protection Agency (EPA). 2006. E-mail and letter attachment from EPA to Lower Willamette Group et al. (from E Blischke [and C Humphrey] to J McKenna and R Wyatt et al.) regarding conditional approval of the Round 3 lamprey ammocoete toxicity FSP. October 11, 2006.

Windward Environmental LLC (Windward). 2006. E-mail from Windward to EPA et al. (from H Andersen to E Blischke et al.) regarding lamprey collection. October 24, 2006.

Environment International, Ltd. 2006. E-mail and attachment from Environment International to EPA and Windward Environmental LLC et al. (from C Thompson to J Goulet and H Andersen et al.) regarding temperature preferences of lamprey ammocoetes. October 27, 2006.

US Environmental Protection Agency (EPA). 2006. E-mail and attached letter from EPA to Lower Willamette Group et al. (from E Blischke [and C Humphrey] to J McKenna and R Wyatt et al.) regarding additional EPA comments on the lamprey toxicity elements of the FSP and QAPP. October 31, 2006.

US Environmental Protection Agency (EPA). 2006. E-mail from EPA to Environment International, Ltd. et al. (from E Blischke to C Thompson et al.) regarding the selection of a final chemical for range-finding tests. November 17, 2006.

US Environmental Protection Agency (EPA). 2006. E-mail from EPA to Windward Environmental LLC et al. (from E Blischke to H Andersen et al.) regarding lamprey toxicity testing for naphthalene. November 17, 2006.

Windward Environmental LLC (Windward). 2007. E-mail and attachments from Windward to EPA et al. (from H Andersen to C Humphrey and Eric Blischke et al.) regarding lamprey toxicity data report and LWG response to EPA comments on the lamprey toxicity FSP and QAPP. April 6, 2007.

US Environmental Protection Agency (EPA). 2007. E-mail from EPA to Windward Environmental LLC et al. (from E Blischke to H Andersen et al.) regarding the scientific taking permit text and testing temperature. May 10, 2007.

US Environmental Protection Agency (EPA). 2007. E-mail from EPA to EPA and Windward Environmental LLC (from B Shephard to E Blischke, C Humphrey, and H Andersen) regarding scientific taking permit text. May 11, 2007.

Windward Environmental LLC (Windward). 2007. E-mail from Windward to EPA et al. (from H Andersen to E Blischke et al.) regarding lamprey testing sizes. May 16, 2007.

US Environmental Protection Agency (EPA). 2007. E-mail from EPA to Windward Environmental LLC et al. (from E Blischke to H Andersen et al.) regarding lamprey testing sizes. May 23, 2007.

Windward Environmental LLC. 2007 (Windward). E-mail from Windward to EPA et al. (from H Andersen to B Shephard et al.) regarding the lamprey collection temperature test. June 20, 2007.

Windward Environmental LLC (Windward). 2007. E-mail from Windward to EPA et al. (from H Andersen to E Blischke et al.) regarding water quality parameters for lamprey toxicity testing. June 22, 2007.

Windward Environmental LLC (Windward). 2007. E-mail and attachment from Windward to EPA et al. (from H Andersen to C Humphrey and E Blischke et al.) regarding lamprey reconnaissance survey (dated June 22, 2007). July 6, 2007.

Windward Environmental LLC (Windward). 2007. E-mail from Windward to EPA et al. (from H Andersen to C Humphrey and E Blischke et al.) regarding the lamprey toxicity testing FSP addendum. July 9, 2007.

Windward Environmental LLC (Windward). 2007. E-mail and attachment from Windward to EPA et al. (from H Andersen to C Humphrey and E Blischke et al.) regarding lamprey LR50 memorandum (dated July 12, 2007). July 13, 2007.

US Environmental Protection Agency (EPA). 2007. E-mail and attachments from EPA to Lower Willamette Group et al. (from E Blischke to J McKenna et al.) regarding EPA comments on Phase 2 toxicity testing. July 20, 2007.

Lower Willamette Group (LWG). 2007. Letter and attachment from LWG to EPA (from J McKenna and B Wyatt to C Humphrey and E Blischke) regarding LWG response to EPA's July 20, 2007, comments on the lamprey toxicity FSP and QAPP Phase 2 addenda . August 10, 2007.

US Environmental Protection Agency (EPA). 2007. Letter from EPA to Lower Willamette Group (from E Blischke and C Humphrey to J McKenna and R Wyatt) regarding LWG's August 10, 2007, response to EPA comments on the lamprey toxicity FSP and QAPP Phase 2 addenda. August 17, 2007.

Windward Environmental LLC (Windward). 2007. E-mail from Windward to EPA (from J Toll to B Shephard) regarding the need for written authorization to collect lamprey in the 2.5-to-6.0-cm size class. August 28, 2007.

Windward Environmental LLC (Windward). 2007. E-mail and attachment from Windward to EPA (from J Toll to B Shephard et al.) regarding lamprey size ranges and August 2007 ammocoete catch data. August 30, 2007.

US Environmental Protection Agency (EPA). 2007. E-mail and attachment from EPA to Windward Environmental LLC et al. (from B Shephard to J Toll and H Andersen et al.), regarding lamprey size ranges and ammocoete catch data submitted on August 30, 2007. September 5, 2007.

US Environmental Protection Agency (EPA). 2007. E-mail and attachment from EPA to Lower Willamette Group et al. (from B Shephard to J McKenna et al.) regarding the Round 3 lamprey ammocoete toxicity testing FSP and authorization to modify allowable size range of fish. September 5, 2007.

Windward Environmental LLC (Windward). 2007. E-mail from Windward to EPA et al. (from H Andersen to E Blischke et al.) regarding laboratory visit request. October 10, 2007.

US Environmental Protection Agency (EPA). 2007. E-mail from EPA to Parametrix and EPA (from B Shephard to R Gensemer and E Blischke) regarding laboratory visit request. October 11, 2007.

Windward Environmental LLC (Windward). 2007. E-mail from Windward to EPA et al. (from H Andersen to B Shephard et al.) regarding upcoming lamprey ammocoete collection. October 11, 2007.

US Environmental Protection Agency (EPA). 2007. E-mail from EPA to EPA and Windward Environmental LLC et al. (from E Blischke to B Shephard and H Andersen et al.) regarding upcoming lamprey ammocoete collection. October 11, 2007.

Windward Environmental LLC (Windward). 2007. E-mail from Windward to EPA et al. (from H Andersen to B Shephard et al.) regarding upcoming field collection of lamprey ammocoetes. October 12, 2007.

Windward Environmental LLC (Windward). 2007. E-mail from Windward to EPA et al. (from J Toll to B Shephard and E Blischke et al.) regarding lamprey ammocoetes collection update. October 18, 2007.

Windward Environmental LLC (Windward). 2007. E-mail from Windward to EPA et al. (from J Toll to B Shephard and E Blischke et al.) regarding lamprey ammocoetes collection update. October 18, 2007.

US Environmental Protection Agency (EPA). 2007. E-mail from EPA to Windward Environmental LLC et al. (from B Shephard to J Toll et al.) regarding lamprey ammocoete collection update. October 18, 2007.

US Environmental Protection Agency (EPA). 2007. E-mail from EPA to Windward Environmental LLC (from B Shephard to J Toll) regarding ammocoete collection. October 19, 2007.

US Environmental Protection Agency (EPA). 2007. E-mail and attachment from EPA to Windward Environmental LLC et al. (from B Shephard to H Andersen et al.) regarding lindane freshwater Table 3-1. October 29, 2007.

Oregon Department of Environmental Quality (ODEQ). 2007. E-mail from ODEQ to Windward Environmental LLC and Northwest Aquatic Services (from J Peterson to H Andersen and D Caldwell) regarding availability of diazinon. October 30, 2007.

US Environmental Protection Agency (EPA). 2007. E-mail from EPA to Windward Environmental LLC et al. (from E Blischke to J Toll et al.) regarding NAS audits and visit. October 31, 2007.

Windward Environmental LLC (Windward). 2007. E-mail from Windward to EPA et al. (from H Andersen to B Shephard et al.) regarding source of diazinon. November 1, 2007.

Windward Environmental LLC (Windward). 2007. E-mail from Windward to EPA et al. (from J Toll to E Blischke and B Shephard et al.) regarding the lamprey flow-through test with naphthalene. November 19, 2007.

Oregon Department of Environmental Quality (ODEQ). 2007. E-mail from ODEQ to Windward Environmental LLC (from J Peterson to H Andersen) regarding diazinon. November 21, 2007.

Windward Environmental LLC (Windward). 2007. E-mail from Windward to EPA et al. (from H Andersen to B Shephard et al.) regarding naphthalene draft survival data. November 21, 2007.

Oregon Department of Environmental Quality (ODEQ). 2007. E-mail from ODEQ to Windward Environmental LLC (from J Peterson to H Andersen) regarding diazinon. December 3, 2007.

US Environmental Protection Agency (EPA). 2007. E-mail from EPA to Windward Environmental LLC et al. (from B Shephard to H Andersen et al.) regarding naphthalene testing recommendations. December 3, 2007.

Oregon Department of Environmental Quality (ODEQ). 2007. E-mail from ODEQ to Windward Environmental LLC et al. (from J Peterson to H Andersen et al.) regarding diazinon sample. December 10, 2007.

US Environmental Protection Agency (EPA). 2007. E-mail from EPA to Windward Environmental LLC et al. (from E. Blischke to H Andersen et al.) regarding lamprey toxicity testing update. December 11, 2007.

Oregon Department of Environmental Quality (ODEQ). 2007. E-mail from ODEQ to Windward Environmental LLC (from J Peterson to H Andersen) regarding diazinon sample. December 11, 2007.

Oregon Department of Environmental Quality (ODEQ). 2008. E-mail from ODEQ to Windward Environmental LLC and Northwest Aquatic Services (from J Peterson to H Andersen and D Caldwell) regarding diazinon shipment. January 10, 2008.

US Environmental Protection Agency (EPA). 2008. E-mail from EPA to Windward Environmental LLC (from B Shephard to H Andersen) regarding update on lamprey toxicity testing. January 24, 2008.

Windward Environmental LLC (Windward). 2008. E-mail from Windward to EPA et al. (from J Toll to E Blischke et al.) regarding lamprey toxicity testing. February 8, 2008.

US Environmental Protection Agency (EPA). 2008. E-mail from EPA to Windward Environmental LLC et al. (from E Blischke to H Andersen et al.) regarding the analysis of lamprey tissue samples. March 10, 2008.

LWG
LOWER WILLAMETTE GROUP
Co-Chairperson: Jim McKenna, Port of Portland
Co-Chairperson: Bob Wyatt, NW Natural
Treasurer: Fred Wolf, Arkema, Inc.

June 2, 2006

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Re: Lamprey/Sturgeon Studies

Dear Erin, Chip, and Eric:

As all parties involved in the Portland Harbor investigation have acknowledged since the beginning of this project, it is important in assessing Portland Harbor contamination to take into account risks to Pacific lamprey and white sturgeon. To this end, the Lower Willamette Group (LWG) identified both lamprey and sturgeon in the Programmatic Work Plan as potential receptors of concern. The LWG recognizes these as important species within the Lower Willamette River ecosystem, and it also recognizes that the Native American Tribes consider both species to be culturally significant.

The following is a summary of work conducted thus far to address lamprey and sturgeon, a summary of recent discussions on the issue, and a proposal for initiating specific sampling and analysis programs aimed at filling specific data needs for the lamprey and sturgeon.

Lamprey and Sturgeon Work to Date

In the first phases of the RI/FS investigation, the LWG was able to obtain data for adult lamprey and adult sturgeon tissue from the Lower Willamette. In addition, the LWG devoted considerable effort attempting to collect sufficient lamprey ammocoete tissue for analysis. During Round 1, three ammocoetes were collected during boat electroshocking in late August 2002. Following that effort, two reconnaissance surveys were conducted to determine if additional lamprey ammocoetes could be collected in Portland Harbor. For the first survey in September 2002, backpack electroshockers and sediment grabs were used at 21 co-located sediment and tissue sampling locations, resulting in the collection of one ammocoete with the electroshocker. For the second survey in October 2002, fisheries biologists from the Umatilla tribe assisted in targeting habitat considered favorable for ammocoetes and eleven locations were sampled with backpack electroshockers. However, no ammocoetes were found.

Following these efforts, Environmental International, consultant to the Tribes, suggested to the LWG that the environmental staff of the Confederated Tribes of the Warm Springs had expertise in identifying lamprey habitat and that they should be consulted to develop a different approach to the tissue collection effort. In April 2005, Lisa Saban, LWG eco-risk assessor, met with environmental staff from the Warm Springs and with Chris Thompson from Environmental International. Lisa shared with those biologists the procedures that had been utilized by the LWG and, in the last effort, by the LWG and the Umatilla biologists. Although a good discussion was had as to what had been successful thus far, neither the representatives of the Warm Springs nor EI had any different techniques to suggest for the collection efforts.

During the Round 2 tissue collection, a benthic sledge was used to collect benthic invertebrates from 33 stations along the river margins in Portland Harbor in November and December 2005. Only seven ammocoetes were collected in 470 tows. Sediment grabs were also collected as part of this effort from six to seven locations within each of the 33 sledge stations; this effort yielded only three ammocoetes. All together, the Round 2 collection efforts resulted in the collection of approximately 14 grams of lamprey ammocoete tissue, which will be submitted for analysis, albeit limited due to the small sample volume.

Adult lamprey were collected at Willamette Falls in the summer of 2003 through a cooperative effort of the Oregon Department of Human Services (ODHS), Agency for Toxic Substances and Disease Registry (ATSDR), Oregon Department of Fish and Wildlife (ODFW), the City of Portland, and U.S Environmental Protection Agency (EPA) Region 10. Four whole body composite samples, which are representative of human consumption, were analyzed. The LWG has compiled and reviewed the analytical data for adult lamprey and will use these data to assess human health risks from consumption of lamprey.

The LWG has also devoted resources to the assessment of sturgeon. Adult sturgeon were collected in the summer of 2003 through the same cooperative effort that collected the adult lamprey samples. The sturgeon samples were collected between river miles 3.5 and 9.2. Six fillets without skin samples, which are representative of human consumption, were analyzed. The LWG has compiled and reviewed the analytical data for sturgeon and will use these data to assess human health risks from consumption of sturgeon.

April 26, 2006 Lamprey/Sturgeon 'Summit' Meeting

The LWG met with the Trustee Council and EPA on April 26, 2006, to specifically discuss further study of both lamprey and sturgeon. At that meeting, representatives of the Trustees presented to the LWG risk team a list of studies relating to lamprey and sturgeon that the Trustees stated they believed would be useful in developing site response and site restoration activities. Following that meeting, the Trustee Council provided to the LWG a paper entitled "Sturgeon and Lamprey Information Issues—Lower Willamette River NPL Site Response & Restoration" which provided a conceptual overview of various questions regarding lamprey and sturgeon that had been developed by the Trustees, and which provided background with respect to the list of possible studies discussed at the meeting.

At the conclusion of the April 26th meeting, the LWG agreed to continue discussions of lamprey and sturgeon through a Technical Team, with a goal of reaching consensus on plans for further study of lamprey and sturgeon. The team includes scientists from NOAA, USFWS, Environment International (consultant to five of the six Tribes), ODFW and technical personnel from the LWG. The team, led by Ron Gouguet from NOAA, has met regularly and is continuing its work to develop a consensus plan. As discussed at the April 26th meeting, the plan may consider both RI/FS data gaps and data gaps with respect to the separate natural resources damages assessment (NRDA), with a goal of developing data collectively, where appropriate. These discussions are following on the heels of the successful effort last

year to coordinate both RI/FS and NRD-focused interests in developing sampling plans for spring-run Chinook juveniles.

Need to Develop Round 3 Lamprey and Sturgeon Work Plans

As we have discussed since last fall, in order to complete the Portland Harbor RI/FS in a timely fashion, it is important to identify those data gaps that need to be a focus of Round 3A sampling by early summer 2006. We believe that all parties acknowledge that there are data gaps with respect to our understanding of the risks to lamprey and sturgeon within the Harbor. These were specifically identified as data gaps by EPA in its December 2, 2005 memorandum, and tissue collection of pre-breeding sturgeon was set forth in EPA's February 17, 2006 suggested Scope of Work, with tissue collection of lamprey identified as a subject on which there would be further direction from EPA.

Although the Technical Team has not reached consensus on a complete plan to incorporate both RI/FS and NRD elements, it has had significant discussion of data objectives and potential studies to meet those objectives. Given the importance of developing Round 3A work plans in time for implementation in the late-summer or fall of 2006, the LWG eco-risk team has been attempting to incorporate some of the near-term data needs that have been preliminarily identified by the Technical Team into its RI/FS planning.

We therefore are at a point where we would like to propose, at a conceptual level, those studies that have been discussed by the Technical Team which the LWG believes will adequately address the RI/FS data gaps regarding lamprey and sturgeon. The LWG is making this proposal with great deference to its understanding of the importance of these two species to EPA's Tribal partners. Although it would be possible to make risk management decisions with respect to both of these species using information on surrogate species and applying conservative assumptions, the LWG acknowledges the importance that the Tribal partners place on obtaining actual tissue and of confirming the conservative nature of risk assumptions developed for other species. Because of the importance of these issues to the Tribes, the LWG members are prepared to agree to more extensive assessment of these two species than the assessment being conducted with respect to other species.

Accordingly, the LWG is prepared to develop work plans for the elements described below. These activities represent the studies for which the Technical Team has reached a consensus on the need for, and utility in the RI/FS and the NRDA. Other candidate studies have been discussed in recent Technical Team meetings, but no consensus has been reached on whether the studies can generate specific data useful in the RI/FS or specific enough to make conclusions in the NRDA. The LWG recognizes that additional data may be needed after these elements are completed. However, we believe that neither the need for additional information, nor the specific data needs can be determined until the following information is collected and evaluated. In the context of recent discussions regarding the RI/FS Round 3 fieldwork, the following correspond to Round 3A activities.

- *Collection of Lamprey Ammocoetes.* An additional attempt at the collection of lamprey ammocoetes within the Portland Harbor and in an agreed-upon upstream area, using the deep water electroshocking technique that has been used in the Great Lakes. If adequate tissue amounts are collected, then the samples will be analyzed for contaminants of interest (COIs) based on the same priority scheme that has been proposed for the recent juvenile salmonid, clam, and invertebrate tissue analyses. If tissue is not collected, then risk to lamprey ammocoetes will be evaluated using other fish or benthic tissue that is best representative of lamprey ammocoete exposure.

  The LWG believes this study could contribute significantly to the understanding of the distribution, occurrence, and habitat use by ammocoetes in the Lower Willamette River. Therefore, the sampling effort will be conducted systematically in the best candidate habitat types (i.e., based on flow, substrate type, etc.) available in the ISA and upstream of the ISA. The

sampled areas will be characterized based on key habitat features to provide information on the potential distribution and occurrence of ammocoetes in the lower river. The LWG will look to the Tribes and other experts to identify the best candidate locations, and the habitat features to be characterized. In addition, the LWG would like to have Tribal and agency scientists involved in the sampling and handling efforts to make sure that the best expertise is being applied.

- ***Ammocoete Sensitivity Testing.*** Side-by-side toxicity tests will be conducted using lamprey ammocoetes and rainbow trout or other standard test organisms to assess the relative sensitivity of ammocoetes compared to species for which sensitivity to contaminants has been well characterized. As currently proposed by the RI/FS/NRD technical team, the LWG would propose to use 96-hour water exposures in these tests. The information gleaned from these tests will help determine whether or not the existing water quality standards or other screening criteria are protective of the ammocoetes.

- ***Collection of Pre-breeding Sturgeon for Tissue Analysis.*** Sampling for pre-breeding (juvenile) sturgeon will be conducted in the ISA and in appropriate reference areas to assess the relative concentrations of COIs. The LWG agrees with the general goals expressed in recent straw proposals communicated by the agency team. Reflected in those goals is a need for reference areas that are selected to elucidate the concentration of fish from the ISA relative to more regional concentrations. The number of fish, and the specific locations should be determined based on results of ongoing discussions within the Technical Team.

Results of these investigation elements would be used to help determine whether a protective remediation decision is possible, or whether additional information/data collection is needed. If additional information is needed, detailed analysis of data needs will be conducted as part of the Round 3b data needs identification process.

Attached is a decision matrix setting forth the specific RI/FS Data Quality Objectives that will be furthered by these studies. The above proposal is made at this time because of the need to immediately begin development of Round 3A work plans and because the described studies (the first two of which are extremely innovative) will require extensive efforts to develop.

Continuation of Lamprey/Sturgeon RI/FS/NRD Technical Team Efforts

The LWG eco-risk team will continue to work with the Technical Team to discuss whether a broader range of studies is necessary to support risk management decisions in the RI/FS and whether RI/FS data collection and analysis programs can further accommodate NRDA needs. We are pleased with the progress the Technical Team is making and will continue to evaluate concepts coming out of that team.

Very truly yours,

Jim McKenna

Bob Wyatt

encl.: Lamprey Sturgeon DQO Table

cc: Rose Longoria, Confederated Tribes and Bands of the Yakama Nation (email only)
Jeff Baker, Confederated Tribes of the Grand Ronde Community of Oregon (email only)
Lisa Bluelake, Confederated Tribes of the Grand Ronde Community of Oregon (email only)
Tom Downey, Confederated Tribes of Siletz Indians of Oregon (email only)
Billy Barquin, Confederated Tribes of Siletz Indians of Oregon (email only)
Audie Huber, Confederated Tribes of the Umatilla Indian Reservation (email only)
Brian Cunninghame, Confederated Tribes of the Warm Springs Reservation of Oregon (email only)
Valerie Lee, Environment International (email only)
Patti Howard, Columbia River Inter-Tribal Fish Commission (email only)
Rick Kepler, Oregon Department of Fish & Wildlife (email only)
Ted Buerger, United States Fish & Wildlife (email only)
Rob Neeley, NOAA (email only)
Preston Sleeger, DOI (email only)
Jim Anderson, Oregon Department of Environmental Quality (email only)
Dick Pedersen, Oregon Department of Environmental Quality (email only)
Mikell O'Meally, Oregon Department of Environmental Quality (email only)
LWG Repository

Problem Statement	Inputs to Decision	Data Sources	Decision Rule
Does the exposure to chemicals resulting from historical and ongoing releases and/or sources within the ISA pose unacceptable risks to lamprey ammocoetes and pre-breeding sturgeon[a]?	• Lamprey ammocoete tissue data collected during Round 2 benthic tissue sampling in December 2005. • Tissue data from Round 3 pre-breeding (juvenile) sturgeon[b] and lamprey ammocoetes[c] • Results from limited number of side-by-side toxicity tests[d] with lamprey ammocoetes and rainbow trout to address relative sensitivity of lamprey with other fish species for selected chemicals to determine potential toxicity and/or bioavailability issues. • Lamprey and sturgeon life history and dietary habits information to determine potential exposure area • Apply safety factors to tissue thresholds for specific COPCs if water toxicity studies indicate higher sensitivity in lamprey.	• Toxicity data from Great Lakes sea lamprey water exposure data (USFW: Applegate et al.1957) to establish effect levels (sensitivity) based on tissue • Tissue-based toxicological data from other literature sources to establish effect levels • Surface sediment, surface water, benthic infauna tissue, and fish tissue data collected (or will be collected) in exposure areas • Toxicity results of side-by-side lamprey and rainbow trout toxicity tests	• If COPC tissue concentration using 95th UCL or maximum concentration is > tissue-based NOEC, the COPC will be retained for further evaluation • If COPC surface water concentration is >AWQC or other effects-based criteria, the COPC will be retained for further evaluation • If COPC dietary exposure dose (estimated from tissue and sediment concentrations) is > dietary NOEC, the COPC will be retained for further evaluation

Reference: Applegate VC, Howell JH, Hall AE, Smith MA. 1957. Toxicity of 4,346 chemicals to larval lampreys and fishes. Special scientific report -- Fisheries No. 207. US Department of the Interior, Fish and Wildlife Service, Washington, DC.

[a] Adult lamprey and sturgeon will not be evaluated. The life stages being evaluated are expected to be the most sensitive and protective of adults.

[b] Lamprey ammocoetes will be collected from the Study Area using the Great Lakes technique (i.e., deep water electroshocking). If collection of lamprey ammocoetes is not feasible, other fish tissue that is representative of lamprey will be used, in agreement with EPA and its partners.

[c] Pre-breeding sturgeon will be collected in summer 2006 (and possibly winter 2006, if warranted).

[d] Side-by-side toxicity tests will be 96 hour water only tests.

Helle B. Andersen

From: Chris Thompson [chris.thompson@EILTD.net]
Sent: Monday, August 07, 2006 9:30 AM
To: Jeff Baker; Ron Gouguet
Cc: Robert.Neely@noaa.gov; Helle B. Andersen; matt_mesa@usgs.gov; Mary.Moser@noaa.gov; Stan Van De Wetering; Tom Downey; Rose Longoria; Jennifer Peterson; Jeremy Buck; KEPLER Rick J; joe goulet; Taku Fuji; Matt Luxon
Subject: RE: Phase 3a Design Issues: Source Options: Ammocoete testing

Hi Jeff,

Good point regarding ID of lamprey ammocoetes (brook vs Pacific). I hadn't thought about that in the context of catching ammocoetes in the field for lab toxicity testing. Here are some relevant references:

Bayer, J.M., M.H. Meeuwig, and J.G. Seelye. 2001. Identification of larval Pacific lampreys (Lampetra tridentata), river lampreys (L.
ayresi), and western brook lampreys (L. richardsoni) and thermal requirements of early life history stages of lampreys. 2000 Annual Report to Bonneville Power Administration, Portland, OR. Project Number 2000-029, Contract Number 00AI23249; DOE/BP-00000013-1.

Meeuwig, M.H., J.M. Bayer, and R.A. Reiche. 2004. Identification of larval Pacific lampreys (Lampetra tridentata), river lampreys (L.
ayresi), and western brook lampreys (L. richardsoni) and thermal requirements of early life history stages of lampreys. Amended Final Report 2002-2004 to Bonneville Power Administration, Portland, OR.
Project Number 2000-029, Contract Number 00AI23249; DOE/BP-00004695-4.

PAPERS IN THE MEEUWIG ET AL. (2004) report above include the following:

Meeuwig, M.H., J.M. Bayer, and R.A. Reiche. 2004. Evaluation of color patterns for identification of larval Pacific lamprey (Lampreta
tridentata) and western brook lamprey (L. richardsoni) from the Columbia River. Pages 12-29 in Meeuwig, M.H., J.M. Bayer, and R.A. Reiche. 2004.
Identification of larval Pacific lampreys (Lampetra tridentata), river lampreys (L. ayresi), and western brook lampreys (L. richardsoni) and thermal requirements of early life history stages of lampreys. Amended Final Report 2002-2004 to Bonneville Power Administration, Portland, OR.
Project Number 2000-029, Contract Number 00AI23249; DOE/BP-00004695-4.
[Filename = Meeuwig et al. 2004 Larval lamprey ID and Thermal reqs.
report 2002-2004.pdf].

Meeuwig, M.H., J.M. Bayer, and R.A. Reiche. 2004. Morphometric discrimination of early life stage Pacific lampreys (Lampreta
tridentata) and western brook lampreys (L. richardsoni) from the Columbia River. Pages 30-60 in Meeuwig, M.H., J.M. Bayer, and R.A.
Reiche. 2004. Identification of larval Pacific lampreys (Lampetra tridentata), river lampreys (L. ayresi), and western brook lampreys (L.
richardsoni) and thermal requirements of early life history stages of lampreys. Amended Final Report 2002-2004 to Bonneville Power Administration, Portland, OR. Project Number 2000-029, Contract Number 00AI23249; DOE/BP-00004695-4. [Filename = Meeuwig et al. 2004 Larval lamprey ID and Thermal reqs. report 2002-2004.pdf].

Meeuwig, M.H., J.M. Bayer, and R.A. Reiche. 2004. River lampreys (Lampreta ayresi) in the Columbia River Basin. Pages 84-95 in Meeuwig, M.H., J.M. Bayer, and R.A. Reiche. 2004.

Identification of larval Pacific lampreys (Lampetra tridentata), river lampreys (L. ayresi), and western brook lampreys (L. richardsoni) and thermal requirements of early life history stages of lampreys. Amended Final Report 2002-2004 to Bonneville Power Administration, Portland, OR. Project Number 2000-029, Contract Number 00AI23249; DOE/BP-00004695-4. [Filename = Meeuwig et al. 2004 Larval lamprey ID and Thermal reqs. report 2002-2004.pdf].

PRELIMINARY FINDINGS TO THE ABOVE REPORTS ARE AS FOLLOWS:

Meeuwig, M.H., J.M. Bayer, and J.G. Seelye. 2002. Identification of larval Pacific lampreys (Lampetra tridentata), river lampreys (L.
ayresi), and western brook lampreys (L. richardsoni) and thermal requirements of early life history stages of lampreys. 2001 Annual Report to Bonneville Power Administration, Portland, OR. Project Number 2000-029, Contract Number 00AI23249; DOE/BP-00004695-1. [filename = Meeuwig et al. 2002 Larval lamprey ID and Thermal reqs. report 2001.pdf].

Meeuwig, M.H., J.M. Bayer, and J.G. Seelye. 2003. Identification of larval Pacific lampreys (Lampetra tridentata), river lampreys (L.
ayresi), and western brook lampreys (L. richardsoni) and thermal requirements of early life history stages of lampreys. 2002 Annual Report to Bonneville Power Administration, Portland, OR. Project Number 2000-029, Contract Number 00AI23249; DOE/BP-00004695-2. [filename = Meeuwig et al. 2003 Larval lamprey ID and Thermal reqs. report 2002]

Meeuwig, M.H., J.M. Bayer, and J.G. Seelye. 2004. Identification of larval Pacific lampreys (Lampetra tridentata), river lampreys (L.
ayresi), and western brook lampreys (L. richardsoni) and thermal requirements of early life history stages of lampreys. 2002-2003 Annual Report to Bonneville Power Administration, Portland, OR. Project Number 2000-029, Contract Number 00AI23249; DOE/BP-00004695-3. [Filename = Meeuwig et al. 2004 Larval lamprey ID and Thermal reqs. report 2002-2003.pdf].

Here's one additional, but older citation that is likely out-dated by Meeuwig et al's work above.

Richards, J.E., R.J. Beamish, and F.W.H. Beamish. 1982. Descriptions and keys for ammocoetes of lampreys from British Columbia, Canada. Can. J.
Fish. Aquat. Sci. 39:1484-1495. [Abstract: The authors provide new data to compliment and update previously published diagnostics for taxonomy of four types of larval lampreys found in streams of British Columbia.
Diagnostics were verified through rearing ammocoetes through metamorphosis to identifiable adults.].

I have hardcopies and/or pdf files of all of these papers, and am glad to supply any/all of you with them. I'll look these refs over myself to assess (1) what the distribution is of river vs. Pacific lamprey,(2) what the methods/criteria are for distiguishing the species as ammocoetes/macropthalmia, and (3) how difficult ID'ing these critters may be.

Any thoughts from anyone else?

Thanks Jeff.

Best regards,

Chris

-----Original Message-----
From: Jeff Baker [mailto:Jeff.Baker@grandronde.org]
Sent: Friday, August 04, 2006 3:30 PM
To: Ron Gouguet; Chris Thompson

Cc: Robert.Neely@noaa.gov; Helle B. Andersen; matt_mesa@usgs.gov; Mary.Moser@noaa.gov; Stan Van De Wetering; Tom Downey; Rose Longoria; Jennifer Peterson; Jeremy Buck; KEPLER Rick J; joe goulet; Taku Fuji; Matt Luxon (Windward)
Subject: RE: Phase 3a Design Issues: Source Options: Ammocoete testing

Ron, Chris, and all,

This is interesting discussion. Considering lab vs. wild ammoceotes:
Are we able to distinguish with certainty between Pacific and brook lamprey ammoceotes? USGS was working on identification I believe. Wild caught ammoceotes could be either species.

Size (age) classes could be selected from wild caught ammoceotes if necessary. Lab reared ammoceotes would obviously be the same age class.

Pacific lamprey appear to use most tributaries in the Willamette so finding them should not be difficult. More difficult might be making sure they are upstream of potential pollution sources.

Jeff

-----Original Message-----
From: Ron Gouguet [mailto:Ron.Gouguet@noaa.gov]
Sent: Friday, August 04, 2006 10:11 AM
To: Chris Thompson
Cc: Robert.Neely@noaa.gov; Helle B. Andersen; matt_mesa@usgs.gov; Mary.Moser@noaa.gov; Stan Van De Wetering; Tom Downey; Jeff Baker; Rose Longoria; Jennifer Peterson; Jeremy Buck; KEPLER Rick J; joe goulet; Taku Fuji; Matt Luxon (Windward)
Subject: Phase 3a Design Issues: Source Options: Ammocoete testing

Hey man -

The last point cuts two ways... Having genetically diverse stock
presents a possibility of variable sensitivity thus we test over a 'broader range of genetically related sensitivity' if it exists & we could detect it, with wild caught larvae. On one hand that's good.

But for toxicity testing we may want a single 'genotype', but we'll be
hard pressed to get it. If that were possible, we might could factor
out the 'genetic' component, if it exists & we could detect it.

If we catch 20 females & 10 males & breed them, we have a hi chance that

we get a pretty diverse brood stock in any case taken from a migratory
choke point for the Willamette River Stock. We'd be sampling late in
the season (I think August-September is late) so may be some
fractionation of the stocks due to that (?). Lab rearing rought time
line would involve holding these fish for a year & breeding maybe next June (2007) - 6 month old 2-3 inch ammocoetes could be available January

2008 (if the eggs don't take too long to hatch?). No idea as to what 'production' could be & how that might affect decisions on power, etc for the tox testing design (see below).

Wild caught may be practicable & probably could work, but there are some

sticky details to work out. If we could get (following up on what
Helle said) 200 larvae each mainstem from maybe the Siletz, Salmon, Mary's & Lower Clakamas and/or other suitable rivers, wit local fishery managers approval.

Effort might be: I crew, 1 day on each river maybe could produce 200 fish (Rough RWC estimate, with fisherman's luck?).

So for 2000 fish maybe 10 crew days (from 10 river 'mainstems' , if there are 10).

Not sure how many total ammocoetes might be required, but depends on something like: (number of chemicals tested) X (the number of dilutions) X (number of replicates) X (number of individuals / replicate) so picking some numbers that were bounced around during previous SL meetings just for scale

15 chemicals X 5 dilutions X 10 replicates X 5 individuals per replicate = 3750 ammocoetes

10 chemicals X 3 dilutions X 8 replicates X 5 individuals per replicate = 1200 ammocoetes

Also, we need to determine if the experiment will compare toxicity to know sensitive endpoints vs establish water LC50 (Acute & Chronic?)

Design Issues, We got 'em!
Whe need to get to work!
Ron

Chris Thompson wrote:
> Hi Ron,
>
> Interesting info....most of which you kindly told me over the phone a
> few days ago. A few other questions come to mind:
>
> 1. An obvious question is whether the LWG has a preference for using
> ammocoetes caught in the field vs. ammocoetes raised in the lab. If,
> for example, the LWG is concerned that ammocoetes in the field may
have
> been exposed to contaminants prior to capture, and thus potentially
more
> sensitive to subsequent exposure to chemicals in the lab, they may
> prefer lab-reared ammocoetes. In any event, we'd better have
> discussions with them and make sure that we are on the same page.
> Similarly, do the trustees have a preference? As you pointed out
during
> our phone conversation Ron, there are two definite negative
consequences
> to usinglab-reared ammocoetes: (1) the process of rearing ammocoetes
> will significantly delay testing, and (2) because lab-reared
ammocoetes
> will come from a relatively small number of females (compared to the
> number of females from which ammocoetes in the field would be
derived),
> these ammocoetes may not accurately reflect the mean sensitivity of
> ammocoetes in the entire population.
>
> Any thoughts??
>
> Thanks,
>
> Chris
>
> -----Original Message-----

> From: Ron Gouguet [mailto:Ron.Gouguet@noaa.gov]
> Sent: Thursday, August 03, 2006 12:46 PM
> To: Robert.Neely@noaa.gov
> Cc: Helle B. Andersen; matt_mesa@usgs.gov; Mary.Moser@noaa.gov; Stan
Van
> De Wetering; Chris Thompson; 'Tom Downey'; Jeff Baker; Rose Longoria;
> Jennifer Peterson; Jeremy Buck; 'KEPLER Rick J'
> Subject: Source Options: Ammocoete testing
>
> In the discussions leading to workplan development for the 3a lamprey
> efforts, I hear a questions of ammocoete sources for the toxicity
> sensitivity comparison came up. I asked around to several of y'all &

> this is what I think we know.
> ****
> I f we want the option of wild catching ammocoetes for our test
subjects
> I spoke to Stan on Monday about . He said that he's seen 1000
> ammocoetes caught in a few hours in one location, other times less 500

> not uncommon. He suggested the lower Clacamas River or maybe Mary's
> River as potential sources.
>
> Stan's got a PhD student that can participate in the capture events
with
>
> us (QA/QC). The Project would need to pay expenses (stipend & etc).

> Me, (others) I'd like to participate as well. We might consider
using
>
> the hooded shocker/sucker in the Pilot to capture the maybe
> 500-1000-2000 (?) ammocoetes over a 4 day period (?) if that's doable.

>
> Also, we need to make sure everyone is OK with sacrificing the number
of
> fish end up using - recognizing this work will help better understand
> toxic effects to lamprey as a species might help folks accept the
loss.
>
> We'd want to get out into the field as soon as possible but not later
> than mid - October, when cold water reduces the catchability of
> ammocoetes in their rearing areas. Arrangements would need to be in
> place to transport & hold/acclimate test animals. Matt said they had
> good results rearing on yeast cell suspensions.
> ****
> I f we want the option of squeezing fish (captive breeding & rearing
to
> a 6 mo old ammocoete) Talked to Matt, Monday too...
>
> We need to capture, in the next 2 months ~ 20 female & ~ 10 male
> immigrating adults at Willamette Falls. They would need to be held
for
>
> a ~ year in 2 'Living Stream" systems (15 fish ea) @ Cook Lab (?)
until

> they reach sexual maturity. The fish would be stripped & spawned &
> could be grown out to a specified age/size (6 mo ~ 2-3 inches).
> Support funding would have to be arranged. Right now the equipment
is
> @ Cook, but in storage. Catching & Holding the 30 fish is a critical
> path item if the 'hatchery option' is to be considered viable. We
could
> have fish of similar genetics & age for tox testing 18 - 24 months
from
> now.
> ****
>
>
> We might consider some size 'slots' to reduce variability some or
maybe
> we want the range?
>
>
> Robert.Neely wrote:
>
>> Hey Helle,
>>
>> After hearing from you that the USGS apparently doesn't have the
>> ability to rear ammocoetes in a lab setting, I was somewhat puzzled
>> because I was pretty sure I remembered hearing information to the
>> contrary sometime back. The working assumption on our part, in terms
>> of study feasibility, was that the means for rearing and testing
>> sufficient numbers of ammocoetes would be available via the GS. I
>> spoke with Ron Gouguet who subsequently forwarded me the message
below
>>
>
>
>> from Matt Mesa outlining the GS capabilities. So either something has

>> changed or there's been a miscommunication somewhere along the line.
>> In any case, let's see if we can all get on the same page. I'm happy
>> to set up a call and hopefully get you and Matt and Ron and I on the
>> phone.
>>
>> Thanks,
>>
>> -R
>>
>> Subject:
>> Info on lamprey culture
>> From:
>> Matthew G Mesa <matt_mesa@usgs.gov>
>> Date:
>> Fri, 24 Feb 2006 07:43:38 -0800
>>
>> To:
>> Ron.Gouguet@noaa.gov
>>
>>
>> Ron
>>

>> I recieved a message from Dave Lentz regarding info needs for
>>
> culturing
>
>> lampreys and COPECS. Our laboratory has considerable experience
>> culturing lampreys. We conducted studies on the early life history
>> and larval identification of lampreys and successfully spawned fish,
>> hatched eggs, and reared juveniles. We were not successful, however,

>> in getting many fish to metamorphose. Although I was not involved in

>> this work specifically,

>> I am
>> head of our lamprey team now and know and worked with the folks who
>> actually did the work. All of the equipment and methods are still
>> here. I recently put together a one page proposal idea for CRITFC
>> regarding a lamprey culture facility for research purposes. I don't
>> know where
it
>>
>
>
>> will
>> go, but I've attached it below.
>>
>> The topics of lamprey culture and COPECS are research directions that
>>
> we
>
>> would be interested in. Please keep us informed on this issue.
>>
>> Cheers
>>
>> Matt
>> ***
>> Matthew G. Mesa, Ph.D.
>> Research Fisheries Biologist
>> U. S. Geological Survey
>> Columbia River Research Laboratory
>> 5501A Cook-Underwood Road
>> Cook, WA 98605
>> COM: (509) 538-2299, ext. 246
>> FAX: (509) 538-2843
>> matt_mesa@usgs.gov
>>
>> (See attached file: Devlopment of an experimental aquaculture
facility
>>
>
>
>> for
>> lampreys.doc)
>>
>>
>
>

Helle B. Andersen

From: Chris Thompson [chris.thompson@EILTD.net]
Sent: Thursday, August 10, 2006 12:17 PM
To: Helle B. Andersen
Subject: RE: requesting PDFs of references

You're very welcome Helle. I'm planning on getting the Richards et al. (1982) ref today or tomorrow and should be able to scan it into a pdf and send it to you by tomorrow or early next week.

Cheers,

Chris

From: Helle B. Andersen [mailto:helleb@windwardenv.com]
Sent: Wednesday, August 09, 2006 5:01 PM
To: Chris Thompson
Subject: RE: requesting PDFs of references

Chris,
Thanks a lot for the two references.
Helle

From: Chris Thompson [mailto:chris.thompson@EILTD.net]
Sent: Wednesday, August 09, 2006 4:37 PM
To: Helle B. Andersen
Cc: Matt Luxon; Lisa Saban
Subject: RE: requesting PDFs of references

Hi Helle,

I'll get the pdf files together and send them to you. I have not read them myself yet; so, I have no idea whether it will be feasible or not to distinguish brook frm Pacific lamprey ammocoetes in the field or lab. As you suggest, however, I think it will be difficult at best, and perhaps impossible.

Best,

Chris

From: Helle B. Andersen [mailto:helleb@windwardenv.com]
Sent: Wednesday, August 09, 2006 10:01 AM
To: Chris Thompson
Cc: Matt Luxon; Lisa Saban
Subject: requesting PDFs of references

Chris,
In you last e-mail (Monday 8/7) about identifying lamprey ammocoetes you offered to send pdfs of all the papers you listed if requested. We would like to have the pdfs of these documents for our reference. All the fishery biologists that we have talked with say that it is not possible to identify ammocoetes collected in the field, however, if there is a way it certainly would make everything so much easier.
Thanks Helle

Helle B. Andersen

Windward Environmental LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119

Direct Line (206) 577-1287
Phone (206) 378-1364
Fax (206) 217-0089
hellea@windwardenv.com

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
OREGON OPERATIONS OFFICE
811 S.W. 6th Avenue
Portland, Oregon 97204

August 29, 2006

Mr. Jim McKenna
Port of Portland & Co-Chairman, Lower Willamette Group
121 NW Everett
Portland, Oregon 07209

Mr. Robert Wyatt
Northwest Natural & Co-Chairman, Lower Willamette Group
220 Northwest Second Avenue
Portland, Oregon 97209

Re: Portland Harbor RI/FS
Round 3 Data Gaps – Lamprey and Sturgeon

Dear Mr. McKenna and Mr. Wyatt:

The purpose of this letter is to provide direction on the Round 3A sampling approach to address lamprey and sturgeon data needs for the Portland Harbor RI/FS and the screening level evaluation of these species for the ecological risk assessment. EPA provided an initial description of lamprey and sturgeon data needs in our December 2, 2005 letter regarding Round 3 Data Gaps, and additional details in the February 17, 2006 Scope of Work. This letter supplements EPA's Data Gaps letter and February 17th Scope of Work and provides general direction for the LWG to use in the preparation of field sampling plans, data collection, and evaluation of the data.

As stated in the LWG's letter dated June 2, 2006 letter to Erin Madden, Chip Humphrey and Eric Blischke, all parties acknowledge that there are data gaps with respect to our understanding of risks to lamprey and sturgeon within the Harbor. The LWG's letter included a proposal to move forward with some specific studies under "Need to Develop Round 3 Lamprey and Sturgeon Work Plans" (pages 3 and 4). EPA generally agrees with the LWG's lamprey and sturgeon studies proposed in your June 2nd letter. We also have determined that sub-adult and adult lamprey and adult sturgeon studies are not necessary for the RI/FS at this time. However, as noted in the LWG's letter, the proposed lamprey and sturgeon studies are for Round 3A and there could be additional data needs that cannot be determined until the Round 3A lamprey and sturgeon study results are collected and evaluated.

It is our understanding that the LWG is already moving forward with preparation of the field sampling plans for this work. The LWG should prepare field sampling plans consistent with the tasks described below.

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Pacific Lamprey

- Collect ammocoetes from the Portland Harbor study areas, and perform chemical analysis on the whole body tissues. Collection of lamprey ammocoetes within Portland Harbor and agreed upon upstream and reference areas should be conducted using the deepwater electro-shocking technique that has been used in the Great Lakes, or other sampling methods as appropriate. Results of the measured tissue residues in ammocoetes should be compared to whole body tissue based toxicity reference values as a screening level evaluation of ecological risk.

- Collect live ammocoetes from a relatively uncontaminated area. If sufficient live ammocoetes can be collected, perform water column toxicity tests to evaluate the sensitivity of lamprey to contaminants to the sensitivity of other fish species. It is envisioned that a series of 96-hour LC_{50} test on a small set of chemicals will be performed. The number of chemicals that can be tested may ultimately depend on the number of ammocoetes that the resource agencies will allow to be captured from the field. The relative sensitivity of lamprey ammocoetes compared to other species for which toxicity data exists can be readily evaluated by generating a species sensitivity distribution (SSD) from available existing LC_{50} data for other species exposed to a given chemical. This approach will also generate confidence limits around the estimated LC_{50} value to permits hypothesis testing as to whether or not proposed TRVs are expected to be protective of lamprey ammocoetes.

White Sturgeon

- Collect sub-adult (i.e. non-breeding) whole body tissue samples from the lower Willamette River within the study area. Compare measured tissue residues in the sturgeon to whole body tissue based toxicity reference values as a screening level evaluation of ecological risk.

Objectives for the above studies are attached. In addition to the data collection and evaluation steps described above, the ecological risk screening will also include comparing measured contaminant concentrations in Willamette River surface water to water quality criteria for aquatic life or other water column toxicity reference values.

Please note that although EPA and LWG appear to be in general agreement on the studies described above, there are a number of details that still need to be worked out. It is critical that the LWG consult with EPA and its partners during preparation of these field sampling plans to ensure that the sampling plans can be reviewed and approved to allow the data collection to begin this fall. We look forward to working with the LWG to finalize the sampling plans and start this important field work.

If you have any questions, please call Chip Humphrey at (503) 326-2678 or Eric Blischke at (503) 326-4006. All legal inquiries should be directed to Lori Cora at (206) 553-1115.

Sincerely,

Chip Humphrey
Eric Blischke
Remedial Project Managers

cc: Greg Ulirsch, ATSDR
Rob Neely, NOAA
Ted Buerger, US Fish and Wildlife Service
Preston Sleeger, Department of Interior
Jim Anderson, DEQ
Kurt Burkholder, Oregon DOJ
Rick Keppler, Oregon Department of Fish and Wildlife
Amanda Guay, Oregon Public Health Branch
Jeff Baker, Confederated Tribes of Grand Ronde
Tom Downey, Confederated Tribes of Siletz
Audie Huber, Confederated Tribes of Umatilla
Brian Cunninghame, Confederated Tribes of Warm Springs
Erin Madden, Nez Perce Tribe
Paul Ward, Confederated Tribes of Yakama Nation
Valerie Lee, Environment International
Keith Pine, Integral Consulting

Helle B. Andersen

From: Helle B. Andersen
Sent: Wednesday, September 27, 2006 1:51 PM
To: 'Eric Blischke (blischke.eric@epa.gov)'
Cc: Lisa Saban
Subject: Lamprey toxicity testing

Contacts: Eric Blichkle

Eric,
I have tried to reach you today by phone but with no luck, so I'm now trying via e-mail. The lamprey toxicity testing FSP was approved by LWG today and we are planning to submit it to EPA on Friday. It would be great if we would know whether we can use Parametrix before then. Have you heard anything from the contract department? Also I would like to talk with you about the upstream lamprey tissue sampling locations, so when you have time could you please call me at (206) 577-1287. Thanks Helle

Helle B. Andersen
Windward Environmental LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119

Direct Line (206) 577-1287
Phone (206) 378-1364
Fax (206) 217-0089
hellea@windwardenv.com

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Helle B. Andersen

From: Blischke.Eric@epamail.epa.gov
Sent: Monday, October 02, 2006 4:49 PM
To: Helle B. Andersen
Cc: Lisa Saban
Subject: RE: Lamprey toxicity testing FSP

Ok - Thanks Helle. I do now notice that NAS representatives are listed on Table 2-1. I will let people know the timeframe for submittal of the QAPP.

Eric

"Helle B. Andersen" <helleb@windwardenv.com>
10/02/2006 04:39 PM

To: Eric Blischke/R10/USEPA/US@EPA
cc: Lisa Saban <lisas@windwardenv.com>
Subject: RE: Lamprey toxicity testing FSP

Eric,
NAS has been selected as the lab (as you can also see in the FSP) and they agreed to do the work last Friday. Now that a lab has been selected we are working on the QAPP and I'm hoping we can get it to you around
10/13 (Exec has to approve first - hopefully on 10/11). So if we are going in the field the week of 10/9 everything that will be done with the ammocoetes are described in the FSP (we will not begin testing until
2-3 weeks after collection and by then you should have the QAPP).
Helle

-----Original Message-----
From: Blischke.Eric@epamail.epa.gov
[mailto:Blischke.Eric@epamail.epa.gov]
Sent: Monday, October 02, 2006 4:33 PM
To: Helle B. Andersen
Subject: Re: Lamprey toxicity testing FSP

Helle, I have started reviewing the FSP and noticed that the QAPP is still in preparation. Although I understand the need to collect the ammocoetes before the water temperature starts dropping, I was curious when a QAPP would be submitted and whether a decision on a lab had been made.

Eric

"Helle B. Andersen" <helleb@windwardenv.com>
09/29/2006 04:46 PM

To
Chip Humphrey/R10/USEPA/US@EPA, Eric Blischke/R10/USEPA/US@EPA
cc
Lisa Saban <lisas@windwardenv.com>, Valerie Oster <voster@anchorenv.com>
Subject
Lamprey toxicity testing FSP

Chip and Eric,
On behalf of LWG, Windward is please to submit the lamprey toxicity testing FSP. As you know we would like to be in the field early to mid October so LWG is requesting a faster approval process than usual.
Windward has received the scientific taking permit so as soon as the plan has been approved by EPA we will be able to go in the field.
Thanks Helle

Helle B. Andersen
Windward Environmental LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119

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If you have received this electronic transmission in error, please notify us by electronic mail at hellea@windwardenv.com.
[attachment "R3 Lamprey tox testing FSP to EPA_9_29_06.pdf" deleted by Eric Blischke/R10/USEPA/US]

Helle B. Andersen

From: Blischke.Eric@epamail.epa.gov
Sent: Wednesday, October 04, 2006 4:08 PM
To: Angelita M. Rodriquez
Cc: ashtod@portptld.com; Helle B. Andersen; Jim.McKenna@portofportland.com; Joanna Florer; John Toll; Lisa Saban; Mike Johns; RICKA@BES.CI.PORTLAND.OR.US; Wyatt, Robert; Thai Do; Humphrey.Chip@epamail.epa.gov
Subject: RE: Siletz biologist - re: Lamprey Sampling

I just spoke to Angelita about the possibility of sampling in the study area on Thursday. My preference is to demobilize the field crew today once enough upstream ammocoetes have been collected to do one sample and one replicate upstream (it is my understanding that we may have already reached that threshold). We will then return to the field on Monday to target the study area. The study area sampling will continue Monday and Tuesday at a minium with a possibility of being out Wednesday depending on the mass of ammocoetes obtained. This will allow Stan the best opportunity to have input on where lamprey ammocoetes may be present in areas not previously targeted for sampling. I believe this is consistent with what was agreed between Chip and Jim below.

Eric

"Angelita M. Rodriquez" <angelitar@windwardenv.com>

10/04/2006 02:39 PM

To
Lisa Saban <lisas@windwardenv.com>, "Helle B. Andersen" <helleb@windwardenv.com>, Joanna Florer <jmf@windwardenv.com>, Thai Do <thaid@windwardenv.com>, Jim.McKenna@portofportland.com, Joanna Florer <jmf@windwardenv.com>

cc
John Toll <johnt@windwardenv.com>, Mike Johns <mikej@windwardenv.com>, RICKA@BES.CI.PORTLAND.OR.US, "Wyatt, Robert" <rjw@nwnatural.com>, ashtod@portptld.com, Eric Blischke/R10/USEPA/US@EPA

Subject
RE: Siletz biologist - re: Lamprey Sampling

In response to Jim's email below, I would to clarify a few things:
A-Currently, the fieldcrew has been highly successfully at the Johnson Creek location.They have collected a total of 24 ammocoetes and will work on collecting the replicate the remainder of today. They are also confident they will complete the upstream locations today.

B-Therefore, they will mobilize the boats and equipment to return to the Study Area on Thursday, Oct. 5th to begin sampling areas, where our catch rate was successful. If they are continuing to have good luck at these locations,(meaning they obtain the 10 g of tissue) the field crew will get off the water and return on Monday, Oct. 9th. That way the fieldcrew can be efficient and able to sample with Stan in the Study Area and any lamprey collected will be additional tissue mass.

If you have any questions, please feel free to contact me at 206.812.5428.
Angelita

This communication is made under the framework of the LWG Participation Agreement and in the parties' common interests in meeting LWG member obligations under the Administrative Order on Consent and in anticipation of litigation concerning liability for the Portland Harbor Superfund site. This communication is intended and believed by the parties to be part of an ongoing and joint effort to develop and maintain a common legal strategy and contains strategies, work product and legal advice within the "common interest" extension of the attorney-client privilege and the work product doctrine. This communication may include attorney-client communications. With respect to communications by private LWG members to public members, those communications are with the expectation that they will be kept confidential by the public entities. The information is intended to be for the use of the individual or entity named above. If you are not the intended recipient, please be aware that any disclosure, copying, distribution or use of the contents of this information is prohibited.
If you have received this electronic transmission in error, please notify us by electronic mail at angelitar@windwardenv.com

-----Original Message-----
From: Lisa Saban
Sent: Wednesday, October 04, 2006 2:07 PM
To: Helle B. Andersen; Angelita M. Rodriquez; Joanna Florer; Thai Do
Cc: John Toll; Mike Johns
Subject: FW: Siletz biologist - re: Lamprey Sampling

angie - pls respond w/field crew's plan.

-----Original Message-----
From: McKenna, James (Jim) [mailto:Jim.McKenna@portofportland.com]
Sent: Wednesday, October 04, 2006 1:18 PM
To: Humphrey.Chip@epamail.epa.gov
Cc: Ashton, David; Blischke.Eric@epamail.epa.gov; Lisa Saban; ricka@bes.ci.portland.or.us; rjw@nwnatural.com; voster@anchorenv.com
Subject: RE: Siletz biologist - re: Lamprey Sampling

Thanks Chip. Valerie and Lisa: please make sure the sampling team is informed about this decision. Jim.

-----Original Message-----
From: Humphrey.Chip@epamail.epa.gov

[mailto:Humphrey.Chip@epamail.epa.gov]
Sent: Wednesday, October 04, 2006 1:00 PM
To: McKenna, James (Jim)
Cc: Ashton, David; Blischke.Eric@epamail.epa.gov; lisas@windwardenv.com; ricka@bes.ci.portland.or.us; rjw@nwnatural.com; voster@anchorenv.com
Subject: Re: Siletz biologist - re: Lamprey Sampling

Jim,

Thanks for your response. The approach you outlined below is acceptable, with the understanding that EPA expects that the additional downstream sampling effort should be for a minimum of two days unless otherwise agreed by EPA.

We appreciate the LWG's flexibility in completing this important field sampling.

Chip Humphrey

"McKenna, James (Jim)" <Jim.McKenna@portofportland.com>		To
10/04/2006 12:32 PM	Chip Humphrey/R10/USEPA/US@EPA, Eric Blischke/R10/USEPA/US@EPA, rjw@nwnatural.com, ricka@bes.ci.portland.or.us, voster@anchorenv.com	
		cc
	lisas@windwardenv.com, "Ashton, David" <David.Ashton@portofportland.com>	
		Subject
	Re: Siletz biologist - re: Lamprey Sampling	

Chip and Eric:

Thanks for discussing with us the options for completing the lamprey ammocoete sampling effort. I have conferred with the LWG Exec and our field crew. Based on these conversations the LWG proposes the
following:

A) we will continue the upstream sampling per the approved FSP. Our team is currently sampling near Johnson Creek in an attempt to collect enough mass for an upstream replicate

sample. They will wrap-up the upstream sampling sometime this week (depending on the rate of ammoceote collection.

B) the field crew will return to the study area (river miles 2 to 11) next Monday to attempt to gather additional tissue mass. As you are aware, the numerous attempts in the study area have yielded only about
32 grams of tissue. The field team will return to the study area for three additional days of sampling, or collect 10 grams of tissue, whichever comes first. We are holding-off remobilization to the stdy area until Monday in order to accommodate Alan Van De Wetering (Siletz biologist).
Our team will confer with Alan to identify sampling locations within the study area.

C) in regards to the limited lamprey tissue that was collected at river mile 11.7 we agree to hold-off the decision to include this mass with any composite sample until the field work is completed.

Please let me know ASAP if this approach is aceeptable so we can instruct our sampling team accordingly. Thanks, Jim.

-----Original Message-----
From: Humphrey.Chip@epamail.epa.gov <Humphrey.Chip@epamail.epa.gov>
To: McKenna, James (Jim)
Sent: Wed Oct 04 11:56:34 2006
Subject: Siletz biologist - re: Lamprey Sampling

Jim -

The Siletz biologist who would be observing the downstream sampling is Stan Van De Wetering.

thanks
chip

Helle B. Andersen

From: Blischke.Eric@epamail.epa.gov
Sent: Wednesday, October 11, 2006 8:33 AM
To: Jim.McKenna@portofportland.com; rjw@nwnatural.com; ricka@bes.ci.portland.or.us
Cc: Humphrey.Chip@epamail.epa.gov; kpine@integral-corp.com; Lisa Saban; Helle B. Andersen
Subject: Lamprey Toxicity FSP
Attachments: LampreyToxCollectionFSPCondAppl101106.doc

EPA is providing conditional approval of the Lamprey Toxicity FSP. This approval is limited to the procedures for collecting, transporting and holding the ammocoetes only. Comments on the Phase 1 toxicity testing will be submitted once the QAPP is received. EPA understands that the QAPP will be submitted to EPA by Friday, October 13, 2006.

If you have any questions, please contact Chip or myself.

Thanks, Eric

(See attached file: LampreyToxCollectionFSPCondAppl101106.doc)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
OREGON OPERATIONS OFFICE
811 S.W. 6th Avenue
Portland, Oregon 97204

October 11, 2006

Mr. Jim McKenna
Port of Portland & Co-Chairman, Lower Willamette Group
121 NW Everett
Portland, Oregon 97209

Mr. Robert Wyatt
Northwest Natural & Co-Chairman, Lower Willamette Group
220 Northwest Second Avenue
Portland, Oregon 97209

Re: Portland Harbor Superfund Site; Administrative Order on Consent for Remedial Investigation and Feasibility Study; Docket No. CERCLA-10-2001-0240. Round 3 Lamprey Ammocoete Toxicity Testing Field Sampling Plan

Dear Messrs. Wyatt and McKenna:

EPA has reviewed the Round 3 Lamprey Ammocoete Toxicity Testing Field Sampling Plan (Lamprey Toxicity FSP). This document was prepared on behalf of the Lower Willamette Group (LWG) by Windward Environmental and was received by EPA on September 29, 2006. EPA understands the collection of lamprey ammocoetes to be used for the toxicity testing needs to commence as soon as possible because the onset of significant precipitation events and declining surface water temperatures may make it difficult or impossible to collect the necessary tissue to perform the range finding tests described in the Lamprey Toxicity FSP. EPA comments are limited to comments related to the collection and holding of the lamprey ammocoetes. Comments on the range finding test are being withheld until the Quality Assurance Project Plan (QAPP) for the range finding testing has been received. This is to allow the lamprey ammocoete collection to begin as soon as possible.

EPA comments on the collection and holding of lamprey ammocoetes are provided below. Please confirm that the collection and holding will incorporate the changes outlined below.

General Comment

Section 1.1.1 of the Lamprey FSP describes a series of objectives for the Phase 1 lamprey ammocoete collection and testing effort. EPA does not believe that rigorous “methods” for the collection, transport and holding of the lamprey ammocoetes will be developed. Rather, one goal of the Phase 1 work will be to collect, transport and hold the ammocoetes for the Phase 1 range finding toxicity testing and to apply lessons learned regarding the collection, transportation and holding of lamprey ammocoetes for the Phase 2 toxicity testing.

Collection of Lamprey Ammocoetes

1. General: EPA assumes that the Siletz River and/or other watersheds targeted for either Phase 1 or Phase 2 lamprey ammocoete collection efforts as toxicologically clean reference/background samples. During the collection of lamprey ammocoetes for the toxicity testing, additional lamprey ammocoetes should be collected for chemical analysis. Lamprey ammocoetes collected as reference samples should be analyzed according to the protocols in the EPA approved Field Sampling Plan: Round 3 Sampling for Lamprey (*Lamperta* SP.) Ammocoete Tissue.
2. General: A representative sub-sample of the collected individuals should be archived for future reference and more detailed taxonomic identification if necessary.
3. Section 2.3.1, Page 9, Field Logs: Site conditions should be noted in the field logbook, including habitat, substrate type, water quality and density of ammocoetes within a specified collection area.
4. Section 2.5, Page 9, Schedule: It is unclear whether a target field water temperature of 10ºC is critical to the success of the study. It is likely that stream flow may be a more critical factor governing the success of the lamprey ammocoete collection event. In either event, alternate locations should be identified to maximize the likelihood of a successful lamprey ammocoete collection event. Should productivity of the collection effort decline in response to lower temperatures and/or precipitation events, consultation with EPA is required to determine when to cease collection efforts.
5. Section 3.1, Page 10, Field Sampling, First Paragraph: The rationale for targeting "up to 800 ammocoetes" for collection is not provided. Further discussion is required to confirm the number of ammocoetes required for the Phase 1 work. This will be important to determine when to cease the Phase 1 ammocoete collection effort.
6. Section 3.1, Page 10, Field Sampling, Third Paragraph: It is unclear what is meant by the term "representative individuals." In addition, the rationale for focusing on the "smallest" ammocoetes is unclear. For example, are smaller ammocoetes likely to be more sensitive to exposure to contaminants than are larger ammocoetes? Once collection efforts have begun, discussion with EPA is required to determine the size range to be transported to the laboratory for the Phase 1 work. EPA agrees that the ammocoetes submitted for Phase 1 testing should be of comparable size.

Holding of Lamprey Ammocoetes:

1. General: A key aspect of the toxicity testing program is the successful holding of the lamprey ammocoetes. Scientists from USGS, USFW, ODFW, the Siletz and others familiar with the holding of lamprey ammocoetes should be consulted to identify key factors and techniques associated with successful holding of lamprey ammocoetes.
2. Section 4.1, Page 12, Laboratory Holding: The health of the lamprey ammocoetes should be monitored closely during holding. EPA recommends maintaining careful records of the water conditions that the ammocoetes are being held in. Metrics for determining the health of the ammocoetes should be maintained. These may include regular weighing; monitoring of behavior such as swimming, burrowing, avoidance, or other responses; measuring respiration rate and mortality. EPA expects that modifications to the holding procedures may be required. For example, varying temperature or feeding in a consistent manner among different holding chambers, and varying the size of the holding chambers/density of fish. It is critical that any changes to the holding protocol be documented and summarized to ensure that Phase 2 is successful.

3. Section 4.1, Page 12, Laboratory Holding: The Lamprey Toxicity FSP states that water hardness will be soft (<50 mg/l as Ca CO3). It is unclear how the water hardness was selected. For example, is the goal to match the hardness of the water from which the organisms were collected or to match the conditions of the Portland Harbor Study Area? Mean water hardness in the ISA is 30 mg/L (range approximately 25-35 mg/L for most samples). EPA recommends matching the hardness of the water from the collection area. Hardness may need to be varied to ensure successful holding of the ammocoetes. Other parameters (e.g., DO, pH) that may affect survival of the lamprey ammocoetes should be monitored and adjusted as necessary.
4. Section 4.1, Page 12, Laboratory Holding: The type and source of the laboratory exposure water should be specified. From the sediment toxicity studies conducted for the Portland Harbor RI/FS at NAS, EPA assumes that the water source will be dechlorinated City of Newport water; this assumption should be confirmed. In addition, EPA recommends transitioning the lamprey from Siletz River water to the laboratory water gradually in case there might be issues with acclimation to the different waters. Given that so little is known about animal husbandry with this species, such a gradual transition to the test waters may help maintain organism vigor.
5. Section 4.1, Page 12, Laboratory Holding: The Lamprey Toxicity FSP states "The water temperature in the holding aquaria will be 12˚ ± 2˚ C (Not to exceed 15˚ C)." The basis for selecting 12˚ C is unclear. Meeuwig et al. (2005) shows that among four temperature treatments (12˚, 14˚, 18˚, and 22˚ C), lamprey at 18˚ C had the highest survival rate; although the only statistical difference was that lamprey at 22˚ C had a lower survival rate than lamprey maintained at the three other temperatures. Similarly, the temperature at which lamprey suffered the lowest rate of developmental abnormalities was 14˚ C, although the only statistical difference was that lamprey at 22˚ C had a lower rate of developmental abnormalities than lamprey maintained at the three other temperatures. Based on these data, the optimal temperature for maintaining ammocoetes in the lab would be between 14˚ and 18˚ C, not 12˚ C. This issue also is important because, in "cold-blooded" fish (and other organisms), toxicity of contaminants typically increases as temperature increases because of the effect of temperature on metabolic rate. Thus, lamprey ammocoetes may be more sensitive to contaminants at 16˚- 18˚ C, than at 12˚ C.
6. Section 3.2, Page 11, Field Holding and Transportation, First Paragraph: It is unclear how was the substrate (sterile sand) in which the ammocoetes are transported was selected. Maintaining the natural conditions may be preferred during transport (assuming no unknown contamination in the source material).

EPA appreciates LWG's efforts to develop the Lamprey Toxicity FSP. Please acknowledge your acceptance of the above comments no later than close of business, October 13, 2006. Please contact Chip Humphrey at (503) 326-2678 or Eric Blischke (503) 326-4006 if you have any questions. All legal inquiries should be directed to Lori Cora at (206) 553-1115.

Sincerely,

Chip Humphrey
Eric Blischke
Remedial Project Managers

cc: Greg Ulirsch, ATSDR
Rob Neely, NOAA
Ted Buerger, US Fish and Wildlife Service
Preston Sleeger, Department of Interior
Jim Anderson, DEQ
Kurt Burkholder, Oregon DOJ
Rick Keppler, Oregon Department of Fish and Wildlife
Kathryn Toepel, Oregon Public Health Branch
Jeff Baker, Confederated Tribes of Grand Ronde
Tom Downey, Confederated Tribes of Siletz
Audie Huber, Confederated Tribes of Umatilla
Brian Cunninghame, Confederated Tribes of Warm Springs
Erin Madden, Nez Perce Tribe
Rose Longoria, Confederated Tribes of Yakama Nation
Valerie Lee, Environment International
Keith Pine, Integral Consulting

Helle B. Andersen

From: Helle B. Andersen
Sent: Tuesday, October 24, 2006 2:44 PM
To: 'Eric Blischke (blischke.eric@epa.gov)'
Cc: Lisa Saban; Thai Do; Angelita M. Rodriquez; Valerie Oster
Subject: lamprey collection

Eric,
The collection of lamprey ammocoetes for the toxicity testing is going very well and we are expecting to complete the effort today. Yesterday the count was around 450 individuals. The field crew is expecting to collect the remaining ammocoetes today based on a request from the lab of about 500 individuals and some additional ammocoetes to be archived for potential taxonomic identification. The field crew is outside of cell phone range so communication has been difficult, but we will let you know the final tally as soon as we have talked with the field crew.
Helle

Helle B. Andersen
Windward Environmental LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119

Direct Line (206) 577-1287
Phone (206) 378-1364
Fax (206) 217-0089
hellea@windwardenv.com

This communication is made under the framework of the LWG Participation Agreement and in the parties' common interests in meeting LWG member obligations under the Administrative Order on Consent and in anticipation of litigation concerning liability for the Portland Harbor Superfund site. This communication is intended and believed by the parties to be part of an ongoing and joint effort to develop and maintain a common legal strategy and contains strategies, work product and legal advice within the "common interest" extension of the attorney-client privilege and the work product doctrine. This communication may include attorney-client communications. With respect to communications by private LWG members to public members, those communications are with the expectation that they will be kept confidential by the public entities. The information is intended to be for the use of the individual or entity named above. If you are not the intended recipient, please be aware that any disclosure, copying, distribution or use of the contents of this information is prohibited. If you have received this electronic transmission in error, please notify us by electronic mail at hellea@windwardenv.com.

Helle B. Andersen

From: Chris Thompson [chris.thompson@EILTD.net]
Sent: Friday, October 27, 2006 12:01 PM
To: Goulet.Joe@epamail.epa.gov; Helle B. Andersen
Cc: Valerie Lee; HOVMerlin@aol.com; Humphrey.Chip@epamail.epa.gov; Blischke.Eric@epamail.epa.gov; Jeff Baker; Stephen.Kelly@grandronde.org; Brian Cunninghame; Erin Madden; wbarquin@hk-law.com; stanv@ctsi.nsn.us; Tom Downey; Audie Huber; Patti Howard
Subject: temperature preferences of lamprey ammocoetes
Attachments: lamprey ammocoete temperature preferences.doc

Hi Joe and Helle,

Thanks for discussing the issue of the appropriate temperature for maintaining and testing ammocoetes in the lab during our conference call a few minutes ago. Please find attached a summary of the tribes' comments on this issue for your consideration. If you have any questions or concerns, please don't hesitate to contact me.

Thanks again.

Best regards,

Chris

The lamprey toxicity testing FSP, dated 29 September 2006, states that "The water temperature in the holding aquaria will be 12˚ ± 2˚ C (Not to exceed 15˚ C)," and that toxicity testing will also occur at 12˚ ± 1˚ C; however, no explanation or justification is provided to support this choice of temperatures. The Tribes further understand from the TCT meeting on 25 October that the LWG still intends to conduct the Phase 1 and Phase 2 toxicity tests at 12˚ C in spite of the comments in EPA's 11 October 2006 letter to the LWG regarding the Draft FSP in which EPA stated that a warmer temperature (16-18˚C) may be more appropriate. Further discussions with Windward (Helle Andersen) indicate that Windward chose 12˚C because this is the temperature at which toxicity tests are conducted on rainbow trout. As a result, Windward believes that conducting toxicity tests on lamprey at the same temperature will make comparison of the results of these tests to those from rainbow trout tests more valid than if tests on the two species were conducted at different temperatures. The tribes believe that this logic conflicts with ecological and physiological principles. The temperature tolerances and preferences of different fish species vary widely. Thus, it only makes sense to conduct toxicity tests on each receptor species at the temperature that is most preferred by that species. While this temperature may be 12˚C for rainbow trout, it will differ for many other species. This appears to be the case for Pacific lamprey ammocoetes.

As discussed below, all available data suggest that a significantly warmer temperature (16˚C to 18˚C) is better for maintaining (and testing) lamprey ammocoetes in the lab.

Larvae of all lamprey species are similar morphologically and physiologically (Hardisty and Potter 1971). To my knowledge, the only empirical data regarding thermal preferences/tolerances and effects of temperature on physiological and morphological parameters of Pacific lamprey are those presented by Meeuwig et al. (2005 and earlier reports) who showed that among four temperature treatments (12˚, 14˚, 18˚, and 22˚ C), lamprey at 18˚ C had the highest survival rate, although the only statistical difference was that lamprey at 22˚ C had a lower survival rate than lamprey maintained at the three other temperatures. Similarly, the temperature at which lamprey suffered the lowest rate of developmental abnormalities was 14˚ C, although the only statistical difference was that lamprey at 22˚ C had a lower rate of developmental abnormalities than lamprey maintained at the three other temperatures. Thus, these data suggest that the optimal temperature for maintaining Pacific lamprey ammocoetes in the lab would be between 14˚ and 18˚ C, not 12˚ C.

Similarly, sea lamprey ammocoetes occur and are most abundant in tributaries of the Great Lakes in locations where the water temperature is 15˚C to 20˚C, but not at warmer or cooler temperatures (Manion and McLain 1971), and in the Ocqueoc River, Michigan, in locations where the water temperature is 18.6˚C to 24.2˚C (Applegate 1950). In the lab, the preferred temperature for sea lamprey ammocoetes is 20.8˚ C in summer (Holmes and Lin 1994) and between 13.6˚ C to 16.8˚ C in winter (Reynolds and Casterlin 1978, Holmes and Lin 1994, respectively). Also, sea lamprey eggs develop most successfully between 15˚C and 19˚C, and develop very slowly if at all below 15˚C (Piavis 1961, Manion and Hanson 1980, Rodríguez-Muñoz et al. 2001). In general, ammocoetes of

various species are reared and maintained in the lab at temperatures well above 12˚C, i.e. typically at temperatures between 15˚C and 20˚C (e.g. Holmes and Lin 1994).

All of the data from various studies presented above indicate that 12˚C is well below the preferred and optimal temperature for maintaining lamprey ammocoetes in the lab, and further indicate that a more appropriate temperature would be between 15˚C and 20˚C.

When conducting a temporally brief test such as a 96-hour acute toxicity test, it is important to consider the effect of temperature on the metabolic rate of lamprey ammocoetes. Because lamprey are "cold-blooded" fish, toxicity of contaminants typically increases as temperature increases because metabolic rate, and thus accumulation and physiological processing of contaminants, increases with increasing temperature. Thus, lamprey ammocoetes will likely be more sensitive to contaminants at 15˚- 20˚ C, than at 12˚ C, especially in the short time frame of 96 hours. Thus, for this reason as well, the acute toxicity tests should be conducted at a temperature not less than 15˚C, and preferably at 17-18˚C.

Literature Cited

Applegate, V.C. 1950. Natural history of the sea lamprey (*Petromyzon marinus*) in Michigan. U.S. Fish and Wildlife Service Special Scientific Report to the Fisheries Service. 55:237 pp.

Hardisty, M.W., and I.C. Potter. 1971. The behaviour, ecology, and growth of larval lampreys. Pages 85-126 *in* M. W. Hardisty and I. C. Potter, editors. The biology of lampreys, volume 1. Academic Press, New York, New York.

Holmes, J.A., and P. Lin. 1994. Thermal niche of larval sea lamprey, *Petromyzon marinus*. Canadian Journal of Fisheries and Aquatic Sciences 51:253-262.

Manion, P.J., and L.H. Hanson. 1980. Spawning behavior and fecundity of lampreys from the upper three Great Lakes. Canadian Journal of Fisheries and Aquatic Sciences 37:1635-1640.

Manion, P.J., and A.L. McLain. 1971. Biology of larval sea lamprey (*Petromyzon marinus*) of the 1960 year class, isolated in the Big Garlic River, Michigan, 1960-1965. Great Lakes Fishery Commission Technical Report number 16. 35 pp.

Meeuwig, M.H., J.M. Bayer, and J.G. Seelye. 2005. Effects of temperature on survival and development of early life stage Pacific and western brook lamprey. Transactions of the American Fisheries Society 134:19-27.

Piavis, G.W. 1961. Embryological stages in the sea lamprey and effects of temperature on development. Fishery Bulletin 61:111-143.

Reynolds, W.W., and M.E. Casterlin. 1978. Behavioral thermoregulation by ammocoete larvae of the sea lamprey (*Petromyzon marinus*) in an electronic shuttlebox. Hydrobiologia 61:145-147.

Rodríguez-Muñoz, R., A.G. Nicieza, and F. Braña. 2001. Effects of temperature on developmental performance, survival and growth of sea lamprey embryos. Journal of Fish Biology 58:475-486.

Helle B. Andersen

Attachments: LampreyToxictyFSPQAPPCondAppl103106.doc

From: Blischke.Eric@epamail.epa.gov [mailto:Blischke.Eric@epamail.epa.gov]
Sent: Tuesday, October 31, 2006 4:25 PM
To: rjw@nwnatural.com; Jim.McKenna@portofportland.com; ricka@bes.ci.portland.or.us
Cc: Humphrey.Chip@epamail.epa.gov; kpine@integral-corp.com; Helle B. Andersen
Subject: Lamprey Toxicity Testing

Attached are EPA's comments on the Lamprey toxicity elements of the FSP and the Lamprey toxicity QAPP.

(See attached file: LampreyToxictyFSPQAPPCondAppl103106.doc)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
OREGON OPERATIONS OFFICE
811 S.W. 6th Avenue
Portland, Oregon 97204

October 31, 2006

Mr. Jim McKenna
Port of Portland & Co-Chairman, Lower Willamette Group
121 NW Everett
Portland, Oregon 97209

Mr. Robert Wyatt
Northwest Natural & Co-Chairman, Lower Willamette Group
220 Northwest Second Avenue
Portland, Oregon 97209

Re: Portland Harbor Superfund Site; Administrative Order on Consent for Remedial Investigation and Feasibility Study; Docket No. CERCLA-10-2001-0240. Round 3 Lamprey Ammocoete Toxicity Testing Field Sampling Plan

Dear Messrs. Wyatt and McKenna:

EPA has reviewed the Round 3 Lamprey Ammocoete Toxicity Testing Field Sampling Plan (Lamprey Toxicity FSP) and the Round 3 Lamprey Ammocoete (*Lampetra* sp.) Toxicity Testing Quality Assurance Project Plan (Lamprey Toxicity QAPP). These documents were prepared on behalf of the Lower Willamette Group (LWG) by Windward Environmental. EPA previously provided comments on the collection and holding components of the Lamprey Toxicity FSP on October 11, 2006. The comments provided below address the toxicity testing component of the Lamprey Toxicity FSP and the Lamprey Toxicity QAPP which was received on October 13, 2006.

As you are aware, the purpose of the toxicity testing is to determine whether existing fish toxicity reference values (TRVs) are sufficiently protective of lamprey survival and growth as determined by laboratory toxicity testing with representative chemicals and identify the relative sensitivity of Pacific lamprey to adverse contaminant effects when compared to the sensitivity of other freshwater species. However, because standard protocols for holding and testing lamprey ammocoetes are not available, EPA believes that open communication between EPA staff and government partners, LWG management and technical staff and the laboratory is required to increase the likelihood of a successful testing program. EPA hopes that the comments provided below are productive and will contribute to a successful outcome.

Lamprey Ammocoete Toxicity Testing Field Sampling Plan (September 29, 2006):

1. Page 6, Section 2.4.1: Daily records of mortality should be recorded, not just at the termination of the test. In addition, other noticeable changes in behavior and other

responses be observed and recorded daily and at the termination of the range finding tests. Examples of behavior that should be noted include narcosis, morbidity, erratic behaviors or changes in swimming ability.

2. Page 11, Section 3.2: EPA understands that the substrate for holding the ammocoetes was changed to site-collected sediment from the proposed sterile sand.
3. Page 13, Section 4.2: EPA provided guidance on the selection of chemicals for the toxicity testing. This rationale should be described to justify the selection of these particular six chemicals with respect to the primary study objectives and the specific chemical modes of action represented by each chemical. In addition, the chemical concentrations to be tested should be determined and identified in consultation with EPA and its government partners prior to initiation of the range finding testing. Due to the size of the chemical concentration range specified in Table 5-1, EPA recommends five chemical concentration ranges be utilized.
4. Page 13, Section 4.2: For most of the proposed chemicals, static-renewal test methods are indeed the most appropriate and cost-effective approach for exposing ammocoetes. However, because naphthalene is quite volatile, the testing laboratory will have to take extra care to either minimize losses from the test solutions, or modify the exposure system itself. In our experience testing with this chemical, for example, we would actually be more likely to use flow-through methods, even when conducting range finding tests. Losses owing to volatilization can still be significant using flow-through methods, but at least it is constant and quantifiable. These conditions are both more difficult to achieve with static-renewal methods. Therefore, the testing laboratory needs to address this concern, and potentially adjust their methods to ensure that the results obtained from the rangefinder are accurate enough to inform the definitive tests.
5. Page 13, Section 4.2: It is unclear why the lamprey will be fed during testing (the text states 2 hours prior to renewal at 48 hours). EPA recommends not feeding the organisms during the test. Not feeding is a standard protocol during 96 hour LC50 tests and feeding could skew the results and uptake of the chemical.
6. Page 13, Section 4.2: Organism mortality should be recorded daily (as opposed to just at 0 and 96-hr).
7. Page 14, Section 4.3: A second set of range finding tests with the flow through system should be performed as part of Phase 2 to confirm the results of Phase 1 and to account for differences between the static range finding testing proposed for Phase 1 and the flow through definitive testing proposed for Phase 2. Additional range finding tests should be conducted during Phase 2 (definitive toxicity testing phase) to ensure that results from Phase 1 testing are comparable to those from organisms collected from different source streams, time of year, etc and to take advantage of any “lessons learned” from the phase 1 work. Confirmatory testing is not necessary for all tests. Further discussion between the LWG and EPA will be required to determine the scope of the Phase 2 range finding testing.
8. Page 14, Section 4.3: If range finding tests in Phase 1 are unsuccessful or inconclusive for a given chemical, an alternate approach to side by side testing with rainbow trout should be considered. The primary goal of the toxicity testing is to compare sensitivity against *published* toxicity data for the most sensitive surrogate species, which may not necessarily be rainbow trout for all chemicals. In the event of an unsuccessful or inconclusive range finding test, the definitive test concentrations could be set to “bracket” the most sensitive known LC50 from the literature. If it is determined that lamprey ammocoetes are equally or more sensitive than the surrogate, a definitive LC50 (or “less than” value) would be obtained, and satisfy the goals of the study. However, if lamprey

ammocoetes are determined to be less sensitive (i.e., few or no organisms die in any test concentration), it will be possible to concluded that the lamprey are less sensitive than the most sensitive surrogate, again achieving the goals of the study. It is still preferable to get a definitive LC50 for all test chemicals based on a valid rangefinder, but this alternative may help achieve the same goal, without the additional expense of side by side testing with rainbow trout.

9. Page 14, Section 4.5: The text should state specifically what water samples would be collected and submitted for laboratory confirmation testing, e.g., before and after exposure, from every test chamber, etc. The volume of water required for the analyses is quite large (page 17, Table 5.1) and individual tests may not provide that much water. EPA recommends that parameters such as temperature, DO, pH and conductivity be recorded daily.
10. Page 17, Section 5.0: Lamprey ammocoete tissue should be analyzed after following toxicity testing in addition to water. Both live and dead ammocoetes should be analyzed at the end of the definitive tests for contaminant body burdens (whole body) of the test chemical. This will provide useful information in its own right, but will also help answer whether or not the ammocoetes received a contaminant dose if few or no mortalities are observed.
11. Page 17, Section 5.1: Chemical analysis daily is required for the static testing to determine chemical loss over the test duration. Chemical analysis of the water should include both total and dissolved copper analysis.
12. Page 18, Section 5.2: The text should demonstrate that the detection and reporting limits are adequate to meet the project goals. In particular, EPA is concerned whether the detection and reporting limits for lindane and pentachlorophenol are sufficient. The ACG for lindane (11 ppb) is higher than the lowest LC50 reported in Table 4-1 of 1 ppb. While the MRL and MDL are low enough to detect test concentrations at or below 1 ppb, why is the ACG higher than 1 ppb? Also the ACG for pentachlorophenol (54 ppb) is substantially higher than the lowest LC50 reported in Table 4-1 (5 ppb). In the latter case, the MRL of 25 ppb would not be low enough if the lamprey LC50 was similar to this lowest reported LC50.
13. Page 20, section 6.0: A table of test conditions and test acceptability criteria should be developed to more formally document test procedures and conditions. Will be especially useful if someone wants to repeat the studies or test ammocoetes with additional chemicals in the future. The table should include the following types of information:

    - Test type (static, static renewal or flow through)
    - Test duration (96 hrs in this case for acute tests)
    - Water temperature
    - Light quality
    - Light intensity
    - Photoperiod (usually 16 hrs light, 8 hrs dark)
    - Test chamber size
    - Test chamber volume
    - Frequency of test solution renewal
    - Age of test organisms
    - Number of organisms per test chamber
    - Number of replicate exposure chambers per test concentration
    - Number of organisms per exposure concentration
    - Feeding regime (probably not needed for a 96 hr fish acute test)

- Test chamber cleaning
- Test chamber aeration
- Dilution water source
- Test concentrations
- Dilution series
- Test endpoint (mortality in this case)
- Test acceptability criterion (90 % survival in controls recommended)

Lamprey Toxicity Quality Assurance Project Plan Comments (October 13, 2006):

1. Page ii, Distribution List: The distribution list should be expanded to include EPA's. This has been done for other QAPPs (e.g., Round 2 QAPP).
2. Page 5, Section 1.2: The QAPP should specify the study objectives identified by EPA for the laboratory toxicity studies. They were 1.) Determine whether existing fish toxicity reference values (TRVs) are sufficiently protective of lamprey survival and growth as determined by laboratory toxicity testing with representative chemicals, and 2.) Identify the relative sensitivity of Pacific Lamprey to adverse contaminant effects when compared to the sensitivity of other freshwater species. These objectives should be incorporated into the QAPP. In addition, the objective of the range finding tests should be explicitly defined. Range finding tests should have only one objective, which is to help define the dose spacing that will be used in the definitive toxicity tests. Any statistically derived results (i.e. LC50s) that can be derived from the range finding tests will not have sufficient power to be useable in meeting overall study objectives and toxicity test acceptability criteria. EPA will not utilize any of the results from the range finding tests in any of its decision making processes on the Portland Harbor site. Goals and objectives (although perhaps elaborated on in the work plan) need to be clearly identified here, including stating the specific problem and what we need to know. For example, add to end of second sentence "…to assess potential risk to lamprey ammocoetes from Portland Harbor contamination" and add to second to last sentence "… with lamprey ammocoetes to determine acute toxicity (range of LC50s) or test sensitivity to chemicals of potential concern relative to other fish species."
3. Page 5, Section 1.2: This section should make clear that an understanding of the relative sensitivity of the lamprey ammocoetes is required to assess risks to lamprey ammocoetes.
4. Page 3, Section 1.2.4: While it is acceptable for the laboratory manager (Linda Nemeth) to also be the laboratory QA/QC officer, to prevent conflicts of interest during conduct of the study, it is not generally considered acceptable for the QA/QC officer to have direct oversight of the study, as indicated in the Responsibility column of Table 2-1. Instead, all direct laboratory testing oversight should reside with the NAS project manager, Gary Buhler.
5. Page 5, Section 1.3: The project schedule should be described (timeframe for analytical work for the Phases). The source of lamprey ammocoetes (e.g., collected from Siletz River) should also be described. It may also be worth citing the FSP (and perhaps a field QAPP) here for more detailed information.
6. Page 5, Section 1.4: At the completion of the Phase 2 "definitive" toxicity test for each of the six contaminants of interest (COI), ammocoete tissue should be composited from the test replicates and measured for the analyte that was tested. This will achieve two goals: (1) it will assure that the COI was, in fact, absorbed by the ammocoetes, and (2) the tissue concentration data can be used to establish a dose-response curve which will be useful for assessing the LD_{50} of the COI.

7. Page 6, Section 1.6.1: The laboratory records should include much more narrative as well as detailed monitoring data (original and summary) of the husbandry phase of the study. More information should also be provided about what constitutes "normal" behavior and "good condition" of lamprey ammocoetes (e.g., how they behaved in the field upon collection) to compare to the results provided in the narrative. The laboratory records should include much more narrative as well as detailed monitoring data (original and summary) of the husbandry phase of the study. More information should also be provided about what constitutes "normal" behavior and "good condition" of lamprey ammocoetes based on the literature. See FSP Comment #1 above.
8. Page 6, Section 1.6.1: A table should be provided that lists the specific water quality measurements (e.g., DO, pH, etc.) that will be performed during the testing.
9. Page 7, Section 1.6.3: Please clarify that audits will be done on-site in the laboratory during testing (first bullet).
10. Section 1.6.4, Data Report: The data report submitted to the government team should include the all raw data electronically (e.g. water quality measurements, replicate survival, etc.) and LC50 calculations from the laboratory. In addition, the data should also be submitted electronically in SEDQUAL format.
11. Page 9. Section 2.1. Experimental Design: Although static range-finding tests may provide some value and insight regarding toxicity of the COIs, they are not an acceptable replacement for flow-through range-finding tests. Thus, flow-through range-finding tests should be done for all COIs as part of the phase 2 definitive testing program. See FSP Comment #7 above.
12. Page 10, Table 2-1, and page 11, section 2.2.: Table 2-1 specifies a temperature of 12°C ± 1°C. EPA and LWG personnel have discussed the temperature issue and believe it is appropriate to explore the effect of higher temperatures (e.g., 15°C). At a minimum, some Phase 1 range finding tests should be performed at a higher temperature to help determine the optimal temperature for the Phase 2 definitive flow through toxicity testing. Further discussion is required to finalize the Phase 1 range finding test temperatures and approach.
13. Page 9, Section 2.1, Experimental Design:
    - Test Waters: Test waters should be measured for ammonia, particulate matter, total dissolved gas, and TOC according to ASTM, 1996.
    - Organism Loading: The protocol outlined here should follow the ASTM guidelines. For static tests, organisms per chamber should not exceed 0.8 g/organism per liter for temperatures 17 degrees C or less.
    - Feeding: For the static tests, the organisms should not be fed unless it is shown to stress the organisms within the test period (96 hours).
    - Fecal matter and uneaten food will decrease the dissolved oxygen concentration and the biological activity of some test materials. This is especially a problem in the static tests.
    - Control Test Run: A control test should be run in the test water and environment prior to conducting testing. During this control run, stress, mortality or other organism behavior that may influence the results of the test should be recorded. This testing can also be used to determine if feeding during the test is necessary.
    - Holding: A daily record of feeding, behavioral observations and any mortality should be recorded and provided to the government team.
14. Pages 10-11, Table 2-1: This table should be expanded to include a column for "Acceptance Criteria" (how much excursion from the proposed conditions are allowed for the test to be considered valid) and a column for "Method" (instruments used) –

basically, to summarize the parameters discussed in Appendix B. Similar tables should be included for the field collection (or cite the FSP) and for the husbandry portion. See FSP Comment # 13 above. Other comments regarding Table 2-1:

- Temperature (see QAPP Comment #12)
- Test chamber size: recommended minimum is 250 ml, but can the chamber size be estimated at this time based upon general knowledge of the range of ammocoete sizes?
- Solution volume: recommended minimum is 200 ml, but can the solution volume be estimated based upon general knowledge of the range of ammocoete sizes?
- Renewal of test solutions: no flow rate is mentioned for the definitive tests; no percent of volume replacement is stated.
- Organisms per test chamber: There is no mention of the size range of these organisms, which would influence the number per chamber; will they be measured upon collection and/or testing?
- Number of replicates: one number (e.g., "minimum of one") should be specified.
- Aeration and Dilution water: are these based on Siletz River conditions?
- Test concentration: one number (e.g., "minimum of 3") should be specified.
- Endpoint: partial mortality should be included for Phase II (based on Section 2.2); also note that non-lethal endpoints might require consideration.
- Test acceptability criterion: the acceptability criterion should be applied to the range-finding tests as well. Why is "control(s)" left ambiguous – i.e., how many will there be?
- Items that should also be detailed include: controls and all water quality parameters.

15. Page 11, Table 2-2, Summary of 96-hour range finding: This is an acute test, but other endpoints in addition to mortality should be noted in addition to mortality. This is especially important in a range finding test. Other endpoints should include altered swimming behavior, narcosis symptoms, and morbidity. This is also important since this organism has not been tested with these chemicals in the laboratory previously. In addition, the number of dead and affected organisms in each test chamber should be counted every 24 hours after the beginning of the test (ASTM 1996).
16. Page 11-12, Section 2.2: This section should include or reference testing methods, handling and custody, and analytical methods. Please cite the relevant appendices (SOPs, testing protocols) and addenda (water chemistry) for specific methods. Because no method currently exists for holding and testing lamprey ammocoetes, method performance criteria should be included here (temperature change is the only parameter listed here).
17. Page 12, Section 2.3: The "standard" QA/QC procedures applicable to these tests should be referenced. In Table 2-1 or elsewhere the proposed ranges for the listed water quality parameters should be stated.
18. Pages 15-16, Section 4: The discussion in this section highlights the lack of specific QA criteria against which to judge the collection, husbandry, and testing. Please provide more specific DQOs, as noted in Section 4.3, which can be used for this assessment.
19. Page 15, Section 4.2, Third bullet: This task should also include reviewing the data from at least the husbandry portion of the effort.

Lamprey Toxicity QAPP Comments – Appendix B (October 13, 2006):

1. Page 3, Section 7.2: The effects criterion is mortality, but other sub-lethal effects should at least be noted during testing, such as swimming, burrowing, avoidance, or other behavior responses; weight change, respiration rate, etc. (morbidity may also be discussed in the summary Table 2-1), particularly considering the experimental nature of this bioassay test (see FSP Comment # 1)
2. Page 4, Table: Number of water samples to be collected for confirmatory testing, volumes required, and sampling schedule during testing should be provided (or cite the upcoming document that will describe water chemistry analytical procedures and QA/QC needs, and tissue residue analyses, if done as well).
3. Page 4, Section 7.7, last paragraph: State that the stock solution being tested will be maintained under the exact same conditions as the testing solution.

EPA appreciates LWG's efforts to develop the Lamprey Toxicity FSP and QAPP. Please acknowledge your acceptance of the above comments no later than close of business, November 6, 2006. Please contact Chip Humphrey at (503) 326-2678 or Eric Blischke (503) 326-4006 if you have any questions. All legal inquiries should be directed to Lori Cora at (206) 553-1115.

Sincerely,

Chip Humphrey
Eric Blischke
Remedial Project Managers

cc: Greg Ulirsch, ATSDR
Rob Neely, NOAA
Ted Buerger, US Fish and Wildlife Service
Preston Sleeger, Department of Interior
Jim Anderson, DEQ
Kurt Burkholder, Oregon DOJ
Rick Keppler, Oregon Department of Fish and Wildlife
Kathryn Toepel, Oregon Public Health Branch
Jeff Baker, Confederated Tribes of Grand Ronde
Tom Downey, Confederated Tribes of Siletz
Audie Huber, Confederated Tribes of Umatilla
Brian Cunninghame, Confederated Tribes of Warm Springs
Erin Madden, Nez Perce Tribe
Rose Longoria, Confederated Tribes of Yakama Nation
Valerie Lee, Environment International
Keith Pine, Integral Consulting

Helle B. Andersen

From: Blischke.Eric@epamail.epa.gov
Sent: Friday, November 17, 2006 10:57 AM
To: chris.thompson@EILTD.net; Shephard.Burt@epamail.epa.gov; Jennifer L Peterson; jeremy_buck@fws.gov; Goulet.Joe@epamail.epa.gov; Helle B. Andersen; rgensemer@parametrix.com
Cc: Humphrey.Chip@epamail.epa.gov
Subject: Selection of Final Chemical for Rangefinding Testing

I would like to set up call to discuss and reach agreement on the final chemical for the rangefinding test. This email is being sent out to everyone who was done at the lab on Monday when this topic was first brought up. The call will take place at 2:00 pm today. The call-in number is 800 504-8071. The access code is 3758297. The issue is whether to run the test with naphthalene or select another chemical.

Naphthalene was selected based on narcosis as the mode of toxic action.
The advantage of using naphthalene is that it is well studied chemical and exerts a strong narcotic effect. The disadvantage of using naphthalene is its volatility. Even with 12 hour or 24 hour renewals, we may loose naphthalene. In addition, it is my understanding that the lamprey are sensitive to DO and do better in aerated testing chambers.

Other chemicals that may be used in place of naphthalene include acenaphthylene and 1,2,4 trichlorobenzene. The disadvantage of using these chemicals is that they may not be as well studied and may be a less potent narcotic. In addition, based on a review of Henry's law constants, 1,2,4 trichlorobenzene may be more volatile than naphthalene and thus not an acceptable substitute; naphthalene is 2 - 4 times more volatile than acenaphthylene.

I apologize for the late notice. However, the laboratory is geared up to do the testing on Monday. Thus, we need to make a decision today. A representative from the laboratory will participate.

Thanks, Eric

Helle B. Andersen

From: Blischke.Eric@epamail.epa.gov
Sent: Friday, November 17, 2006 3:24 PM
To: Helle B. Andersen
Cc: Goulet.Joe@epamail.epa.gov; Shephard.Burt@epamail.epa.gov; rgensemer@parametrix.com
Subject: Lamprey Toxicity Testing for Naphthalene

Helle, as discussed, we agreed to not perform the static renewal rangefinding test for naphthalene during the Phase 1 lamprey toxicity testing program. Instead, a flow-through rangefinding test for naphthalene will be performed as part of the Phase 2 lamprey toxicity testing program. In addition, loss characteristics of the flow through system will be tested as part of Phase 2 prior to flow-through rangefinding testing.

Let me know if you have any questions.

Thanks, Eric

Helle B. Andersen

From: Helle B. Andersen
Sent: Friday, April 06, 2007 2:38 PM
To: 'Humphrey.Chip@epamail.epa.gov'; 'Eric Blischke (blischke.eric@epa.gov)'
Cc: Lisa Saban; John Toll; 'Valerie Oster'; 'Lora Boehlke'
Subject: Lamprey toxicity data report and response to comments document
Attachments: LWG Ltr EPA Lamprey Toxicity Testing (04-05-07).pdf; Round 3 Lamprey Bioassay Report to EPA_4_6_07.pdf; LWG response to comments document_to EPA.pdf

Chip and Eric,
On behalf of LWG we are pleased to submit the Lamprey Toxicity Testing Data Report for Phase 1 and the FSP/QAPP response to comments document.
Helle

Helle B. Andersen
Windward Environmental LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119

Direct Line (206) 577-1287
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Fax (206) 217-0089
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This communication is made under the framework of the LWG Participation Agreement and in the parties' common interests in meeting LWG member obligations under the Administrative Order on Consent and in anticipation of litigation concerning liability for the Portland Harbor Superfund site. This communication is intended and believed by the parties to be part of an ongoing and joint effort to develop and maintain a common legal strategy and contains strategies, work product and legal advice within the "common interest" extension of the attorney-client privilege and the work product doctrine. This communication may include attorney-client communications. With respect to communications by private LWG members to public members, those communications are with the expectation that they will be kept confidential by the public entities. The information is intended to be for the use of the individual or entity named above. If you are not the intended recipient, please be aware that any disclosure, copying, distribution or use of the contents of this information is prohibited. If you have received this electronic transmission in error, please notify us by electronic mail at hellea@windwardenv.com.

LWG
LOWER WILLAMETTE GROUP

Co-Chairperson: Jim McKenna, Port of Portland
Co-Chairperson: Bob Wyatt, NW Natural
Treasurer: Fred Wolf, Arkema

April 5, 2007

Chip Humphrey
Project Manager
US Environmental Protection Agency
811 SW Sixth Ave., Third Floor
Portland, OR 97204

Eric Blischke
US Environmental Protection Agency
811 SW Sixth Ave., Third Floor
Portland, OR 97204

RE: Portland Harbor Superfund Site, Administrative Order on Consent for Remedial Investigation and Feasibility Study; Docket No. CERCLA-10-2001-0240. Portland Harbor RI/FS Quality Assurance Project Plan: Round 3 Toxicity Testing with Lamprey Ammoceotes (*Lampetra* sp.)

Dear Chip and Eric:

In the two letters that provide conditional approval of the field sampling plan (FSP) and quality assurance project plan (QAPP) dated October 11 and October 31, 2006, respectively, EPA and its partners provided several recommendations on how the Phase 1 and Phase 2 toxicity testing should be conducted. In response to these recommendations and based on the results of the Phase 1 toxicity testing, LWG is submitting a response to comments document. In addition, LWG is submitting the data report for the Phase 1 toxicity testing with lamprey ammocoetes.

LWG is looking forward to continued communications with EPA and its partners about the lamprey ammocoete toxicity testing. If you have any questions, please call Bob Wyatt at (503) 226-4211 x 5425 or Jim McKenna at (503) 944-7325.

Sincerely,

Bob Wyatt
Co-Chair

Jim McKenna
Co-Chair

LWG
LOWER WILLAMETTE GROUP

cc: Jim Anderson, ODEQ (with enclosure)
Dick Pedersen, ODEQ (email only)
Mikell O'Mealy, ODEQ (email only)
Dana Davoli, USEPA (email only)
Joe Goulet, USEPA (email only)
Kristine Koch, USEPA (email only)
Rick Kepler, ODFW (email only)
Ted Buerger, USFWS (email only)
Rob Neely, NOAA (email only)
Ben Shorr, NOAA (email only)
Ron Gouguet, NOAA (email only)
Preston Sleeger, DOI (email only)
Patty Howard, CRITFC (email only)
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Rose Longoria, Confederated Tribes of Yakama Nation (email only)
Jeff Baker, Confederated Tribes of Grand Ronde (email only)
Lisa Bluelake, Confederated Tribes of Grand Ronde (email only)
Tom Downey, Confederated Tribes of Siletz (email only)
Billy Barquin, Confederated Tribes of Siletz (email only)
Audie Huber, Confederated Tribes of Umatilla (email only)
Erin Madden, Nez Perce Tribe (email only)
Valerie Lee, Environment International (email only)
Sheila Fleming, Ridolfi for Yakama Nation (email only)
LWG Repository
LWG Legal

COMMENT NO.	EPA COMMENT	LWG Response
EPA's conditional approval letter of the Lamprey Toxicity Testing FSP, October 11, 2006		
General Comment	Section 1.1.1 of the Lamprey FSP describes a series of objectives for the Phase 1 lamprey ammocoete collection and testing effort. EPA does not believe that rigorous "methods" for the collection, transport and holding of the lamprey ammocoetes will be developed. Rather, one goal of the Phase 1 work will be to collect, transport and hold the ammocoetes for the Phase 1 range finding toxicity testing and to apply lessons learned regarding the collection, transportation and holding of lamprey ammocoetes for the Phase 2 toxicity testing.	LWG agrees with EPA's assessment of the goals for Phase 1.
Collection 1	General: EPA assumes that the Siletz River and/or other watersheds targeted for either Phase 1 or Phase 2 lamprey ammocoete collection efforts as toxicologically clean reference/background samples. During the collection of lamprey ammocoetes for the toxicity testing, additional lamprey ammocoetes should be collected for chemical analysis. Lamprey ammocoetes collected as reference samples should be analyzed according to the protocols in the EPA approved Field Sampling Plan: Round 3 Sampling for Lamprey (*Lamperta* SP.) Ammocoete Tissue.	Based on a later conversation with Burt Shephard, it is LWG's understanding that EPA dropped this request. However, lamprey ammocoetes were collected and archived frozen for potential further analysis (chemical analyses or taxonomic identification; see comment Collection 2).
Collection 2	General: A representative sub-sample of the collected individuals should be archived for future reference and more detailed taxonomic identification if necessary.	See response to comment Collection 3.
Collection 3	Section 2.3.1, Page 9, Field Logs: Site conditions should be noted in the field logbook, including habitat, substrate type, water quality and density of ammocoetes within a specified collection area.	Information on site conditions was noted in the field logbook during the collection of ammocoetes.
Collection 4	Section 2.5, Page 9, Schedule: It is unclear whether a target field water temperature of 10ºC is critical to the success of the study. It is likely that stream flow may be a more critical factor governing the success of the lamprey ammocoete collection event. In either event, alternate locations should be identified to maximize the likelihood of a successful lamprey ammocoete collection event. Should productivity of the collection effort decline in response to lower temperatures and/or precipitation events, consultation with EPA is required to determine when to cease collection efforts.	The target maximum number (800) of ammocoetes was collected for Phase 1 at a single location identified by Stan Van de Wetering as having a high density of lamprey ammocoetes.

COMMENT NO.	EPA COMMENT	LWG Response
Collection 5	Section 3.1, Page 10, Field Sampling, First Paragraph: The rationale for targeting "up to 800 ammocoetes" for collection is not provided. Further discussion is required to confirm the number of ammocoetes required for the Phase 1 work. This will be important to determine when to cease the Phase 1 ammocoete collection effort.	The large target number of ammocoetes (800) ensured that the laboratory (NAS) had sufficient ammocoetes to complete the Phase 1 testing, including the additional temperature testing later requested by EPA and its partners. The large target number of ammocoetes also provided NAS with a sufficient range of sizes of ammocoetes so that the laboratory could select ammocoetes that were the most "comparable" in size for the Phase 1 testing. For further response on the size issue, see Collection 6 comment.
Collection 6	Section 3.1, Page 10, Field Sampling, Third Paragraph: It is unclear what is meant by the term "representative individuals." In addition, the rationale for focusing on the "smallest" ammocoetes is unclear. For example, are smaller ammocoetes likely to be more sensitive to exposure to contaminants than are larger ammocoetes? Once collection efforts have begun, discussion with EPA is required to determine the size range to be transported to the laboratory for the Phase 1 work. EPA agrees that the ammocoetes submitted for Phase 1 testing should be of comparable size.	At the initiation of the field collection effort, the size range of the ammocoetes in the Siletz River was unknown; also unknown was whether sufficient ammocoetes of a given size range could be collected. For these reasons, the field crew retained all ammocoetes that they collected, and they collected more than were strictly needed for conducting the six range-finding tests. After the collection of all 800 ammocoetes, a representative subsample of six ammocoetes was selected, and these ammocoetes were weighed and measured for length. The ammocoetes ranged from 28 to 84 mm in length and from 0.04 to 0.78 g in weight. The Phase 1 testing was conducted with ammocoetes approximately in the middle of this range (average length was 67 ± 11 mm; average weight was 0.45 ± 0.20 g).
Holding 1	General: A key aspect of the toxicity testing program is the successful holding of the lamprey ammocoetes. Scientists from USGS, USFW, ODFW, the Siletz and others familiar with the holding of lamprey ammocoetes should be consulted to identify key factors and techniques associated with successful holding of lamprey ammocoetes.	Scientists from USGS, USFW, ODFW, the Siletz and others familiar with the holding of lamprey ammocoetes were consulted extensively by NAS and the LWG during Phase 1 holding and testing.
Holding 2	Section 4.1, Page 12, Laboratory Holding: The health of the lamprey ammocoetes should be monitored closely during holding. EPA recommends maintaining careful records of the water conditions that the ammocoetes are being held in. Metrics for determining the health of the ammocoetes should be maintained. These may include regular weighing; monitoring of behavior such as swimming, burrowing, avoidance, or other responses; measuring respiration rate and mortality. EPA expects that modifications to the holding procedures may be required. For example, varying temperature or feeding in a consistent manner among different holding chambers, and varying the size of the holding chambers/density of fish. It is critical that any changes to the holding protocol be documented and summarized to ensure that Phase 2 is successful.	Normal behavior for lamprey ammocoetes is to immediately burrow into the sediment and remain there. If any are observed swimming around and not burrowing, it is an indication that they are under some sort of stress. Except for six, which later died, all lamprey ammocoetes burrowed into the sediment during holding and were not observed swimming in the water column. Lamprey ammocoetes were not fed during the first month of holding on the recommendation of William Swink, MS, Research Fishery Biologist with the USGS at Hammond Bay Biological Station. Mr. Swink has more than 15 years of experience working with sea lamprey, including the culture of larval lampreys; effects of density on growth of larvae; and survival, growth, and feeding of newly metamorphosed lampreys. Records of water quality parameters were kept during Phase 1 holding and will be kept during Phase 2 holding.

COMMENT NO.	EPA COMMENT	LWG Response
Holding 3	Section 4.1, Page 12, Laboratory Holding: The Lamprey Toxicity FSP states that water hardness will be soft (<50 mg/l as Ca CO3). It is unclear how the water hardness was selected. For example, is the goal to match the hardness of the water from which the organisms were collected or to match the conditions of the Portland Harbor Study Area? Mean water hardness in the ISA is 30 mg/L (range approximately 25-35 mg/L for most samples). EPA recommends matching the hardness of the water from the collection area. Hardness may need to be varied to ensure successful holding of the ammocoetes. Other parameters (e.g., DO, pH) that may affect survival of the lamprey ammocoetes should be monitored and adjusted as necessary.	The water hardness was selected so that it matched the hardness in the Siletz River and in the Lower Willamette River (LWR). Other parameters such as dissolved oxygen, pH, temperature, conductivity, and alkalinity were monitored during holding.
Holding 4	Section 4.1, Page 12, Laboratory Holding: The type and source of the laboratory exposure water should be specified. From the sediment toxicity studies conducted for the Portland Harbor RI/FS at NAS, EPA assumes that the water source will be dechlorinated City of Newport water; this assumption should be confirmed. In addition, EPA recommends transitioning the lamprey from Siletz River water to the laboratory water gradually in case there might be issues with acclimation to the different waters. Given that so little is known about animal husbandry with this species, such a gradual transition to the test waters may help maintain organism vigor.	The water source used during holding was dechlorinated city of Newport (Oregon) water. The ammocoetes were transported to the laboratory in site-collected water and transferred directly into the holding aquaria with the dechlorinated city of Newport water. The ammocoetes showed no effects in response to the transfer; they swam to the bottom and burrowed into the sediment.

COMMENT NO.	EPA COMMENT	LWG Response
Holding 5	Section 4.1, Page 12, Laboratory Holding: The Lamprey Toxicity FSP states "The water temperature in the holding aquaria will be 12˚ ± 2˚ C (Not to exceed 15˚ C)." The basis for selecting 12˚ C is unclear. Meeuwig et al. (2005) shows that among four temperature treatments (12˚, 14˚, 18˚, and 22˚ C), lamprey at 18˚ C had the highest survival rate; although the only statistical difference was that lamprey at 22˚ C had a lower survival rate than lamprey maintained at the three other temperatures. Similarly, the temperature at which lamprey suffered the lowest rate of developmental abnormalities was 14˚ C, although the only statistical difference was that lamprey at 22˚ C had a lower rate of developmental abnormalities than lamprey maintained at the three other temperatures. Based on these data, the optimal temperature for maintaining ammocoetes in the lab would be between 14˚ and 18˚ C, not 12˚ C. This issue also is important because, in "cold-blooded" fish (and other organisms), toxicity of contaminants typically increases as temperature increases because of the effect of temperature on metabolic rate. Thus, lamprey ammocoetes may be more sensitive to contaminants at 16˚- 18˚ C, than at 12˚ C.	In response to EPA comments, two other temperature tests that compared the survival of ammocoetes in 12ºC with survival in 17º C and 22º C were conducted.
Holding 6	Section 3.2, Page 11, Field Holding and Transportation, First Paragraph: It is unclear how was the substrate (sterile sand) in which the ammocoetes are transported was selected. Maintaining the natural conditions may be preferred during transport (assuming no unknown contamination in the source material).	The sterile sand was selected based on recommendation from Stan Van de Wetering, Siletz Tribe. The substrate used in the field collection and holding was later changed to site-collected sediment based on comments from Christina Lucier, USFW biologist. Christina pointed out that store-bought sand could have sharp edges and thereby potentially damage the ammocoetes during transportation.

COMMENT NO.	EPA COMMENT	LWG Response
EPA's conditional approval letter of the Lamprey Toxicity Testing FSP and QAPP, October 31, 2006		
FSP 1	Page 6, Section 2.4.1: Daily records of mortality should be recorded, not just at the termination of the test. In addition, other noticeable changes in behavior and other responses be observed and recorded daily and at the termination of the range finding tests. Examples of behavior that should be noted include narcosis, morbidity, erratic behaviors or changes in swimming ability.	Mortality was recorded daily. Because the behavior of lamprey ammocoetes differs from the common behavior of other fish used in toxicity testing, qualitative records were not made during Phase 1. Instead, the following general observations were noted. At test initiation, when the ammocoetes were transferred from sediment to the test chamber that contained only water, the ammocoetes would swim around erratically, presumably searching for sediment. When no sediment was found, the ammocoetes would sink to the bottom of the test chamber, where they remained (mostly inactive) throughout the tests. This behavior was also observed in the control. LWG will continue to make qualitative behavioral observations in Phase 2. However, there is great uncertainty associated with documenting observed behaviors, as well as the overall consequences of these behaviors because of the limited amount of published information and experience with lamprey ammocoetes.
FSP 2	Page 11, Section 3.2: EPA understands that the substrate for holding the ammocoetes was changed to site-collected sediment from the proposed sterile sand.	The substrate was changed to site-collected sediment based on comments from Christina Lucier, USFW biologist. Christina pointed out that store-bought sand could have sharp edges and thereby potentially damage the ammocoetes during transportation.
FSP 3	Page 13, Section 4.2: EPA provided guidance on the selection of chemicals for the toxicity testing. This rationale should be described to justify the selection of these particular six chemicals with respect to the primary study objectives and the specific chemical modes of action represented by each chemical. In addition, the chemical concentrations to be tested should be determined and identified in consultation with EPA and its government partners prior to initiation of the range finding testing. Due to the size of the chemical concentration range specified in Table 5-1, EPA recommends five chemical concentration ranges be utilized.	Due to time constraints, the FSP will not be revised to address the requested revisions and resubmitted. Four widely spaced concentrations and a control were tested for each of the five chemicals (copper, aniline, pentachlorophenol, lindane, and diazinon) in Phase 1. In Phase 2, the five chemicals in the definitive tests will be tested with five concentrations and a control. The concentration range of the five chemicals will be based on the Phase 1 testing. In addition, in Phase 2, a range-finding test and a definitive test will be performed with naphthalene, with the same number of concentrations as for the other five chemicals.

COMMENT NO.	EPA COMMENT	LWG Response
FSP 4	Page 13, Section 4.2: For most of the proposed chemicals, static-renewal test methods are indeed the most appropriate and cost-effective approach for exposing ammocoetes. However, because naphthalene is quite volatile, the testing laboratory will have to take extra care to either minimize losses from the test solutions, or modify the exposure system itself. In our experience testing with this chemical, for example, we would actually be more likely to use flow-through methods, even when conducting range finding tests. Losses owing to volatilization can still be significant using flow-through methods, but at least it is constant and quantifiable. These conditions are both more difficult to achieve with static-renewal methods. Therefore, the testing laboratory needs to address this concern, and potentially adjust their methods to ensure that the results obtained from the rangefinder are accurate enough to inform the definitive tests.	NAS did some initial work with naphthalene for the Phase 1 testing and found that the chemical was too volatile for conducting a meaningful static-renewal range-finding test. In consultation with EPA and its partners, it was agreed that the range-finding test with naphthalene would be delayed to the Phase 2 flow-through testing.
FSP 5	Page 13, Section 4.2: It is unclear why the lamprey will be fed during testing (the text states 2 hours prior to renewal at 48 hours). EPA recommends not feeding the organisms during the test. Not feeding is a standard protocol during 96 hour LC50 tests and feeding could skew the results and uptake of the chemical.	The ammocoetes were not fed during testing.
FSP 6	Page 13, Section 4.2: Organism mortality should be recorded daily (as opposed to just at 0 and 96-hr).	Mortality was recorded daily during Phase 1 and will be recorded during Phase 2.

COMMENT NO.	EPA COMMENT	LWG Response
FSP 7	Page 14, Section 4.3: A second set of range finding tests with the flow through system should be performed as part of Phase 2 to confirm the results of Phase 1 and to account for differences between the static range finding testing proposed for Phase 1 and the flow through definitive testing proposed for Phase 2. Additional range finding tests should be conducted during Phase 2 (definitive toxicity testing phase) to ensure that results from Phase 1 testing are comparable to those from organisms collected from different source streams, time of year, etc and to take advantage of any "lessons learned" from the phase 1 work. Confirmatory testing is not necessary for all tests. Further discussion between the LWG and EPA will be required to determine the scope of the Phase 2 range finding testing.	In comment QAPP 2, EPA states that range-finding tests only have one objective, which is to help define the dose spacing that will be used in the definitive tests. In the Phase 1 testing, NAS successfully defined the range for five of the six chemicals (copper, aniline, pentachlorophenol, lindane, and diazinon). Based on this fact, the laboratory is confident that it can successfully conduct the definitive tests for these chemicals without conducting another set of range-finding tests. Because of the limited number of ammocoetes ODFW allows to be collected for the study, LWG proposes that no additional range-finding tests be performed for the five chemicals. If one of the definitive tests fails based on the control performance, another definitive test will be conducted. If the test is not acceptable for other reasons, another test will be conducted to satisfy the primary goal of the toxicity testing, which is to compare sensitivity against published toxicity data for the most sensitive surrogate species (see comment FSP 8). Test concentrations would be set to bracket the most sensitive known LC50 from the literature. As agreed upon with EPA, a flow-through range-finding test with naphthalene will be performed as part of the Phase 2 testing prior to the definitive test with this chemical.
FSP 8	Page 14, Section 4.3: If range finding tests in Phase 1 are unsuccessful or inconclusive for a given chemical, an alternate approach to side by side testing with rainbow trout should be considered. The primary goal of the toxicity testing is to compare sensitivity against *published* toxicity data for the most sensitive surrogate species, which may not necessarily be rainbow trout for all chemicals. In the event of an unsuccessful or inconclusive range finding test, the definitive test concentrations could be set to "bracket" the most sensitive known LC50 from the literature. If it is determined that lamprey ammocoetes are equally or more sensitive than the surrogate, a definitive LC50 (or "less than" value) would be obtained, and satisfy the goals of the study. However, if lamprey ammocoetes are determined to be less sensitive (i.e., few or no organisms die in any test concentration), it will be possible to concluded that the lamprey are less sensitive than the most sensitive surrogate, again achieving the goals of the study. It is still preferable to get a definitive LC50 for all test chemicals based on a valid rangefinder, but this alternative may help achieve the same goal, without the additional expense of side by side testing with rainbow trout.	All five range-finding tests with copper, aniline, pentachlorophenol, lindane, and diazinon were completed successfully in Phase 1, providing NAS with concentrations for each chemical that range from causing no mortality to 100% mortality. A range-finding test with naphthalene was not conducted during Phase 1 testing (see comment FSP 4 for further details). LWG expects to be able to provide LC50 values for all six chemicals.

COMMENT NO.	EPA COMMENT	LWG Response
FSP 9	Page 14, Section 4.5: The text should state specifically what water samples would be collected and submitted for laboratory confirmation testing, e.g., before and after exposure, from every test chamber, etc. The volume of water required for the analyses is quite large (page 17, Table 5.1) and individual tests may not provide that much water. EPA recommends that parameters such as temperature, DO, pH and conductivity be recorded daily.	For Phase 1, confirmatory chemical analyses were performed for each chemical solution and the control at test initiation, 48 hours (both new and old solutions), and test termination. For Phase 2, confirmatory chemical analyses will be performed on water samples collected very 24 hours. Temperature, dissolved oxygen, and pH were measured daily in all concentrations. Conductivity, hardness, and alkalinity were measured daily in the control and highest concentration.
FSP 10	Page 17, Section 5.0: Lamprey ammocoete tissue should be analyzed after following toxicity testing in addition to water. Both live and dead ammocoetes should be analyzed at the end of the definitive tests for contaminant body burdens (whole body) of the test chemical. This will provide useful information in its own right, but will also help answer whether or not the ammocoetes received a contaminant dose if few or no mortalities are observed.	LWG disagrees with EPA's proposal to measure lamprey ammocoete tissue concentrations following toxicity testing. The specific objective of the Phase 2 lamprey ammocoete collection and testing effort as stated in the FSP is to perform one acceptable (i.e., passing the acceptability criteria) definitive test deriving the concentration that is lethal to 50% of an exposed population (LC50) for each of the following six chemicals: copper, aniline, pentachlorophenol, naphthalene, diazinon, and lindane. Therefore, ammocoete tissue concentration data would not contribute to satisfying the study objective. For further comment, please see the response to comment QAPP 6.
FSP 11	Page 17, Section 5.1: Chemical analysis daily is required for the static testing to determine chemical loss over the test duration. Chemical analysis of the water should include both total and dissolved copper analysis.	Confirmatory chemical analyses were performed for each chemical solution and the control at test initiation, 48 hours (both new and old solutions), and test termination. For the Phase 2 testing, confirmatory chemical analyses will be performed every 24 hours. The water samples from Phase 1 were analyzed for total copper.
FSP 12	Page 18, Section 5.2: The text should demonstrate that the detection and reporting limits are adequate to meet the project goals. In particular, EPA is concerned whether the detection and reporting limits for lindane and pentachlorophenol are sufficient. The ACG for lindane (11 ppb) is higher than the lowest LC50 reported in Table 4-1 of 1 ppb. While the MRL and MDL are low enough to detect test concentrations at or below 1 ppb, why is the ACG higher than 1 ppb? Also the ACG for pentachlorophenol (54 ppb) is substantially higher than the lowest LC50 reported in Table 4-1 (5 ppb). In the latter case, the MRL of 25 ppb would not be low enough if the lamprey LC50 was similar to this lowest reported LC50.	The MRLs used in Phase 1 were all below the lowest published values (the ACGs listed in Table 5-2 are incorrect) and sufficiently low to detect all concentrations used in the toxicity tests.

COMMENT NO.	EPA COMMENT	LWG Response
FSP 13	Page 20, section 6.0: A table of test conditions and test acceptability criteria should be developed to more formally document test procedures and conditions. Will be especially useful if someone wants to repeat the studies or test ammocoetes with additional chemicals in the future. The table should include the following types of information: • Test type (static, static renewal or flow through) • Test duration (96 hrs in this case for acute tests) • Water temperature • Light quality • Light intensity • Photoperiod (usually 16 hrs light, 8 hrs dark) • Test chamber size • Test chamber volume • Frequency of test solution renewal • Age of test organisms • Number of organisms per test chamber • Number of replicate exposure chambers per test concentration • Number of organisms per exposure concentration • Feeding regime (probably not needed for a 96 hr fish acute test) • Test chamber cleaning • Test chamber aeration • Dilution water source • Test concentrations • Dilution series • Test endpoint (mortality in this case) Test acceptability criterion (90 % survival in controls recommended)	A table of test conditions and test acceptability criteria, including the list of parameters given by EPA and its partners, was developed for Phase 1 testing and will also be included for Phase 2 testing.
QAPP 1	Page ii, Distribution List: The distribution list should be expanded to include EPA's. This has been done for other QAPPs (e.g., Round 2 QAPP).	Due to time constraints, the QAPP will not be revised to address the requested revisions and resubmitted. However, the distribution list in future QAPPs and FSPs will be expanded to include EPA's distribution list.

COMMENT NO.	EPA COMMENT	LWG Response
QAPP 2	Page 5, Section 1.2: The QAPP should specify the study objectives identified by EPA for the laboratory toxicity studies. They were 1.) Determine whether existing fish toxicity reference values (TRVs) are sufficiently protective of lamprey survival and growth as determined by laboratory toxicity testing with representative chemicals, and 2.) Identify the relative sensitivity of Pacific Lamprey to adverse contaminant effects when compared to the sensitivity of other freshwater species. These objectives should be incorporated into the QAPP. In addition, the objective of the range finding tests should be explicitly defined. Range finding tests should have only one objective, which is to help define the dose spacing that will be used in the definitive toxicity tests. Any statistically derived results (i.e. LC50s) that can be derived from the range finding tests will not have sufficient power to be useable in meeting overall study objectives and toxicity test acceptability criteria. EPA will not utilize any of the results from the range finding tests in any of its decision making processes on the Portland Harbor site. Goals and objectives (although perhaps elaborated on in the work plan) need to be clearly identified here, including stating the specific problem and what we need to know. For example, add to end of second sentence "…to assess potential risk to lamprey ammocoetes from Portland Harbor contamination" and add to second to last sentence "… with lamprey ammocoetes to determine acute toxicity (range of LC50s) or test sensitivity to chemicals of potential concern relative to other fish species."	Due to time constraints, the QAPP will not be revised to address the requested revisions and resubmitted. However, LWG agrees with the objectives stated in the EPA comment. LWG also agrees with the statement that range-finding tests only have one objective, which is to help define the dose spacing that will be used in the definitive tests. In Phase 1 testing, NAS successfully defined the range for five of the six chemicals (copper, aniline, pentachlorophenol, lindane, and diazinon). Based on this fact, the laboratory is confident that it can successfully conduct the definitive tests for these chemicals without conducting another set of range-finding tests. Because of the limited number of ammocoetes ODFW allows to be collected for the study, LWG proposes that no additional range-finding tests be performed for the five chemicals. If one of the definitive tests fails based on the control performance, another definitive test will be conducted. If the test is not acceptable for other reasons, another test will be conducted to satisfy the primary goal of the toxicity testing, which is to compare sensitivity against published toxicity data for the most sensitive surrogate species (see EPA comment FSP 8). Test concentrations would be set to bracket the most sensitive known LC50 from the literature. As agreed upon with EPA, a flow-through range-finding test with naphthalene will be performed as part of Phase 2 testing prior to the definitive test with this chemical.
QAPP 3	Page 5, Section 1.2: This section should make clear that an understanding of the relative sensitivity of the lamprey ammocoetes is required to assess risks to lamprey ammocoetes.	Due to time constraints, the QAPP will not be revised to address the requested revisions and resubmitted. However, LWG agrees that an understanding of the relative sensitivity of lamprey ammocoetes is required to assess risks to lamprey ammocoetes.
QAPP 4	Page 3, Section 1.2.4: While it is acceptable for the laboratory manager (Linda Nemeth) to also be the laboratory QA/QC officer, to prevent conflicts of interest during conduct of the study, it is not generally considered acceptable for the QA/QC officer to have direct oversight of the study, as indicated in the Responsibility column of Table 2-1. Instead, all direct laboratory testing oversight should reside with the NAS project manager, Gary Buhler.	All direct laboratory testing oversight during Phase 1 was performed by Gary Buhler. In addition, Dick Cardwell was involved with the chemical issues of testing (e.g., solubility of the chemicals, concentration ranges). Linda Nemeth performed the tasks of a QA/QC officer and the general overall tasks of a laboratory manager, including communication with Windward. A similar division of work will be used during the Phase 2 testing.

COMMENT NO.	EPA COMMENT	LWG Response
QAPP 5	Page 5, Section 1.3: The project schedule should be described (timeframe for analytical work for the Phases). The source of lamprey ammocoetes (e.g., collected from Siletz River) should also be described. It may also be worth citing the FSP (and perhaps a field QAPP) here for more detailed information.	Due to time constraints, the QAPP will not be revised to address the requested revisions and resubmitted. However, validated chemistry data will be available 4 months after the completion of each definitive test. The collection sites of the lamprey ammocoetes for Phase 1 and 2 are detailed in the FSP, and the FSP should have been cited for this information.
QAPP 6	Page 5, Section 1.4: At the completion of the Phase 2 "definitive" toxicity test for each of the six contaminants of interest (COI), ammocoete tissue should be composited from the test replicates and measured for the analyte that was tested. This will achieve two goals: (1) it will assure that the COI was, in fact, absorbed by the ammocoetes, and (2) the tissue concentration data can be used to establish a dose-response curve which will be useful for assessing the LD_{50} of the COI.	LWG disagrees with EPA's proposal to measure tissue concentrations and derive LD50s because it will not help satisfy the study objective (see response to FSP 10) and because of concerns with the following methodology issues: • There is no established procedure for developing lamprey ammocoete LD50s. Developing an experimental design for lamprey LD50s would require experimental research, which is not part of the study objectives. • The proper experimental design for developing lamprey LD50s would be a sediment bioassay. Lamprey ammocoetes are benthic infauna, and LD50s for other benthic organisms are based on sediment bioassays. • Using tissue concentration data from lamprey that die during the tests would not be appropriate because post-mortem processes can significantly alter tissue concentrations. However, if tissue analysis is conducted on surviving lamprey, only no effects concentrations can be derived.
QAPP 7	Page 6, Section 1.6.1: The laboratory records should include much more narrative as well as detailed monitoring data (original and summary) of the husbandry phase of the study. More information should also be provided about what constitutes "normal" behavior and "good condition" of lamprey ammocoetes (e.g., how they behaved in the field upon collection) to compare to the results provided in the narrative. The laboratory records should include much more narrative as well as detailed monitoring data (original and summary) of the husbandry phase of the study. More information should also be provided about what constitutes "normal" behavior and "good condition" of lamprey ammocoetes based on the literature. See FSP Comment #1 above.	Normal behavior for lamprey ammocoetes is to immediately burrow into the sediment and remain there. If any are observed swimming around and not burrowing, it is an indication that they are under some sort of stress. All lamprey ammocoetes except the six that later died burrowed into the sediment during holding and were not observed swimming in the water column.
QAPP 8	Page 6, Section 1.6.1: A table should be provided that lists the specific water quality measurements (e.g., DO, pH, etc.) that will be performed during the testing.	Temperature, dissolved oxygen, and pH were measured daily in all concentrations. Conductivity, hardness, and alkalinity were measured daily in the control and highest concentration.

COMMENT NO.	EPA COMMENT	LWG Response
QAPP 9	Page 7, Section 1.6.3: Please clarify that audits will be done on-site in the laboratory during testing (first bullet).	One audit was performed by Dr. Paul Dinnel (Dinnel Marine Resources) as an external reviewer. In addition, EPA and its partners performed one day-long audit during the Phase 1 testing. The same level of oversight by Paul Dinnel and EPA and its partners is expected for Phase 2.
QAPP 10	Section 1.6.4, Data Report: The data report submitted to the government team should include the all raw data electronically (e.g. water quality measurements, replicate survival, etc.) and LC50 calculations from the laboratory. In addition, the data should also be submitted electronically in SEDQUAL format.	The Phase 1 data report will include all raw data electronically (e.g., water quality measurements, replicate survival). The Phase 2 report will include all raw data electronically (e.g., water quality measurements, replicate survival) and LC50 calculations from the laboratory. In addition, the data from Phase 2 will also be submitted electronically in SEDQUAL format.
QAPP 11	Page 9. Section 2.1. Experimental Design: Although static range-finding tests may provide some value and insight regarding toxicity of the COIs, they are not an acceptable replacement for flow-through range-finding tests. Thus, flow-through range-finding tests should be done for all COIs as part of the phase 2 definitive testing program. See FSP Comment #7 above.	As stated in comment QAPP 2, the range-finding tests only have one objective, which is to help define the dose spacing that will be used in the definitive tests. In Phase 1 testing, NAS successfully defined the range for five of the six chemicals (copper, aniline, pentachlorophenol, lindane, and diazinon). Based on this fact, the laboratory is confident that it can successfully conduct the definitive tests for these chemicals without conducting another set of range-finding tests. Because of the limited number of ammocoetes ODFW allows to be collected for the study, LWG proposes that no additional range-finding tests be performed for the five chemicals. If one of the definitive tests fails based on the control performance, another definitive test will be conducted. If the test is not acceptable for other reasons, another test will be conducted to satisfy the primary goal of the toxicity testing, which is to compare sensitivity against published toxicity data for the most sensitive surrogate species (see EPA comment FSP 8). Test concentrations would be set to bracket the most sensitive known LC50 from the literature. As agreed upon with EPA, a flow-through range-finding test with naphthalene will be performed as part of the Phase 2 testing prior to the definitive test with this chemical.
QAPP 12	Page 10, Table 2-1, and page 11, section 2.2.: Table 2-1 specifies a temperature of 12°C ± 1°C. EPA and LWG personnel have discussed the temperature issue and believe it is appropriate to explore the effect of higher temperatures (e.g., 15°C). At a minimum, some Phase 1 range finding tests should be performed at a higher temperature to help determine the optimal temperature for the Phase 2 definitive flow through toxicity testing. Further discussion is required to finalize the Phase 1 range finding test temperatures and approach.	In response to EPA comments, two other temperature tests that compared the survival of ammocoetes in 12ºC with survival in 17º C and 22º C were conducted. LWG proposes to conduct the Phase 2 toxicity testing at 17º C.

COMMENT NO.	EPA COMMENT	LWG Response
QAPP 13	Page 9, Section 2.1, Experimental Design: • Test Waters: Test waters should be measured for ammonia, particulate matter, total dissolved gas, and TOC according to ASTM, 1996. • Organism Loading: The protocol outlined here should follow the ASTM guidelines. For static tests, organisms per chamber should not exceed 0.8 g/organism per liter for temperatures 17 degrees C or less. • Feeding: For the static tests, the organisms should not be fed unless it is shown to stress the organisms within the test period (96 hours). • Fecal matter and uneaten food will decrease the dissolved oxygen concentration and the biological activity of some test materials. This is especially a problem in the static tests. • Control Test Run: A control test should be run in the test water and environment prior to conducting testing. During this control run, stress, mortality or other organism behavior that may influence the results of the test should be recorded. This testing can also be used to determine if feeding during the test is necessary. Holding: A daily record of feeding, behavioral observations and any mortality should be recorded and provided to the government team.	Analyses of the test waters for ammonia, particulate mater, total dissolved gas, and TOC were not performed during Phase 1 testing but will be conducted during Phase 2. The loading rate for the Phase 1 testing complied with the EPA guideline of a maximum 1.1 g organism/L (EPA 2002). The loading rate for Phase 2 will comply with both EPA and ASTM guidelines of a maximum of 0.8 g organism/L (ASTM 1996). The lamprey ammocoetes were not fed during Phase 1 testing and will not be fed during Phase 2 testing. A small toxicity test including a control and three to five test concentrations was performed prior to each range-finding test in Phase 1. Normal behavior for lamprey ammocoetes is to immediately burrow into the sediment and remain there. If any are observed swimming around and not burrowing, it is an indication that they are under some sort of stress. All lamprey ammocoetes except six that later died burrowed into the sediment during holding and were not observed swimming in the water column. Lamprey ammocoetes were not fed during the first month of holding on the recommendation of William Swink, MS, Research Fishery Biologist with the USGS at Hammond Bay Biological Station. Mr. Swink has more than 15 years' experience working with sea lamprey, including the culture of larval lampreys; effects of density on growth of larvae; and survival, growth, and feeding of newly metamorphosed lampreys.

COMMENT NO.	EPA COMMENT	LWG Response
QAPP 14	Pages 10-11, Table 2-1: This table should be expanded to include a column for "Acceptance Criteria" (how much excursion from the proposed conditions are allowed for the test to be considered valid) and a column for "Method" (instruments used) – basically, to summarize the parameters discussed in Appendix B. Similar tables should be included for the field collection (or cite the FSP) and for the husbandry portion. See FSP Comment # 13 above. Other comments regarding Table 2-1: • Temperature (see QAPP Comment #12) • Test chamber size: recommended minimum is 250 ml, but can the chamber size be estimated at this time based upon general knowledge of the range of ammocoete sizes? • Solution volume: recommended minimum is 200 ml, but can the solution volume be estimated based upon general knowledge of the range of ammocoete sizes? • Renewal of test solutions: no flow rate is mentioned for the definitive tests; no percent of volume replacement is stated. • Organisms per test chamber: There is no mention of the size range of these organisms, which would influence the number per chamber; will they be measured upon collection and/or testing? • Number of replicates: one number (e.g., "minimum of one") should be specified. • Aeration and Dilution water: are these based on Siletz River conditions? • Test concentration: one number (e.g., "minimum of 3") should be specified. • Endpoint: partial mortality should be included for Phase II (based on Section 2.2); also note that non-lethal endpoints might require consideration. • Test acceptability criterion: the acceptability criterion should be applied to the range-finding tests as well. Why is "control(s)" left ambiguous – i.e., how many will there be? Items that should also be detailed include: controls and all water quality parameters.	Due to time constraints, the QAPP will not be revised to address the requested revisions and resubmitted. However, the issues raised in this comment can be addressed based on the information gained during Phase 1 testing. • The temperature for Phase 1 was 12º C; LWG proposes testing at 17º C for Phase 2. • Based on the size of the lamprey collected during Phase 1 and a loading rate of 1.1 g/L, the chambers were 9.5-L aquaria, and the solution volume was 2.8 L. • An 80% volume replacement was performed during Phase 1. The flow rate will be determined as part of Phase 2. • Five ammocoetes were exposed in one replicate during the chemical testing, and five ammocoetes were exposed in each of four replicates during the temperature testing in Phase 1. Ten ammocoetes will be exposed in each of four replicates during Phase 2 testing. • One replicate for each of the four test concentrations and the control was used in the range-finding tests, and four replicates were used for the temperature tests during Phase 1. Four replicates for each of the five test concentrations and the control will be used during the Phase 2 definitive tests. • The hardness of the dilution water was selected based on hardness of the Siletz River and LWR. The aeration criterion is the standard criterion for testing with cold water fish (trout at 12ºC). • As stated in the QAPP, the chemical concentration ranges will be selected to produce partial mortality in some of the test solutions similar to the guidance in ASTM. However, because of the experimental nature of the study and the potential limited number of ammocoetes, the definitive tests from which the LC50 values will be derived may not fulfill the ASTM definition of acceptable partial mortality in a definitive test. • The test acceptability criterion of ≥ 90% survival was applied to the range-finding tests as well. The number of controls was left open in case a solvent control was needed in addition to the standard control. In the end, only a standard control was needed for all six chemicals. • In Phase 1, temperature, dissolved oxygen, and pH were measured daily in all concentrations. Conductivity, hardness, and alkalinity were measured daily in the control and highest concentration. Similar measurements will be taken in Phase 2.

COMMENT NO.	EPA COMMENT	LWG Response
QAPP 15	Page 11, Table 2-2, Summary of 96-hour range finding: This is an acute test, but other endpoints in addition to mortality should be noted in addition to mortality. This is especially important in a range finding test. Other endpoints should include altered swimming behavior, narcosis symptoms, and morbidity. This is also important since this organism has not been tested with these chemicals in the laboratory previously. In addition, the number of dead and affected organisms in each test chamber should be counted every 24 hours after the beginning of the test (ASTM 1996).	Mortality was recorded daily. Because the behavior of lamprey ammocoetes differs from the common behavior of other fish used in toxicity testing, qualitative records were not made during Phase 1. Instead, the following general observations were noted. At test initiation, when the ammocoetes were transferred from sediment to the test chamber that contained only water, the ammocoetes would swim around erratically, presumably searching for sediment. When no sediment was found, the ammocoetes would sink to the bottom of the test chamber, where they remained (mostly inactive) throughout the tests. This behavior was also observed in the control. LWG will continue to make qualitative behavioral observations in Phase 2. However, there is great uncertainty associated with documenting observed behaviors, as well as the overall consequences of these behaviors because of the limited amount of published information and experience with lamprey ammocoetes
QAPP 16	Page 11-12, Section 2.2: This section should include or reference testing methods, handling and custody, and analytical methods. Please cite the relevant appendices (SOPs, testing protocols) and addenda (water chemistry) for specific methods. Because no method currently exists for holding and testing lamprey ammocoetes, method performance criteria should be included here (temperature change is the only parameter listed here).	Due to time constraints, the QAPP will not be revised to address the requested revisions and resubmitted. Toxicity test procedures are provided in Appendix B of the lamprey ammocoete toxicity testing QAPP (Windward 2006b). Sample custody, handling, and storage procedures for the test solution samples are described in Section 4.5 of the FSP (Windward 2006a). Methods for the chemical analysis of the test solution samples and related QA/QC procedures are described in the QAPP for chemical analysis of the test water (Integral 2006). During Phase 1 testing, ammocoetes were successfully handled and held to provide healthy organisms for testing. Because there are no established methods for testing with lamprey ammocoetes, the method performance criteria used during the Phase 1 testing, including water quality parameters (temperature and dissolved oxygen) and test acceptability (≥ 90% survival), were similar to those provided by EPA for the 96-hour acute testing with fish (EPA 2002).
QAPP 17	Page 12, Section 2.3: The "standard" QA/QC procedures applicable to these tests should be referenced. In Table 2-1 or elsewhere the proposed ranges for the listed water quality parameters should be stated.	Due to time constraints, the QAPP will not be revised to address the requested revisions and resubmitted. Because there are no established methods for testing with lamprey ammocoetes, the method performance criteria used during the Phase 1 testing, including water quality parameters and test acceptability (≥ 90% survival), were similar to those provided by EPA for the 96-hour acute testing with fish (EPA 2002). Water quality parameters specified in the EPA manual include temperature (± 1ºC) and dissolved oxygen (cold water tests not to fall below 6 mg/L). Performance criteria for other water quality parameters, such as hardness, alkalinity, pH, and conductivity, to be measured during Phase 2 will be within the ranges measured during Phase 1.

COMMENT NO.	EPA COMMENT	LWG Response
QAPP 18	Pages 15-16, Section 4: The discussion in this section highlights the lack of specific QA criteria against which to judge the collection, husbandry, and testing. Please provide more specific DQOs, as noted in Section 4.3, which can be used for this assessment.	Because there is no standard method for testing with lamprey ammocoetes, it was difficult to provide specific QA criteria and DQOs before Phase 1 testing. With the completion of Phase 1 testing, the following specific QA criteria have been developed for collection and transportation, husbandry, and testing: • The mortality rate after collection and transportation of ammocoetes to the laboratory should be low. If greater than 5% mortality is observed in the holding tanks, the health of the ammocoetes in that batch will be assessed. • The majority of ammocoetes should burrow into the sediment. If more than 5% of the ammocoetes are observed on the sediment surface, the health of the ammocoetes in that batch will be assessed. • The standard QA criterion for acute testing of ≥ 90% survival in the control should be met. If the test fails this criterion, the test will be rerun.
QAPP 19	Page 15, Section 4.2, Third bullet: This task should also include reviewing the data from at least the husbandry portion of the effort.	Paul Dinnel reviewed the holding information and determined that the procedures were in compliance with the FSP (Windward 2006a) and QAPP (Windward 2006b).
QAPP Appendix B1	Page 3, Section 7.2: The effects criterion is mortality, but other sub-lethal effects should at least be noted during testing, such as swimming, burrowing, avoidance, or other behavior responses; weight change, respiration rate, etc. (morbidity may also be discussed in the summary Table 2-1), particularly considering the experimental nature of this bioassay test (see FSP Comment # 1)	Mortality was recorded daily. Because the behavior of lamprey ammocoetes differs from the common behavior of other fish used in toxicity testing, qualitative records were not made during Phase 1. Instead, the following general observations were noted. At test initiation, when the ammocoetes were transferred from sediment to the test chamber that contained only water, the ammocoetes would swim around erratically, presumably searching for sediment. When no sediment was found, the ammocoetes would sink to the bottom of the test chamber, where they remained (mostly inactive) throughout the tests. This behavior was also observed in the control. LWG will continue to make qualitative behavioral observations in Phase 2. However, there is great uncertainty associated with documenting observed behaviors, as well as the overall consequences of these behaviors because of the limited amount of published information and experience with lamprey ammocoetes.
QAPP Appendix B2	Page 4, Table: Number of water samples to be collected for confirmatory testing, volumes required, and sampling schedule during testing should be provided (or cite the upcoming document that will describe water chemistry analytical procedures and QA/QC needs, and tissue residue analyses, if done as well).	Due to time constraints, the QAPP will not be revised to address the requested revisions and resubmitted. In Phase 1, water samples were collected at test initiation, at 48 hours (new and old solutions), and at 96 hours. In Phase 2, the water samples will be collected at test initiation and every 24 hours. The volume requirements are listed in Table 5-1 of the QAPP, and the analytical methods and quality control procedures are described in Sections 5.2 and 5.3. LWG disagrees with the proposal to perform an analysis of the tissue (see response to comments FSP 10 and QAPP 6).

COMMENT NO.	EPA COMMENT	LWG Response
QAPP Appendix B3	Page 4, Section 7.7, last paragraph: State that the stock solution being tested will be maintained under the exact same conditions as the testing solution.	The stock solutions were made 24 hours before use and mixed for approximately 20 hours. The solutions were made at room temperature to ensure that the chemicals went into solution (none of the chemicals except copper would go into solution at 12ºC). Copper was treated similarly to the other chemicals even though it was not necessary for getting copper into solution.

References

ASTM. 1996. Standard guide for conducting acute toxicity tests on test materials with fishes, macroinvertebrates, and amphibians. E729-96. American Society for Testing and Materials, Philadelphia, PA.

EPA. 2002. Methods for measuring the acute toxicity of effluents and receiving waters to freshwater and marine organisms. Fifth edition. EPA-821-R-02-012. Office of Water, US Environmental Protection Agency, Washington, DC.

Integral. 2006. Portland Harbor RI/FS Round 2 quality assurance project plan. Addendum 7: Round 3 chemical analysis of lamprey ammocoete toxicity test water. Draft. Integral Consulting, Inc., Mercer Island, WA.

Windward. 2006a. Portland Harbor RI/FS. Round 3 lamprey ammocoete toxicity testing field sampling plan. Draft. WE-06-0005. Prepared for Lower Willamette Group. Windward Environmental LLC, Seattle, WA.

Windward. 2006b. Portland Harbor RI/FS. Round 3 lamprey ammocoete toxicity testing quality assurance project plan. Draft. WE-06-0007. Prepared for Lower Willamette Group. Windward Environmental LLC, Seattle, WA.

Helle B. Andersen

From: Blischke.Eric@epamail.epa.gov
Sent: Thursday, May 10, 2007 4:33 PM
To: Helle B. Andersen
Cc: Humphrey.Chip@epamail.epa.gov; Shephard.Burt@epamail.epa.gov
Subject: Re: FW: Scientific Taking Permit text

That's a yes on the watersheds. Regarding the temperature, its 17 +/- 1. This should be enough for you to move forward on the permit. We will provide more direction on other elements of the testing once we get some additional issues worked out (e.g., size range).

Eric

"Helle B. Andersen" <helleb@windwardenv.com>
05/10/2007 03:52 PM

To: Eric Blischke/R10/USEPA/US@EPA
cc: "John Toll" <johnt@windwardenv.com>, "Lisa Saban" <lisas@windwardenv.com>
Subject: FW: Scientific Taking Permit text

Eric,
I understand from John that you are fine with the rivers listed below and a testing temperature of 17ºC. Please reply with a yes to this e-mail.
Thanks Helle

From: Helle B. Andersen
Sent: Monday, May 07, 2007 10:32 AM
To: 'Eric Blischke (blischke.eric@epa.gov)'
Cc: John Toll; 'Valerie Oster'; Lisa Saban
Subject: Scientific Taking Permit text

Eric,
Below please find the text in the draft lamprey collection application specifying the number of ammocoetes to be collected and the sampling rivers. Please let me know if EPA and its partners approve of this text.
As I mentioned on the phone I would like to submit the permit application this week or early next week.
Thanks Helle

The objective of the Phase 2 lamprey ammocoete collection and testing effort is to perform one definitive test to derive an LC50 for each of the following six chemicals: copper, aniline, pentachlorophenol, naphthalene, diazinon, and lindane. Because the majority of the objectives for Phase 1 were successfully met, Phase 2 is planned for the summer of 2007.

A maximum of 3,000 ammocoetes will be collected for the Phase 2 toxicity testing. Approximately 2,000 ammocoetes are expected to be required to complete the testing, and 3,000 allows for incidental mortality during transportation. The sampling effort is planned to be conducted in a minimum of three sampling events, with a maximum of 1,000 ammocoetes collected per event. Sampling of ammocoetes will cease as soon as the six definitive tests have successfully been completed. Based on conversations with Oregon’s fish biologists, lamprey ammocoetes may be collected in the following rivers with the maximum number collected stated in parentheses. Marys River (1,000), Long Tom River (1,000), Calapooia River (1,000), Siletz River (400), Alsea River (400), Wilson and Trask Rivers (250), and Neustucca River (250).

Lamprey will be transported in coolers with 6 inches of sediment collected at the sampling location and filled to capacity with water to minimize sloshing during transport. Water will be aerated using air stones. At the laboratory, the water will be sieved off, and the sand containing the ammocoetes will then be poured onto a large table where ammocoetes will be sorted by hand into aquaria. All ammocoetes remaining after the toxicity tests will be euthanize.

Helle B. Andersen
Windward Environmental LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119

Direct Line (206) 577-1287
Phone (206) 378-1364
Fax (206) 217-0089
hellea@windwardenv.com

This communication is made under the framework of the LWG Participation Agreement and in the parties' common interests in meeting LWG member obligations under the Administrative Order on Consent and in anticipation of litigation concerning liability for the Portland Harbor Superfund site. This communication is intended and believed by the parties to be part of an ongoing and joint effort to develop and maintain a common legal strategy and contains strategies, work product and legal advice within the "common interest" extension of the attorney-client privilege and the work product doctrine. This communication may include attorney-client communications. With respect to communications by private LWG members to public members, those communications are with the expectation that they will be kept confidential by the public entities. The information is intended to be for the use of the individual or entity named above. If you are not the intended recipient, please be aware that any disclosure, copying, distribution or use of the contents of this information is prohibited.
If you have received this electronic transmission in error, please notify us by electronic mail at hellea@windwardenv.com.

Helle B. Andersen

From: Shephard.Burt@epamail.epa.gov
Sent: Friday, May 11, 2007 9:25 AM
To: Blischke.Eric@epamail.epa.gov
Cc: Humphrey.Chip@epamail.epa.gov; Helle B. Andersen
Subject: Re: FW: Scientific Taking Permit text

Eric,

Just a point of clarification, after talking with Stan and the other lamprey biologists, the intent of the permit limits means individuals that are captured but which are immediately returned to the river alive and uninjured because they are too large, too small, or for some other reason do not count against the permit limits. The permit limits refer to the number of individuals retained. Might want to confirm this to make sure, but that's the intent as expressed to EPA and the natural resource trustees on a telephone call a couple of weeks ago.

Best regards,

Burt Shephard
Risk Evaluation Unit
Office of Environmental Assessment (OEA-095) U.S. Environmental Protection Agency, Region 10
1200 6th Avenue Seattle, WA 98101

Telephone: (206) 553-6359
Fax: (206) 553-0119

e-mail: Shephard.Burt@epa.gov

"If your experiment needs statistics to analyze the results, then you ought to have done a better experiment"
- Ernest Rutherford

Eric Blischke/R10/USEPA/US
05/10/2007 04:33 PM

To: "Helle B. Andersen" <helleb@windwardenv.com>
cc: Chip Humphrey/R10/USEPA/US@EPA, Burt Shephard/R10/USEPA/US@EPA
Subject: Re: FW: Scientific Taking Permit text(Document link: Burt Shephard)

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Eric

"Helle B. Andersen" <helleb@windwardenv.com>
05/10/2007 03:52 PM

To: Eric Blischke/R10/USEPA/US@EPA
cc: "John Toll" <johnt@windwardenv.com>, "Lisa Saban" <lisas@windwardenv.com>
Subject: FW: Scientific Taking Permit text

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Thanks Helle

From: Helle B. Andersen
Sent: Monday, May 07, 2007 10:32 AM
To: 'Eric Blischke (blischke.eric@epa.gov)'
Cc: John Toll; 'Valerie Oster'; Lisa Saban
Subject: Scientific Taking Permit text

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Thanks Helle

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per event. Sampling of ammocoetes will cease as soon as the six definitive tests have successfully been completed. Based on conversations with Oregon’s fish biologists, lamprey ammocoetes may be collected in the following rivers with the maximum number collected stated in parentheses. Marys River (1,000), Long Tom River (1,000), Calapooia River (1,000), Siletz River (400), Alsea River (400), Wilson and Trask Rivers (250), and Neustucca River (250).

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If you have received this electronic transmission in error, please notify us by electronic mail at hellea@windwardenv.com.

Helle B. Andersen

From: Helle B. Andersen
Sent: Wednesday, May 16, 2007 5:54 PM
To: 'Eric Blischke (blischke.eric@epa.gov)'
Cc: 'girissarri@nwaquatic.com'; 'Valerie Oster'; John Toll; Lisa Saban; 'McKenna, James (Jim)'; ricka@bes.ci.portland.or.us; 'Robert Wyatt (rjw@nwnatural.com)'
Subject: lamprey testing sizes

Eric,
Before the lamprey toxicity testing phase 2 is initiated two issues remain to be resolved: size of lamprey ammocoetes to be tested and behavioral observations during the tests. I understand from John Toll that you had a conversation last Friday and that you requested an e-mail summarizing our concerns with a verbal suggestion from EPA that the LWG consider using only ammocoetes in a 2.5-4.0 cm size class for the phase 2 testing.

We have four types of concerns about adopting a 2.5-4.0 cm size range including 1) difficulties collecting them in the field and transporting them to the lab, 2) difficulties in holding, 3) limitation in tissue biomass for potential chemistry analysis, and 4) not representative of the ammocoetes collected in the lower Willamette River or the ammocoetes tested in phase 1. Our specific concerns are as follows:

1) EPA has commented (comment Collection 6 in EPA's conditional approval of the Lamprey Toxicity Testing FSP, October 11, 2006) that the phase 1 and phase 2 ammocoete test populations should be of comparable sizes. The average length of the ammocoetes tested during phase 1 was 6.7 cm with a standard deviation of 1.1 cm (range = 4.9-9.0 cm). Therefore, adopting the suggested 2.5-4.0 cm size class would conflict with the stated objective of using comparably sized test populations for the phase 1 and phase 2 testing programs.
2) The average weight of the ammocoetes tested in phase 1 was 0.45 g ww (standard deviation = 0.20 g ww). The average weight of the ammocoetes collected from the lower Willamette during the fall 2006 tissue sampling effort was 1.35 g ww. The two smallest ammocoetes collected from the lower Willamette weighed 0.20 and 0.50 g ww. The largest weight recorded was 2.90 g ww, representing the average individual weight in a composite of two ammocoetes. Therefore, the ammocoetes in the phase 1 toxicity test population were smaller than the ammocoetes collected from the lower Willamette. If the suggested 2.5-4.0 cm size class were employed for the phase 2 testing, the sizes of the individuals in that test population will be even further removed from the sizes of the ammocoetes collected from the lower Willamette River during the fall 2006 tissue sampling effort. From a risk assessment perspective, this would introduce uncertainty into the interpretation of the phase 2 toxicity data. If in fact the 2.5-4.0 cm size class proves to be at the lower end of the size range of the populations sampled for the phase 2 toxicity testing program, then using the 2.5-4.0 cm size class would introduce uncertainty unnecessarily by artificially increasing the size difference between the test population and the lower Willamette ammocoete population.
3) The ammocoetes for phase 2 will be collected earlier in the season and from different rivers than the phase 1 ammocoetes. Therefore, what size ammocoetes we will be able to collect is an unknown, and size may vary from river to river. Based on the results of the phase 1 sampling, there is a real possibility that instituting a 2.5-4.0 cm size class restriction would jeopardize the success of the field sampling effort.
4) Instituting a size class restriction would increase the time spend in the field collecting ammocoetes. If the defined size class falls in the tail of the population distribution (i.e., unusually large or small ammocoetes) then the field time could increase significantly. Because we will also be sampling under a water temperature restriction, it might not be possible to collect enough ammocoetes within the size class even if they are present, again jeopardizing the success of the field sampling effort.
5) The field crew will observe the general size of the ammocoetes but as a matter of practicality they cannot measure them. Therefore, the sample population might include numerous ammocoetes that cannot be used in testing if a size class restriction is enforced. These ammocoetes would still be counted as take in the scientific permit, reducing the effective size of the sample population and potentially jeopardizing our ability to collect a large enough test population.
6) Sampling large numbers of lamprey ammocoetes for toxicity testing is not a standard practice, so the uncertainty about how the sampled organisms will respond to handling and transport is high. Imposing a size class restriction on the test population, particularly if it limits the sample population to unusually small ammocoetes, raises the risk of losses during transport. Though the data to verify do not exist, the field crew that conducted the phase 1 sampling suspects that small ammocoetes are more sensitive to handling and transport. The suggested 2.5-4.0 cm size class would be at the very small end of the phase 1 sample population, so these fish would be at greatest risk from handling and transport.

7) Similarly, the lab has stated a suspicion that smaller ammocoetes are more sensitive to handling and holding. Again, the suggested 2.5-4.0 cm size class would be at the very small end of the phase 1 sample population so ammocoetes in that size class would be the fish at greatest risk from handling and holding. This is difficult to quantify because the ammocoetes are held in sediment, so the fate of individuals cannot be observed. The sediment is sieved at test initiation to retrieve the ammocoetes which increases handling.
8) EPA has commented (comment QAPP 6 in EPA's conditional approval of the Lamprey Toxicity Testing FSP, October 11, 2006) that "after the completion of the Phase 2 definitive toxicity test for each of the six contaminants of interest (COI), ammocoete tissue should be composited from the test replicates and measured for the analyte that was tested." The LWG disagrees with EPA's proposal to measure tissue concentrations because it will not help satisfy the study objective and because of concerns about methodological issues described in our comment response. Setting aside this disagreement for the moment, the suggested 2.5-4.0 cm size class would yield insufficient biomass for chemical analysis. A few small ammocoetes were measured during phase 1 with lengths of 2.8, 3.0, and 4.5 cm and weights of 0.04, 0.06, and 0.15 g ww. The flow through test will be conducted with a total of 40 ammocoetes per concentration so if we were to adopt a 2.5-4.0 cm size range on the test population we estimate that the total biomass per test concentration would range from ~1.5 to 6 g ww. Our initial estimate is that the biomass that would be required to run tissue chemistry varies from 1 g ww for copper to 20 g ww for lindane.

Instead of specifying a 2.5-4.0 size class for the phase 2 test population, we suggest two options:

1) Stipulate that the phase 1 and phase 2 ammocoete test populations should be of comparable sizes. This would result in a size class of ~4-9 cm for the phase 2 test population.
2) Employ a similar approach to phase 1. For phase 1 testing the field crew collected all the ammocoetes they saw. The lab selected the ammocoetes to be tested from the sample population. They selected ammocoetes that were "typical" of the sampled population, i.e., preferentially avoiding unusually sized ammocoetes (large or small). This ensured a more homogeneous test population (i.e., it was possible to get a narrower size range by selecting ammocoetes closer in size to the mode of the sample population). For phase 2, we recommend that the field crew select ammocoetes that are typical of the field population at the site being sampled, and that the lab select ammocoetes for testing that are typical of the sampled population. This will have the effect of minimizing variability in the size distribution of the test population.

Option 1 would maximize the comparability of phase 1 and phase 2 testing and therefore the representativeness of the range-finding tests completed in phase 1. It would also tend to reduce inter-river variability in the size distribution of the sample populations.

Option 2 would minimize size variability in the test population while maximizing the probability of collecting sufficient numbers test organisms.

In light of the advantages and risks of these options, we recommend that option 1 be selected but we are comfortable with either of these two options.

Helle

Helle B. Andersen
Windward Environmental LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119

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Phone (206) 378-1364
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Helle B. Andersen

From: Blischke.Eric@epamail.epa.gov
Sent: Wednesday, May 23, 2007 5:39 PM
To: Helle B. Andersen
Cc: girissarri@nwaquatic.com; John Toll; Lisa Saban; McKenna, James (Jim); ricka@bes.ci.portland.or.us; rjw@nwnatural.com; Valerie Oster
Subject: Re: lamprey testing sizes

Helle, as we discussed previously, EPA wanted to provide you with direction regarding the test parameters for the Phase 2 Lamprey Toxicity testing in advance of the LWG's development of the FSP Addendum. Key test parameters are outlined below.

Type of test: Definitive acute mortality toxicity test Water temperature: 17°C plus or minus 1°C Water hardness: 25 - 30 mg/L as CaCO3 (matches typical Willamette River hardness at Portland, won't match all source stream hardnesses) Light-dark cycle: Run tests in darkness except for periods when fish are being counted, handled, or other routine test operations (e.g. water chemistry sampling) Test endpoint: 96 hour LC50. Qualitatively monitor abnormal behavioral activity of fish if feasible during performance of test. Feed ammocoetes during toxicity tests: No Provide substrate during toxicity tests: No Perform chemical analysis on Phase 2 ammocoetes following 96 hour toxicity test: Yes Watersheds for collection: Marys, Long Tom, Calapooia, Siletz, Alsea, Wilson and Trask, and Neustucca.

Regarding the size range, EPA acknowledges that the 25 - 40 m fish are small but are within the size range of fish previously captured for the rangefinding toxicity tests. Many of the concerns raised below such as the relative sensitivity of the ammocoetes to handling, transport and holding conditions are speculation. In addition, EPA does not believe that the size range of ammocoetes collected in the Willamette River at Portland Harbor has any bearing on the primary objective of the toxicity test, which is to determine the sensitivity of lamprey to a suite of contaminants relative to the sensitivity of other aquatic species to those same contaminants. Any sized ammocoetes will provide useable information on this topic.

EPA has determined that the phase 2 toxicity testing should target ammocoetes in the 25 - 40 mm size range. This size range was determined with input from fisheries biologists with specific expertise with lamprey. The biologists believe that sufficient numbers of ammocoetes in the 25 - 40 mm size range can be captured for the purposes of the toxicity study. However, should the field crews have trouble getting sufficient numbers of fish in the 25 - 40 mm size range, LWG representatives should contact EPA staff to get the approval to capture larger ammocoetes. This process should eliminate your concern about field collections, the schedule of field collections, and jeopardizing the success of the field efforts. Regardless of the size range collected, the fish should be sorted in the laboratory and each test should be run with a distribution of size ranges that mimics the distribution of total lamprey collected.

EPA also has some concerns about the logistics of the field effort due to the potential for lamprey collected at different temperatures or different size classes from the different watersheds targeted for collection. Regarding the temperature, it is EPA's goal to collect all ammocoetes in one field season (i.e., late spring/early summer). As a result, EPA believes that the collection effort should target streams in the 16 - 20 degree range followed by acclimation in the lab and testing at 17 +/- 1 degree C. Regarding the size range, EPA should be contacted regarding the size ranges collected from the various watersheds to ensure representative size classes for testing.

If you have any questions about this, please contact Burt Shephard or myself.

Thanks, Eric

"Helle B. Andersen" <helleb@windwardenv.com>
05/16/2007 05:53 PM

To
Eric Blischke/R10/USEPA/US@EPA

cc
<girissarri@nwaquatic.com>, "Valerie Oster" <voster@anchorenv.com>, "John Toll" <johnt@windwardenv.com>, "Lisa Saban" <lisas@windwardenv.com>, "McKenna, James \(Jim\)" <mckenj@portptld.com>, <ricka@bes.ci.portland.or.us>, <rjw@nwnatural.com>

Subject
lamprey testing sizes

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We have four types of concerns about adopting a 2.5-4.0 cm size range including 1) difficulties collecting them in the field and transporting them to the lab, 2) difficulties in holding, 3) limitation in tissue biomass for potential chemistry analysis, and 4) not representative of the ammocoetes collected in the lower Willamette River or the ammocoetes tested in phase 1. Our specific concerns are as follows:

1) EPA has commented (comment Collection 6 in EPA's conditional approval of the Lamprey Toxicity Testing FSP, October 11, 2006) that the phase 1 and phase 2 ammocoete test populations should be of comparable sizes. The average length of the ammocoetes tested during phase 1 was 6.7 cm with a standard deviation of 1.1 cm (range = 4.9-9.0 cm). Therefore, adopting the suggested 2.5-4.0 cm size class would conflict with the stated objective of using comparably sized test populations for the phase 1 and phase 2 testing programs.
2) The average weight of the ammocoetes tested in phase 1

was 0.45 g ww (standard deviation = 0.20 g ww). The average weight of the ammocoetes collected from the lower Willamette during the fall 2006 tissue sampling effort was 1.35 g ww. The two smallest ammocoetes collected from the lower Willamette weighed 0.20 and 0.50 g ww. The largest weight recorded was 2.90 g ww, representing the average individual weight in a composite of two ammocoetes. Therefore, the ammocoetes in the phase 1 toxicity test population were smaller than the ammocoetes collected from the lower Willamette. If the suggested 2.5-4.0 cm size class were employed for the phase 2 testing, the sizes of the individuals in that test population will be even further removed from the sizes of the ammocoetes collected from the lower Willamette River during the fall 2006 tissue sampling effort. From a risk assessment perspective, this would introduce uncertainty into the interpretation of the phase 2 toxicity data. If in fact the 2.5-4.0 cm size class proves to be at the lower end of the size range of the populations sampled for the phase 2 toxicity testing program, then using the 2.5-4.0 cm size class would introduce uncertainty unnecessarily by artificially increasing the size difference between the test population and the lower Willamette ammocoete population.

3) The ammocoetes for phase 2 will be collected earlier in the season and from different rivers than the phase 1 ammocoetes. Therefore, what size ammocoetes we will be able to collect is an unknown, and size may vary from river to river. Based on the results of the phase 1 sampling, there is a real possibility that instituting a 2.5-4.0 cm size class restriction would jeopardize the success of the field sampling effort.

4) Instituting a size class restriction would increase the time spend in the field collecting ammocoetes. If the defined size class falls in the tail of the population distribution (i.e., unusually large or small ammocoetes) then the field time could increase significantly. Because we will also be sampling under a water temperature restriction, it might not be possible to collect enough ammocoetes within the size class even if they are present, again jeopardizing the success of the field sampling effort.

5) The field crew will observe the general size of the ammocoetes but as a matter of practicality they cannot measure them. Therefore, the sample population might include numerous ammocoetes that cannot be used in testing if a size class restriction is enforced. These ammocoetes would still be counted as take in the scientific permit, reducing the effective size of the sample population and potentially jeopardizing our ability to collect a large enough test population.

6) Sampling large numbers of lamprey ammocoetes for toxicity testing is not a standard practice, so the uncertainty about how the sampled organisms will respond to handling and transport is high. Imposing a size class restriction on the test population, particularly if it limits the sample population to unusually small ammocoetes, raises the risk of losses during transport. Though the data to verify do not exist, the field crew that conducted the phase 1 sampling suspects that small ammocoetes are more sensitive to handling and transport. The suggested 2.5-4.0 cm size class would be at the very small end of the phase 1 sample population, so these fish would be at greatest risk from handling and transport.

7) Similarly, the lab has stated a suspicion that smaller

ammocoetes are more sensitive to handling and holding. Again, the suggested 2.5-4.0 cm size class would be at the very small end of the phase 1 sample population so ammocoetes in that size class would be the fish at greatest risk from handling and holding. This is difficult to quantify because the ammocoetes are held in sediment, so the fate of individuals cannot be observed. The sediment is sieved at test initiation to retrieve the ammocoetes which increases handling.

8) EPA has commented (comment QAPP 6 in EPA's conditional approval of the Lamprey Toxicity Testing FSP, October 11, 2006) that "after the completion of the Phase 2 definitive toxicity test for each of the six contaminants of interest (COI), ammocoete tissue should be composited from the test replicates and measured for the analyte that was tested." The LWG disagrees with EPA's proposal to measure tissue concentrations because it will not help satisfy the study objective and because of concerns about methodological issues described in our comment response. Setting aside this disagreement for the moment, the suggested 2.5-4.0 cm size class would yield insufficient biomass for chemical analysis. A few small ammocoetes were measured during phase 1 with lengths of 2.8, 3.0, and 4.5 cm and weights of 0.04, 0.06, and 0.15 g ww. The flow through test will be conducted with a total of 40 ammocoetes per concentration so if we were to adopt a 2.5-4.0 cm size range on the test population we estimate that the total biomass per test concentration would range from ~1.5 to 6 g ww. Our initial estimate is that the biomass that would be required to run tissue chemistry varies from 1 g ww for copper to 20 g ww for lindane.

Instead of specifying a 2.5-4.0 size class for the phase 2 test population, we suggest two options:

1) Stipulate that the phase 1 and phase 2 ammocoete test populations should be of comparable sizes. This would result in a size class of ~4-9 cm for the phase 2 test population.

2) Employ a similar approach to phase 1. For phase 1 testing the field crew collected all the ammocoetes they saw. The lab selected the ammocoetes to be tested from the sample population. They selected ammocoetes that were "typical" of the sampled population, i.e., preferentially avoiding unusually sized ammocoetes (large or small). This ensured a more homogeneous test population (i.e., it was possible to get a narrower size range by selecting ammocoetes closer in size to the mode of the sample population). For phase 2, we recommend that the field crew select ammocoetes that are typical of the field population at the site being sampled, and that the lab select ammocoetes for testing that are typical of the sampled population. This will have the effect of minimizing variability in the size distribution of the test population.

Option 1 would maximize the comparability of phase 1 and phase 2 testing and therefore the representativeness of the range-finding tests completed in phase 1. It would also tend to reduce inter-river variability in the size distribution of the sample populations.

Option 2 would minimize size variability in the test population while maximizing the probability of collecting sufficient numbers test organisms.

In light of the advantages and risks of these options, we recommend that option 1 be selected but we are comfortable with either of these two options.

Helle

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Helle B. Andersen

From: Helle B. Andersen
Sent: Wednesday, June 20, 2007 12:50 PM
To: 'Shephard.Burt@epamail.epa.gov'
Cc: 'blischke.eric@epa.gov'; 'Gene Revelas'; John Toll; Lisa Saban; 'McKenna, James (Jim)'; 'ricka@bes.ci.portland.or.us'; 'rjw@nwnatural.com'; 'Valerie Oster'
Subject: RE: Lamprey collection temperature text

Thanks Burt for the fast response - I will insert the text in the FSP so that it can go through the full review cycle.
Helle

-----Original Message-----
From: Shephard.Burt@epamail.epa.gov [mailto:Shephard.Burt@epamail.epa.gov]
Sent: Wednesday, June 20, 2007 12:29 PM
To: Helle B. Andersen
Cc: blischke.eric@epa.gov; Gene Revelas; John Toll; Lisa Saban; McKenna, James (Jim); ricka@bes.ci.portland.or.us; rjw@nwnatural.com; Valerie Oster
Subject: Re: Lamprey collection temperature text

Helle,

Probably nothing we can do about the max sampling temperature being 18° C, but in red below is a suggestion for text to relax the temperature restrictions for field collections if necessary to keep the tox testing on schedule. Haven't run this past anyone on our side yet for review, so consider this an initial cut at FSP text.,

Best regards,

Burt Shephard
Risk Evaluation Unit
Office of Environmental Assessment (OEA-095) U.S. Environmental Protection Agency, Region 10
1200 6th Avenue Seattle, WA 98101

Telephone: (206) 553-6359
Fax: (206) 553-0119

e-mail: Shephard.Burt@epa.gov

"If your experiment needs statistics to analyze the results, then you ought to have done a better experiment"
- Ernest Rutherford

"Helle B. Andersen" <helleb@windwardenv.com>
06/20/2007 09:54 AM

To
Burt Shephard/R10/USEPA/US@EPA, Eric Blischke/R10/USEPA/US@EPA
cc
"Valerie Oster" <voster@anchorenv.com>, "John Toll" <johnt@windwardenv.com>,

"Lisa Saban"
<lisas@windwardenv.com>, "Gene
Revelas"
<grevelas@integral-corp.com>,
"McKenna, James \(Jim\)"
<mckenj@portptld.com>,
<ricka@bes.ci.portland.or.us>,
<rjw@nwnatural.com>
Subject
Lamprey collection temperature
text

Eric and Burt,
On the lamprey phone call last Monday you mentioned maybe relaxing the temperature restriction for the lamprey ammocoete collection effort.
Below is the current text in the FSP addendum (to be submitted to EPA in July). Please revise the text so that it addresses your idea about relaxing the temperature restriction and I will insert the text in the FSP addendum.
Thanks Helle

The Phase 2 field collection of lamprey ammocoetes will be conducted using the same methods as those used in Phase 1 (Windward 2006a). The collection will be conducted when the water temperature in the rivers ranges between 16 and 20ºC as requested by EPA and its partners (Blischke 2007). Because of the federal restriction of electrofishing in water temperatures above 18º C in locations where threatened and endangered species are present, collection in Marys, Long Tom, and Calapooia Rivers will be limited to times when the water temperature ranges between 16 and 18ºC. The water and sediment temperature will be measured and recorded in the field logbook before the sampling effort is initiated at each location. The collection temperature range is based on recommendations from fishery biologists that lamprey ammocoetes be collected at temperatures similar to those at which they will be tested in the laboratory.

Procedures to thermally acclimate field collected fish from one temperature to another during and after transfer from the field to a laboratory setting are well developed. If necessary to maintain the toxicity testing schedule and laboratory availability of staff and facilities, LWG may propose alternative field sampling times when the water temperature in streams from which ammocoetes are collected are outside of the desired temperature range of 16°C to 20°C. Before LWG can field collect ammocoetes from streams with water temperatures outside of the 16°C to 20°C range, the LWG must first contact appropriate EPA management and technical staff for approval of the proposed change in field sampling. Thermal acclimation of field collected fish brought into the laboratory to the toxicity test temperature of 17°C must take place at no more than a 1°C change in water temperature per hour.

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Helle B. Andersen

From: Helle B. Andersen
Sent: Friday, June 22, 2007 9:20 AM
To: 'Blischke.Eric@epamail.epa.gov'; 'Shephard.Burt@epamail.epa.gov'; 'rgensemer@parametrix.com'; 'Humphrey.Chip@epamail.epa.gov'
Cc: 'Birgitte'; 'Dave Livesay'; 'Gene Revelas'; John Toll; 'Jeff Peterson'; 'Joan Snyder'; 'Laura kennedy'; 'Linda Baker'; Lisa Saban; 'McKenna, James (Jim)'; Mike Johns; 'Mark Lewis'; 'M.E.R@attglobal.net'; Nancy Judd; 'Nick Varnum'; 'Penny Hunter'; 'Rob Barrick'; 'ricka@bes.ci.portland.or.us'; 'rjw@nwnatural.com'; 'rpastorok@integral-corp.com'; 'Sean Gormley'; Shannon M. Pierce; 'TakuFuji@KennedyJenks.com'; 'Valerie Oster'
Subject: RE: Water quality parameters for lamprey toxicity testing

Eric,
I will add in that ammonia will be monitored at the beginning and end of each test. Regarding the FSP - right now two issues are holding up the FSP and QAPP addenda 1) tissue analysis and 2) if we will be allowed to collect more ammocoetes in Siletz, Nestucca, and Trask (this also ties into the size restriction - if we are not allowed to collect more in these rivers it will be very difficult to met the requested size range). I have contacted Stan (Siltez River) and Keith Brown (Nestucca and Trask River) and also Shelly Miller (the permit coordinator). I have not heard back from Stan and Keith.
Helle

-----Original Message-----
From: Blischke.Eric@epamail.epa.gov [mailto:Blischke.Eric@epamail.epa.gov]
Sent: Thursday, June 21, 2007 9:30 PM
To: Helle B. Andersen; Shephard.Burt@epamail.epa.gov; rgensemer@parametrix.com; Humphrey.Chip@epamail.epa.gov
Cc: Birgitte; Dave Livesay; Gene Revelas; John Toll; Jeff Peterson; Joan Snyder; Laura kennedy; Linda Baker; Lisa Saban; McKenna, James (Jim); Mike Johns; Mark Lewis; M.E.R@attglobal.net; Nancy Judd; Nick Varnum; Penny Hunter; Rob Barrick; ricka@bes.ci.portland.or.us; rjw@nwnatural.com; rpastorok@integral-corp.com; Sean Gormley; Shannon M. Pierce; TakuFuji@KennedyJenks.com; Valerie Oster
Subject: Re: Water quality parameters for lamprey toxicity testing

Helle, this looks fine with the following modification:: Ammonia should be monitored at both the beginning and end of the test.

As we discussed, total dissolved gas does not need to me measured.

Please let us know when the FSP addendum will be completed.

Thanks, Eric

"Helle B. Andersen" <helleb@windwardenv.com>
06/18/2007 02:18 PM

To
Eric Blischke/R10/USEPA/US@EPA
cc
"Gene Revelas" <grevelas@integral-corp.com>, "Valerie Oster" <voster@anchorenv.com>, "Nick

Varnum"
<nvarnum@integral-corp.com>,
"McKenna, James \(Jim\)"
<mckenj@portptld.com>,
<ricka@bes.ci.portland.or.us>,
<rjw@nwnatural.com>, "Birgitte"
<brigitte@geomega.com>, "Dave
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<dlivesay@groundwatersolutions.co
m>, "Jeff Peterson"
<jpeterson@mfainc.org>, "Joan
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"John Toll"
<johnt@windwardenv.com>, "Laura
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<laurakennedy@kennedyjenks.com>,
"Linda Baker" <lbaker@retec.com>,
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Barrick" <rbarrick@entrix.com>,
<rpastorok@integral-corp.com>,
"Sean Gormley"
<sean.gormley@amec.com>, "Shannon
M. Pierce"
<shannonp@windwardenv.com>,
<TakuFuji@KennedyJenks.com>
Subject
Water quality parameters for
lamprey toxicity testing

Eric,
As requested in the lamprey phone call this morning the following water quality parameters will be measured during the Phase 2 testing:

1) Temperature, dissolved oxygen, and pH will be measured daily in all concentrations.
2) Conductivity, hardness, and alkalinity will be measured daily in the control and highest concentration.
3) In addition, as requested by EPA water samples will also be collected at test initiation for analyses of ammonia, particulate matter, and total organic carbon (TOC).

As agreed upon at the meeting total dissolved gas will not be measured in water samples during the Phase 2 testing.

Helle

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Helle B. Andersen

From: Helle B. Andersen
Sent: Friday, July 06, 2007 11:52 AM
To: 'Humphrey.Chip@epamail.epa.gov'; 'Eric Blischke (blischke.eric@epa.gov)'
Cc: Lisa Saban; John Toll; 'Valerie Oster'; 'Lora Boehlke'
Subject: Second e-mail with survey memo
Attachments: Lamprey recon survey 6_22_07_to_Exec.pdf; Figure 1 R3 lamprey collection recon area .pdf

Chip and Eric,
Attached please find the reconnassaince survey memo submitted to LWG.
Helle

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MEMORANDUM

To: Lower Willamette Group

From: Helle Andersen and Thai Do, Windward Environmental LLC

Subject: Reconnaissance Survey for Lamprey Toxicity Testing

Date: June 22, 2007

A reconnaissance survey of suitable lamprey ammocoete habitat was conducted from June 11 through June 14, 2007, in the following eight rivers: Calapooia River, Long Tom River and its tributaries (Bear Creek and Ferguson Creek), Marys River and one of its tributaries (Greasy Creek), Alsea River, Siletz River, Nestucca River, Trask River, and Wilson River. These rivers were identified by Oregon fishery biologists as potential sampling areas for lamprey ammocoetes. The biologists also identified the number of ammocoetes permitted to be collected in each river. The objectives of the survey were to:

- Identify areas in each river with suitable habitat for lamprey ammocoetes
- Estimate the population size at each potential collection area to develop a "catch per unit effort"
- Measure the lengths of the ammocoetes caught to estimate the size distribution at each sampling area and thereby determine if it is possible to collect sufficient lamprey ammocoetes in size range (2.5 to 4 cm) requested by the US Environmental Protection Agency (EPA)
- Measure water and sediment temperature at the potential collection areas

SUMMARY OF SURVEYED POTENTIAL SAMPLING AREAS

A total of 72 areas in the eight rivers were surveyed for suitable lamprey ammocoete habitat. Because the rivers ran mostly through private property, the survey was primarily performed from bridges, boat ramps, and other public assess areas. In a few places, the landowner granted us permission to do the survey. Of all areas surveyed, 26 areas were deemed to have suitable habitat for lamprey ammocoetes. Suitable habitat was identified as an area with sandy or silty substrate and with medium to slow water flow. In addition, to be able to electrofish with the packpack electrofisher and catch the ammocoetes with a hand-held dip net, the water should be relatively clear, the water depth should be less than approximately 0.5 m, and the sampling substrate should be relatively free of debris (e.g., rocks, wood). Electrofishing was conducted in 23 of these areas, and lamprey ammocoetes or macrophalmia were caught in 21 areas. Table 1

summarizes the areas surveyed in the eight rivers. Figure 1 presents the potential lamprey ammocoete sampling areas in relation to Newport, Oregon, where the toxicity testing laboratory is located.

LAMPREY AMMOCOETE CATCH DATA

The number and estimated lengths of lamprey ammocoetes caught at each sampling area are summarized in Table 2. An estimated catch-per-unit effort (CPUE) based on all ammocoetes caught at each area is calculated to provide general information on the level of effort needed to collect ammocoetes for toxicity testing. The percentage of the caught ammocoetes in the size range requested by EPA and the estimated mean length are also presented in the table. The most ammocoetes were caught in the Siletz River at "Miller Place" and in the Trask River at boat ramp No. 4890, with an estimated CPUE of 120 ammocoetes per hour (which includes all ammocoetes caught regardless of size). Two other productive areas are in the Trask River at the Cedar Creek boat ramp (96 ammocoetes per hour) and in the Nestucca River at the Three Rivers boat ramp (84 ammocoetes per hour). The mean size ranged from 3.7 to 11.4 cm. At 43% of all areas fished, no ammocoetes were caught in the required 2.5-to-4-cm range and in an additional 43% of all areas, the required size range represented only between 8 and 45% of all ammocoetes caught. At only three areas (in the Siletz, Nestucca, and Trask Rivers) was a majority (50 to 89%) of the ammocoetes in the 2.5-to-4-cm size range.

The composition of the collected ammocoetes species is unknown because it is not possible to visually identify the species at this life stage in the field. However, based on limited information in the literature, at least three species may be present in the rivers. In the coastal rivers, Pacific lampreys are likely the most abundant species. In addition, Western brook lampreys are also abundant in the lower portions of coastal basins. Juvenile river lampreys, if they are present, are likely to be mixed among Western brook lampreys. In the inlands rivers, the three species have also been reported, but the relative abundance of the species is not known because of inefficient or unsystematic monitoring of lamprey abundance and distribution (Kostow 2002).

TEMPERATURE DATA

Water and sediment temperatures were measured at the majority of the areas where electrofishing was performed. The temperature at a few areas was not measured because the thermometer broke on the way down a steep embankment. The water temperature ranged from 11.0º C in Marys River and in a tributary to Long Tom River, to 18.0º C in a tributary to Calapooia River. The sediment temperature was measured in the top 2 to 5 cm of the substrate, and the temperature was similar to the water temperature, ranging from 11.0 to 18.0º C. At five areas, the sediment temperature was 1.0 to 1.5º C lower than the water temperature; and at another two areas, the sediment temperature was 0.5º C higher than the water temperature. The temperature measurements are summarized in Table 3.

CONCLUSIONS

Based on this survey, there are several issues to discuss with EPA. The first issue is the restricted size range. Ammocoetes were caught (by electrofishing) at 21 areas. At nine of these areas, no ammocoetes in the 2.5-to-4-cm range were caught (43% of all areas); and in an additional nine

areas, the required size range only represented between 8 and 45% of all ammocoetes caught. At only three areas (in the Siletz, Nestucca, and Trask Rivers) was a majority (50 to 89%) of ammocoetes in the 2.5-to-4-cm size range. The second issue relates to the amount of time spent in the field collecting the ammocoetes. If all ammocoetes caught at each area are included (ranging from 2.5 to 15 cm), the CPUE ranged from 28 to 120 ammocoetes per hour. An absolute minimum of 1,500, but preferably 2,000, ammocoetes are required for the toxicity testing; the collection permit allows for taking up to 3,000 ammocoetes. This may be an issue because at the very productive areas, only 125 to 400 ammocoetes are permitted to be collected; and at other locations, the area of accessible suitable habitat is relatively small and may therefore not provide all the ammocoetes that are allowed for collection. Depending on which rivers will be used to collect the ammocoetes (the most productive rivers are on the coast, where water temperature data indicate that the summer maximum temperature is about 20 to 22º C for a few warm days at end of July), the temperature may therefore only exceed the upper limit (20º C) of the temperature range requested by EPA for about 1 week in July. The toxicity testing with the ammocoetes can more or less be performed at any time during the summer.

REFERENCES

Kostow K. 2002. Oregon lampreys: natural history status and analysis of management issues. Oregon Department of Fish and Wildlife, Portland, OR.

Table 1. Areas Surveyed for Suitable Lamprey Ammocoete Habitat in the Eight Oregon Rivers

River and Tributary	Coordinates		Comment
	Latitude	Longitude	
Calapooia River			
McKercher Park upstream	44 21.475 N	122 52.525 W	Electrofished and caught lamprey ammocoetes.
McKercher Park central	44 21.482 N	122 52.546 W	Electrofished and caught lamprey ammocoetes.
Sodom Ditch (Morse Brothers Slate Quarry)	44 24.650 N	123 02.798 W	Electrofished and caught lamprey ammocoetes.
Linn West Road	44 25.516 N	123 03.857 W	Electrofished and caught lamprey ammocoetes
Sodom Ditch upstream of sampling area at Morse Brothers Slate Quarry	44 24.422 N	123 02.520 W	Potential sampling area – did not electrofish.
Sodom Ditch next to Linn West Road	-	-	No suitable habitat.
Brownsville dam on Kirk Ave	44 23.288 N	122 55. 994 W	Electrofished two places and caught nothing.
Roberts Road bridge at MP 1.14	-	-	No suitable habitat.
Slough next to Boston Mill Road	-	-	No suitable habitat.
Boston Mill Road at Boston Mill	-	-	No suitable habitat.
Boston Mill Road	-	-	No suitable habitat.
Sodom Ditch on Boston Mill Road	-	-	No suitable habitat.
KOA Campground outside Corvallis	-	-	No suitable habitat.
Long Tom River			
Stroada Farm	44 16.713 N	123 17.293 W	Electrofished and caught one lamprey macropthalmia.
Bear Creek	44 11.093 N	123 19.102 W	Electrofished and caught lamprey ammocoetes.
Ferguson Creek	44 15.111 N	123 22.329 W	Electrofished and caught lamprey ammocoetes.
Ferguson Creek at Thompson	44 15.389 N	123 22.997 W	Electrofished and caught lamprey ammocoetes.
Bridge along Bear Creek east of Goldson	-	-	Access denied by owner.
Bridge along Bear Creek on Territorial Highway	-	-	No suitable habitat.
Bridge along Bear Creek on High Pass Road	-	-	No suitable habitat.
Bridge along Ferguson Creek on Territorial Highway	-	-	No suitable habitat.
Last bridge on Ferguson Road	-	-	No suitable habitat.

Table 1. Areas Surveyed for Suitable Lamprey Ammocoete Habitat in the Eight Oregon Rivers

River and Tributary	Coordinates		Comment
	Latitude	Longitude	
Marys River			
Marys Road	44 37.880 N	123 34.459 W	Electrofished and caught lamprey ammocoetes.
East Fork second bridge on Hoskins Road	44 39.950 N	123 32.170 W	Electrofished and caught lamprey ammocoetes.
West Fork bridge on Marks Road	44 41.245 N	123 34.124 W	Electrofished and caught lamprey ammocoetes.
West Fork at Marys Road	44 41.657 N	123 34.295 W	Electrofished and caught lamprey ammocoetes.
Greasy Creek Road	44 29.701 N	123 26.374 W	Electrofished and caught lamprey ammocoetes.
Bridge on Long Road	-	-	No suitable habitat.
First bridge on Huskin Road	-	-	No suitable habitat.
Bridge at Blodgett	-	-	No suitable habitat.
Bridge on Highway 20 MP 44	-	-	No suitable habitat.
Bridge on Highway 34 at Philomath	-	-	No suitable habitat.
Bridge on Fir Creek Lane (Greasy Creek)	-	-	No suitable habitat.
Bridge on Decker Road	-	-	No suitable habitat.
Bridge on Botkin Road	-	-	No suitable habitat.
Alsea River			
Camp Bell boat ramp No. 3024	44 21.960 N	123 41.383 W	Electrofished and caught lamprey ammocoetes.
Blackberry Campground boat ramp No. 3021	44 22.398 N	123 50.183 W	Electrofished and caught lamprey ammocoetes.
Bridge near Fish Hatchery Road	-	-	No suitable habitat.
Mill Creek boat ramp	-	-	No suitable habitat.
Salmonberry Park boat ramp No. 3066	-	-	Small potential sampling area – did not electrofish.
Missouri Bend Rec. Area	-	-	No suitable habitat.
River Edge Rec. area boat ramp No. 3067	-	-	No suitable habitat.
Boat ramp No. 3057?	-	-	No suitable habitat.
Bridge over Fall Creek	-	-	No suitable habitat.
Five Rivers Road	-	-	No suitable habitat.
Boat ramp No. 3048	-	-	No suitable habitat.

Table 1. Areas Surveyed for Suitable Lamprey Ammocoete Habitat in the Eight Oregon Rivers

River and Tributary	Coordinates		Comment
	Latitude	Longitude	
Mike Bauer Waysite boat ramp No. 3051	-	-	Potential sampling area – did not electrofish.
Angling spot downstream of boat ramps No. 3063 and No. 3039	-	-	No suitable habitat.
Boat ramp No. 3078	-	-	No suitable habitat.
Tidewater/Kozy boat ramp	-	-	No suitable habitat.
Taylor's Landing boat ramps No. 3036 and No. 3072	-	-	No suitable habitat.
Siletz River			
Miller Place	44 47.973 N	123 56.893 W	Electrofished and caught lamprey ammocoetes.
Morgan boat ramp	44 47.969 N	123 54.445 W	Potential sampling area – did not electrofish.
Nestucca River			
Three Rivers boat ramp	45 14.077 N	123 52.400 W	Electrofished and caught lamprey ammocoetes.
Wolf Road boat ramp No. 4221	45 16.763 N	123 46.822 W	Electrofished and caught lamprey ammocoetes.
Clear Creek bridge	-	-	No suitable habitat.
Bridge in Cloverdale	-	-	No suitable habitat.
Wayside boat ramp	-	-	Small potential sampling area – did not electrofish.
First bridge after turnoff from Highway 101 at Bixby; Blaine Road	-	-	No suitable habitat.
Bridge at Bora Road	-	-	No suitable habitat.
Trask River			
Lower Trask boat ramp No. 4890	45 25.816 N	123 49.122 W	Electrofished and caught lamprey ammocoetes.
Cedar Creek boat ramp (pool)	45 26.884 N	123 42.337 W	Electrofished and caught lamprey ammocoetes.
Cedar Creek boat ramp (sandbar)	45 26.884 N	123 42.337 W	Electrofished and caught lamprey ammocoetes.
Bridge at Johnson Ridge (Trask River Road)	-	-	No suitable habitat.
Loren's Drift boat ramp No. 4884	-	-	No suitable habitat.
Wilson River			
Mills Bridge boat ramp off Highway 6	45 28.313 N	123 44.341 W	Tried to electrofish but could not see anything due to waves and reflections of the water.
Sollie Smith boat ramp No. 5184	-	-	No suitable habitat.

Table 1. Areas Surveyed for Suitable Lamprey Ammocoete Habitat in the Eight Oregon Rivers

River and Tributary	Coordinates		Comment
	Latitude	Longitude	
Boquist River Road of Highway 101	-	-	No suitable habitat.
Wilson River RV Park	-	-	No suitable habitat.
Bridge at Mill Bridge Road	-	-	No suitable habitat.
Herd Hole boat ramp No. 5175	45 29.479 N	123 41.220 W	Potential area on other side of fast moving river.
Bridge at Kansas Creek Road	-	-	No suitable habitat.

Table 2. Lamprey Ammocoete Catch Information

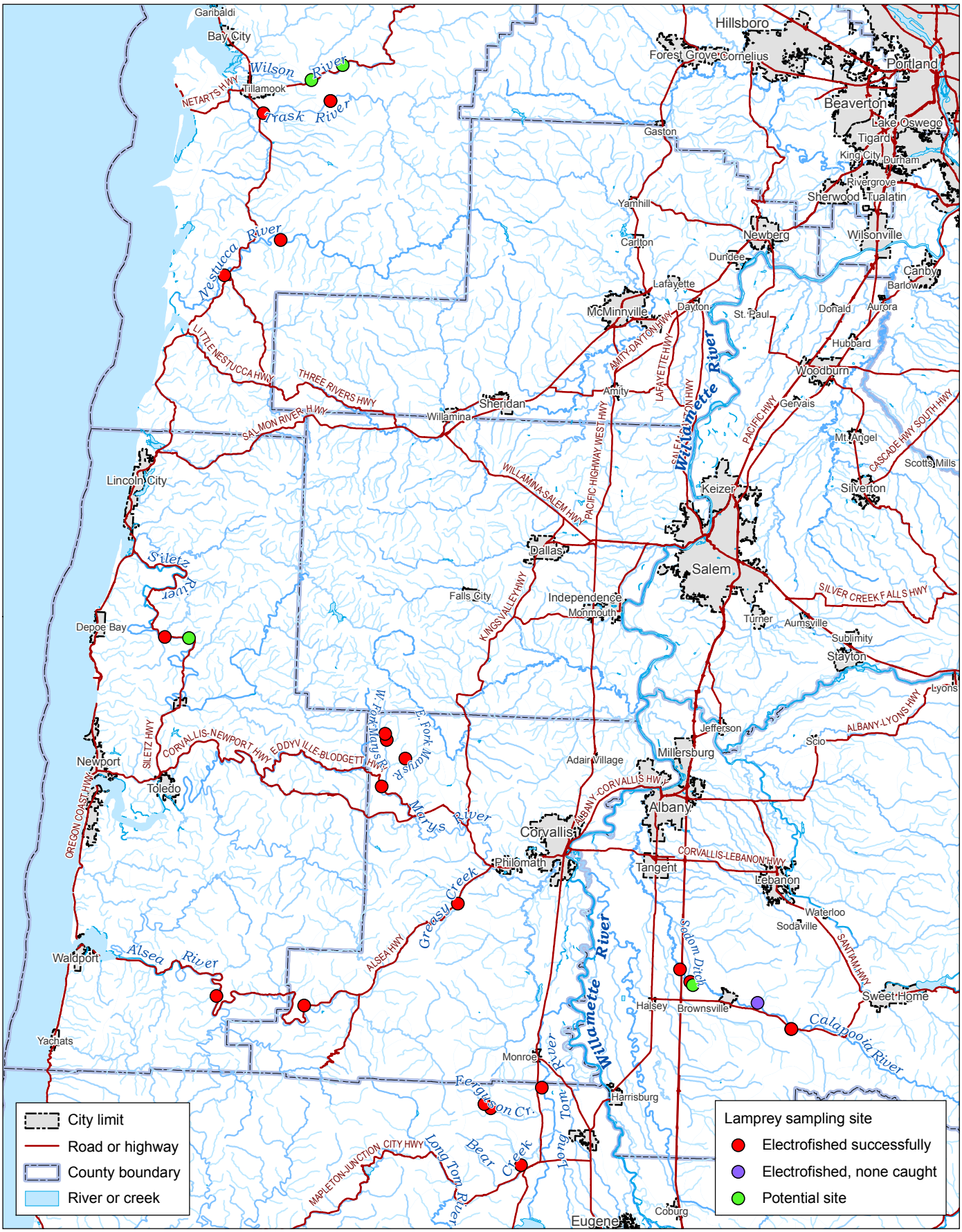
Number of Lamprey Permitted for Collection by River	Tributary/Area	Total Number Caught	Estimated Size of Lamprey Caught (cm)	Mean Size (cm)	% in Required Size Range (2.5 to 4 cm)	Time (minutes)	CPUE (per hour)
Calapooia River							
1,000 ammocoetes	McKercher Park upstream	4	8, 8, 8, 8	8.0	0	5	48
	McKercher Park central	7	10, 10, 10, 10, 10, 10, 5	9.3	0	15	28
	Sodom Ditch (Morse Brothers)	6	5, 6, 7, 10, 10, 10	8.0	0	15	24
	Linn West Road	9	4, 5, 5, 7, 8, 8, 10, 10, 12	7.7	11	12	45
Long Tom River							
1,000 ammocoetes	Stroada Farm	-	1 macrophalmia	-	-	15	-
	Bear Creek	10	6, 6, 7, 7, 7, 7, 10, 10, 15, 15	9.0	0	15	40
	Ferguson Creek	6	3, 5, 6, 7, 8, 10	6.5	17	15	24
	Ferguson Creek at Thompson	10	3, 3, 4, 5, 5, 5, 6, 7, 10, 10	5.8	30	10	60

Table 2. Lamprey Ammocoete Catch Information

Number of Lamprey Permitted for Collection by River	Tributary/Area	Total Number Caught	Estimated Size of Lamprey Caught (cm)	Mean Size (cm)	% in Required Size Range (2.5 to 4 cm)	Time (minutes)	CPUE (per hour)
Marys River							
1,000 ammocoetes	Marys Road	5	7, 10, 12, 14, 14	11.4	0	15	20
	East Fork at Hoskins Road	4	6, 7, 8, 10	7.8	0	15	16
	West Fork at Marks Road	11	2, 3, 3, 3, 3, 4.5, 6, 6, 7, 7, 9	4.9	45	15	44
	West Fork at Marys Road	12	3, 3, 4, 5, 5, 6, 7, 7, 7, 9, 10, 11	6.4	25	10	72
	Greasy Creek Road	13	3, 5, 5, 6, 7, 7, 7, 7, 7, 7, 8, 8, 9	6.6	8	10	78
Alsea River							
400 ammocoetes	Camp Bell boat ramp	8	4, 4, 5, 5, 6, 7, 8, 9	6.0	25	15	32
	Blackberry Campground	6	6, 7, 8, 10, 10, 11	8.7	0	14	26
Siletz River							
400 ammocoetes	Miller Place (by Cedar Creek)	20	3, 3, 3, 3, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 5, 5, 7, 7, 9	4.5	75	10	120
Nestucca River							
250 ammocoetes	Three Rivers Boat ramp	14	3, 3, 4, 4, 4, 4, 4.5, 5, 6, 7, 7, 9, 9, 9	5.6	43	10	84
	Boat ramp No. 4221	9	2.5, 3, 3, 3.5, 3.5, 3.5, 4, 4, 6	3.7	89	15	36
Trask River							
125 ammocoetes	Boat ramp No. 4890	20	4, 4, 4, 4, 4, 4, 4, 4.5, 5, 5, 5, 5, 5, 5 (6 escaped)	4.5	50	10	120
	Cedar Creek boat ramp (pool)	8	3.5, 4, 5, 6, 6, 6, 7, 8	5.7	25	10	48
	Cedar Creek boat ramp (sandbar)	8	7, 7, 7, 7, 8, 9, 10, 10	8.1	0	5	96

Table 3. Sediment and Water Temperature Data

River/Tributary/Area	Temperature (ºC)	
	Sediment	**Water**
Calapooia River		
McKercher Park upstream	15.0	16.5
Sodom Ditch (Morse Brothers Slate Quarry)	18.0	18.0
Brownsville dam on Kirk Ave	14.0	15.5
Long Tom River		
Stroada Farm	16.0	16.0
Bear Creek	11.0	11.0
Marys River		
Marys Road	12.0	12.0
East Fork second bridge on Hoskins Road	11.0	11.0
West Fork bridge on Marks Road	11.5	11.0
West Fork at Marys Road	11.0	11.0
Greasy Creek Road	12.5	12.5
Alsea River		
Camp Bell boat ramp No. 3024	15.0	14.5
Blackberry Campground boat ramp No. 3021	16.0	16.0
Siletz River		
Miller Place	15.0	16.0
Nestucca River		
Three Rivers boat ramp	13.0	13.0
Wolf Road boat ramp No. 4221	11.5	12.5
Trask River		
Lower Trask boat ramp No. 4890	14.5	15.5
Cedar Creek boat ramp (pool)	13.0	13.0
Wilson River		
Mills Bridge boat ramp off Highway 6	14.0	14.0



Prepared by LSM 6/15/07, map #2966, W:\Projects\01-25-01 Portland Harbor ERA\Data\GIS\Events\Lamprey&Sturgeon\R3

Wind Ward LLC environmental

0 1 2 3 4 5 10 15 Miles

0 2.5 5 10 15 20 Kilometers

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Lamprey (*Lampetra* sp.) Ammocoete Reconnaissance June 11 to 14, 2007

DRAFT

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WORK PRODUCT PREPARED IN ANTICIPATION OF LITIGATION

Helle B. Andersen

From: Helle B. Andersen
Sent: Monday, July 09, 2007 11:41 AM
To: 'Humphrey.Chip@epamail.epa.gov'; 'Eric Blischke (blischke.eric@epa.gov)'
Cc: Lisa Saban; John Toll; 'Valerie Oster'; 'Lora Boehlke'
Subject: FSP addendum
Attachments: R3 Lamprey tox testing FSP addendum to EPA_7_6_07.pdf

Chip and Eric,
As discovered by Chip the QAPP addendum had wrongfully been pdf'ed as the FSP addendum. Attached is the correct pdf'ed file of the FSP addendum.
Sorry about the confusion.
Helle

Helle B. Andersen
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200 West Mercer Street, Suite 401
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This communication is made under the framework of the LWG Participation Agreement and in the parties' common interests in meeting LWG member obligations under the Administrative Order on Consent and in anticipation of litigation concerning liability for the Portland Harbor Superfund site. This communication is intended and believed by the parties to be part of an ongoing and joint effort to develop and maintain a common legal strategy and contains strategies, work product and legal advice within the "common interest" extension of the attorney-client privilege and the work product doctrine. This communication may include attorney-client communications. With respect to communications by private LWG members to public members, those communications are with the expectation that they will be kept confidential by the public entities. The information is intended to be for the use of the individual or entity named above. If you are not the intended recipient, please be aware that any disclosure, copying, distribution or use of the contents of this information is prohibited. If you have received this electronic transmission in error, please notify us by electronic mail at hellea@windwardenv.com.

Helle B. Andersen

From: Helle B. Andersen
Sent: Friday, July 13, 2007 9:11 AM
To: 'Humphrey.Chip@epamail.epa.gov'; 'Eric Blischke (blischke.eric@epa.gov)'
Cc: Lisa Saban; John Toll; Valerie Oster; Lora Boehlke; Gene Revelas
Subject: Lamprey LR50 meorandum
Attachments: LR50 writeup_Final_7_12_07.doc

Chip and Eric,
On behalf of LWG we are pleased to submit the lamprey LR50 memorandum requested by EPA.
Helle

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MEMORANDUM

To:	Lower Willamette Group Executive Committee
From:	Matt Luxon, Windward Environmental LLC
Subject:	Results of a literature search for fish LR50 studies conducted with chemicals proposed for definitive lamprey toxicity tests
Date:	July 12, 1007

Assuming that chemical tissue concentrations are in equilibrium throughout the organism, whole body tissue concentration data are considered a better estimate of the chemical dose at the site of toxic action than concentrations in the exposure media such as LC50s. Tissue concentrations from toxicity tests associated with a specified endpoint are referred to as critical tissue concentrations (CTCs). LR50s are a statistically robust method of calculating a CTC based on the mortality endpoint for a given test population. EPA has requested the Lower Willamette Group (LWG) collect tissue concentration data from lamprey used in Round 3 Phase II toxicity tests in order to calculate LR50s from these data. For these data to be useful, it is necessary that comparable data exist for other fish in order to determine the relative sensitivity of lamprey. To determine if comparable data are available, Windward Environmental LLC (Windward) conducted a literature search to identify fish LR50 studies for the chemicals used in the Round 3 lamprey toxicity tests. Searches were conducted in the US Environmental Protection Agency (EPA) ECOTOX database and the US Army Corps of Engineers (USACE) Environmental Residue Effects Database (ERED). ECOTOX search terms included the Chemical Abstract Service (CAS) numbers and LR50 and LRX (i.e., any other lethal residue value) endpoints. ERED search terms included LD50 (dose that is lethal to 50% of an exposed population) and CAS number. A Google™ search was also conducted using the term LR50 and the chemical name. The studies identified were reviewed to determine their quality. Factors such as the use of controls, replication of exposures, and exposure route were considered. Factors that may affect the comparability of the identified studies to lamprey LR50s were also identified and are described in the following subsections by chemical.

No fish LR50 studies were identified for any of the chemicals proposed for lamprey toxicity testing. Studies reporting LD50s (concentration in exposure media that is lethal to 50% of a population) with associated tissue concentrations were identified for pentachlorophenol, diazinon, and aniline; but no LD50 studies that also reported tissue concentrations were

identified for copper or naphthalene (Table 1). The pentachlorophenol, diazinon, and aniline LD50 results are discussed below. Based on an initial review of the LD50 studies that report tissue concentrations, it appears that several pentachlorophenol studies provide tissue concentration data that could provide an indirect comparison with lamprey LR50 data. However, these data are not directly comparable to an LR50 because they do not consider the variability in tissue concentrations between replicates and among doses to statistically derive a tissue concentration associated with 50% mortality in the test population. Instead, these studies generally report tissue concentrations associated with one or more exposure concentration. Toxicity data for copper, naphthalene, and aniline appear to be insufficient for comparison with lamprey LR50 data. The diazinon toxicity data has not yet been reviewed. However, no standard analytical method exists for analysis of diazinon in tissue so reported diazinon tissue residue concentrations from different studies may not be comparable.

Table 1. Literature search results for fish LR50s and LD50s with tissue chemistry data for chemicals used in lamprey toxicity testing study

Chemical	CAS	Number of Fish LR50 Studies Identified	Number of Fish LD50 Studies with Tissue-Residue Data
Copper	7440-50-8	0	0
Pentachlorophenol	87-86-5	0	9
Diazinon	33-41-5	0	1
Aniline	62-53-3	0	2
Naphthalene	91-20-3	0	0

CAS – Chemical Abstract Service

LR50 – tissue concentration that is lethal to 50% of an exposed population

LD50 – dose (in any exposure media) that is lethal to 50% of an exposed population

Pentachlorophenol

Nine fish pentachlorophenol LD50 studies that reported whole-body tissue concentrations for five different species were identified (Table 2). Several papers provided tissue concentrations associated with 50% mortality. However, as discussed above, these data are not directly comparable to an LR50. Nonetheless, several of the studies used robust experimental designs that resulted in consistent tissue concentrations over several exposure durations and pentachlorophenol concentrations. Therefore, the results are likely comparable to a statistically derived LR50 for that test population. In evaluating these data, it is important to note that pentachlorophenol is transformed to excretable byproducts within a matter of hours to days (1995; van den Heuvel et al. 1991); so, despite the fact that some studies reported consistent tissue concentrations associated with mortality, tissue concentrations are likely to vary with exposure duration. This and other sources of variability may affect comparisons with lamprey LR50 data.

Table 2. Fish whole-body tissue concentrations of pentachlorophenol associated with LD50 or higher concentrations

Citation	Journal	Species	Exposure Route	Tissue Concentration in Dead Fish (mg/kg ww)	Tissue Concentration in Surviving Fish (mg/kg ww)
Thomas et al. (1981)	Biomonitoring Mar. Poll. 73-103	striped mullet	water	nr[a]	37[a]
van den Huevel et al. (1991)	Aquat Toxicol 20: 235-252	rainbow trout	water	22 – 39[b]	44
Hodson et al. (1988)	Environ Tox & Chem 07:443-454	rainbow trout	injection	35	nr
Hodson et al. (1984)	Environ Tox & Chem 03:243-254	rainbow trout	injection	37	nr
Kishino T, K Kobayashi (1995)	Water Res 29:431-442	goldfish	water	82 – 98	0.89 – 66[c]
Kobayashi et al. (1979)	Bull Jpn Soc Sci Fish 45:173-175	goldfish	water	95	nr
Hickie et al. (1995)	Environ Tox & Chem 14:2187-2197	fathead minnow	water	80[d]	45 – 152[e]
McCarty et al. (1993)	Ecotoxicol Environ Saf 25:253-270	fathead minnow	water	71[f]	nr
Hattula, et al.(1981)	Bull Environ Contam Toxicol 26:295-298	brown trout	water	200	nr

[a] Some liver and blood tissue was removed from carcasses prior to PCB analysis. It is not clear if tissue concentration analyses were based only on surviving fish or if dead fish were also included.

[b] Tissue concentrations are for 100% mortality.

[c] Concentrations in live fish exposed to 0.1 mg/L at pH range of 5.5 to 10. LC50 concentration range was 0.15 to 2.5 mg/L in this pH range, decreasing with increasing pH.

[d] Mean tissue concentration for exposure concentrations ranging from 310 to 517 mg/L and exposure durations ranging from 8 to 60 hours. Standard deviation was 5.3 mg/kg.

[e] Concentrations in live fish exposed to 196 mg/L for 144 hours. Concentration was lower than the 144-hour LC50 of 258 mg/L.

[f] Tissue concentration estimated from LC50 based on an estimated bioconcentration factor.

nr – not reported

Three studies reported data for rainbow trout (van den Heuvel et al. 1991; Hodson et al. 1988, 1984). In one study, van den Heuval et al. (1991) exposed rainbow trout to six aqueous pentachlorophenol concentrations. Whole-body tissue concentrations were measured in all individual dead and surviving fish. The tissue concentrations reported for dead fish (22 to 39 mg/kg) are associated with exposure concentrations for which mortality was 100%. A higher tissue concentration (44 mg/kg) was reported for live fish exposed at water concentrations below the LC50. Exposure duration, lipid content, and exposure dose all significantly affected lethal tissue concentrations. Lipid levels also significantly affected non-lethal tissue concentrations. In two separate studies, Hodson et al. (1984; 1988) exposed rainbow trout through intraperitoneal injection and reported only the injected dose, so these data are poorly representative of whole-body tissue concentrations.

Two studies reported data for goldfish (Kobayashi et al. 1979; Kishino and Kobayashi 1995). Kobayashi et al. (1979) exposed 2-g goldfish to six concentrations of aqueous pentachlorophenol for 12 or 24 hours. All dead fish were analyzed for whole-body pentachlorophenol concentrations. The tissue concentration for the water concentration closest to the 24-hour LC50 was reported. Kishino and Kobayashi (1995) exposed 1.3-g goldfish to aqueous pentachlorophenol for 5 hours at six pHs levels ranging from 5.5 to 10. Tissue concentrations were analyzed in pooled samples of surviving fish and dead fish. LC50 values decreased with increasing pH. Tissue concentrations in live fish increased with time and exposure concentration but decreased with pH. Tissue concentrations in dead fish were similar among all pH and pentachlorophenol exposure concentrations.

Two studies were identified for fathead minnow (Hickie et al. 1995; McCarty 1993). Hickie et al. (1995) exposed juvenile fathead minnows to several different pulsed and non-pulsed aqueous pentachlorophenol concentrations for periods ranging from 2 to 96 hours. Whole-body tissue concentrations in dead fish were consistent regardless of exposure conditions. Tissue concentrations in surviving fish ranged from 45 to 152 mg/kg. McCarty et al. (1993) estimated the tissue concentration from the LC50 based on the log K_{OW}-bioconcentration factor (BCF) relationship; therefore, this tissue concentration is uncertain and not appropriate for comparison with a lamprey LR50 concentration.

One study each was identified for brown trout and striped mullet (Hattula et al. 1981; Thomas et al. 1981, respectively). Hattula et al. (1981) exposed 4.5-g brown trout to aqueous pentachlorophenol for 24 hours. The LC50 was derived, and a single whole-body tissue concentration was associated with the LC50. The methods for associating the tissue concentration with the LC50 are not described. Thomas et al. (1981) exposed juvenile striped mullet for 14 days to 100 or 200 mg/L aqueous pentachlorophenol and monitored mortality daily. Fifty percent mortality was reported for the 100-mg/L exposure at 5 days, and 33% mortality was reported for the 200-mg/L exposure at 24 hours, associated with tissue concentrations of 37 and 17.8 mg/kg, respectively. Results of this study are not comparable with an LC50 because the 50% mortality data are based on 50% mortality associated with a single exposure concentration, rather than a statistical analysis of several exposure concentrations.

Based on the literature data identified, the range of fish pentachlorophenol CTCs associated with mortality is less than an order of magnitude (i.e., 22 to 200 mg/kg) indicating that CTCs are somewhat consistent among different fish and exposure conditions. However, these data represent only five species from three families so extrapolation to fish in general is uncertain. In contrast, based on the EPA Ecotox database, there are LC50 values for 77 different fish species. Because pentachlorophenol CTC studies represent only a small fraction of the species for which LC50 data exist, determining the sensitivity of lamprey relative to other fish based on CTC data is not likely to reduce the uncertainty in comparisons of the relative sensitivity of lamprey and other fish based on LC50s alone.

Diazinon

One diazinon fish LD50 study that reported whole-body tissue concentration data was identified (Table 3). This study has not yet been obtained for review. Note that in addition to the lack of published fish LR50 data, there is additional uncertainty regarding the comparison of a lamprey diazinon LR50 to a published tissue concentration associated with an LD50 because there is no standard analytical method for the analysis of diazinon in tissue so reported diazinon tissue residue concentrations from different studies may not be comparable.

Table 3. Whole-Body Fish Tissue Concentrations of Diazinon Associated with LD50s

Citation	Journal	Species	Tissue Concentration (mg/kg ww)	Exposure Route
Keizer et al. (1991)	Aquat Toxicol 21:239-254	guppy	85	absorption
Keizer et al. (1991)	Aquat Toxicol 21:239-254	zebra fish	1,800	absorption

ww – wet weight

Aniline

Two aniline fish LD50 studies reporting whole body tissue concentration data were identified. These studies are both poorly comparable with an LR50 because they reported the injected dose, rather than measured tissue concentrations (Table 4).

Table 4. Whole-Body Fish Tissue Concentrations of Aniline Associated with LD50s

Citation	Journal	Species	Tissue Concentration (mg/kg ww)	Reps	Exposure Route
Hodson et al. (1988)	ET&C 1988	rainbow trout	1330	1	injection
Hodson et al. (1984)	ET&C 1984	rainbow trout	1350	30	injection

ww – wet weight

Conclusions

Based on a search of the published literature, no fish LR50 studies were identified for any of the chemicals proposed for lamprey toxicity testing. Studies reporting LD50s with associated CTCs were identified for pentachlorophenol, diazinon, and aniline; but no LD50 studies that also reported CTCs were identified for copper or naphthalene. Because pentachlorophenol CTC studies represent only a small fraction of the species for which LC50 data exist, determining the sensitivity of lamprey relative to other fish based on CTC data is not likely to reduce the uncertainty in comparisons of the relative sensitivity of lamprey and other fish based on LC50s alone. For the other chemicals investigated, literature data are too sparse for comparison with

lamprey LR50s. Therefore, the available toxicity literature are insufficient for comparison with lamprey LR50s and do not justify chemical analysis of lamprey that did not survive in the Round 3, phase 2 LC50 studies.

References

Hattula ML, Wasenius V-M, Reunanen H, Arstila AU. 1981. Acute toxicity of some chlorinated phenols, catechols and cresols to trout. Bull Environ Contam Toxicol 26:295-298.

Hickie BE, McCarty LS, Dixon DG. 1995. A residue-based toxicokinetic model for pulse-exposure toxicity in aquatic systems. Environ Toxicol Chem 14(12):2187-2197.

Hodson PV, Dixon DG, Kaiser KLE. 1984. Measurement of median lethal dose as a rapid indication of contaminant toxicity to fish. Environ Toxicol Chem 3:243-254.

Hodson PV, Dixon DG, Kaiser KLE. 1988. Estimating the acute toxicity of waterborne chemicals in trout from measurements of median lethal dose and the octanol-water partition coefficient. Environ Toxicol Chem 7:443-454.

Keizer J, Agostino D, Vittozzi L. 1991. The importance of biotransformation in the toxicity of xenobiotics to fish. I. Toxicity and bioaccumulation of diazinon in guppy (Poecilia reticulata) and zebra fish (Brachydanio rerio). Aquat Toxicol 21: 239-254.

Kishino T, Kobayashi K. 1995. Relation between toxicity and accumulation of chlorophenols at various pH, and their absorption mechanism in fish. Wat Res 29(2):431-442.

Kobayashi K, Akitake H, Manabe K. 1979. Relation between toxicity and accumulation of various chlorophenols in goldfish. Bull Jap Soc Sci Fish 45(2):173-175.

McCarty L, Mackay D, Smith AD, Ozburn, GW, and Dixon DG. 1993. Residue-based interpretation of toxicity and bioconcentration QSARs from aquatic bioassays: Polar narcotic organics. Ecotoxicol Env Saf 25:253-270.

Thomas P, Carr RS, Neff JM. 1981. Biochemical stress responses of mullet *Mugil cephalus* and polychaete worms *Neanthes virens* to pentachlorophenyl. In: Vernberg FJ, Calabrese A, Thurberg FP, Vernberg WB, eds, Biological monitoring of marine organisms. Academic Press, New York, NY, pp 73-103.

van den Heuvel MR, McCarty LS, Lanno RP, Hickie BE, Dixon DG. 1991. Effect of total body lipid on the toxicity and toxicokinetics of pentachlorophenol in rainbow trout (*Onchorynchus mykiss*). Aquat Toxicol 20:235-252.

Helle B. Andersen

From: Blischke.Eric@epamail.epa.gov
Sent: Friday, July 20, 2007 5:21 PM
To: Jim.McKenna@portofportland.com; rjw@nwnatural.com; ricka@bes.ci.portland.or.us
Cc: Humphrey.Chip@epamail.epa.gov; Shephard.Burt@epamail.epa.gov; Helle B. Andersen; John Toll
Subject: EPA Comments on Phase 2 :Lamprey Toxicity Testing
Attachments: EPACommentsPhase2LampretToxFSP072007.pdf; LampreytoxFSPComments072007.pdf; Table1.pdf

EPA comments on the Phase 2 Toxicity Testing are attached.

Thanks, Eric

(See attached file: EPACommentsPhase2LampretToxFSP072007.pdf)(See attached file: LampreytoxFSPComments072007.pdf)(See attached file: Table1.pdf)

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OREGON OPERATIONS OFFICE
811 S.W. 6th Avenue
Portland, Oregon 97204

June 20, 2007

Mr. Jim McKenna
Port of Portland & Co-Chairman, Lower Willamette Group
121 NW Everett
Portland, Oregon 97209

Mr. Robert Wyatt
Northwest Natural & Co-Chairman, Lower Willamette Group
220 Northwest Second Avenue
Portland, Oregon 97209

Re: Portland Harbor Superfund Site; Administrative Order on Consent for Remedial Investigation and Feasibility Study; Docket No. CERCLA-10-2001-0240. Round 3 Lamprey Ammocoete Toxicity Testing, Field Sampling Plan Addendum: Phase 2 Lamprey Ammocoete Collection and Testing

Dear Messrs. Wyatt and McKenna:

EPA has completed its review of the Round 3 Lamprey Ammocoete Toxicity Testing Field Sampling Plan Addendum: Phase 2 Lamprey Ammocoete Collection and Testing (Phase 2 Lamprey Toxicity FSP) dated July 6, 2007. EPA comments are attached.

The attached comments are quite detailed. EPA requests a meeting to discuss the comments. This conversation should focus on collection and holding procedures and the set up and calibration of the flow through diluters. Once these comments have been resolved, field collection of lamprey ammocoetes can begin.

If you have any questions, please contact Chip Humphrey at (503) 326-2678 or Eric Blischke (503) 326-4006. All legal inquiries should be directed to Lori Cora at (206) 553-1115.

Sincerely,

Chip Humphrey
Eric Blischke
Remedial Project Managers

cc: Greg Ulirsch, ATSDR
Rob Neely, NOAA
Ted Buerger, US Fish and Wildlife Service
Preston Sleeger, Department of Interior
Jim Anderson, DEQ
Kurt Burkholder, Oregon DOJ
Rick Keppler, Oregon Department of Fish and Wildlife
Kathryn Toepel, Oregon Public Health Branch
Jeff Baker, Confederated Tribes of Grand Ronde
Tom Downey, Confederated Tribes of Siletz
Audie Huber, Confederated Tribes of Umatilla
Brian Cunninghame, Confederated Tribes of Warm Springs
Erin Madden, Nez Perce Tribe
Rose Longoria, Confederated Tribes of Yakama Nation
Valerie Lee, Environment International

EPA Comments on Round 3 Lamprey Ammocoete Toxicity Testing
Field Sampling Plan Addendum: Phase 2 Lamprey Ammocoete Collection and Testing
July 20, 2007

EPA has reviewed the Round 3 Lamprey Ammocoete Toxicity Testing Field Sampling Plan Addendum: Phase 2 Lamprey Ammocoete Collection and Testing and associated documents. Successful completion of the Phase 2 Lamprey Toxicity Testing will require close coordination with EPA. In particular, EPA would like to visit the laboratory to ensure that the flow-through testing diluters are properly constructed and calibrated prior to the initiation of the ammocoete collection effort. In addition, close coordination will be required regarding the size range of ammocoetes obtained in the field and the selection of the nominal text exposures concentrations for each test chemical.

Specific Comments:

Section 1.0 – Introduction: The second objective is not completely accurate. EPA has previously stated that the "identify the relative sensitivity of Pacific lamprey to adverse contaminant effects when compared to the sensitivity of other freshwater species."

Section 2.3.1 – Field Logs: Water depth, estimated/qualitative current speed, and numbers of shocks (and maybe number of ammocoetes per shock) should be added to the station records.

Section 2.4.1 – Toxicity Testing Records: Testing Results records should include the times of test initiation and termination along with the dates. In addition, the study reports should include endpoint derivation statistics, not just the calculated LC50 values as stated here in this section of the FSP (and in other locations in the FSP, e.g., on pages 8 and 9). The FSP should specify the statistics package that will be used (e.g., CETIS or Toxcalc).

Section 2.4.3 – Data Review and Validation:

EPA is pleased with the selection of Paul Dinnel as your auditor, data reviewer and validator for the toxicity tests. EPA also plans to have Burt Shephard (EPA) and Robert Gensemer (Parametrix) perform two audits of NAS during the course of the toxicity testing. The first audit will be during diluter calibration prior to performance of any toxicity tests, to ensure that the diluters have been properly constructed, calibrated, can maintain concentrations and dose spacing during the toxicity tests, and are otherwise suitable for use during the toxicity tests. The second EPA audit will be an on-site audit during one of the earlier toxicity tests, similar to the type of on-site audit that Paul Dinnel will perform during the toxicity tests.

EPA recommends that LWG and NAS describe criteria or guidelines for early test termination or requirements for retesting a chemical, and that any out of compliance items that would require a retest be immediately communicated to EPA during the performance of a toxicity test. An obvious example requiring early termination and a retest would be 100% control mortality on day 1 of a test. The NAS QA/QC Manual for Aquatic Toxicology Studies goes into some, but not extensive detail regarding out of control items, out of compliance items or deviations from toxicity test protocols, but does not explicitly discuss requirements for retesting. The purpose of

this comment is to require LWG to quickly communicate to EPA problems that may require a retest, not to require changes to the FSP and QAPP Addenda, or to NAS study protocol or QA/QC Manual. EPA does not want to learn that one or more tests are unacceptable after completion of all six toxicity tests.

Section 2.4.4 – Data Report: For those who do not have ready access to SEDQUAL, we suggest that all electronic data summaries be submitted in either Excel format if Toxcalc is used to perform calculations, or Access format if CETIS is used for the calculations.

Section 2.5 – Schedule: The four month period between completion of a toxicity test and receipt of validated analytical data appears excessive given the possibility that a diluter may not maintain nominal dose spacing and concentrations. It would be useful to have a real time sense that the desired concentrations are being maintained during the toxicity tests. One possibility is for NAS to perform chemical analyses on exposure chamber water during the toxicity tests during the tests themselves. These data would not require validation, and would be used only to ensure that test concentrations are close to nominal.

Section 3.1, Field Sampling:

The goal of the field sampling effort is to collect ammocoetes in the desired size range of 25-40 mm. As a result, the field crew should be able to accurately and quickly estimate the size range of captured ammocoetes. Due to the difficulty associated with measuring ammocoetes in the field, EPA recommends anesthetizing some ammocoetes with MS222 and measuring them. This will allow the field crew to better estimate the size range during field collection efforts.

The FSP states "If during sampling it becomes apparent that sufficient ammocoetes cannot be collected in the target size range, larger ammocoetes will be collected as permitted by EPA (Blischke 2007)." This statement is slightly inaccurate. The collection of larger ammocoetes will be permitted following consultation with EPA "should the field crews have trouble getting sufficient numbers of fish in the 25 - 40 mm size range."

The FSP states "The sampling effort is planned to be conducted in a minimum of three sampling events, with a maximum of 1,000 ammocoetes collected per event. Sampling of ammocoetes will cease as soon as the six definitive tests have successfully been completed." This raises issues regarding randomization of the sizes (lengths) and geographic source(s) of ammocoetes used among the six toxicity tests. EPA recommends collecting the ammocoetes at one time and homogenizing the collection to eliminate any time and/or location bias to the testing. However, the description in this paragraph implies that ammocoetes would more likely be collected as immediately before use as possible. This timing is supported by the discussion in Section 4.1 that holding will be minimal. This timing of "at least three collections" is also consistent with the performance of the bioassays as two rounds of two tests and one round of one test, assuming they only have sufficient dilutors for testing two chemicals at a time. If early tests are run with all small ammocoetes, but later tests are run on larger, potentially more robust, ammocoetes, a bias in the testing results could be introduced. Because of the issue of possible variable sensitivity of test organisms among tests performed over time, EPA protocol recommends protocol the inclusion of a reference toxicant to which the response of the test organism has been established.

Such an approach could be useful here to overcome logistic challenges. A similar result could be obtained by replicating in the entire test series one of the copper concentrations that produced significant but not complete toxicity during the copper test. EPA recognizes that this approach will increase the number of ammocoetes needed and may present its own logistical challenges.

The specified maximum water change rate (1º C per hour) is too rapid and may introduce organism stress. ASTM (E728 acute toxicity test guidance) recommends temperature changes no faster than 3º C per 12 hr, preferably no faster than 3º C per 72 hr (i.e., 1º C per day). EPA recommends a temperature acclimation rate of no greater than 1º C per day.

Section 3.2 – Field Holding and Transportation: A maximum holding time for the ammocoetes in the coolers should be specified. EPA recommends a 24 hour maximum holding time.

Section 4.1 – Laboratory Holding:

Commercial grade sand may have herbicides and pesticides present. The sand should be autoclaved and rinsed to ensure that it is free from contaminants. Chemical analysis of the sand should be performed to demonstrate that it is free from contaminants. Alternatively, the ammocoetes could be held in NAS reference sediment for sediment toxicity tests. NAS should have contaminant analyses for this on file and it is likely to have at least some organic matter the ammocoetes could feed on.

The FSP states a holding temperature of 17º C at ± 2º C. ASTM guidance and testing protocol specify a narrower range - 17º C at ± 1º C. For consistency, the maximum allowed temperature variation during holding also be ± 1º C. Finally, no mention is made of a minimum acclimation/holding time; this should be specified to ensure organisms are being acclimated to laboratory conditions for an acceptable period of time prior to testing. ASTM guidance suggests a minimum 14 day acclimation period, including the period of gradual transition from field-collection water to laboratory dilution water.

The FSP states "Upon receipt of the ammocoetes at the laboratory, ….the water [in the coolers in which they were transported to the lab] will then be poured off and the sand containing the ammocoetes will be poured onto a large table where ammocoetes will be sorted by hand into holding aquariums." EPA recommends anesthetizing the organisms at this time to facilitate the sorting process and to ensure that size range distribution is approximately the same for all test chambers.

The FSP states "To assess the feasibility of successfully holding ammocoetes smaller than those used in the Phase 1 toxicity testing, the first field collection effort will be conducted as follows. Approximately 500 smaller ammocoetes and 50 larger ammocoetes (similar in size to those used in Phase 1 testing) will be collected and transported separately to the laboratory. The two size classes will also be kept separate in the laboratory (approximately 50 ammocoetes per holding tank). At test initiation, the survival rate of the smaller ammocoetes during holding will be compared with the survival rate of the 50 larger ammocoetes. Based on this comparison a decision will be made in cooperation with EPA and its partners as to which size class will be

used for the remainder of the Phase 2 toxicity testing." EPA does not believe that this procedure is necessary and requests that it be deleted from the FSP. During Phase I, survivorship of ammocoetes of all sizes was extremely high; there is no evidence that larger ammocoetes survived at a higher rate than smaller ammocoetes. EPA has determined that a target ammocoete size range of 25 – 40 mm is appropriate for the Phase 2 toxicity testing.

Section 4.2 – Phase 2 Testing:

Please demonstrate that the method to measure hardness has precision necessary to ensure that the water hardness in the 25 – 30 mg/l range, and that alkalinity and pH can be accurately measured in the relatively low ionic strength dilution water that will be used in the toxicity tests. Suitably accurate measurements of hardness and alkalinity may require titrametric analysis as described in either Standard Methods or EPA analytical chemistry methods, while a special pH electrode suitable for use in low ionic strength waters may be needed.

A more detailed description of the water quality monitoring procedures should be provided. For example, how many of the test replicates will be tested for which parameter? Will the samples be collected from the feed water to the test chambers or at the chamber outlets? Will the samples for the different parameters that are collected at the same time be collected sequentially, or will one sample be collected, homogenized, and distributed to the sample containers? If the samples are collected from the effluent from the test chambers, given the volumes required and the projected flow rates, is there a concern for loss of more volatile substances?

The qualitative behavioral observations should include observations on both hyper- and hypoactivity, in addition to the other observations described. Narcotic organic chemicals (e.g. naphthalene) can and do cause reduced swimming activity prior to death, while some central nervous system agents can cause both increased and reduced swimming activity, depending on when during the time course of the toxicity study the observations are made.

It should be clarified that the survival must be greater than or equal to 90% in all control replicates before the test will be considered acceptable.

The first sentence in this section reads as if mortality will only be measured at 96 hr, whereas the Study Protocol correctly states that mortality data must be collected daily (i.e. at 24, 48, 72 and 96 hours). This should be edited here to be consistent with the Protocol.

The footnote at the bottom of page 14 editorially misinterprets the standard ASTM guidance. To be correct and consistent with ASTM guidance, this should read: "Per ASTM Guidance, *a test (or LC50 calculation) would usually be considered unacceptable if* no treatment other than the control treatment(s) kill*ed* or affect*ed* less than 37% of the test organisms exposed to it, and*/or* no treatment kill*ed* or affect*ed* more than 63% of the organisms exposed to it." Regarding test acceptability criteria, EPA is not so much concerned with the actual percent mortalities in a given exposure concentration than it is with seeing monotonically increasing mortality with increasing concentrations, with at least one and preferably two or more partial mortality concentrations bracketed by control level and 100% mortality.

EPA will work with LWG and NAS to develop the nominal test exposure concentrations for each chemical prior to EPA approval of the dose spacing, to help ensure that the concentrations proposed are appropriate based on the results from the Phase 1 range-finding studies. Accurate selection of flow-through definitive test concentrations is often a challenging task, but is critical to the success of the study (i.e., maximizes the potential that adequate partial mortalities are observed as per page 14, footnote #2). Ultimately, it would be preferable to include the proposed nominal test concentrations (as well as diluter flow rates) in the test protocol. Regardless of how this information is provided, it is quite critical that study sponsors and stakeholders get the opportunity to evaluate and approve the proposed nominal dose concentrations before testing occurs.

The FSP states that "…water samples will be collected from control and each test concentration…". Will these be taken from only one replicate (this is typically the case) per treatment, and how will the replicate be chosen (i.e., will they be randomly selected)?

EPA requires additional information regarding the performance of the naphthalene flow-through range-finding test. We propose that a flow through version of the static range-finding tests performed with five chemicals last fall be performed (i.e. 5 fish/tank, 5 doses plus control, same number of replicate exposure tanks/dose, etc.) as was done for the static rangefinders be used.

EPA continues to require the analysis of ammocoete tissues at the completion of each toxicity test for the chemical to which the ammocoetes were exposed. These analyses will provide additional information about the sensitivity of lamprey to chemicals relative to the sensitivity of other aquatic species on a tissue basis, in addition to the relative sensitivity of ammocoetes compared to the sensitivity of other aquatic species to water column exposure to chemicals. The relative sensitivity of a species compared to the sensitivity of other species can and does differ depending on whether the comparison is done on a water column concentration or an absorbed dose basis. Knowledge of lamprey sensitivity on both exposure media and tissue residues basis will be useful to EPA as the ecological risk assessment of Portland Harbor nears completion.

If the LWG concern regarding tissue analyses is that the test chemicals may not reach steady state within the 96 hour test duration, EPA has performed calculations showing that all organic test chemicals except pentachlorophenol can be expected to reach greater than 95% of the final steady state concentration within 96 hours. Pentachlorophenol has a substantial amount of residue-effects information available in the literature, so critical body residues observed in the lamprey study can be compared to a sizable empirical data set. Toxicity can be and is observed in aquatic species even before tissue residues reach steady state concentrations. The estimated times to 95% steady state concentrations in ammocoete tissues are as follows:

Pentachlorophenol – 12.5 days
Aniline – 0.24 days
Diazinon – 2.36 days
Lindane – 3.45 days
Naphthalene – 2.52 days

Table 4-1. The proposed water quality monitoring should be included in the table. Flow rate monitoring should be added to the table.

Specific Comments – Round 3 QAPP Addendum:

Section 2.1 – Phase 2 Experimental Design: The abnormal behavioral activities should not be limited as implied in this paragraph. The three abnormalities listed are taken from the EPA guidance. However, the EPA guidance document refers to these as suggestions, i.e., introduced by "such as…." Behavioral observations should not be limited. Rather, standard laboratory practices of observation should be relied upon. Both hyperactivity and hypoactivity should be noted if observed. Observations such as normal behavior should also be noted.

Section 2.3 – Laboratory Quality Assurance/Quality Control. The flow of the feed water to the test chambers needs to be monitored. It's often not a simple matter to maintain similar flows in a distributed system. Where, when, and how the flow rates through each test chamber will be monitored needs to be described.

Page 14, Section 4.2, Phase 2 Testing. Contrary to ASTM guidance, no performance criteria are stated regarding acceptable levels of mortality in the 5 dilutions (excluding controls) in each toxicity test. This section states "The definitive test will be deemed acceptable if ≥ 90% of the ammocoetes survive in the control. The chemical concentration ranges will be selected to produce partial mortality in some of the test solutions similar to the guidance in ASTM (1996),[2]" where footnote 2 states "Per ASTM guidance, no treatment other than the control treatment(s) will kill or affect less than 37 % of the test organisms exposed to it and no treatment will kill or affect more than 63 % of the organisms exposed to it." However, this section continues that "because of the experimental nature of the study and the potentially limited number of ammocoetes, the definitive tests from which the LC_{50} values will be derived may not fulfill the ASTM definition of acceptable partial mortality in a definitive test. The test conditions and test acceptability criteria are summarized Table 4-1." However, no performance criteria are specified in Table 4-1 regarding acceptable levels of mortality in the 5 dilutions of each toxicity test. This is not acceptable because accurate calculation of LC_{50} values requires monotonically increasing mortality with increasing concentration, and that mortality in each dilution not be greater or less than the values stated above. Therefore, performance measures need to be discussed and agreed upon by EPA before Phase 2 testing begins.

Page 14, Section 4.2, Phase 2 Testing. Ammocoetes of different sizes, collected from different locations, and/or collected on different dates may respond differently to exposure to the chemicals used during Phase 2 testing. Therefore, it is important that the composition (size distribution and geographic origin(s)) of ammocoetes used within each test (i.e. the 10 ammocoetes in each of the 5 dilutions within each test) and among the 6 tests conducted be as similar to one another as possible. These concerns were recognized and discussed at length by EPA and government partners during numerous conference calls. No mention of this is made in the FSP. Thus, a protocol for selecting and assigning ammocoetes (i.e., either a randomized or stratified approach) to treatment groups within and among tests must be developed and followed. EPA's preferred approach would be to sample and hold all 3000 ammocoetes at the same time, rather than have field collections in three batches collected at different times, then randomly

select individual ammocoetes from the 3000 individuals as needed to populate the exposure chambers for each toxicity test.

Specific Comments – Study Protocol

Test Material – Preparation of Working Stock Solution and Test Concentrations: EPA requests more detail regarding how NAS will actually implement the Veith and Comstock (1975) glass bead exposure system with respect to size of beads, tubing, flow rates, etc. This is an appropriate method citation, but if NAS is planning to deviate from cited method in any significant way, this should be described in the Protocol.

Test Organisms – Acclimation and Pretest Observations: Maximum allowed temperature changes during holding or acclimation should be specified as they are in the FSP Addendum. In addition, minimum acclimation times should be specified (see comments above). In addition, test protocol states "Any dead animals are removed daily." This sentence should specify that any lamprey observed above the sediment that are dead will be removed, i.e., lamprey buried within the sediment will not be disturbed daily to assess whether any of them are dead or not.

Description of Test System – Preparation of Test Concentrations: How often will diluter flow rates be calibrated, and how will this be accomplished? Typically for 96-hr tests, *all* diluter flow rates would be calibrated at the beginning of the test, and the toxicant flow rate into the diluter would be checked daily. The laboratory should empirically verify that the diluters will accurately deliver the proposed or intended nominal exposure concentrations in the test exposure chambers. Particularly with volatile chemicals, even the best efforts to estimate final delivery concentrations on the basis of calculated flows, dilutions, or evaporation should be validated empirically. This is particularly important given the difficulty in obtaining test organisms to ensure organisms are not wasted on an exposure system that has not been fully bench tested before definitive studies begin.

Experimental Design and Test Procedures – Effect Criterion: The protocol states "The mortality data may be used to compute LC_{50}s for each exposure period." One of the main objectives of Phase II testing is to derive LC_{50}s for lamprey for each of the 6 chemicals being tested. Thus, this statement should be revised to state that "The mortality data *will* be used to compute LC_{50}s for each chemical tested."

Experimental Design and Test Procedures – Criteria of Test Acceptance. As stated above, no performance criteria are specified regarding acceptable levels of mortality in the 5 dilutions of each toxicity test. This is not acceptable because accurate calculation of LC_{50} values requires that mortality in each dilution not be greater or less than the values stated in ASTM guidance (stated above). Therefore, performance measures need to be discussed and agreed upon by EPA and partners before Phase 2 testing begins.

Data Analysis: As stated in FSP comments above, EPA recommends the use of the CETIS software for toxicity endpoint calculations. However, EPA recognizes that Toxcalc can also be acceptable. Regardless, statistical software used should also be cited in the FSP.

Table 1
Organic chemical bioaccumulation time to steady state and elimination times for bioaccumulated chemicals

Chemical	log Kow	log BCF	k_e (elimination rate constant, day^{-1})	time to 50% of steady state (days)	time to 80% of steady state (days)	time to 95% of steady state (days)	time to 99% of steady state (days)
Pentachlorophenol	5.05	3.5925	0.239	2.894	6.720	12.508	19.229
Aniline	0.90	0.065	12.514	0.055	0.129	0.239	0.368
Diazinon	3.30	2.105	1.270	0.546	1.267	2.359	3.626
Lindane	3.70	2.445	0.867	0.799	1.856	3.454	5.309
Naphthalene	3.37	2.1645	1.188	0.583	1.355	2.522	3.876

LWG
LOWER WILLAMETTE GROUP

Co-Chairperson: Jim McKenna, Port of Portland
Co-Chairperson: Bob Wyatt, NW Natural
Treasurer: Fred Wolf, Legacy Site Services for Arkema

August 10, 2007

Chip Humphrey
Eric Blischke
U.S. Environmental Protection Agency, Region 10
811 SW 6th Avenue, 3rd Floor
Portland, OR 97204

Re: Submittal of the LWG responses to EPA's comments on Lamprey Toxicity Test FSP and QAPP Phase 2 Addenda

Dear Messrs. Humphrey and Blischke:

The LWG is pleased to submit its response to EPA's July 20, 2007 comments on the Round 3 Lamprey Ammocoete Toxicity Testing Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP) Addenda: Phase 2 Lamprey Ammocoete Collection and Testing.

Per the agreement during the July 24, 2007 conference call between Eric Blischke and Burt Shephard (EPA) and Lisa Saban and Helle Andersen (Windward, on behalf of the LWG), the field collection and toxicity testing may begin following EPA approval of the LWG's responses. The FSP and QAPP Addenda will be revised accordingly while the ammocoete collection and toxicity testing efforts are underway.

The LWG is seeking approval as soon as possible so that the collection and testing effort can be initiated while the river temperatures are still above 15°C.

Sincerely,

Jim McKenna

Bob Wyatt

cc: Confederated Tribes and Bands of the Yakama Nation
Confederated Tribes of the Grand Ronde Community of Oregon
Confederated Tribes of Siletz Indians of Oregon
Confederated Tribes of the Umatilla Indian Reservation
Confederated Tribes of the Warm Springs Reservation of Oregon
Nez Perce Tribe
Oregon Department of Fish & Wildlife
United States Fish & Wildlife
Oregon Department of Environmental Quality

Response to Comments Raised in EPA's Letter Dated July 20, 2007		
Comment No.	**EPA Comment**	**LWG Response**
Round 3 Lamprey Ammocoete Toxicity Testing Field Sampling Plan Addendum: Phase 2		
General comment	EPA has reviewed the Round 3 Lamprey Ammocoete Toxicity Testing Field Sampling Plan Addendum: Phase 2 Lamprey Ammocoete Collection and Testing and associated documents. Successful completion of the Phase 2 Lamprey Toxicity Testing will require close coordination with EPA. In particular, EPA would like to visit the laboratory to ensure that the flow-through testing diluters are properly constructed and calibrated prior to the initiation of the ammocoete collection effort. In addition, close coordination will be required regarding the size range of ammocoetes obtained in the field and the selection of the nominal test exposures concentrations for each test chemical.	The Lower Willamette Group (LWG) agrees that close coordination with the US Environmental Protection Agency (EPA) is needed for successful completion of the Phase 2 lamprey toxicity collection and testing, as set forth in the Round 3 Lamprey Ammocoete Toxicity testing Field Sampling Plan Addendum: Phase 2 (FSP addendum) Two laboratory audits by EPA will be expected, the field crew will be in daily contact with EPA during the sampling of ammocoetes, and proposed nominal test concentrations will be provided for EPA for review and approval prior to test initiation.
Comments Specific to Field Sampling Plan		
FSP 1	**Section 1.0 – Introduction:** The second objective is not completely accurate. EPA has previously stated that the "identify the relative sensitivity of Pacific lamprey to adverse contaminant effects when compared to the sensitivity of other freshwater species."	The FSP addendum provides "EPA specified the following two general objectives: 1) determine whether existing fish toxicity reference values are sufficiently protective of lamprey survival and growth as determined by laboratory testing with representative chemicals (the rationales for the selected chemicals are presented in the Round 3 lamprey ammocoete toxicity testing quality assurance project plan [QAPP] (Windward 2006)), and 2) identify the relative sensitivity of Pacific lamprey to adverse contaminant effects by comparing the data with published toxicity data for the most sensitive surrogate species (EPA 2006)." The second objective will be revised to reflect EPA's language word for word, as stated in EPA's comment and in EPA's letter (EPA 2006). The revised FSP addendum will be resubmitted to EPA.
FSP 2	**Section 2.3.1 – Field Logs:** Water depth, estimated/qualitative current speed, and numbers of shocks (and maybe number of ammocoetes per shock) should be added to the station records.	Water depth and estimated current speed data will be added to the station record. Because the shocking is continuous, the number of shocks cannot be counted. However, the shocking effort can be timed, and the number of ammocoetes shocked per time unit (minute) can be calculated.

DRAFT DOCUMENT: DO NOT QUOTE OR CITE
This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part.

Response to Comments Raised in EPA's Letter Dated July 20, 2007		
Comment No.	**EPA Comment**	**LWG Response**
FSP 3	**Section 2.4.1 – Toxicity Testing Records:** Testing Results records should include the times of test initiation and termination along with the dates. In addition, the study reports should include endpoint derivation statistics, not just the calculated LC50 values as stated here in this section of the FSP (and in other locations in the FSP, e.g., on pages 8 and 9). The FSP should specify the statistics package that will be used (e.g., CETIS or Toxcalc).	Times of test initiation and termination were included in the Phase 1 toxicity testing and will be included in the Phase 2 toxicity testing. The endpoint derivation statistics (i.e., the raw survival/mortality data) will be noted on the bench sheets; and the LC50s, as well as various statistical summaries, will be calculated using ToxCalc™. The FSP addendum will be revised to state that the times of test initiation and termination will be included and ToxCalc™ will be used. The revised FSP addendum will be resubmitted to EPA.
FSP 4	**Section 2.4.3 Data Review and Validation:** EPA is pleased with the selection of Paul Dinnel as your auditor, data reviewer and validator for the toxicity tests. EPA also plans to have Burt Shephard (EPA) and Robert Gensemer (Parametrix) perform two audits of NAS during the course of the toxicity testing. The first audit will be during diluter calibration prior to performance of any toxicity tests, to ensure that the diluters have been properly constructed, calibrated, can maintain concentrations and dose spacing during the toxicity tests, and are otherwise suitable for use during the toxicity tests. The second EPA audit will be an on-site audit during one of the earlier toxicity tests, similar to the type of on-site audit that Paul Dinnel will perform during the toxicity tests.	Two audits by EPA will be expected: one audit to ensure that the diluter is properly constructed and calibrated prior to test initiation, and another audit during one of the toxicity tests conducted early in the process.

DRAFT DOCUMENT: DO NOT QUOTE OR CITE
This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part.

Response to Comments Raised in EPA's Letter Dated July 20, 2007		
Comment No.	**EPA Comment**	**LWG Response**
FSP 5	**Section 2.4.3 Data Review and Validation:** EPA recommends that LWG and NAS describe criteria or guidelines for early test termination or requirements for retesting a chemical, and that any out of compliance items that would require a retest be immediately communicated to EPA during the performance of a toxicity test. An obvious example requiring early termination and a retest would be 100% control mortality on day 1 of a test. The NAS QA/QC Manual for Aquatic Toxicology Studies goes into some, but not extensive detail regarding out of control items, out of compliance items or deviations from toxicity test protocols, but does not explicitly discuss requirements for retesting. The purpose of this comment is to require LWG to quickly communicate to EPA problems that may require a retest, not to require changes to the FSP and QAPP Addenda, or to NAS study protocol or QA/QC Manual. EPA does not want to learn that one or more tests are unacceptable after completion of all six toxicity tests.	In accordance with EPA and American Society for Testing and Materials (ASTM) manuals, the acceptability of the lamprey toxicity tests will be based on a survival rate ≥ 90% in control group. If the toxicity test does not meet this criterion, the test will be deemed unacceptable, and the chemical will be retested. EPA will be informed immediately if a test is deemed unacceptable. This clarification will be added to the FSP addendum, and the FSP addendum will be resubmitted to EPA.
FSP 6	**Section 2.4.4 – Data Report:** For those who do not have ready access to SEDQUAL, we suggest that all electronic data summaries be submitted in either Excel format if Toxcalc is used to perform calculations, or Access format if CETIS is used for the calculations.	All electronic data summaries will be provided in Excel®, ToxCalc™, and SEDQUAL. The FSP addendum will be revised to state that ToxCalc™ will be used, and the FSP addendum will be resubmitted to EPA.

DRAFT DOCUMENT: DO NOT QUOTE OR CITE
This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part.

Response to Comments Raised in EPA's Letter Dated July 20, 2007		
Comment No.	**EPA Comment**	**LWG Response**
FSP 7	**Section 2.5 – Schedule:** The four month period between completion of a toxicity test and receipt of validated analytical data appears excessive given the possibility that a diluter may not maintain nominal dose spacing and concentrations. It would be useful to have a real time sense that the desired concentrations are being maintained during the toxicity tests. One possibility is for NAS to perform chemical analyses on exposure chamber water during the toxicity tests during the tests themselves. These data would not require validation, and would be used only to ensure that test concentrations are close to nominal.	In a conference call between EPA and LWG on July 24, 2007, the following agreement was reached. Northwestern Aquatic Sciences, Inc. (NAS), will measure the test concentrations of the organic compounds while the tests are being conducted using a non-EPA-approved gas chromatography/mass spectrometry (GC/MS) procedure. The test concentrations will remain internal NAS data; however, EPA will be informed if significant deviation from nominal concentrations occurs while the tests are being conducted. NAS does not have the capability to perform an in-house copper analysis, so verification of the nominal concentrations cannot be performed while this test is being conducted. However, it is expected that nominal copper test concentrations will be achieved through a careful metering of the correct concentrated copper stock solution into the diluters' toxicant stock mixing chamber, which is supplied through a constant flow of dilution water on demand from the diluter. The FSP addendum will be revised to reflect this agreement and will be resubmitted to EPA.
FSP 8	**Section 3.1 - Field Sampling:** The goal of the field sampling effort is to collect ammocoetes in the desired size range of 25-40 mm. As a result, the field crew should be able to accurately and quickly estimate the size range of captured ammocoetes. Due to the difficulty associated with measuring ammocoetes in the field, EPA recommends anesthetizing some ammocoetes with MS222 and measuring them. This will allow the field crew to better estimate the size range during field collection efforts.	A special measuring device has been made to facilitate measuring the length of ammocoetes in the field to the nearest 5 mm. If proven too difficult or time consuming to perform in the field, MS222 will be used.
FSP 9	**Section 3.1 - Field Sampling:** The FSP states "If during sampling it becomes apparent that sufficient ammocoetes cannot be collected in the target size range, larger ammocoetes will be collected as permitted by EPA (Blischke 2007)." This statement is slightly inaccurate. The collection of larger ammocoetes will be permitted following consultation with EPA "should the field crews have trouble getting sufficient numbers of fish in the 25 - 40 mm size range."	EPA will be notified if there are any difficulties collecting 25 to 40-mm ammocoetes in the field, and the field crew will not collect larger ammocoetes until EPA has been consulted. The FSP addendum will be revised accordingly and resubmitted to EPA.

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Comment No.	**EPA Comment**	**LWG Response**
FSP 10	**Section 3.1 - Field Sampling:** The FSP states "The sampling effort is planned to be conducted in a minimum of three sampling events, with a maximum of 1,000 ammocoetes collected per event. Sampling of ammocoetes will cease as soon as the six definitive tests have successfully been completed." This raises issues regarding randomization of the sizes (lengths) and geographic source(s) of ammocoetes used among the six toxicity tests. EPA recommends collecting the ammocoetes at one time and homogenizing the collection to eliminate any time and/or location bias to the testing. However, the description in this paragraph implies that ammocoetes would more likely be collected as immediately before use as possible. This timing is supported by the discussion in Section 4.1 that holding will be minimal. This timing of "at least three collections" is also consistent with the performance of the bioassays as two rounds of two tests and one round of one test, assuming they only have sufficient dilutors for testing two chemicals at a time. If early tests are run with all small ammocoetes, but later tests are run on larger, potentially more robust, ammocoetes, a bias in the testing results could be introduced. Because of the issue of possible variable sensitivity of test organisms among tests performed over time, EPA protocol recommends protocol the inclusion of a reference toxicant to which the response of the test organism has been established. Such an approach could be useful here to overcome logistic challenges. A similar result could be obtained by replicating in the entire test series one of the copper concentrations that produced significant but not complete toxicity during the copper test. EPA recognizes that this approach will increase the number of ammocoetes needed and may present its own logistical challenges.	NAS does not have the facility to hold all 3,000 ammocoetes at one time based on the Phase 1 loading of 50 ammocoetes per 10-gal. holding tank . Holding 3,000 ammocoetes at one time would require 60 10-gal. tanks and NAS can only maintain and operate a maximum of 20 holding tanks at one time (i.e., a maximum of 1,000 ammocoetes can be held based on the Phase 1 loading rate). To reduce the variability in test organisms used in the tests, the following steps will be taken: 1) The sampling effort will focus on the four coastal rivers with an expected permitted take of 2,000 organisms (600 from the Siletz River, 500 from the Nestucca River, 500 from the Trask River, and 400 from the Alsea River). This should be enough organisms to perform the six toxicity tests assuming all first runs of the toxicity tests and the range-finding test for naphthalene are acceptable. The focus on the coastal rivers is based on the assumption that the species composition will be similar in the four rivers. 2) Based on the maximum number of ammocoetes that NAS can hold at one time (1,000 ammocoetes), the sampling effort will be performed in two rounds. In each round, the following number of ammocoetes will be collected in the four rivers: 300 from the Siletz River, 250 each from the Nestucca and Trask Rivers, and 200 from the Alsea River. The organisms collected in each river will, to the extent possible, be distributed evenly in the 20 holding tanks. This will ensure that the two batches have a similar composition of ammocoetes assuming that a sufficient number of ammocoetes in the 25-to-40-mm size range can be collected. In a conference call between EPA and LWG on July 24, 2007, EPA agreed that the performance of a reference toxicant along with each toxicity test is not feasible because the response of lamprey ammocoetes to a given chemical has not been established. Establishing such a response would require numerous toxicity tests (at least 5 and preferably 20 tests with 240 organisms per test). Therefore, the FSP addendum will not be revised to include protocol for inclusion of a reference toxicant.

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Comment No.	**EPA Comment**	**LWG Response**
FSP 11	**Section 3.1 - Field Sampling:** The specified maximum water change rate (1º C per hour) is too rapid and may introduce organism stress. ASTM (E728 acute toxicity test guidance) recommends temperature changes no faster than 3º C per 12 hr, preferably no faster than 3º C per 72 hr (i.e., 1º C per day). EPA recommends a temperature acclimation rate of no greater than 1º C per day.	The text in the FSP addendum is from Burt Shephard's e-mail of June, 20, 2007, and reads "[p]rocedures for thermally acclimating field-collected fish from one temperature to another during and after transfer from the field to a laboratory setting are well developed. If necessary to maintain the toxicity testing schedule and laboratory availability of staff and facilities, LWG may propose alternative field sampling times when the water temperature in streams from which ammocoetes are collected is outside of the desired temperature range of 16° C to 20° C. Before LWG can field-collect ammocoetes from streams with water temperatures outside of the 16° C to 20° C range, LWG must first contact appropriate EPA management and technical staff for approval of the proposed change in field sampling. The thermal acclimation of field-collected fish brought into the laboratory to the toxicity test temperature of 17° C must take place at no more than a 1° C change in water temperature per hour." A rate of change of 1° C per hour is not unacceptable over a small 3-to-5° C temperature range. If a temperature adjustment of more than 3-to-5º C is required, the transfer from field collection water to laboratory dilution water will be gradual, at a rate of no faster than 3º C per 12 hr. The FSP addendum will be modified to clarify this protocol and will be resubmitted to EPA.
FSP 12	**Section 3.2 – Field Holding and Transportation:** A maximum holding time for the ammocoetes in the coolers should be specified. EPA recommends a 24 hour maximum holding time.	The field crew is expected to deliver the ammocoetes on the same day that they are collected (approximately a maximum of 5 hours after the last ammocoete is collected). The FSP addendum will be revised to specify the maximum cooler holding time, and the FSP addendum will be resubmitted to EPA.
FSP 13	**Section 4.1 – Laboratory Holding:** Commercial grade sand may have herbicides and pesticides present. The sand should be autoclaved and rinsed to ensure that it is free from contaminants. Chemical analysis of the sand should be performed to demonstrate that it is free from contaminants. Alternatively, the ammocoetes could be held in NAS reference sediment for sediment toxicity tests. NAS should have contaminant analyses for this on file and it is likely to have at least some organic matter the ammocoetes could feed on.	The reference sediment used by NAS is very fine-grained, and NAS has concerns that the sediment may affect the lamprey ammocoetes. The holding sediment will be the same as that used in Phase 1 (store-bought sand). The FSP addendum will be revised as follows: the aquariums will be provided with at least 3 inches of Phase 1 sediment as burrowing substrate and a continuous inflow of water. The holding sediment will be analyzed for herbicides and pesticides.

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FSP 14	**Section 4.1 – Laboratory Holding:** The FSP states a holding temperature of 17º C at ± 2º C. ASTM guidance and testing protocol specify a narrower range - 17º C at ± 1º C. For consistency, the maximum allowed temperature variation during holding also be ± 1º C. Finally, no mention is made of a minimum acclimation/holding time; this should be specified to ensure organisms are being acclimated to laboratory conditions for an acceptable period of time prior to testing. ASTM guidance suggests a minimum 14 day acclimation period, including the period of gradual transition from field-collection water to laboratory dilution water.	The maximum temperature variation during holding will be ±1º C. The ammocoetes will be acclimated to the laboratory test conditions for a minimum of 5 to 7 days prior to test initiation. This minimum number of days applies only to the first toxicity test conducted on each batch of field-collected organisms. For all other tests, the ammocoetes will be held for at least 13 days prior to test initiation. When a temperature adjustment of more than 3 to 5° C is required, the transfer from field collection water to laboratory dilution water will be gradual. The FSP addendum will be revised accordingly and resubmitted to EPA. It should be noted that the statement "ASTM guidance suggests a minimum 14 day acclimation period" is incorrect. The 14-day holding time is a quarantine guidance (ASTM E729-96 (2002) Sect 10.4.1). ASTM E729-96 (2002) Section 13.1.5 states, regarding the relationship to acceptability of a test, that a test may be considered unacceptable if "the test organisms were not maintained in the dilution water at the test temperature for at least the last 48 hours before they were placed in the test chambers." So a 48-hour acclimation period is acceptable. The revised proposal of 5 to 7 days exceeds this minimum guidance.
FSP 15	**Section 4.1 – Laboratory Holding:** The FSP states "Upon receipt of the ammocoetes at the laboratory, ….the water [in the coolers in which they were transported to the lab] will then be poured off and the sand containing the ammocoetes will be poured onto a large table where ammocoetes will be sorted by hand into holding aquariums." EPA recommends anesthetizing the organisms at this time to facilitate the sorting process and to ensure that size range distribution is approximately the same for all test chambers.	LWG does not agree that anesthetization is an acceptable method because it may place undue stress on the organisms. Instead a similar method to what was used successfully in Phase 1 will be performed. Ammocoetes will be removed by gently combing the collection site sediment by hand and netting ammocoetes that emerge. These will be transferred to pans of water for subsequent counting and sorting into acclimation tanks. The FSP addendum will be revised to clarify the process and resubmitted to EPA.

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FSP 16	**Section 4.1 – Laboratory Holding:** The FSP states "To assess the feasibility of successfully holding ammocoetes smaller than those used in the Phase 1 toxicity testing, the first field collection effort will be conducted as follows. Approximately 500 smaller ammocoetes and 50 larger ammocoetes (similar in size to those used in Phase 1 testing) will be collected and transported separately to the laboratory. The two size classes will also be kept separate in the laboratory (approximately 50 ammocoetes per holding tank). At test initiation, the survival rate of the smaller ammocoetes during holding will be compared with the survival rate of the 50 larger ammocoetes. Based on this comparison a decision will be made in cooperation with EPA and its partners as to which size class will be used for the remainder of the Phase 2 toxicity testing." EPA does not believe that this procedure is necessary and requests that it be deleted from the FSP. During Phase I, survivorship of ammocoetes of all sizes was extremely high; there is no evidence that larger ammocoetes survived at a higher rate than smaller ammocoetes. EPA has determined that a target ammocoete size range of 25 – 40 mm is appropriate for the Phase 2 toxicity testing.	As requested by EPA, this text will be deleted from the FSP addendum. However, as EPA and the LWG have previously discussed, it should be noted that if the survival rate of smaller ammocoetes is significantly reduced, it may not be possible to complete the testing program. The FSP addendum will be revised accordingly and resubmitted to EPA.
FSP 17	**Section 4.2 – Phase 2 Testing:** Please demonstrate that the method to measure hardness has precision necessary to ensure that the water hardness in the 25 – 30 mg/l range, and that alkalinity and pH can be accurately measured in the relatively low ionic strength dilution water that will be used in the toxicity tests. Suitably accurate measurements of hardness and alkalinity may require titrametric analysis as described in either Standard Methods or EPA analytical chemistry methods, while a special pH electrode suitable for use in low ionic strength waters may be needed.	A special system has been installed to lower the hardness of the city of Newport dechlorinated water from approximately 45 to 50 mg/ L as $CaCO_3$ to 25 to 30 mg/ L as $CaCO_3$. A Hach titrimetric method will be employed to measure the hardness. This method is capable of suitable precision in the total hardness range of 25 to 30 mg/L as $CaCO_3$. In a conference call between EPA and LWG on July 24, 2007, EPA acknowledged that the use of a special pH electrode is not needed. The FSP addendum will be revised accordingly and resubmitted to EPA.

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FSP 18	**Section 4.2 – Phase 2 Testing:** A more detailed description of the water quality monitoring procedures should be provided. For example, how many of the test replicates will be tested for which parameter? Will the samples be collected from the feed water to the test chambers or at the chamber outlets? Will the samples for the different parameters that are collected at the same time be collected sequentially, or will one sample be collected, homogenized, and distributed to the sample containers? If the samples are collected from the effluent from the test chambers, given the volumes required and the projected flow rates, is there a concern for loss of more volatile substances?	Samples for the definitive analysis of toxicant concentrations will be taken directly from the test aquaria. Collection will involve the pooling of one-quarter of the sample from each replicate of a treatment level. Samples will be dipped from the aquaria using a clean glass vessel at each concentration. The FSP addendum will be revised accordingly and resubmitted to EPA.
FSP 19	**Section 4.2 – Phase 2 Testing:** The qualitative behavioral observations should include observations on both hyper- and hypoactivity, in addition to the other observations described. Narcotic organic chemicals (e.g. naphthalene) can and do cause reduced swimming activity prior to death, while some central nervous system agents can cause both increased and reduced swimming activity, depending on when during the time course of the toxicity study the observations are made.	As stated in the FSP addendum, the laboratory will qualitatively monitor abnormal behavioral activity, if feasible, during the performance of tests. The abnormal behavioral activities to be qualitatively monitored, if feasible, are erratic swimming, hyperventilation, hemorrhaging and hyper/hypoactivity (compared to the activity of the organisms in the control group). Qualitative observations will be made in accordance with the *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA 2002). The qualitative observations of the monitored abnormal behavioral activities will be documented on the laboratory bench sheets. The FSP addendum will be revised accordingly and resubmitted to EPA.
FSP 20	**Section 4.2 – Phase 2 Testing:** It should be clarified that the survival must be greater than or equal to 90% in all control replicates before the test will be considered acceptable.	LWG disagrees that survival must be greater than 90% in all replicates. In EPA and ASTM manuals, the acceptance criterion for acute tests is ≥ 90% survival in control group. Greater mortality can occur in an individual replicate.
FSP 21	**Section 4.2 – Phase 2 Testing:** The first sentence in this section reads as if mortality will only be measured at 96 hr, whereas the Study Protocol correctly states that mortality data must be collected daily (i.e. at 24, 48, 72 and 96 hours). This should be edited here to be consistent with the Protocol.	The mortality will be measured daily as was done in Phase 1. The sentence will be revised, and the FSP addendum will be resubmitted to EPA.

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FSP 22	**Section 4.2 – Phase 2 Testing:** The footnote at the bottom of page 14 editorially misinterprets the standard ASTM guidance. To be correct and consistent with ASTM guidance, this should read: "Per ASTM Guidance, *a test (or LC50 calculation) would usually be considered unacceptable if* no treatment other than the control treatment(s) kill*ed* or affect*ed* less than 37% of the test organisms exposed to it, and/*or* no treatment kill*ed* or affect*ed* more than 63% of the organisms exposed to it." Regarding test acceptability criteria, EPA is not so much concerned with the actual percent mortalities in a given exposure concentration than it is with seeing monotonically increasing mortality with increasing concentrations, with at least one and preferably two or more partial mortality concentrations bracketed by control level and 100% mortality.	The text in the FSP addendum will be revised as follows: "To be consistent with ASTM guidance with respect to achieving an optimal LC50 calculation, each dataset should have at least one mean treatment response that is < 37% and one that is > 63%." The toxicity tests will be performed as a 50% dilution series, and it is anticipated that each test will have at least one or maybe two partial mortality concentrations. Nominal concentrations of each toxicity test will be provided to EPA for review and approval prior to test initiation. The FSP addendum will be revised accordingly, and the FSP addendum will be resubmitted to EPA.
FSP 23	**Section 4.2 – Phase 2 Testing:** EPA will work with LWG and NAS to develop the nominal test exposure concentrations for each chemical prior to EPA approval of the dose spacing, to help ensure that the concentrations proposed are appropriate based on the results from the Phase 1 range-finding studies. Accurate selection of flow-through definitive test concentrations is often a challenging task, but is critical to the success of the study (i.e., maximizes the potential that adequate partial mortalities are observed as per page 14, footnote #2). Ultimately, it would be preferable to include the proposed nominal test concentrations (as well as diluter flow rates) in the test protocol. Regardless of how this information is provided, it is quite critical that study sponsors and stakeholders get the opportunity to evaluate and approve the proposed nominal dose concentrations before testing occurs.	The diluter produces a nominal 50% dilution series and cannot be readily modified. Nominal concentrations will be specified and provided to EPA for review and approval prior to test initiation. The FSP addendum will be revised accordingly, and the FSP addendum will be resubmitted to EPA.
FSP 24	**Section 4.2 – Phase 2 Testing:** The FSP states that "…water samples will be collected from control and each test concentration…". Will these be taken from only one replicate (this is typically the case) per treatment, and how will the replicate be chosen (i.e., will they be randomly selected)?	Water quality monitoring, other than toxicant concentration, will be done consistently in a single replicate. Samples for definitive analysis of toxicant concentrations will involve the pooling of one-quarter of the sample from each replicate of a treatment level. The FSP addendum will be revised accordingly and resubmitted to EPA.

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FSP 25	**Section 4.2 – Phase 2 Testing:** EPA requires additional information regarding the performance of the naphthalene flow-through range-finding test. We propose that a flow through version of the static range-finding tests performed with five chemicals last fall be performed (i.e. 5 fish/tank, 5 doses plus control, same number of replicate exposure tanks/dose, etc.) as was done for the static rangefinders be used.	A flow-through test using a 10% dilution series cannot be done because of the diluter design. A static test will be required with daily solution changes and minimal aeration. Other aspects of the test can be done as in Phase I. NAS can monitor naphthalene concentrations, including the rate of loss of naphthalene during a 24-hour exposure cycle. This procedure will be satisfactory as a range-finding test to select test concentrations for the subsequent definitive test.
FSP 26	**Section 4.2 – Phase 2 Testing:** EPA continues to require the analysis of ammocoete tissues at the completion of each toxicity test for the chemical to which the ammocoetes were exposed. These analyses will provide additional information about the sensitivity of lamprey to chemicals relative to the sensitivity of other aquatic species on a tissue basis, in addition to the relative sensitivity of ammocoetes compared to the sensitivity of other aquatic species to water column exposure to chemicals. The relative sensitivity of a species compared to the sensitivity of other species can and does differ depending on whether the comparison is done on a water column concentration or an absorbed dose basis. Knowledge of lamprey sensitivity on both exposure media and tissue residues basis will be useful to EPA as the ecological risk assessment of Portland Harbor nears completion.	LWG is anticipating further discussion with EPA when the Phase 2 toxicity testing has been completed and the tissue masses have been estimated by the bioassay laboratory. The LWG has searched the published literature and identified no fish LR50 studies for any of the test chemicals. Studies reporting LD50s with associated critical tissue concentrations (CTCs) were identified for three test chemicals (pentachlorophenol, diazinon and aniline). Because pentachlorophenol CTC studies represent only a small fraction of the species for which LC50 data exist, determining the sensitivity of lamprey relative to other fish based on CTC data is not likely to reduce the uncertainty in comparisons of the relative sensitivity of lamprey and other fish based on LC50s alone. For the other chemicals investigated, literature data are too sparse for comparison with lamprey LR50s. Therefore, as discussed in prior technical discussions with EPA, the LWG continues to believe that the analysis of ammocoete tissues at the completion of each toxicity test is not justified.

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FSP 27	**Section 4.2 – Phase 2 Testing:** If the LWG concern regarding tissue analyses is that the test chemicals may not reach steady state within the 96 hour test duration, EPA has performed calculations showing that all organic test chemicals except pentachlorophenol can be expected to reach greater than 95% of the final steady state concentration within 96 hours. Pentachlorophenol has a substantial amount of residue-effects information available in the literature, so critical body residues observed in the lamprey study can be compared to a sizable empirical data set. Toxicity can be and is observed in aquatic species even before tissue residues reach steady state concentrations. The estimated times to 95% steady state concentrations in ammocoete tissues are as follows: Pentachlorophenol – 12.5 days Aniline – 0.24 days Diazinon – 2.36 days Lindane – 3.45 days Naphthalene – 2.52 days	LWG is anticipating further discussion with EPA when the Phase 2 toxicity testing has been completed and the tissue masses have been estimated by the bioassay laboratory.
FSP 28	**Table 4-1.** The proposed water quality monitoring should be included in the table. Flow rate monitoring should be added to the table.	The five water quality parameters (pH, conductivity, dissolved oxygen, and alkalinity) and flow rate to be monitored will be included in the table. Table 4-1 in the FSP addendum will be revised accordingly, and the FSP addendum will be resubmitted to EPA.
Comment Specific to the QAPP Addendum		
QAPP 1	**Section 2.1 – Phase 2 Experimental Design:** The abnormal behavioral activities should not be limited as implied in this paragraph. The three abnormalities listed are taken from the EPA guidance. However, the EPA guidance document refers to these as suggestions, i.e., introduced by "such as…." Behavioral observations should not be limited. Rather, standard laboratory practices of observation should be relied upon. Both hyperactivity and hypoactivity should be noted if observed. Observations such as normal behavior should also be noted.	As stated in the FSP addendum, the laboratory will qualitatively monitor abnormal behavioral activity, if feasible, during the performance of tests. The abnormal behavioral activities to be qualitatively monitored, if feasible, are erratic swimming, hyperventilation, hemorrhaging and hyper/hypoactivity (compared to the activity of the organisms in the control group). Qualitative observations will be made in accordance with the *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA 2002). The qualitative observations of monitored abnormal behavioral activity will be documented on the laboratory bench sheets. The QAPP addendum will be revised accordingly and resubmitted to EPA.

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QAPP 2	**Section 2.3 – Laboratory Quality Assurance/Quality Control:** The flow of the feed water to the test chambers needs to be monitored. It's often not a simple matter to maintain similar flows in a distributed system. Where, when, and how the flow rates through each test chamber will be monitored needs to be described.	Flows to individual replicate aquaria will be verified and documented in the raw data at the beginning and end of each 96-hr study. This will be accomplished through the physical measurement of the flow volume of a delivery cycle (a surge tank delivery) at the point of entry to the aquaria. The QAPP addendum will be revised accordingly and resubmitted to EPA.
QAPP 3	**Page 14, Section 4.2, Phase 2 Testing:** Contrary to ASTM guidance, no performance criteria are stated regarding acceptable levels of mortality in the 5 dilutions (excluding controls) in each toxicity test. This section states "The definitive test will be deemed acceptable if ≥ 90% of the ammocoetes survive in the control. The chemical concentration ranges will be selected to produce partial mortality in some of the test solutions similar to the guidance in ASTM (1996),[2]" where footnote 2 states "Per ASTM guidance, no treatment other than the control treatment(s) will kill or affect less than 37 % of the test organisms exposed to it and no treatment will kill or affect more than 63 % of the organisms exposed to it." However, this section continues that "because of the experimental nature of the study and the potentially limited number of ammocoetes, the definitive tests from which the LC_{50} values will be derived may not fulfill the ASTM definition of acceptable partial mortality in a definitive test. The test conditions and test acceptability criteria are summarized Table 4-1." However, no performance criteria are specified in Table 4-1 regarding acceptable levels of mortality in the 5 dilutions of each toxicity test. This is not acceptable because accurate calculation of LC_{50} values requires monotonically increasing mortality with increasing concentration, and that mortality in each dilution not be greater or less than the values stated above. Therefore, performance measures need to be discussed and agreed upon by EPA before Phase 2 testing begins.	The toxicity tests will be performed as a 50% dilution series, and it is anticipated that each test will have at least one or possibly two partial mortality concentrations. The nominal concentrations of each toxicity test will be provided to EPA for review and approval prior to test initiation. However, because of the experimental nature of the study, and the limited supply of ammocoetes, the acceptability of the toxicity tests will be based only on the ≥ 90% survival in control group. Footnote 2 in the QAPP addendum will be revised as follows: "To be consistent with ASTM guidance with respect to achieving an optimal LC50 calculation, each dataset should have at least one mean treatment response that is < 37% and one that is > 63%." The QAPP addendum will be revised accordingly and resubmitted to EPA.

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QAPP 4	**Page 14, Section 4.2, Phase 2 Testing:** Ammocoetes of different sizes, collected from different locations, and/or collected on different dates may respond differently to exposure to the chemicals used during Phase 2 testing. Therefore, it is important that the composition (size distribution and geographic origin(s)) of ammocoetes used within each test (i.e. the 10 ammocoetes in each of the 5 dilutions within each test) and among the 6 tests conducted be as similar to one another as possible. These concerns were recognized and discussed at length by EPA and government partners during numerous conference calls. No mention of this is made in the FSP. Thus, a protocol for selecting and assigning ammocoetes (i.e., either a randomized or stratified approach) to treatment groups within and among tests must be developed and followed. EPA's preferred approach would be to sample and hold all 3000 ammocoetes at the same time, rather than have field collections in three batches collected at different times, then randomly select individual ammocoetes from the 3000 individuals as needed to populate the exposure chambers for each toxicity test.	NAS does not have the facility to hold all 3,000 ammocoetes at one time based on the Phase 1 loading of 50 ammocoetes per 10-gal. holding tank. Holding 3,000 ammocoetes at one time would require 60 10-gal. tanks). and NAS can only maintain and operate a maximum of 20 holding tanks at one time (i.e., a maximum of 1,000 ammocoetes can be held based on the Phase 1 loading rate). To reduce the variability in test organisms used in the tests, the following steps will be taken: 1) The sampling effort will focus on the four coastal rivers, with an expected permitted take of 2,000 organisms (600 from the Siletz River, 500 from the Nestucca River, 500 from the Trask River, and 400 from the Alsea River). This should be enough organisms to perform the six toxicity tests assuming all first runs of the toxicity tests and the range-finding test for naphthalene are acceptable. The focus on the coastal rivers is based on the assumption that the species composition will be similar in the four rivers. 2) Based on the maximum number of ammocoetes that NAS can hold at one time (1,000 ammocoetes), the sampling effort will be performed in two rounds. In each round, the following number of ammocoetes will be collected in the four rivers: 300 from the Siletz River, 250 each from the Nestucca and Trask River, and 200 from the Alsea River. The organisms collected in each river will, to the extent possible, be distributed evenly in the 20 holding tanks. This will ensure that the two batches have a similar composition of ammocoetes assuming that sufficient number of ammocoetes in the 25-to-40-mm size range can be collected. See also the LWG's response to EPA Comment FSP10.

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Comment No.	**EPA Comment**	**LWG Response**
Comments Specific to QAPP Study Protocol		
QAPP 5	**Test Material – Preparation of Working Stock Solution and Test Concentrations:** EPA requests more detail regarding how NAS will actually implement the Veith and Comstock (1975) glass bead exposure system with respect to size of beads, tubing, flow rates, etc. This is an appropriate method citation, but if NAS is planning to deviate from cited method in any significant way, this should be described in the Protocol.	The preparation of the working stock solutions for the sparingly soluble organic compounds (naphthalene, lindane, pentchlorophenol, and diazanon) will employ the column concept described by Veith and Comstock (1975). This is a conceptual approach in which the specific column, flow rates, glass bead sizes, etc. need to be developed empirically, with analytical feedback, for each study considering such variables as chemical solubility, test temperature, desired highest test concentration, stock toxicant consumption rate, etc. Given the above, some modifications are anticipated as the studies progress. Initial system characteristics are as follows: 1) the toxicant mixing tank will have a 60-liter capacity; 2) a 20 x 280-cm glass column will be employed (10 x 200-cm and 40 x 560-cm columns are also available); 3) the column packing will employ 5-mm glass beads coated with the test compound; 4) particulates will be filtered out through glass wool; flow through the column will be supplied by a variable-speed peristaltic pump; and 5) tubing will be glass and silicone rubber. GC/MS analysis of toxicant in the toxicant mixing tank will be used to optimize the system for each chemical noted above prior to test initiation. The FSP addendum will be revised accordingly and resubmitted to EPA.
QAPP 6	**Test Organisms – Acclimation and Pretest Observations:** Maximum allowed temperature changes during holding or acclimation should be specified as they are in the FSP Addendum. In addition, minimum acclimation times should be specified (see comments above). In addition, test protocol states "Any dead animals are removed daily." This sentence should specify that any lamprey observed above the sediment that are dead will be removed, i.e., lamprey buried within the sediment will not be disturbed daily to assess whether any of them are dead or not.	The maximum temperature variation during holding will be ± 1º C. The ammocoetes will be acclimated to the laboratory test conditions for a minimum of 5 to 7 days prior to test initiation. This minimum number of days applies only to the first toxicity test conducted on each batch of field-collected organisms. For all other tests, the ammocoetes will be held for at least 13 days prior to test initiation. When a temperature adjustment of more than 3 to 5°C is required, the transfer from field collection water to laboratory dilution water will be gradual. It is correct that only dead ammocoetes observed on the sediment surface will be removed. The QAPP addendum will be revised accordingly and resubmitted to EPA.

DRAFT DOCUMENT: DO NOT QUOTE OR CITE
This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part.

Response to Comments Raised in EPA's Letter Dated July 20, 2007		
Comment No.	**EPA Comment**	**LWG Response**
QAPP 7	**Description of Test System – Preparation of Test Concentrations:** How often will diluter flow rates be calibrated, and how will this be accomplished? Typically for 96-hr tests, *all* diluter flow rates would be calibrated at the beginning of the test, and the toxicant flow rate into the diluter would be checked daily. The laboratory should empirically verify that the diluters will accurately deliver the proposed or intended nominal exposure concentrations in the test exposure chambers. Particularly with volatile chemicals, even the best efforts to estimate final delivery concentrations on the basis of calculated flows, dilutions, or evaporation should be validated empirically. This is particularly important given the difficulty in obtaining test organisms to ensure organisms are not wasted on an exposure system that has not been fully bench tested before definitive studies begin.	Diluter flow rates will be measured and documented at the beginning and conclusion of each 96-hour test. This will be done by measuring individual diluter capillary tube flows. When the flow rates are entered into an Excel® spreadsheet, the actual dilutions of the toxicant stock can be computed. Actual test chemical concentrations (organic chemicals) in the toxicant mixing chamber (toxicant stock solution) and in exposure aquaria will periodically be measured on a real-time basis at NAS to verify that nominal concentrations are being routinely achieved. Definitive concentration documentation in test aquaria will result from daily samples shipped for analysis to CAS. The QAPP addendum will be revised accordingly and resubmitted to EPA.
QAPP 8	**Experimental Design and Test Procedures – Effect Criterion:** The protocol states "The mortality data may be used to compute LC_{50}s for each exposure period." One of the main objectives of Phase II testing is to derive LC_{50}s for lamprey for each of the 6 chemicals being tested. Thus, this statement should be revised to state that "The mortality data *will* be used to compute LC_{50}s for each chemical tested."	The mortality data will be used to compute LC50s for each of the tested chemicals. The QAPP addendum will be revised accordingly resubmitted to EPA.
QAPP 9	**Experimental Design and Test Procedures – Criteria of Test Acceptance:** As stated above, no performance criteria are specified regarding acceptable levels of mortality in the 5 dilutions of each toxicity test. This is not acceptable because accurate calculation of LC_{50} values requires that mortality in each dilution not be greater or less than the values stated in ASTM guidance (stated above). Therefore, performance measures need to be discussed and agreed upon by EPA and partners before Phase 2 testing begins.	The toxicity tests will be performed as a 50% dilution series, it is anticipated that each test will have at least one or possibly two partial mortality concentrations. Nominal concentrations of each toxicity test will be provided to EPA for review and approval prior to test initiation. However, because of the experimental nature of the study and the limited supply of ammocoetes, the acceptability of the toxicity tests will be based only on the $\geq$ 90% survival in control group.
QAPP 10	**Data Analysis:** As stated in FSP comments above, EPA recommends the use of the CETIS software for toxicity endpoint calculations. However, EPA recognizes that Toxcalc can also be acceptable. Regardless, statistical software used should also be cited in the FSP.	ToxCalc™ will be used as the statistical software to calculate the LC50s. The QAPP addendum will be revised accordingly and resubmitted to EPA.

DRAFT DOCUMENT: DO NOT QUOTE OR CITE
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References

ASTM. 1996. Standard guide for conducting acute toxicity tests on test materials with fishes, macroinvertebrates, and amphibians. E729-96. American Society for Testing and Materials, Philadelphia, PA.

EPA. 2006. Letter to Lower Willamette Group from C. Humphrey and E. Blischke dated October 31, 2006 regarding Portland Harbor RI/FS Field Sampling Plan: Round 3 lamprey ammocoete toxicity testing field sampling plan. US Environmental Protection Agency Region 10, Oregon Operations Office, Portland, OR.

Windward. 2006. Portland Harbor RI/FS. Round 3 lamprey ammocoete toxicity testing quality assurance project plan. Draft. WE-06-0007. Prepared for Lower Willamette Group. Windward Environmental LLC, Seattle, WA.

DRAFT DOCUMENT: DO NOT QUOTE OR CITE
This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
OREGON OPERATIONS OFFICE
811 S.W. 6th Avenue
Portland, Oregon 97204

August 17, 2007

Mr. Jim McKenna
Port of Portland & Co-Chairman, Lower Willamette Group
121 NW Everett
Portland, Oregon 97209

Mr. Robert Wyatt
Northwest Natural & Co-Chairman, Lower Willamette Group
220 Northwest Second Avenue
Portland, Oregon 97209

Re: Portland Harbor Superfund Site; Administrative Order on Consent for Remedial Investigation and Feasibility Study; Docket No. CERCLA-10-2001-0240. Lamprey Toxicity Test Field Sampling Plan and QAPP Phase 2 Addenda

Dear Messrs. Wyatt and McKenna:

As you are aware, EPA submitted comments on the Round 3 Lamprey Ammocoete Toxicity Testing Field Sampling Plan Addendum: Phase 2 Lamprey Ammocoete Collection and Testing (Lamprey Toxicity Testing FSP) on July 20, 2007. The Lower Willamette Group (LWG) submitted a response to these comments on August 10, 2007. EPA has reviewed the response to comments and finds the proposed changes to the Lamprey Toxicity Testing FSP generally acceptable. As a result, EPA authorizes the LWG to begin the collection of lamprey ammocoetes as soon as practicable. EPA understands that the collection is scheduled to begin on August 27, 2007 contingent on obtaining a scientific take permit from Oregon Fish and Wildlife (ODFW). As stated in EPA's July 20, 2007 comments, successful completion of the Phase 2 Lamprey Toxicity Testing will require close coordination with EPA both during ammocoete collection regarding the size range of ammocoetes obtained in the field and during the laboratory toxicity testing regarding the selection of the nominal text exposures concentrations for each test chemical.

Although EPA generally finds the proposed response to comments acceptable, EPA requests the following modifications and/or clarifications:

<u>General Comment:</u> As a minor point of clarification, EPA recognizes that Northwestern Aquatic Sciences (NAS) is only using one diluter for the lamprey studies, not multiple diluters as implied in the general comment.

FSP Comment 4: Note that the first EPA visit to NAS occurred on August 9, 2007, at which time EPA observed that both the diluter and ammocoete holding facilities are acceptable. EPA believes that lamprey toxicity testing can commence once final calibration of the organic chemical toxicant delivery system is completed. The toxicant delivery system itself is a standard design, and EPA anticipates no difficulties with the system once calibrated. At the request of NAS, EPA and NAS staff reviewed the rangefinding test results and discussed nominal dose spacing for copper, diazinon, pentachlorophenol, aniline and lindane. EPA and NAS are in agreement on the approach to be used to define the nominal doses for the definitive tests. EPA and NAS are also in agreement on an approach to be used to assign individual ammocoetes to exposure chambers during the toxicity tests.

FSP Comment 5: EPA agrees that test acceptability criteria for control survival is a minimum 90% survival in the pooled control exposure chambers, not a minimum 90% survival in each individual control exposure chamber.

FSP Comment 7: EPA understands that the laboratory selected to perform the toxicity testing (Northwestern Aquatic Sciences, Inc. – NAS) does not have the analytical equipment necessary to perform an in-house copper analysis. However, EPA also understands that copper samples will be sent to an outside laboratory and that this information will be available to help verify that the definitive toxicity test for copper was run correctly. EPA reiterates that chemical analyses of toxicants during the toxicity tests is solely for the purpose of ensuring the delivered test concentrations are close to nominal values, and will not be used as the definitive measures of test concentrations.

FSP Comment 8: While the proposed response is acceptable, please clarify that if field measurements of ammocoete length are too difficult or time consuming to perform, the MS222 will be used only on a subset of ammocoete samples to allow field personnel to visually estimate ammocoete length in the field without application of MS222. MS222 will not be used on all 3000 ammocoetes collected for transport to NAS.

FSP Comment 11: EPA's original comment regarding the maximum acceptable temperature change rate included a typographical error. The maximum acceptable temperature change rate is 1° C per *day* not 1° C per *hour*. As a result, EPA does not agree with the proposed temperature change rate of 3° C per 12 hours. Please specify a maximum acceptable temperature change rate of 1° C per day.

FSP Comment 15: During the August 9, 2007 EPA site visit to NAS, ammocoete handling procedures were discussed. EPA concurs with the LWG response to our comment regarding ammocoete handling and removal from sediment.

FSP Comment 18: During the August 9, 2007 EPA site visit to NAS, it was agreed that water samples for both definitive toxicant analysis and monitoring during the tests themselves could be removed from the flow splitting chambers, as an alternative to

obtaining the water samples from the test aquaria. Either method of obtaining water samples is acceptable to EPA.

FSP Comment 20: See EPA response to FSP Comment 5. EPA concurs with the LWG response to our FSP Comment 20.

FSP Comment 22: During the EPA August 9, 2007 visit to NAS, discussions were held regarding calculation of the nominal test concentrations for the definitive tests. As a result of those discussions, EPA believes the approach agreed to for calculation of nominal concentrations will result in at least one concentration with no response, one concentration with partial mortality, and one concentration with complete mortality. This assumes that the results of the rangefinding tests accurately represent the response of the ammocoetes to test chemicals during the definitive tests. Based on the EPA – NAS discussions, EPA now concurs with the LWG response to FSP Comment 22.

FSP Comment 25: Based on discussions with NAS staff during EPA's August 9, 2007 visit to the NAS laboratory, it is our understanding that both the rangefinding and definitive naphthalene toxicity tests will be performed under flow through conditions. This is acceptable to EPA. EPA should be notified by LWG if this currently intended study approach for naphthalene will be changed prior to test initiation. EPA acknowledges that the geometric progression of the toxicant dilutions during the definitive tests (and the naphthalene rangefinding test) will differ from the dilution progression of the rangefinding tests. These differences are by design, follow standard toxicity testing protocols, and are acceptable to EPA.

FSP Comment 26: EPA is aware of lethal body burden literature for all six test chemicals, for both fish and invertebrates. An increasing amount of literature indicates that the order of sensitivity of species exposed to waterborne chemicals is not the same as the order of species sensitivity when sensitivity is expressed on a tissue residue basis. EPA continues to believe that residue analysis of ammocoetes at the end of the toxicity studies is warranted and will provide useful ecological risk assessment information for interpretation of residues in the field collected ammocoetes.

QAPP Comment 1: EPA wishes to reiterate that an objective of these tests is to obtain LC_{50} data for lamprey ammocoetes. The tests are not designed as behavioral tests, nor is it intended by EPA that NAS quantitatively calculate EC_{50} values for any observed behavioral changes in the ammocoetes. The request to note any observed behavioral changes is merely a reiteration of good laboratory practice during toxicity test performance, where any unusual or abnormal observations should be noted on laboratory bench sheets.

QAPP Comment 2: During the EPA August 9, 2007 visit to the NAS laboratory, we reviewed NAS calibration data for flows to individual aquaria, and concluded that NAS has documented consistent and acceptable flows of water and toxicant to the test aquaria.

QAPP Comment 5: During the EPA August 9, 2007 visit to the NAS laboratory, we observed the column containing the glass beads that will be used as part of the toxicant delivery system of the diluter. We found the column to be a standard toxicant delivery system and acceptable for use in the lamprey toxicity tests once the toxicant delivery rate from the column has been calibrated.

Please have a final Lamprey Toxicity Testing FSP prepared and submitted to EPA that incorporates the above clarifications within 30 days following the date of this letter. If you have any questions, please contact Chip Humphrey at (503) 326-2678 or Eric Blischke (503) 326-4006. All legal inquiries should be directed to Lori Cora at (206) 553-1115.

Sincerely,

Chip Humphrey
Eric Blischke
Remedial Project Managers

cc: Greg Ulirsch, ATSDR
Rob Neely, NOAA
Ted Buerger, US Fish and Wildlife Service
Preston Sleeger, Department of Interior
Jim Anderson, DEQ
Kurt Burkholder, Oregon DOJ
Rick Keppler, Oregon Department of Fish and Wildlife
Michael Karnosh, Confederated Tribes of Grand Ronde
Tom Downey, Confederated Tribes of Siletz
Audie Huber, Confederated Tribes of Umatilla
Brian Cunninghame, Confederated Tribes of Warm Springs
Erin Madden, Nez Perce Tribe
Rose Longoria, Confederated Tribes of Yakama Nation

John Toll

From: John Toll
Sent: Tuesday, August 28, 2007 5:54 PM
To: Shephard.Burt@epamail.epa.gov
Subject: RE: need written authorization to collect 2.5-6.0 cm lamprey ammocoete size class

Thanks Burt. As you may have heard the crew successfully collected 250 ammocoetes in the 2.5-6.0 cm size class from the Trask River yesterday and 250 in the 2.5-6.0 cm size class from the Nestucca River today. We had to capture 540 ammocoetes to get the 250 in the 2.5-6.0 cm size class from the Nestucca (others were larger). Of the 250 captured in the Trask, it is my initial understanding, based on verbal communication with the field crew, that approximately 95% of the retained ammocoetes were between 4.0 and 6.0 cm in length. Also, it's my initial understanding, based on verbal communication with the field crew, that the ammocoetes from the Nestucca were larger than the ammocoetes from the Trask. So, we will have to discard most of the ammocoetes collected from the Trask and Nestucca if you do not authorize us to test 2.5-6.0 cm fish, and given the per river permit limits I am concerned that we won't be able to compensate for the larger ammocoetes from the Trask and Nestucca by collecting more 2.5-4.0 cm ammocoetes from other rivers (even if they are there). So, I think that we're going to need a decision to test the size class we've caught in order to complete the testing program. John

John Toll, Partner
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-----Original Message-----
From: Shephard.Burt@epamail.epa.gov [mailto:Shephard.Burt@epamail.epa.gov]
Sent: Tuesday, August 28, 2007 5:30 PM
To: John Toll
Cc: Blischke.Eric@epamail.epa.gov; Humphrey.Chip@epamail.epa.gov; Goulet.Joe@epamail.epa.gov
Subject: Re: need written authorization to collect 2.5-6.0 cm lamprey ammocoete size class

John,

As per previous verbal direction to Helle Andersen of Windward, you are authorized to collect and retain lamprey ammocoetes between 2.5 and 6.0 cm in length for possible use in toxicity testing. At this time, this authorization does not extend to approval to use 4 to 6 cm ammocoetes for toxicity testing.

Discussions with both Helle and Jeremy Buck of U.S. Fish and Wildlife Service have indicated that the ammocoetes being collected are most abundant centered on a size range of approximately 5 cm in length, with decreasing numbers of longer and shorter ammocoetes above

and below 5 cm. As this is only the second day of field collections, I believe it prudent to give the field crews a few more days to see if other streams have greater abundances of the 2.5 to 4 cm length ammocoetes prior to making a final determination that the larger fish are acceptable for use in the toxicity tests. If it turns out that other streams have higher abundances of the 2.5 to 4 cm fish that can be captured in an expeditious manner, its likely that EPA will continue to require that the toxicity tests be performed with the 2.5 to 4 cm fish.

I appreciate your field crew keeping me informed of their progress.

Best regards,

Burt Shephard
Risk Evaluation Unit
Office of Environmental Assessment (OEA-095) U.S. Environmental Protection Agency, Region 10
1200 6th Avenue Seattle, WA 98101

Telephone: (206) 553-6359
Fax: (206) 553-0119

e-mail: Shephard.Burt@epa.gov

"If your experiment needs statistics to analyze the results, then you ought to have done a better experiment"
- Ernest Rutherford

"John Toll"
<johnt@windwardenv.com>
08/28/2007 10:23 AM

To
Burt Shephard/R10/USEPA/US@EPA
cc
Subject
need written authorization to collect 2.5-6.0 cm lamprey ammocoete size class

Hi Burt – Per your decision and our discussion yesterday, would you please e-mail me written authorization for the LWG to retain ammocoetes in the 2.5-6.0 cm size class for toxicity testing? This is a deviation from the approved FSP, which specifies a 2.5-4.0 cm size class. Per your discussion yesterday with Helle Andersen, collecting sufficient numbers of ammocoetes in the 2.5-4.0 cm size class has proved to be infeasible. Thanks. John

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John Toll

From: John Toll
Sent: Thursday, August 30, 2007 9:25 PM
To: Shephard.Burt@epamail.epa.gov
Cc: Blischke.Eric@epamail.epa.gov; Humphrey.Chip@epamail.epa.gov; Goulet.Joe@epamail.epa.gov; Helle B. Andersen; Lisa Saban (lisas@windwardenv.com); Mike Johns (mikej@windwardenv.com); Bob Wyatt; Jim McKenna; Rick Applegate (ricka@bes.ci.portland.or.us)
Subject: RE: lamprey ammocoete sampling update and request for approval to test 2.5-6.0 cm ammocoetes
Attachments: Ammocoete catch data August 2007.xls

Hi Burt. Attached please find an updated workbook with the summary of the catch data through the first four days of sampling. The fourth day of sampling was on the Alsea River. The crew was again successful in taking the desired number of ammocoetes, in the 2.5-6.0 cm size range. As before, the bulk of the take (in this case 73.1%) was between 4.0 and 6.0 cm in length, and it took a full day of effort to obtain the desired take. As before, please let me know if you have any questions or comment on this sampling effort. John

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From: John Toll
Sent: Thursday, August 30, 2007 10:33 AM
To: 'Shephard.Burt@epamail.epa.gov'
Cc: Blischke.Eric@epamail.epa.gov; Humphrey.Chip@epamail.epa.gov; Goulet.Joe@epamail.epa.gov; Helle B. Andersen; John Toll (johnt@windwardenv.com); Lisa Saban (lisas@windwardenv.com); Mike Johns (mikej@windwardenv.com); Bob Wyatt (rjw@nwnatural.com); Jim McKenna (Jim.McKenna@portofportland.com); Rick Applegate (ricka@bes.ci.portland.or.us)
Subject: lamprey ammocoete sampling update and request for approval to test 2.5-6.0 cm ammocoetes

Hi Burt. Attached please find a summary of the catch data for the first three days of the lamprey ammocoete collection program. The catch and take from the three rivers we have sampled so far are summarized in the attached table. The numbers highlighted in yellow are the ones we released after we measured the length. These ammocoetes count against our permitted catch limit, put not against permitted take. The first three days of sampling were successful in taking the desired numbers of ammocoetes from the Trask, Nestucca and Siletz rivers. As you know we were unable to obtain the desired numbers in the 2.5-4.0 cm size class, which is why you authorized us to collect and retain ammocoetes from 2.5-6.0 cm in length.

Taking a look at the catch data, I want to point out to you the relatively high total catch numbers for the Nestucca and Trask Rivers. This is in response to your 8/28 request that the LWG obtain information on the size class distributions at the sampled sites. We cannot sustain this side effort to characterize the size class distribution at the sampled sites, though because we are at risk of reaching our total catch limits before we reach or total take limits.

I also want to point out the data on percentage of take in the 2.5-4.0 cm size class. This was 7.6% on the Trask, 20.7% on the Nestucca and 9.7% on the Siletz (so, the take percentages in the 4.0-6.0 cm size class were 92.4%, 79.3% and 90.3%,

respectively). On each of the first three rivers it was a full day's effort to capture the targeted numbers of ammocoetes, in the 2.5-6.0 cm size class. Based on these data we estimate that it would have taken nearly 2 months (57 days' effort) to obtain the total permitted take from these first three rivers if we had been limited to the originally specified 2.5-4.0 cm size class (as opposed to 6 days' effort with the 2.5-6.0 cm size class). This assumes that daily take wouldn't decline over the two month effort, and it assumes that we could take the permitted numbers of ammocoetes in the 2.5-4.0 cm size class without exceeding the permitted total catch limits. Neither of these is a realistic assumption, nor is it realistic to assume that we could spend 2 months capturing 1,100 ammocoetes, which is roughly one-third of the permitted take.

In light of the above, I am requesting written approval at this time to use the 2.5-6.0 cm ammocoetes, which we have been authorized to collect and retain, for toxicity testing. Please let me know at your earliest convenience whether you approve this request, or if you have questions or concerns about it.

Thanks,

John

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Sent: Tuesday, August 28, 2007 5:30 PM
To: John Toll
Cc: Blischke.Eric@epamail.epa.gov; Humphrey.Chip@epamail.epa.gov; Goulet.Joe@epamail.epa.gov
Subject: Re: need written authorization to collect 2.5-6.0 cm lamprey ammocoete size class

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the toxicity tests be performed with the 2.5 to 4 cm fish.

I appreciate your field crew keeping me informed of their progress.

Best regards,

Burt Shephard
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Fax: (206) 553-0119

e-mail: Shephard.Burt@epa.gov

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- Ernest Rutherford

"John Toll" <johnt@windwardenv.com> 08/28/2007 10:23 AM

To Burt Shephard/R10/USEPA/US@EPA

cc

Subject need written authorization to collect 2.5-6.0 cm lamprey ammocoete size class

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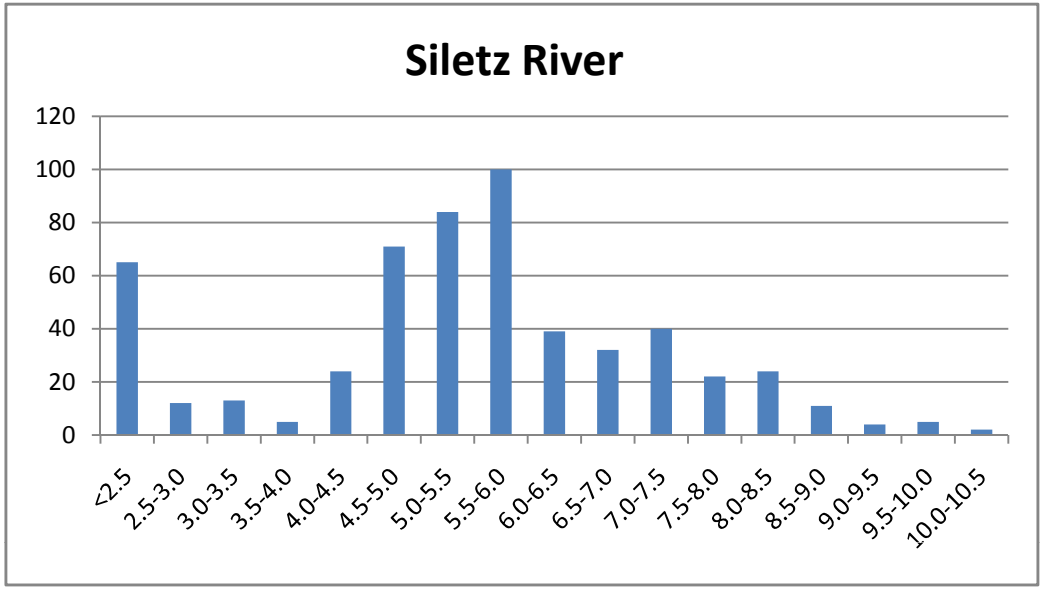
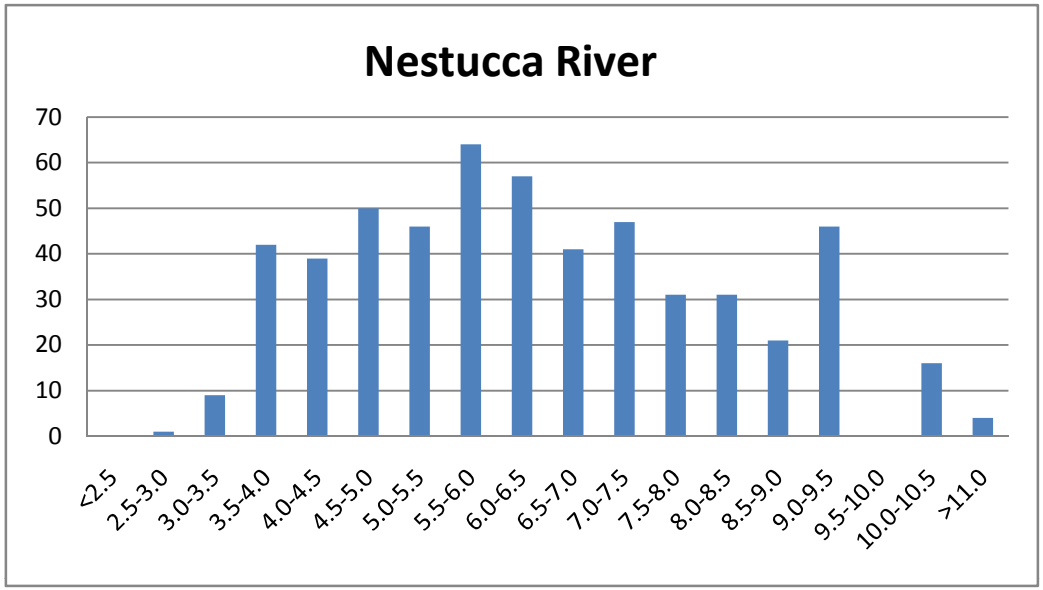
	Number of Ammocoetes			
	9/27/2007	9/28/2007	9/29/2007	9/30/2007
Size	Trask River	Nestucca River	Siletz River	Alsea River
<2.5	4	0	65	
2.5-3.0	2	1	12	
3.0-3.5	4	9	13	
3.5-4.0	13	42	5	
4.0-4.5	24	39	24	
4.5-5.0	57	50	71	
5.0-5.5	80	46	84	
5.5-6.0	71	64	100	
6.0-6.5	35	57	39	
6.5-7.0	17	41	32	
7.0-7.5	10	47	40	
7.5-8.0	6	31	22	
8.0-8.5	7	31	24	
8.5-9.0	8	21	11	
9.0-9.5	1	46	4	
9.5-10.0			5	
10.0-10.5		16	2	
>11.0		4		
Total take	251	251	309	0
Total catch	339	545	553	0
take/catch ratio	74.0%	46.1%	55.9%	#DIV/0!
Permitted take	500	500	600	200
Permitted total catch	1000	1000	1200	400
minimum overall take/catch ratio	50.0%	50.0%	50.0%	50.0%
Portion of permitted total take remaining	249	249	291	200
Portion of permitted total catch remaining	661	455	647	400
minimum possible take/catch ratio for remaining take	37.7%	54.7%	45.0%	50.0%
percentage of take in the 2.5-4.0 cm size class	7.6%	20.7%	9.7%	#DIV/0!
percenteage of catch in the 2.5-4.0 cm size class	5.6%	9.5%	5.4%	#DIV/0!

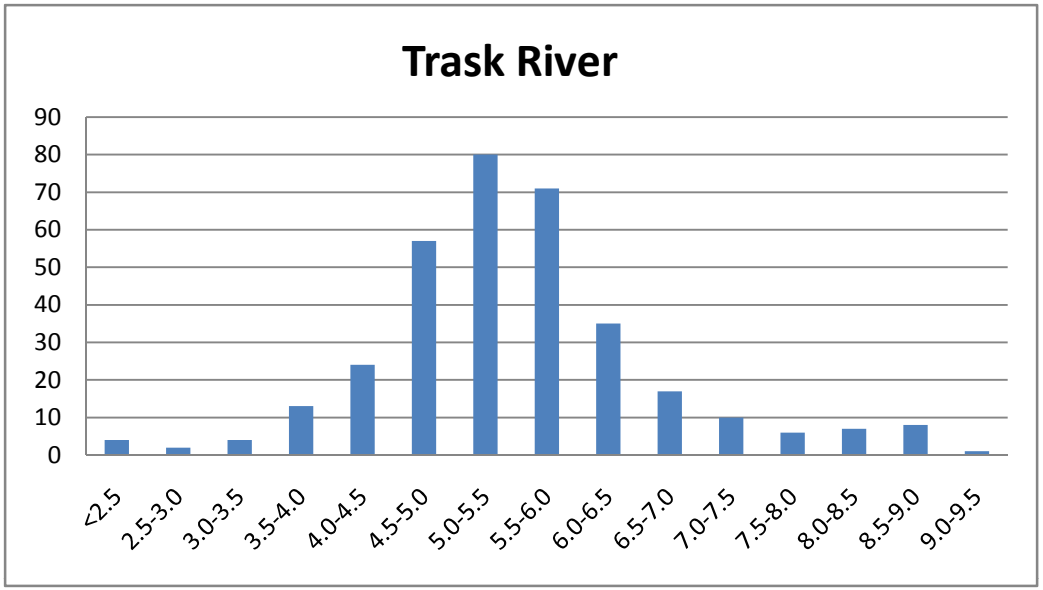
Size	Siletz River
<2.5	65
2.5-3.0	12
3.0-3.5	13
3.5-4.0	5
4.0-4.5	24
4.5-5.0	71
5.0-5.5	84
5.5-6.0	100
6.0-6.5	39
6.5-7.0	32
7.0-7.5	40
7.5-8.0	22
8.0-8.5	24
8.5-9.0	11
9.0-9.5	4
9.5-10.0	5
10.0-10.5	2



Size	Nestucca River
<2.5	0
2.5-3.0	1
3.0-3.5	9
3.5-4.0	42
4.0-4.5	39
4.5-5.0	50
5.0-5.5	46
5.5-6.0	64
6.0-6.5	57
6.5-7.0	41
7.0-7.5	47
7.5-8.0	31
8.0-8.5	31
8.5-9.0	21
9.0-9.5	46
9.5-10.0	
10.0-10.5	16
>11.0	4



Size	Trask River
<2.5	4
2.5-3.0	2
3.0-3.5	4
3.5-4.0	13
4.0-4.5	24
4.5-5.0	57
5.0-5.5	80
5.5-6.0	71
6.0-6.5	35
6.5-7.0	17
7.0-7.5	10
7.5-8.0	6
8.0-8.5	7
8.5-9.0	8
9.0-9.5	1



Helle B. Andersen

From: Shephard.Burt@epamail.epa.gov
Sent: Wednesday, September 05, 2007 4:32 PM
To: John Toll; Helle B. Andersen
Cc: Blischke.Eric@epamail.epa.gov; Humphrey.Chip@epamail.epa.gov; Goulet.Joe@epamail.epa.gov; rgensemer@parametrix.com
Subject: Lamprey size ranges
Attachments: Ammocoete catch data August 30 2007.xls

John, Helle,

Attached is the spreadsheet (originally from John) with some recombined size ranges that indicate you have sufficient ammocoetes in the 4 to 6 cm range to perform the first three definitive toxicity tests. Look at row 38 and down of the All Rivers tab on the spreadsheet to see my analysis. Its clear that the best combination of minimizing size differences in the toxicity tests while ensuring you have enough fish to complete the tests is to run the tests on 4 to 6 cm fish. I'll get you a formal approval of this change in a few minutes, which meets EPA's general objective of testing with a smaller size range of ammocoetes than was used in the rangefinding tests. For reference, the size ranges of the rangefinding tests as read off by Helle earlier today on the phone are below.

Rangefinding toxicity test length ranges aniline - 6.7 to 8.3 cm copper - 5.2 to 5.9 cm pentachlorophenol - 4.9 to 8.2 cm lindane - 5.8 to 8.8 cm diazinon - 6.8 to 9.0 cm

Best regards,

Burt Shephard
Risk Evaluation Unit
Office of Environmental Assessment (OEA-095) U.S. Environmental Protection Agency, Region 10
1200 6th Avenue Seattle, WA 98101

Telephone: (206) 553-6359
Fax: (206) 553-0119

e-mail: Shephard.Burt@epa.gov

"If your experiment needs statistics to analyze the results, then you ought to have done a better experiment"
- Ernest Rutherford

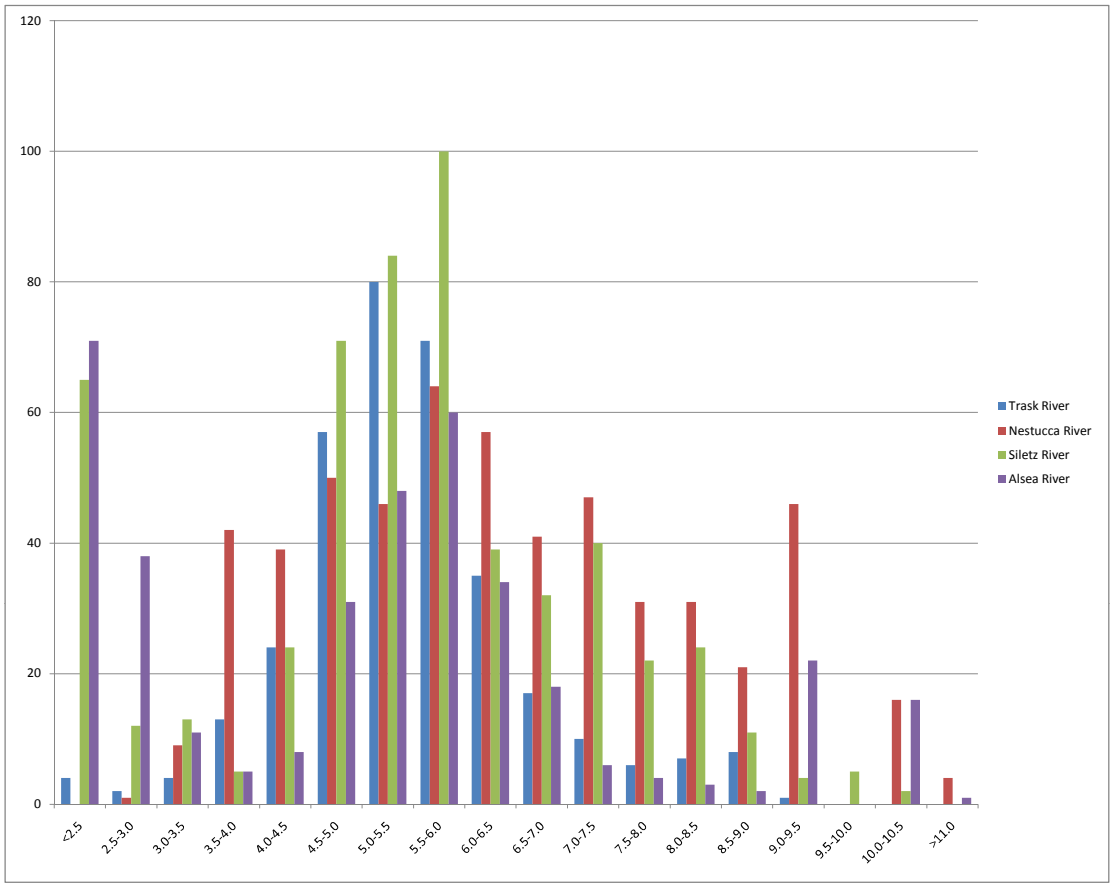
(See attached file: Ammocoete catch data August 30 2007.xls)

	Number of Ammocoetes			
	9/27/2007	9/28/2007	9/29/2007	9/30/2007
Size	Trask River	Nestucca River	Siletz River	Alsea River
<2.5	4	0	65	71
2.5-3.0	2	1	12	38
3.0-3.5	4	9	13	11
3.5-4.0	13	42	5	5
4.0-4.5	24	39	24	8
4.5-5.0	57	50	71	31
5.0-5.5	80	46	84	48
5.5-6.0	71	64	100	60
6.0-6.5	35	57	39	34
6.5-7.0	17	41	32	18
7.0-7.5	10	47	40	6
7.5-8.0	6	31	22	4
8.0-8.5	7	31	24	3
8.5-9.0	8	21	11	2
9.0-9.5	1	46	4	22
9.5-10.0	0	0	5	0
10.0-10.5	0	16	2	16
>11.0	0	4	0	1
Total take	251	251	309	201
Total catch	339	545	553	377
take/catch ratio	74.0%	46.1%	55.9%	53.3%
Permitted take	500	500	600	400
Permitted total catch	1000	1000	1200	800
minimum overall take/catch ratio	50.0%	50.0%	50.0%	50.0%
Portion of permitted total take remaining	249	249	291	199
Portion of permitted total catch remaining	661	455	647	423
minimum possible take/catch ratio for remaining take	37.7%	54.7%	45.0%	47.0%
percentage of take in the 2.5-4.0 cm size class	7.6%	20.7%	9.7%	26.9%
percenteage of catch in the 2.5-4.0 cm size class	5.6%	9.5%	5.4%	14.3%

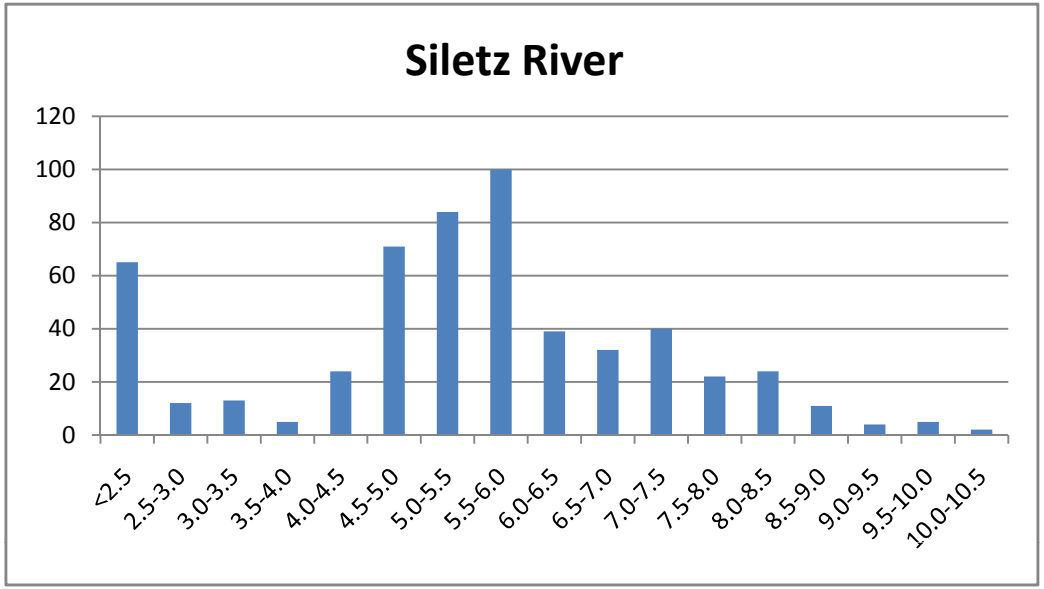
Requirement to run 3 definitive
720 ammocoetes

6 concentrations (5 doses + control)
4 replicates per concentration
10 ammocoetes/replicate
6 x 4 x 10 = 240 ammocoetes/test

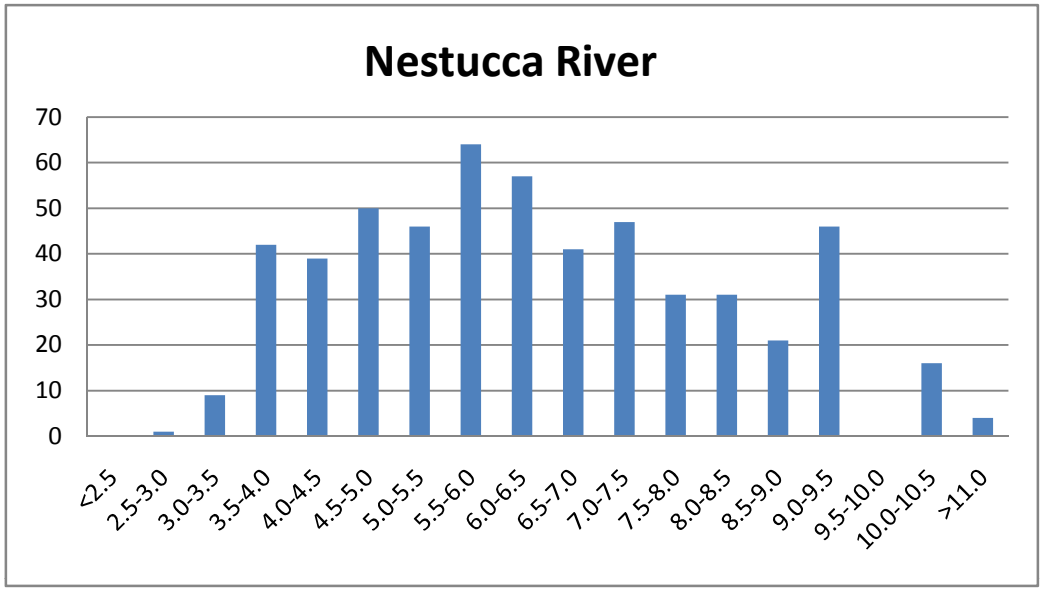
Size range sums	
<2.5	140
2.5 - 4.0	155
4.0 - 6.0	857
6.0 - 8.0	439
>8.0	159
3.5 - 5.5	627
3.0 - 5.5	664



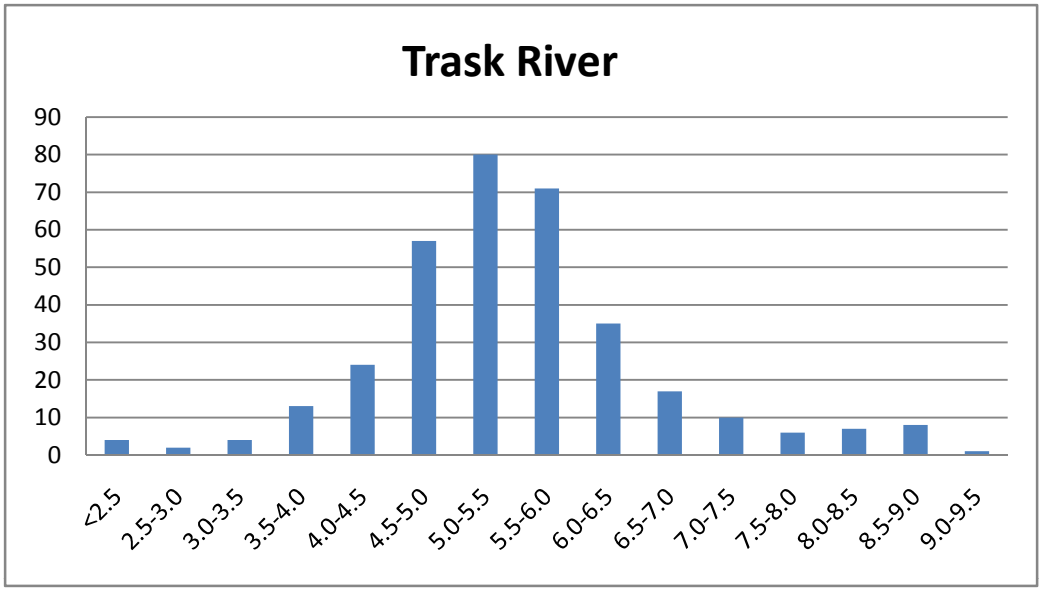
Size	Siletz River
<2.5	65
2.5-3.0	12
3.0-3.5	13
3.5-4.0	5
4.0-4.5	24
4.5-5.0	71
5.0-5.5	84
5.5-6.0	100
6.0-6.5	39
6.5-7.0	32
7.0-7.5	40
7.5-8.0	22
8.0-8.5	24
8.5-9.0	11
9.0-9.5	4
9.5-10.0	5
10.0-10.5	2



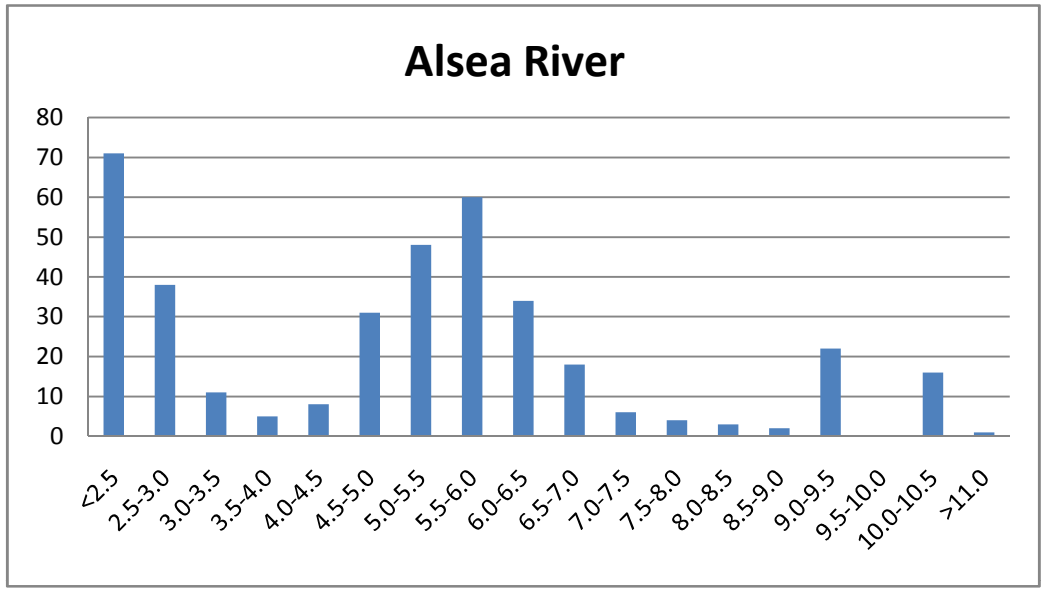
Size	Nestucca River
<2.5	0
2.5-3.0	1
3.0-3.5	9
3.5-4.0	42
4.0-4.5	39
4.5-5.0	50
5.0-5.5	46
5.5-6.0	64
6.0-6.5	57
6.5-7.0	41
7.0-7.5	47
7.5-8.0	31
8.0-8.5	31
8.5-9.0	21
9.0-9.5	46
9.5-10.0	
10.0-10.5	16
>11.0	4



Size	Trask River
<2.5	4
2.5-3.0	2
3.0-3.5	4
3.5-4.0	13
4.0-4.5	24
4.5-5.0	57
5.0-5.5	80
5.5-6.0	71
6.0-6.5	35
6.5-7.0	17
7.0-7.5	10
7.5-8.0	6
8.0-8.5	7
8.5-9.0	8
9.0-9.5	1



Size	Alsea River
<2.5	71
2.5-3.0	38
3.0-3.5	11
3.5-4.0	5
4.0-4.5	8
4.5-5.0	31
5.0-5.5	48
5.5-6.0	60
6.0-6.5	34
6.5-7.0	18
7.0-7.5	6
7.5-8.0	4
8.0-8.5	3
8.5-9.0	2
9.0-9.5	22
9.5-10.0	
10.0-10.5	16
>11.0	1



John Toll

From: Shephard.Burt@epamail.epa.gov
Sent: Wednesday, September 05, 2007 4:53 PM
To: Jim McKenna; Rick Applegate; Bob Wyatt
Cc: Blischke.Eric@epamail.epa.gov; Humphrey.Chip@epamail.epa.gov; John Toll; Jessica Pisano
Subject: Modification to Round 3 lamprey ammocoete toxicity test FSP - allowable size range of fish (with message this time)
Attachments: Ammocoete catch data August 30 2007.xls

Jim, Rick, Bob,

This e-mail authorizes LWG to make a change to the toxicity testing procedure for lamprey ammocoetes being performed as part of the Portland Harbor RI/FS investigations. The change allows toxicity testing to be performed with ammocoetes of a size range of 4.0 to 6.0 cm in length.
The FSP previously called for testing of ammocoetes between 2.5 and 4.0 cm in length, but contained an option for testing of larger ammocoetes if it proved infeasible to collect sufficient numbers of ammocoetes of
2.5 to 4.0 cm length. Based on catch of various length classes of ammocoetes (see attached spreadsheet), it became clear that fish from 4 to 6 cm in length provided sufficient numbers of animals for toxicity testing, while at the same time minimizing the difference in sizes among fish within a single toxicity test. A total of 240 fish are required for each definitive test. Since the 4 to 6 cm size range is the narrowest range that currently contains a sufficient number of fish to complete three toxicity tests while minimizing the variation in length of animals within a single toxicity test, 4 to 6 cm is the size range authorized to test by EPA. This size range also meets a general goal of EPA's to test smaller ammocoetes in the definitive toxicity tests than were tested in the rangefinding toxicity tests.

EPA also authorizes LWG to collect ammocoetes between 4 and 6 cm in length during the second ammocoete field collection effort to obtain animals for the remainder of the toxicity tests.

Best regards,

Burt Shephard
Risk Evaluation Unit
Office of Environmental Assessment (OEA-095) U.S. Environmental Protection Agency, Region 10
1200 6th Avenue Seattle, WA 98101

Telephone: (206) 553-6359
Fax: (206) 553-0119

e-mail: Shephard.Burt@epa.gov

"If your experiment needs statistics to analyze the results, then you ought to have done a better experiment"
- Ernest Rutherford

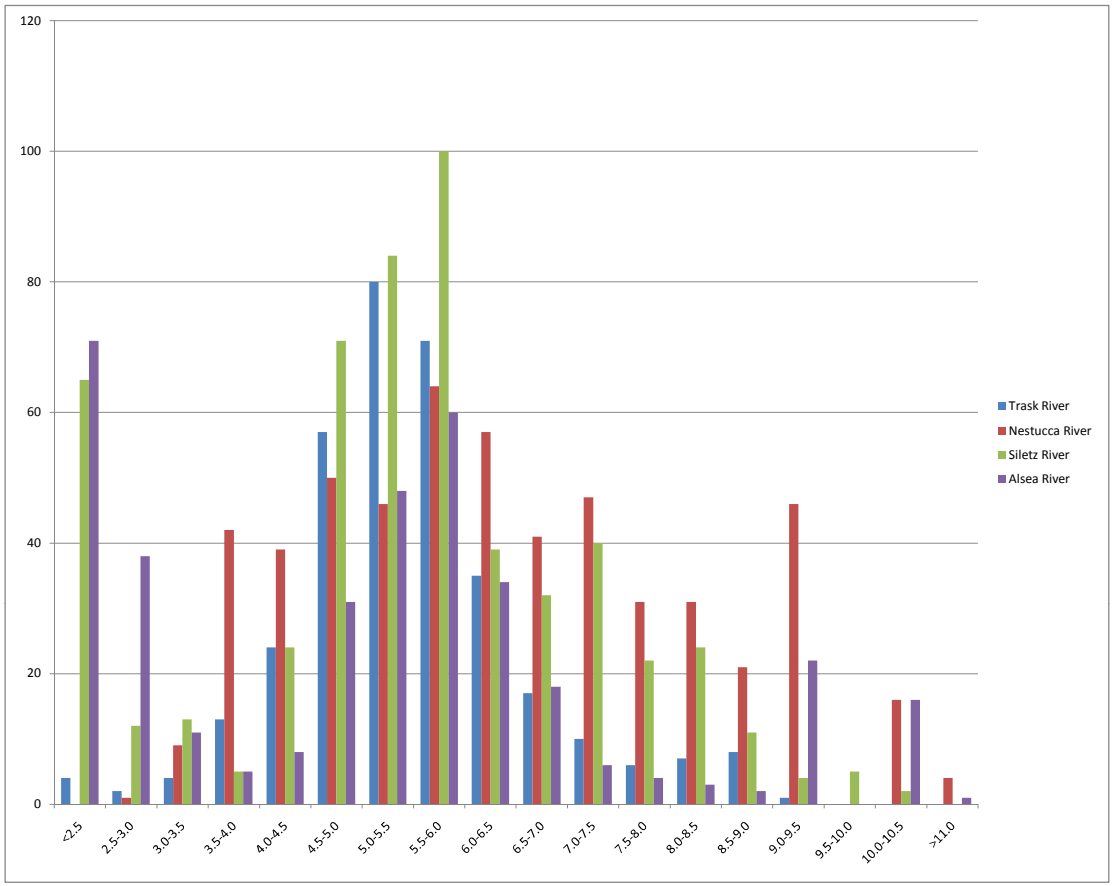
(See attached file: Ammocoete catch data August 30 2007.xls)

	Number of Ammocoetes			
	9/27/2007	9/28/2007	9/29/2007	9/30/2007
Size	Trask River	Nestucca River	Siletz River	Alsea River
<2.5	4	0	65	71
2.5-3.0	2	1	12	38
3.0-3.5	4	9	13	11
3.5-4.0	13	42	5	5
4.0-4.5	24	39	24	8
4.5-5.0	57	50	71	31
5.0-5.5	80	46	84	48
5.5-6.0	71	64	100	60
6.0-6.5	35	57	39	34
6.5-7.0	17	41	32	18
7.0-7.5	10	47	40	6
7.5-8.0	6	31	22	4
8.0-8.5	7	31	24	3
8.5-9.0	8	21	11	2
9.0-9.5	1	46	4	22
9.5-10.0	0	0	5	0
10.0-10.5	0	16	2	16
>11.0	0	4	0	1
Total take	251	251	309	201
Total catch	339	545	553	377
take/catch ratio	74.0%	46.1%	55.9%	53.3%
Permitted take	500	500	600	400
Permitted total catch	1000	1000	1200	800
minimum overall take/catch ratio	50.0%	50.0%	50.0%	50.0%
Portion of permitted total take remaining	249	249	291	199
Portion of permitted total catch remaining	661	455	647	423
minimum possible take/catch ratio for remaining take	37.7%	54.7%	45.0%	47.0%
percentage of take in the 2.5-4.0 cm size class	7.6%	20.7%	9.7%	26.9%
percenteage of catch in the 2.5-4.0 cm size class	5.6%	9.5%	5.4%	14.3%

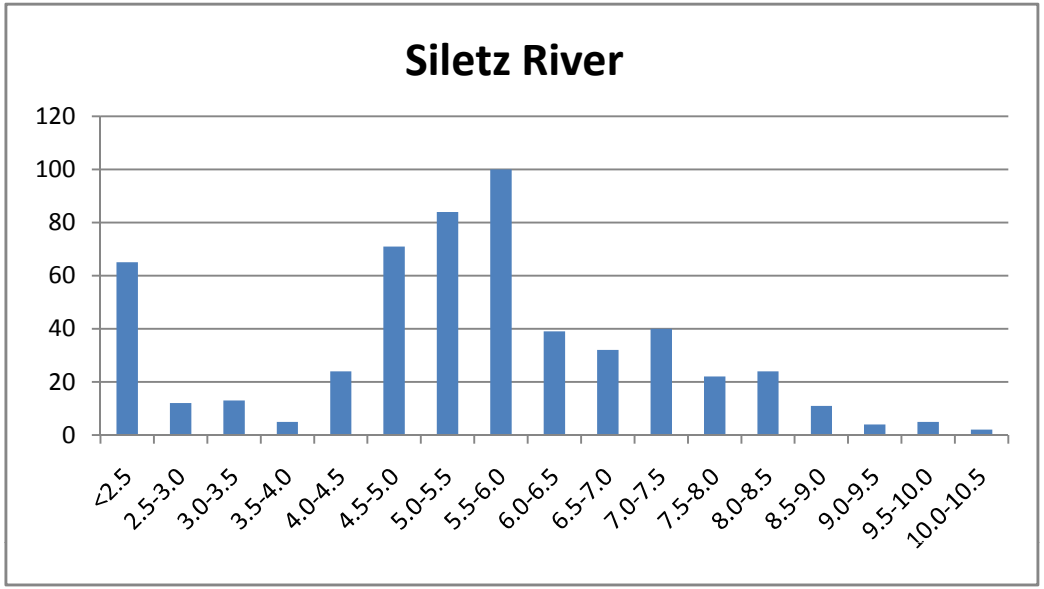
Requirement to run 3 definitive
720 ammocoetes

6 concentrations (5 doses + control)
4 replicates per concentration
10 ammocoetes/replicate
6 x 4 x 10 = 240 ammocoetes/test

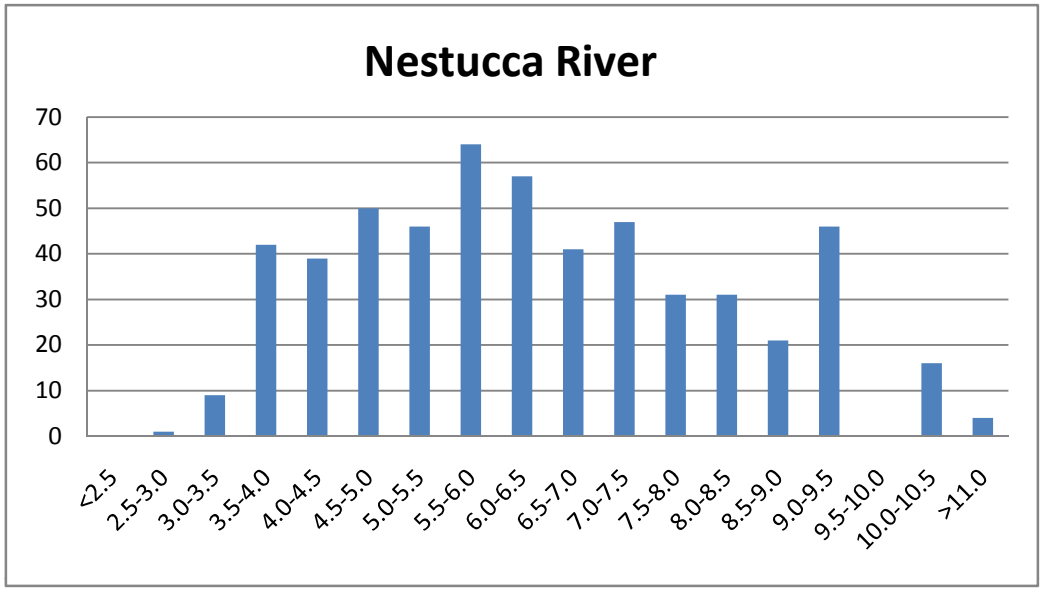
Size range sums	
<2.5	140
2.5 - 4.0	155
4.0 - 6.0	857
6.0 - 8.0	439
>8.0	159
3.5 - 5.5	627
3.0 - 5.5	664



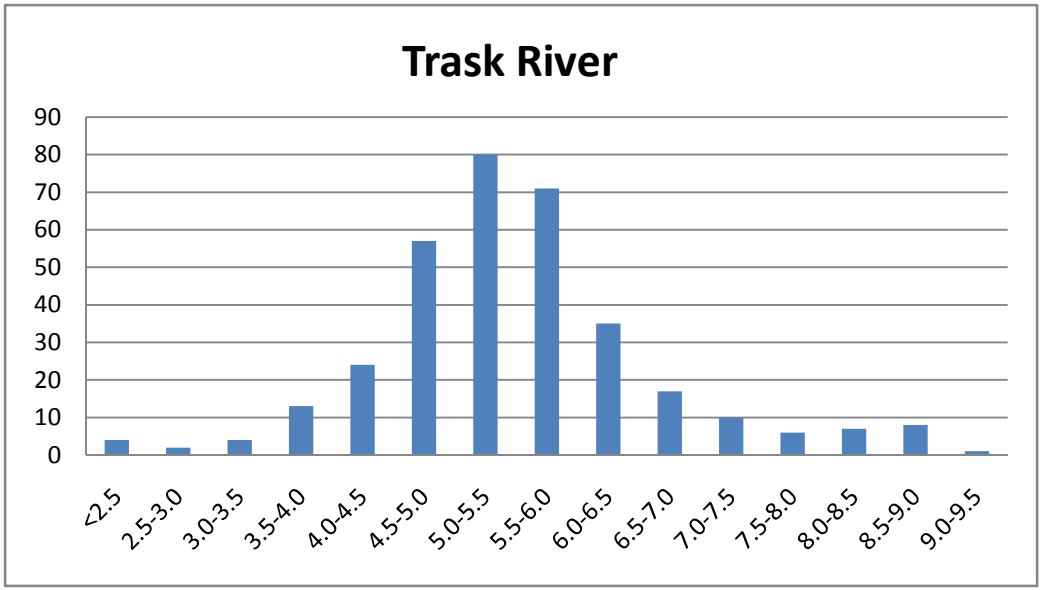
Size	Siletz River
<2.5	65
2.5-3.0	12
3.0-3.5	13
3.5-4.0	5
4.0-4.5	24
4.5-5.0	71
5.0-5.5	84
5.5-6.0	100
6.0-6.5	39
6.5-7.0	32
7.0-7.5	40
7.5-8.0	22
8.0-8.5	24
8.5-9.0	11
9.0-9.5	4
9.5-10.0	5
10.0-10.5	2



Size	Nestucca River
<2.5	0
2.5-3.0	1
3.0-3.5	9
3.5-4.0	42
4.0-4.5	39
4.5-5.0	50
5.0-5.5	46
5.5-6.0	64
6.0-6.5	57
6.5-7.0	41
7.0-7.5	47
7.5-8.0	31
8.0-8.5	31
8.5-9.0	21
9.0-9.5	46
9.5-10.0	
10.0-10.5	16
>11.0	4



Size	Trask River
<2.5	4
2.5-3.0	2
3.0-3.5	4
3.5-4.0	13
4.0-4.5	24
4.5-5.0	57
5.0-5.5	80
5.5-6.0	71
6.0-6.5	35
6.5-7.0	17
7.0-7.5	10
7.5-8.0	6
8.0-8.5	7
8.5-9.0	8
9.0-9.5	1



Size	Alsea River
<2.5	71
2.5-3.0	38
3.0-3.5	11
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5.0-5.5	48
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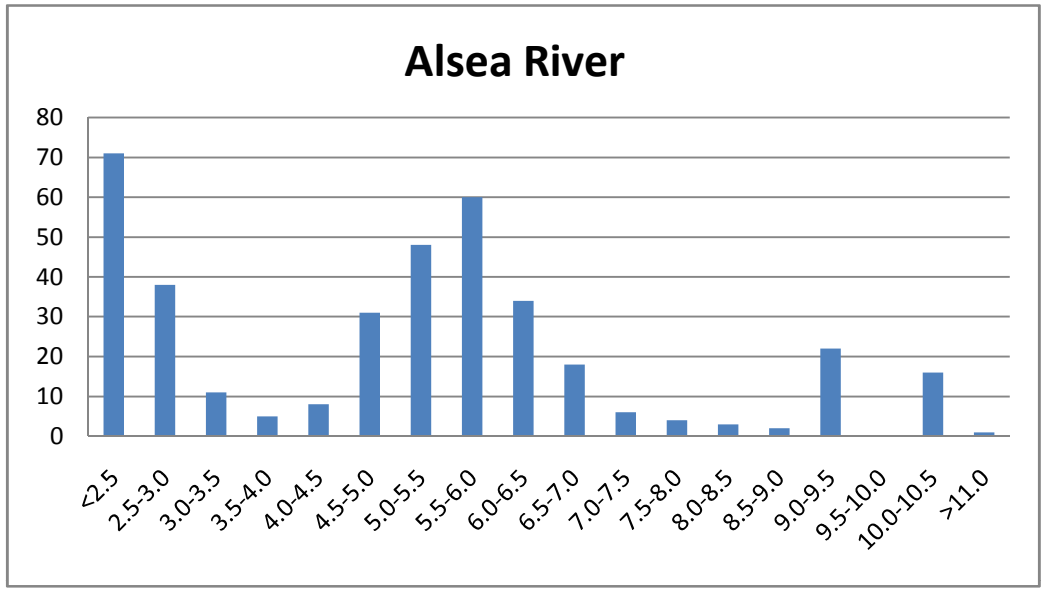
6.0-6.5	34
6.5-7.0	18
7.0-7.5	6
7.5-8.0	4
8.0-8.5	3
8.5-9.0	2
9.0-9.5	22
9.5-10.0	
10.0-10.5	16
>11.0	1



Helle B. Andersen

From: Helle B. Andersen
Sent: Wednesday, October 10, 2007 4:39 PM
To: 'Blischke.Eric@epamail.epa.gov'
Cc: 'jeremy_buck@fws.gov'; 'Jennifer L Peterson'; 'Shephard.Burt@epamail.epa.gov'; John Toll; Dick Caldwell (rcaldwell@nwaquatic.com)
Subject: RE: Lab Visit Request

Eric,
Right now the lab is working with lindane. The diluter system is running and Dick is keeping track of the concentrations to see if they are in the appropriate range and whether the concentrations can be maintained. If all goes well the test with lindane will be initiated next week. LWG has requested that I or another representative is present when the lab receives visitors. I will be down in the Newport area collecting ammocoetes next week. Based on the sampling effort and the lab schedule the best days for the visit would be Thursday or Friday (18th or 19th). Please let us know if any of these days work for you. If not we can keep you informed about the remaining three tests.
Thanks Helle

-----Original Message-----
From: Blischke.Eric@epamail.epa.gov [mailto:Blischke.Eric@epamail.epa.gov]
Sent: Wednesday, October 10, 2007 4:15 PM
To: Helle B. Andersen
Cc: jeremy_buck@fws.gov; Jennifer L Peterson; Shephard.Burt@epamail.epa.gov
Subject: Lab Visit Request

Helle, Jeremy Buck and Jennifer Peterson would like to visit NAS to observe some of the lamprey toxicity testing. Can you let us know what the schedule is for the next test. I assume that the aniline test is wrapping up.

Thanks, Eric

Helle B. Andersen

From: Shephard.Burt@epamail.epa.gov
Sent: Thursday, October 11, 2007 11:20 AM
To: Robert W. Gensemer
Cc: Blischke.Eric@epamail.epa.gov
Subject: RE: Lab Visit Request

Hey Bob,

I talked with Helle Andersen of Windward earlier this morning about lamprey sampling starting next week, I agreed with her recommendation on a small issue regarding how to ramp up the holding tank temperatures from the temperatures in the field next week (presumably cooler than 17°
C) to the target test temperature of 17°C. Basically, NAS will keep all the fish at the field collected temperature as they come in from each river, then ramp all ammocoetes up at once by 1°C/day until they hit 17° C. The alternative was to have different batches of ammocoetes ramped up independently of each other, which would be difficult given the holding tank room setup at NAS. Helle and I agreed that it would be better to ramp the fish up to 17°C only after all ammocoetes for the last 3 tox tests are in place at NAS.

Would it be worth it for me to go with Jeremy and Jennifer to NAS? I could give the EPA party line about the objective of the test more definitively than could Dick Caldwell, as I suspect Jeremy and Jen will ask about behavior.

Best regards,

Burt Shephard
Risk Evaluation Unit
Office of Environmental Assessment (OEA-095) U.S. Environmental Protection Agency, Region 10
1200 6th Avenue Seattle, WA 98101

Telephone: (206) 553-6359
Fax: (206) 553-0119

e-mail: Shephard.Burt@epa.gov

"If your experiment needs statistics to analyze the results, then you ought to have done a better experiment"
- Ernest Rutherford

"Robert W. Gensemer" <BGensemer@parametrix.com> 10/11/2007 10:14 AM

To: Eric Blischke/R10/USEPA/US@EPA
cc: Burt Shephard/R10/USEPA/US@EPA
Subject: RE: Lab Visit Request

Eric: No, I was not escorted by anyone from LWG, nor was I aware such a thing was needed. However, I'm quite sure that Helle was fully aware that I was going.

FYI, Jeremy asked yesterday if I would be able/willing to attend if/when he and Jennifer visit NAS. From your perspective, would this be appropriate? So long as their empirical data show that the lindane delivery system is accurately and consistently delivering the right amounts, I see no particular reason to go again unless you or Burt feel differently about it.

That said, I suggest that we (EPA) get direct feedback on these prelim lindane tests before they start the definitives. Again, just to be sure the system is delivering what it should on a consistent basis. [not that I'm all that worried, Dick knows what he's doing] Once we're comfortable with that, the tests should be fine.
-Bob

-----Original Message-----
From: Blischke.Eric@epamail.epa.gov
[mailto:Blischke.Eric@epamail.epa.gov]
Sent: Thursday, October 11, 2007 7:16 AM
To: Robert W. Gensemer
Subject: Fw: Lab Visit Request

Bob, were you "escorted" by LWG reps during your lab visit? Just curious.

Eric
----- Forwarded by Eric Blischke/R10/USEPA/US on 10/11/2007 07:14 AM

Jeremy_Buck@fws.gov		
		To
10/10/2007 06:16 PM	Eric Blischke/R10/USEPA/US@EPA	
		cc
		Subject
	Fw: Lab Visit Request	

Hmmm....seems they are now suspect of me after the whole belly flap incident. That's what I get when I try to protect human health interests.

Does this actually indicate that they don't want us near their lab unless chaperoned? Jennifer has a very limited schedule to work around, and this could be quite difficult if Helle needs to be out catching lamprey.

Jennifer can't make tues or thurs, just mon or weds, not sure about friday.

----- Forwarded by Jeremy Buck/OSO/R1/FWS/DOI on 10/10/2007 06:05 PM -----

"Helle B. Andersen" <helleb@windwardenv.com>		To
	<Blischke.Eric@epamail.epa.gov>	
		cc
10/10/2007 04:38 PM	<jeremy_buck@fws.gov>, "Jennifer L Peterson" <PETERSON.Jenn@deq.state.or.us>, <Shephard.Burt@epamail.epa.gov>, "John Toll" <johnt@windwardenv.com>, <rcaldwell@nwaquatic.com>	
		Subject
	RE: Lab Visit Request	

Eric,
Right now the lab is working with lindane. The diluter system is running and Dick is keeping track of the concentrations to see if they are in the appropriate range and whether the concentrations can be maintained.
If all goes well the test with lindane will be initiated next week. LWG has requested that I or another representative is present when the lab receives visitors. I will be down in the Newport area collecting ammocoetes next week. Based on the sampling effort and the lab schedule the best days for the visit would be Thursday or Friday (18th or 19th).
Please let us know if any of these days work for you. If not we can keep you informed about the remaining three tests.
Thanks Helle

-----Original Message-----
From: Blischke.Eric@epamail.epa.gov
[mailto:Blischke.Eric@epamail.epa.gov]
Sent: Wednesday, October 10, 2007 4:15 PM
To: Helle B. Andersen
Cc: jeremy_buck@fws.gov; Jennifer L Peterson; Shephard.Burt@epamail.epa.gov
Subject: Lab Visit Request

Helle, Jeremy Buck and Jennifer Peterson would like to visit NAS to observe some of the lamprey toxicity testing. Can you let us know what the schedule is for the next test. I assume that the aniline test is wrapping up.

Thanks, Eric

Helle B. Andersen

From: Helle B. Andersen
Sent: Thursday, October 11, 2007 12:29 PM
To: 'Shephard.Burt@epamail.epa.gov'
Cc: 'blischke.eric@epa.gov'; 'Gene Revelas'; John Toll; 'Jessica Pisano'; Lisa Saban
Subject: RE: upcoming lamprey ammocoete collection

Burt,
Yes, you are right the lindane test will be conducted with the ammocoetes already in holding. We will collect the last 1,000 ammocoetes we have permit for in the four rivers. That should be enough ammocoetes to run the three definitive tests and the naphthalene range-finding test (pending no excessive mortality in the holding tanks).
Helle

-----Original Message-----
From: Shephard.Burt@epamail.epa.gov [mailto:Shephard.Burt@epamail.epa.gov]
Sent: Thursday, October 11, 2007 12:22 PM
To: Helle B. Andersen
Cc: blischke.eric@epa.gov; Gene Revelas; John Toll; Jessica Pisano; Lisa Saban
Subject: Re: upcoming lamprey ammocoete collection

Helle,

Just wanted to be clear on two issues. One is that the lindane definitive test (the 3rd of the 6 definitives) will be run with the ammocoetes already in holding at NAS. Second, that enough ammocoetes are collected during the upcoming field collections to permit the running of both a naphthalene rangefinder and definitive test, as well as definitive tests with PCP and diazinon. At this time, we don't have a naphthalene rangefinder to use in selecting the dose spacing for the definitive.

Otherwise, what you've sent out captures our discussion from this morning, I recommend that Eric approve this addition/modification to the field sampling plan.

Best regards,

Burt Shephard
Risk Evaluation Unit
Office of Environmental Assessment (OEA-095) U.S. Environmental Protection Agency, Region 10
1200 6th Avenue Seattle, WA 98101

Telephone: (206) 553-6359
Fax: (206) 553-0119

e-mail: Shephard.Burt@epa.gov

"If your experiment needs statistics to analyze the results, then you ought to have done a better experiment"
- Ernest Rutherford

"Helle B. Andersen" <helleb@windwardenv.com> To Burt Shephard/R10/USEPA/US@EPA,

Eric Blischke/R10/USEPA/US@EPA
10/11/2007 09:03 AM
cc
"John Toll" <johnt@windwardenv.com>, "Lisa Saban" <lisas@windwardenv.com>, "Gene Revelas" <grevelas@integral-corp.com>, "Jessica Pisano" <jpisano@anchorenv.com>
Subject
upcoming lamprey ammocoete collection

Burt and Eric,
As you both know we are going out next Monday (10/15) to collect the next round of ammocoetes in the four costal rivers. Because the weather in the last couple of weeks has been quite cold we are expecting the temperature in the rivers to be lower than the holding and testing temperature of 17ºC+1ºC. I have talked with the lab about how to bring the newly collected ammocoetes up to 17ºC and this is the plan:

1) The lab will clean out all the remaining ammocoetes from the 20 holding tanks. They are planning to set up the third test early next week, so when we come with the first batch there should only be about 250 left in the tanks of which about 155 are too small (< 4 cm) for testing.
2) The lab will then lower the temperature in the 20 tanks to about 12ºC (I will call from the field as soon as we have the first temperature reading from Trask River but last year at this time the temperature was about 12ºC).
3) So when the field crew comes with the first batch of ammocoetes collected in Trask River the holding tanks should be ready and we will proceed loading the ammocoetes in all 20 holding tanks (as described in the FSP).
4) When all ammocoetes have been collected in the four rivers the lab will slowly raise the temperature to 17ºC (1ºC per day).

I talked with Burt this morning and he was fine with this plan but for the record could you please return this e-mail with comments and/or an ok.
Thanks Helle

Helle B. Andersen
Windward Environmental LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119

Direct Line (206) 577-1287
Phone (206) 378-1364
Fax (206) 217-0089
hellea@windwardenv.com

This communication is made under the framework of the LWG Participation Agreement and in the parties' common interests in meeting LWG member obligations under the Administrative Order on Consent and in anticipation of litigation concerning liability for the Portland Harbor Superfund site. This communication is intended and believed by the parties to be part of an ongoing and joint effort to develop and maintain a common legal strategy and contains strategies, work product and legal advice within the "common interest" extension of the attorney-client privilege and the work product doctrine. This communication may include attorney-client communications. With respect to communications by private LWG members to public members, those communications are with the expectation that they will be kept confidential by the public entities. The information is intended to be for the use of the individual or entity named above. If you are not the intended recipient, please be aware that any disclosure, copying, distribution or use of the contents of this information is prohibited.
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Helle B. Andersen

From: Blischke.Eric@epamail.epa.gov
Sent: Thursday, October 11, 2007 1:26 PM
To: Shephard.Burt@epamail.epa.gov
Cc: Gene Revelas; Helle B. Andersen; John Toll; Jessica Pisano; Lisa Saban
Subject: Re: upcoming lamprey ammocoete collection

All, the modification is ok by EPA.

Eric

Burt Shephard/R10/USEPA/US
10/11/2007 12:22 PM

To: "Helle B. Andersen" <helleb@windwardenv.com>
cc: Eric Blischke/R10/USEPA/US@EPA, "Gene Revelas" <grevelas@integral-corp.com>, "John Toll" <johnt@windwardenv.com>, "Jessica Pisano" <jpisano@anchorenv.com>, "Lisa Saban" <lisas@windwardenv.com>
Subject: Re: upcoming lamprey ammocoete collection(Document link: Eric Blischke)

Helle,

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Otherwise, what you've sent out captures our discussion from this morning, I recommend that Eric approve this addition/modification to the field sampling plan.

Best regards,

Burt Shephard

Risk Evaluation Unit
Office of Environmental Assessment (OEA-095) U.S. Environmental Protection Agency, Region 10
1200 6th Avenue Seattle, WA 98101

Telephone: (206) 553-6359
Fax: (206) 553-0119

e-mail: Shephard.Burt@epa.gov

"If your experiment needs statistics to analyze the results, then you ought to have done a better experiment"
- Ernest Rutherford

"Helle B. Andersen" <helleb@windwardenv.com>
10/11/2007 09:03 AM

To: Burt Shephard/R10/USEPA/US@EPA, Eric Blischke/R10/USEPA/US@EPA
cc: "John Toll" <johnt@windwardenv.com>, "Lisa Saban" <lisas@windwardenv.com>, "Gene Revelas" <grevelas@integral-corp.com>, "Jessica Pisano" <jpisano@anchorenv.com>
Subject: upcoming lamprey ammocoete collection

Burt and Eric,
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I talked with Burt this morning and he was fine with this plan but for the record could you please return this e-mail with comments and/or an ok.
Thanks Helle

Helle B. Andersen
Windward Environmental LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119

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Phone (206) 378-1364
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hellea@windwardenv.com

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Helle B. Andersen

From: Helle B. Andersen
Sent: Friday, October 12, 2007 11:48 AM
To: 'Shephard.Burt@epamail.epa.gov'
Cc: 'blischke.eric@epa.gov'; 'Gene Revelas'; 'goulet.joe@epamail.epa.gov'; John Toll; 'Jessica Pisano'; Lisa Saban; 'McKenna, James (Jim)'; 'ricka@bes.ci.portland.or.us'; 'rjw@nwnatural.com'
Subject: RE: Upcoming field collection of lamprey ammocoetes

Burt,
I just talked with the NAS and they are still planning to start the test with lindane early next week so that it will be up and running when Jeremy, Jennifer, and Joe are visiting on Wednesday.
Helle

-----Original Message-----
From: Shephard.Burt@epamail.epa.gov [mailto:Shephard.Burt@epamail.epa.gov]
Sent: Friday, October 12, 2007 10:25 AM
To: Helle B. Andersen
Cc: blischke.eric@epa.gov; Gene Revelas; goulet.joe@epamail.epa.gov; John Toll; Jessica Pisano; Lisa Saban; McKenna, James (Jim); ricka@bes.ci.portland.or.us; rjw@nwnatural.com
Subject: Re: Upcoming field collection of lamprey ammocoetes

Thanks for the update, Helle. Have you heard anything more recent from Dick Caldwell as to when he'll be starting the lindane toxicity test? I talked with Jeremy Buck yesterday, he is particularly interested in observing the lindane test.

Best regards,

Burt Shephard
Risk Evaluation Unit
Office of Environmental Assessment (OEA-095) U.S. Environmental Protection Agency, Region 10
1200 6th Avenue Seattle, WA 98101

Telephone: (206) 553-6359
Fax: (206) 553-0119

e-mail: Shephard.Burt@epa.gov

"If your experiment needs statistics to analyze the results, then you ought to have done a better experiment"
- Ernest Rutherford

"Helle B. Andersen" <helleb@windwardenv.com>
10/12/2007 09:53 AM

To
Eric Blischke/R10/USEPA/US@EPA, Joe Goulet/R10/USEPA/US@EPA, Burt Shephard/R10/USEPA/US@EPA

cc
"Gene Revelas" <grevelas@integral-corp.com>, "Jessica Pisano"

<jpisano@anchorenv.com>, "John Toll" <johnt@windwardenv.com>, "Lisa Saban" <lisas@windwardenv.com>, "McKenna, James \(Jim\)" <mckenj@portptld.com>, <ricka@bes.ci.portland.or.us>, <rjw@nwnatural.com>
Subject
Upcoming field collection of lamprey ammocoetes

Eric, Burt, and Joe,
As you know we will be collecting lamprey ammocoetes in the four coastal rivers next week from Monday 15 through Thursday 18 (driving back to Seattle Friday). You can reach the field crew during the collection effort at either of these phone numbers. The cell phone probably only works when we are in the Newport area either early in the morning or late afternoon.

The field cell phone: (206) 353-9346
The satellite phone number: 8816-4146-7191.
The dialing instructions for the satellite phone are:
Call 1.480.768.2500
When prompted, enter the satellite phone number (8816-4146-7191)
and wait to be connected
Yesterday Joe talked about maybe coming as oversight on Wednesday when he, Jennifer, and Jeremy are down there anyway for the lab visit. On Wednesday we will be sampling in the Siletz River. We will be leaving Newport around 7am and depending on the water level of the river we will be sampling at either Morgan Boat ramp or at the “Miller Site”. Please let me know if you are still planning to come so that we can coordinate.
Thanks Helle

Helle B. Andersen
Windward Environmental LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119

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John Toll

From: John Toll [mailto:johnt@windwardenv.com]
Sent: Thursday, October 18, 2007 3:56 PM
To: John Toll; shephard.burt@epa.gov; blischke.eric@epa.gov
Cc: Helle B. Andersen; rjw@nwnatural.com; McKenna, James (Jim); ricka@bes.ci.portland.or.us; Lisa Saban; Mike Johns
Subject: RE: lamprey ammocoete collection update

Burt and Eric,

Just an update to let you know that yesterday's ammocoete collection effort on the Siletz was successful in obtaining the targeted 300 ammocoetes. The ammocoetes were delivered to NAS. The crew is out today collecting the final batch of ammocoetes for this field event, from the Alsea.

I've also had a report from Helle that yesterday's lab visit by Jennifer, Jeremy and Joe was successful. The three of them also visited the field crew on the Siletz to observe ammocoete collection. No issues were raised during the lab visit or the field visit.

John

John Toll, Partner
Windward Environmental LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119-3958
(206) 812-5433
(206) 913-3292 (cell)
www.windwardenv.com

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From: John Toll
Sent: Wednesday, October 17, 2007 3:27 PM
To: Burt Shephard (shephard.burt@epa.gov); Eric Blischke (blischke.eric@epa.gov)
Cc: Helle B. Andersen; Bob Wyatt (rjw@nwnatural.com); Jim McKenna (Jim.McKenna@portofportland.com); Rick Applegate (ricka@bes.ci.portland.or.us); John Toll (johnt@windwardenv.com); Lisa Saban (lisas@windwardenv.com); Mike Johns (mikej@windwardenv.com)
Subject: lamprey ammocoete collection update

Burt and Eric,

Just a quick note to let you know that on Monday the ammocoete field crew got the targeted 250 ammocoetes from the Trask River and delivered them to NAS, and yesterday they collected and delivered the targeted 250 ammocoetes from the Nestucca River. Today they're on the Siletz where they're attempting to collect 300 ammocoetes.

John

John Toll, Partner
Windward Environmental LLC
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John Toll

From: John Toll
Sent: Thursday, October 18, 2007 4:07 PM
To: Blischke.Eric@epamail.epa.gov; Burt Shephard (shephard.burt@epa.gov)
Cc: Helle B. Andersen; 'Bob Wyatt (rjw@nwnatural.com)'; 'Jim McKenna (Jim.McKenna@portofportland.com)'; 'Rick Applegate (ricka@bes.ci.portland.or.us)'; Lisa Saban; Mike Johns; Christine Hawley (chawley@integral-corp.com); Gene Revelas (grevelas@integral-corp.com); Jessica Pisano (jpisano@anchorenv.com); Valerie Oster
Subject: RE: lamprey ammocoete collection update

Hi Eric. I called the lab and confirmed that the lindane test was started today. My understanding is that NAS decided to delay the start by a day to be certain of their ability to maintain the highest test concentration. John

John Toll, Partner
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-----Original Message-----
From: Blischke.Eric@epamail.epa.gov [mailto:Blischke.Eric@epamail.epa.gov]
Sent: Thursday, October 18, 2007 3:59 PM
To: John Toll
Subject: RE: lamprey ammocoete collection update

Thanks John. I heard from Joe that there were some issues with the lindane delivery system. I assume that these have been taken care of and the test is underway. Can you confirm?

Eric

"John Toll" <johnt@windwardenv.com> 10/18/2007 03:56 PM		To "John Toll" <johnt@windwardenv.com>, Burt Shephard/R10/USEPA/US@EPA, Eric Blischke/R10/USEPA/US@EPA
		cc "Helle B. Andersen" <helleb@windwardenv.com>, <rjw@nwnatural.com>,

<Jim.McKenna@portofportland.com>,
<ricka@bes.ci.portland.or.us>,
"Lisa Saban"
<lisas@windwardenv.com>, "Mike
Johns" <mikej@windwardenv.com>
Subject
RE: lamprey ammocoete collection
update

Burt and Eric,

Just an update to let you know that yesterday's ammocoete collection effort on the Siletz was successful in obtaining the targeted 300 ammocoetes. The ammocoetes were delivered to NAS. The crew is out today collecting the final batch of ammocoetes for this field event, from the Alsea.

I've also had a report from Helle that yesterday's lab visit by Jennifer, Jeremy and Joe was successful. The three of them also visited the field crew on the Siletz to observe ammocoete collection. No issues were raised during the lab visit or the field visit.

John

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Cc: Helle B. Andersen; Bob Wyatt (rjw@nwnatural.com); Jim McKenna (Jim.McKenna@portofportland.com); Rick Applegate (ricka@bes.ci.portland.or.us); John Toll (johnt@windwardenv.com); Lisa Saban (lisas@windwardenv.com); Mike Johns (mikej@windwardenv.com)
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Sent: Thursday, October 18, 2007 4:29 PM
To: John Toll
Cc: blischke.eric@epa.gov; Helle B. Andersen; Jim.McKenna@portofportland.com; John Toll; Lisa Saban; Mike Johns; ricka@bes.ci.portland.or.us; rjw@nwnatural.com
Subject: RE: lamprey ammocoete collection update

Thanks for the update, John.

You probably don't need me to tell you this, but if the weather from this incoming storm gets as bad as the forecasts indicate, don't push your luck in the field. Get off the water, stay dry and try it again after the storm blows through the area.

Best regards,

Burt Shephard
Risk Evaluation Unit
Office of Environmental Assessment (OEA-095) U.S. Environmental Protection Agency, Region 10
1200 6th Avenue Seattle, WA 98101

Telephone: (206) 553-6359
Fax: (206) 553-0119

e-mail: Shephard.Burt@epa.gov

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- Ernest Rutherford

"John Toll" <johnt@windwardenv.com>
10/18/2007 03:56 PM

To "John Toll" <johnt@windwardenv.com>, Burt Shephard/R10/USEPA/US@EPA, Eric Blischke/R10/USEPA/US@EPA

cc "Helle B. Andersen" <helleb@windwardenv.com>, <rjw@nwnatural.com>, <Jim.McKenna@portofportland.com>, <ricka@bes.ci.portland.or.us>, "Lisa Saban" <lisas@windwardenv.com>, "Mike Johns" <mikej@windwardenv.com>

Subject RE: lamprey ammocoete collection update

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Sent: Wednesday, October 17, 2007 3:27 PM
To: Burt Shephard (shephard.burt@epa.gov); Eric Blischke (blischke.eric@epa.gov)
Cc: Helle B. Andersen; Bob Wyatt (rjw@nwnatural.com); Jim McKenna (Jim.McKenna@portofportland.com); Rick Applegate (ricka@bes.ci.portland.or.us); John Toll (johnt@windwardenv.com); Lisa Saban (lisas@windwardenv.com); Mike Johns (mikej@windwardenv.com)
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(206) 913-3292 (cell)
www.windwardenv.com

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John Toll

From: Shephard.Burt@epamail.epa.gov
Sent: Friday, October 19, 2007 12:57 PM
To: John Toll
Subject: Re: ammocoete collection

John,

I did talk with Eric earlier, I left you a phone message telling you to bring your field crew home, they're done unless one of the tests blows up and you would need to go back to the field and collect the last few additional fish to complete a test. Speaking of, a reason to hang on to the remaining 108 fish from the first round of collections would be to help populate the naphthalene rangefinder test, which still needs to be run.

Best regards,

Burt Shephard
Risk Evaluation Unit
Office of Environmental Assessment (OEA-095) U.S. Environmental Protection Agency, Region 10
1200 6th Avenue Seattle, WA 98101

Telephone: (206) 553-6359
Fax: (206) 553-0119

e-mail: Shephard.Burt@epa.gov

"If your experiment needs statistics to analyze the results, then you ought to have done a better experiment"
- Ernest Rutherford

johnt@windwardenv.com
10/19/2007 12:32 PM
Please respond to johnt@windwardenv.com

To: Burt Shephard/R10/USEPA/US@EPA
cc:
Subject: ammocoete collection

Hi Burt. Did you get the okay from Eric? I want to tell the crew that they're done (for now). John

Helle B. Andersen

From: Shephard.Burt@epamail.epa.gov
Sent: Monday, October 29, 2007 1:04 PM
To: Helle B. Andersen
Cc: Gene Revelas; John Toll; Jessica Pisano; Lisa Saban; McKenna, James (Jim); Mike Johns; ricka@bes.ci.portland.or.us; rjw@nwnatural.com; Valerie Oster; Blischke.Eric@epamail.epa.gov; Humphrey.Chip@epamail.epa.gov; Goulet.Joe@epamail.epa.gov; rgensemer@parametrix.com
Subject: Re: Lindane test
Attachments: Lindane freshwater Table 3-1.xls

Thanks Helle for the update.

I'd had a brief chat with a couple of folks about what to do about lindane before the test was complete, anticipating you might run into a solubility maximum problem given where the rangefinder tests came out.
A couple of options were to 1.) report out the LC50 as a greater than value, or 2.) run the test with a carrier solvent. Given that one of the ultimate purposes of the toxicity studies was to evaluate the protectiveness of water column screening level benchmarks or toxicity reference values such as ambient water quality criteria to lamprey, it may be good enough to know that the LC50 is substantially higher than the water column benchmark, even though we don't have a numerical estimate of the LC50. I assume, but couldn't tell from your message, that the 12.5% mortality in the highest test concentration was the only partial mortality you got above allowable control mortality.

This also could potentially be an issue for diazinon when NAS gets to that test. My recommendation is to let Dick Caldwell complete his workup of the lindane results, wait for the definitive analytical results to come back in from the exposure tanks (not the monitoring results that Dick is doing, although they should also be informative), then identify the path forward. I know what my ultimate recommendation would be, but I haven't talked with any site managers about it yet.

In the meantime, I've attached a spreadsheet section that compiles the available high quality LC50 data for freshwater species exposed to lindane. Its linked to other files in our office, just click on don't update links unless you like watching your computer hang up. The ECA term you'll see in the spreadsheet is defined as the LC50 divided by
2.27 (roughly analogous to the approach EPA uses to derive water quality criteria, which divides a final acute value by two, I can give you the details if you like, but they're not applicable to Portland Harbor, the spreadsheet was developed for other work). The CA term is the acute lindane water quality criterion. You can make your own judgement regarding the relative sensitivity of lamprey to other aquatic species.

Best regards,

Burt Shephard
Risk Evaluation Unit
Office of Environmental Assessment (OEA-095) U.S. Environmental Protection Agency, Region 10
1200 6th Avenue Seattle, WA 98101

Telephone: (206) 553-6359
Fax: (206) 553-0119

e-mail: Shephard.Burt@epa.gov

"If your experiment needs statistics to analyze the results, then you ought to have done a better experiment"
- Ernest Rutherford

(See attached file: Lindane freshwater Table 3-1.xls)

"Helle B. Andersen" <helleb@windwardenv.com>
10/26/2007 12:09 PM

To: Burt Shephard/R10/USEPA/US@EPA
cc: "John Toll" <johnt@windwardenv.com>, "Lisa Saban" <lisas@windwardenv.com>, "Mike Johns" <mikej@windwardenv.com>, "Jessica Pisano" <jpisano@anchorenv.com>, "Valerie Oster" <voster@anchorenv.com>, "Gene Revelas" <grevelas@integral-corp.com>, "McKenna, James \(Jim\)" <mckenj@portptld.com>, <ricka@bes.ci.portland.or.us>, <rjw@nwnatural.com>
Subject: Lindane test

Burt,
The lindane toxicity test that ended earlier this week was not able to produce an LC50. Only 12.5% of the ammocoetes died in the highest concentration. The highest concentration was close to saturation based on information on the solubility of lindane at 17C and Dick Caldwell's experiences with the chemical. The lab will continue working with the three remaining chemicals (starting with naphthalene) which will provide EPA and LWG time to discuss the results of the lindane test and the path forward for testing with lindane.
Helle

Helle B. Andersen
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This communication is made under the framework of the LWG Participation Agreement and in the parties' common interests in meeting LWG member obligations under the Administrative Order on Consent and in anticipation of litigation concerning liability for the Portland Harbor Superfund site. This communication is intended and believed by the parties to be part of an ongoing and joint effort to develop and maintain a common legal strategy and contains strategies, work product and legal advice within the "common interest" extension of the attorney-client privilege and the work product doctrine. This communication may include attorney-client communications. With respect to communications by private LWG members to public members, those communications are with the expectation that they will be kept confidential by the public entities. The information is intended to be for the use of the individual or entity named above. If you are not the intended recipient, please be aware that any disclosure, copying, distribution or use of the contents of this information is prohibited.
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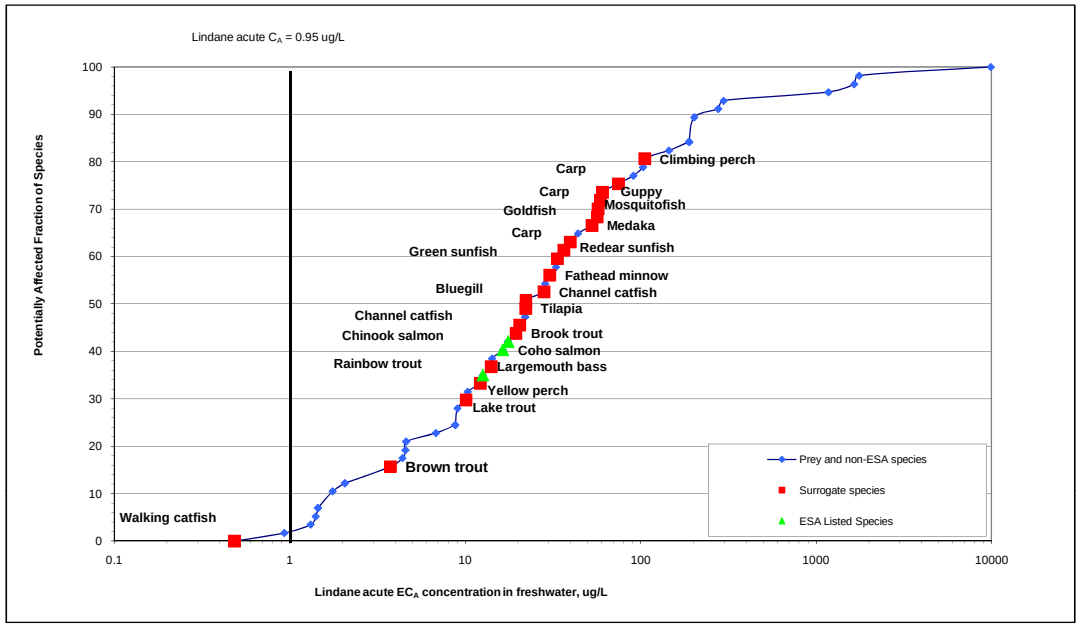
Phylum	Class	Order	Family	Genus	Species	Common Name	Mean LC50 (ug/L)	Acute EC_A (LC_{50}/2.27)	Meas NOEC	Est NOEC	Mean Acute EC_A Percentile	5th percentile acute ECA=	1.396476
Chordata	Actinopterygii	Siluriformes	Clariidae	Clarias	batrachus	Walking catfish	1.1	0.48		0.044	0.0		
Arthropoda	Insecta	Plecoptera	Pteronarcyidae	Pteronarcys	californica	Stonefly	2.1213	0.93		0.084852	1.7		
Arthropoda	Insecta	Heteroptera	Notonectidae	Notonecta	undulata	Backswimmer	3	1.32		0.12	3.5		
Arthropoda	Crustacea	Podocopa	Cypridopsidae	Cypridopsis	vidua	Ostracod, Seed shrimp	3.2	1.41		0.128	5.2		
Arthropoda	Insecta	Diptera	Chaoboridae	Chaoborus	sp.	Phantom midge	3.3	1.45		0.132	7.0		
Mollusca	Gastropoda	Basommatophora	Lymnaeidae	Lymnaea	stagnalis	Great pond snail	3.3	1.45		0.132	7.0		
Arthropoda	Insecta	Diptera	Chaoboridae	Chaoborus	flavicans	Midge	4	1.76		0.16	10.5		
Arthropoda	Insecta	Diptera	Culicidae	Aedes	cantator	Mosquito	4.7	2.07		0.188	12.2		
Arthropoda	Insecta	Diptera	Culicidae	Aedes	vexans	Mosquito	4.7	2.07		0.188	12.2		
Chordata	Actinopterygii	Salmoniformes	Salmonidae	Salmo	trutta	Brown trout	8.5194	3.75		0.340776	15.7		
Arthropoda	Malacostraca	Isopoda	Asellidae	Asellus	brevicaudus	Aquatic sowbug	10	4.41		0.4	17.5		
Arthropoda	Insecta	Diptera	Culicidae	Aedes	punctor	Mosquito	10.4	4.58		0.416	19.2		
Arthropoda	Malacostraca	Amphipoda	Gammaridae	Gammarus	fasciatus	Scud	10.4881	4.62	4.3		21.0		
Arthropoda	Malacostraca	Decapoda	Palaemonidae	Palaemonetes	kadiakensis	Grass shrimp,freshwater prawn	15.5227	6.84		0.620908	22.8		
Arthropoda	Insecta	Coleoptera	Haliplidae	Peltodytes	sp.	Beetle	20	8.81		0.8	24.5		
Arthropoda	Insecta	Zygoptera	Lestidae	Lestes	congener	Damselfly	20	8.81		0.8	24.5		
Arthropoda	Insecta	Diptera	Chironomidae	Chironomus	plumosus	Midge	20.5917	9.07		0.823668	28.0		
Chordata	Actinopterygii	Perciformes	Percidae	Perca	flavescens	Yellow perch	23	10.13		0.92	29.8		
Arthropoda	Malacostraca	Amphipoda	Hyalellidae	Hyalella	azteca	Scud	23.4972	10.35		0.939888	31.5		
Chordata	Actinopterygii	Salmoniformes	Salmonidae	Salvelinus	namaycush	Lake trout, siscowet	27.7128	12.21		1.108512	33.3		
Chordata	Actinopterygii	Salmoniformes	Salmonidae	Oncorhynchus	mykiss	Rainbow trout,donaldson trout	28.6862	12.64		1.147448	35.0		
Chordata	Actinopterygii	Perciformes	Centrarchidae	Micropterus	salmoides	Largemouth bass	32	14.10		1.28	36.8		
Arthropoda	Malacostraca	Amphipoda	Gammaridae	Gammarus	pulex	Scud	32.4326	14.29	0.8		38.5		
Chordata	Actinopterygii	Salmoniformes	Salmonidae	Oncorhynchus	kisutch	Coho salmon,silver salmon	37.2878	16.43		1.491512	40.3		
Chordata	Actinopterygii	Salmoniformes	Salmonidae	Oncorhynchus	tshawytscha	Chinook salmon	40	17.62		1.6	42.1		
Chordata	Actinopterygii	Salmoniformes	Salmonidae	Salvelinus	fontinalis	Brook trout	44.3	19.52		1.772	43.8		
Chordata	Actinopterygii	Siluriformes	Ictaluridae	Ictalurus	punctatus	Channel catfish	46.4327	20.45		1.857308	45.6		
Arthropoda	Insecta	Ephemeroptera	Baetidae	Cloeon	sp.	Mayfly	50	22.03		2	47.3		
Chordata	Actinopterygii	Perciformes	Cichlidae	Tilapia	zillii	Tilapia	50.2729	22.15		2.010916	49.1		
Chordata	Actinopterygii	Perciformes	Centrarchidae	Lepomis	macrochirus	Bluegill	50.4018	22.20	29.9833		50.8		
Chordata	Actinopterygii	Siluriformes	Ictaluridae	Ameiurus	melas	Channel catfish	64	28.19		2.56	52.6		
Arthropoda	Malacostraca	Amphipoda	Gammaridae	Gammarus	lacustris	Scud	64.9923	28.63		2.599692	54.3		
Chordata	Actinopterygii	Cypriniformes	Cyprinidae	Pimephales	promelas	Fathead minnow	69.0567	30.42	9.1		56.1		
Arthropoda	Insecta	Diptera	Culicidae	Aedes	aegypti	Yellow fever mosquito	74.8331	32.97		2.993324	57.8		
Chordata	Actinopterygii	Perciformes	Centrarchidae	Lepomis	cyanellus	Green sunfish	76.2234	33.58		3.048936	59.6		
Chordata	Actinopterygii	Perciformes	Centrarchidae	Lepomis	microlophus	Redear sunfish	83	36.56		3.32	61.4		
Chordata	Actinopterygii	Cypriniformes	Cyprinidae	Leuciscus	idus	Carp	90.1869	39.73		3.607476	63.1		
Arthropoda	Branchiopoda	Diplostraca	Daphniidae	Daphnia	carinata	Water flea	100	44.05		4	64.9		
Chordata	Actinopterygii	Cyprinodontiformes	Cyprinodontidae	Oryzias	latipes	Medaka, high-eyes	120	52.86		4.8	66.6		
Chordata	Actinopterygii	Cypriniformes	Cyprinidae	Carassius	auratus	Goldfish	128.6453	56.67		5.145812	68.4		
Chordata	Actinopterygii	Cyprinodontiformes	Poeciliidae	Gambusia	affinis	Western mosquitofish	130	57.27		5.2	70.1		
Chordata	Actinopterygii	Cypriniformes	Cyprinidae	Cyprinus	carpio	Carp	134.1641	59.10		5.366564	71.9		
Chordata	Actinopterygii	Cyprinodontiformes	Poeciliidae	Poecilia	reticulata	Guppy	138	60.79		5.52	73.6		
Chordata	Actinopterygii	Cypriniformes	Cyprinidae	Hypophthalmichthys	nobilis	Carp	170	74.89		6.8	75.4		
Arthropoda	Insecta	Diptera	Chironomidae	Chironomus	tentans	Midge	207	91.19	2.2		77.1		
Arthropoda	Insecta	Diptera	Chironomidae	Chironomus	thummi	Midge	235	103.52	1.1		78.9		
Chordata	Actinopterygii	Perciformes	Anabantidae	Anabas	testudineus	Climbing perch	240.2998	105.86	56		80.7		
Arthropoda	Insecta	Trichoptera	Hydropsychidae	Hydropsyche	angustipennis	Caddisfly	330	145.37		13.2	82.4		
Annelida	Oligochaeta	Haplotaxida	Tubificidae	Limnodrilus	hoffmeisteri	Tubificid worm, Oligochaete	430	189.43		17.2	84.2		
Mollusca	Gastropoda	Basommatophora	Physidae	Physa	fontinalis	Bladder snail	430	189.43		17.2	84.2		
Platyhelminthes	Turbellaria	Tricladida	Planariidae	Polycelis	tenuis	Turbellarian	430	189.43		17.2	84.2		
Arthropoda	Branchiopoda	Diplostraca	Daphniidae	Daphnia	pulex	Water flea	460	202.64		18.4	89.4		
Arthropoda	Branchiopoda	Diplostraca	Daphniidae	Daphnia	magna	Water flea	630.1788	277.61	33.1662		91.2		
Arthropoda	Branchiopoda	Diplostraca	Daphniidae	Simocephalus	serrulatus	Water flea	676.4614	298.00		27.058456	92.9		
Chordata	Amphibia	Anura	Hylidae	Pseudacris	triseriata	Western chorus frog	2674.883	1178.36		106.995328	94.7		
Chordata	Amphibia	Anura	Bufonidae	Bufo	woodhousei	Fowler's toad	3752.333	1653.01		150.093304	96.4		
Annelida	Oligochaeta	Haplotaxida	Tubificidae	Tubifex	tubifex	Tubificid worm	4000	1762.11		160	98.2		
Rotifera	Monogononta	Ploima	Brachionidae	Brachionus	calyciflorus	Rotifer	22500	9911.89		900	100.0		
Arthropoda	Branchiopoda	Diplostraca	Daphniidae	Ceriodaphnia	dubia	Water flea		0.00	8.3247				
Arthropoda	Insecta	Ephemeroptera	Baetidae	Baetis	sp.	Mayfly		0.00	0.8				
Rotifera	Monogononta	Ploima	Brachionidae	Brachionus	angularis	Rotifer		0.00	12				
Rotifera	Monogononta	Ploima	Brachionidae	Brachionus	rubens	Rotifer		0.00	55				
Chlorophyta	Chlorophyceae	Chlorococcales	Scenedesmaceae	Scenedesmus	abundans	Green algae		0.00	2500				
Chlorophyta	Chlorophyceae	Volvocales	Chlamydomonadaceae	Chlamydomonas	reinhardtii	Green algae		0.00	1388.0998				

Phylum	Class	Order	Family	Genus	Species	Common Name	Mean LC50 (ug/L)	Acute EC_A (LC_{50}/2.27)	Meas NOEC	Est NOEC	Mean Acute EC_A Percentile	5th percentile acute ECA=	1.396476
Surrogate species													
Chordata	Actinopterygii	Siluriformes	Clariidae	Clarias	batrachus	Walking catfish	1.1	0.48		0.044	0.0	**5th percentile acute ECA =**	**4.709907**
Chordata	Actinopterygii	Salmoniformes	Salmonidae	Salmo	trutta	Brown trout	8.5194	3.75		0.340776	15.7	**fish only**	
Chordata	Actinopterygii	Perciformes	Percidae	Perca	flavescens	Yellow perch	23	10.13		0.92	29.8		
Chordata	Actinopterygii	Salmoniformes	Salmonidae	Salvelinus	namaycush	Lake trout, siscowet	27.7128	12.21		1.108512	33.3		
Chordata	Actinopterygii	Perciformes	Centrarchidae	Micropterus	salmoides	Largemouth bass	32	14.10		1.28	36.8		
Chordata	Actinopterygii	Salmoniformes	Salmonidae	Salvelinus	fontinalis	Brook trout	44.3	19.52		1.772	43.8		
Chordata	Actinopterygii	Siluriformes	Ictaluridae	Ictalurus	punctatus	Channel catfish	46.4327	20.45		1.857308	45.6		
Chordata	Actinopterygii	Perciformes	Cichlidae	Tilapia	zillii	Tilapia	50.2729	22.15		2.010916	49.1		
Chordata	Actinopterygii	Perciformes	Centrarchidae	Lepomis	macrochirus	Bluegill	50.4018	22.20	29.9833		50.8		
Chordata	Actinopterygii	Siluriformes	Ictaluridae	Ameiurus	melas	Channel catfish	64	28.19		2.56	52.6		
Chordata	Actinopterygii	Cypriniformes	Cyprinidae	Pimephales	promelas	Fathead minnow	69.0567	30.42	9.1		56.1		
Chordata	Actinopterygii	Perciformes	Centrarchidae	Lepomis	cyanellus	Green sunfish	76.2234	33.58		3.048936	59.6		
Chordata	Actinopterygii	Perciformes	Centrarchidae	Lepomis	microlophus	Redear sunfish	83	36.56		3.32	61.4		
Chordata	Actinopterygii	Cypriniformes	Cyprinidae	Leuciscus	idus	Carp	90.1869	39.73		3.607476	63.1		
Chordata	Actinopterygii	Cyprinodontiformes	Cyprinodontidae	Oryzias	latipes	Medaka, high-eyes	120	52.86		4.8	66.6		
Chordata	Actinopterygii	Cypriniformes	Cyprinidae	Carassius	auratus	Goldfish	128.6453	56.67		5.145812	68.4		
Chordata	Actinopterygii	Cyprinodontiformes	Poeciliidae	Gambusia	affinis	Western mosquitofish	130	57.27		5.2	70.1		
Chordata	Actinopterygii	Cypriniformes	Cyprinidae	Cyprinus	carpio	Carp	134.1641	59.10		5.366564	71.9		
Chordata	Actinopterygii	Cyprinodontiformes	Poeciliidae	Poecilia	reticulata	Guppy	138	60.79		5.52	73.6		
Chordata	Actinopterygii	Cypriniformes	Cyprinidae	Hypophthalmichthys	nobilis	Carp	170	74.89		6.8	75.4		
Chordata	Actinopterygii	Perciformes	Anabantidae	Anabas	testudineus	Climbing perch	240.2998	105.86	56		80.7		
Listed species													
Chordata	Actinopterygii	Salmoniformes	Salmonidae	Oncorhynchus	mykiss	Rainbow trout,donaldson trout	28.6862	12.64		1.147448	35.0		
Chordata	Actinopterygii	Salmoniformes	Salmonidae	Oncorhynchus	kisutch	Coho salmon,silver salmon	37.2878	16.43		1.491512	40.3		
Chordata	Actinopterygii	Salmoniformes	Salmonidae	Oncorhynchus	tshawytscha	Chinook salmon	40	17.62		1.6	42.1		
Prey species													
Arthropoda	Insecta	Plecoptera	Pteronarcyidae	Pteronarcys	californica	Stonefly	2.1213	0.93		0.084852	1.7	**5th percentile acute ECA =**	**1.370044**
Arthropoda	Insecta	Heteroptera	Notonectidae	Notonecta	undulata	Backswimmer	3	1.32		0.12	3.5	**Invertebrates only**	
Arthropoda	Crustacea	Podocopa	Cypridopsidae	Cypridopsis	vidua	Ostracod, Seed shrimp	3.2	1.41		0.128	5.2		
Arthropoda	Insecta	Diptera	Chaoboridae	Chaoborus	sp.	Phantom midge	3.3	1.45		0.132	7.0		
Mollusca	Gastropoda	Basommatophora	Lymnaeidae	Lymnaea	stagnalis	Great pond snail	3.3	1.45		0.132	7.0		
Arthropoda	Insecta	Diptera	Chaoboridae	Chaoborus	flavicans	Midge	4	1.76		0.16	10.5		
Arthropoda	Insecta	Diptera	Culicidae	Aedes	cantator	Mosquito	4.7	2.07		0.188	12.2		
Arthropoda	Insecta	Diptera	Culicidae	Aedes	vexans	Mosquito	4.7	2.07		0.188	12.2		
Arthropoda	Malacostraca	Isopoda	Asellidae	Asellus	brevicaudus	Aquatic sowbug	10	4.41		0.4	17.5		
Arthropoda	Insecta	Diptera	Culicidae	Aedes	punctor	Mosquito	10.4	4.58		0.416	19.2		
Arthropoda	Malacostraca	Amphipoda	Gammaridae	Gammarus	fasciatus	Scud	10.4881	4.62	4.3		21.0		
Arthropoda	Malacostraca	Decapoda	Palaemonidae	Palaemonetes	kadiakensis	Grass shrimp,freshwater prawn	15.5227	6.84		0.620908	22.8		
Arthropoda	Insecta	Coleoptera	Haliplidae	Peltodytes	sp.	Beetle	20	8.81		0.8	24.5		
Arthropoda	Insecta	Zygoptera	Lestidae	Lestes	congener	Damselfly	20	8.81		0.8	24.5		
Arthropoda	Insecta	Diptera	Chironomidae	Chironomus	plumosus	Midge	20.5917	9.07		0.823668	28.0		
Arthropoda	Malacostraca	Amphipoda	Hyalellidae	Hyalella	azteca	Scud	23.4972	10.35		0.939888	31.5		
Arthropoda	Malacostraca	Amphipoda	Gammaridae	Gammarus	pulex	Scud	32.4326	14.29	0.8		38.5		
Arthropoda	Insecta	Ephemeroptera	Baetidae	Cloeon	sp.	Mayfly	50	22.03		2	47.3		
Arthropoda	Malacostraca	Amphipoda	Gammaridae	Gammarus	lacustris	Scud	64.9923	28.63		2.599692	54.3		
Arthropoda	Insecta	Diptera	Culicidae	Aedes	aegypti	Yellow fever mosquito	74.8331	32.97		2.993324	57.8		
Arthropoda	Branchiopoda	Diplostraca	Daphniidae	Daphnia	carinata	Water flea	100	44.05		4	64.9		
Arthropoda	Insecta	Diptera	Chironomidae	Chironomus	tentans	Midge	207	91.19	2.2		77.1		
Arthropoda	Insecta	Diptera	Chironomidae	Chironomus	thummi	Midge	235	103.52	1.1		78.9		
Arthropoda	Insecta	Trichoptera	Hydropsychidae	Hydropsyche	angustipennis	Caddisfly	330	145.37		13.2	82.4		
Annelida	Oligochaeta	Haplotaxida	Tubificidae	Limnodrilus	hoffmeisteri	Tubificid worm, Oligochaete	430	189.43		17.2	84.2		
Mollusca	Gastropoda	Basommatophora	Physidae	Physa	fontinalis	Bladder snail	430	189.43		17.2	84.2		
Platyhelminthes	Turbellaria	Tricladida	Planariidae	Polycelis	tenuis	Turbellarian	430	189.43		17.2	84.2		
Arthropoda	Branchiopoda	Diplostraca	Daphniidae	Daphnia	pulex	Water flea	460	202.64		18.4	89.4		
Arthropoda	Branchiopoda	Diplostraca	Daphniidae	Daphnia	magna	Water flea	630.1788	277.61	33.1662		91.2		
Arthropoda	Branchiopoda	Diplostraca	Daphniidae	Simocephalus	serrulatus	Water flea	676.4614	298.00		27.058456	92.9		
Annelida	Oligochaeta	Haplotaxida	Tubificidae	Tubifex	tubifex	Tubificid worm	4000	1762.11		160	98.2		
Rotifera	Monogononta	Ploima	Brachionidae	Brachionus	calyciflorus	Rotifer	22500	9911.89		900	100.0		


Lindane acute C_A = 0.95 ug/L
Potentially Affected Fraction of Species
Lindane acute EC_A concentration in freshwater, ug/L
0
10
20
30
40
50
60
70
80
90
100
0.1
1
10
100
1000
10000
Climbing perch
Carp
Guppy
Carp
Mosquitofish
Goldfish
Medaka
Carp
Redear sunfish
Green sunfish
Fathead minnow
Bluegill
Channel catfish
Tilapia
Channel catfish
Brook trout
Chinook salmon
Coho salmon
Largemouth bass
Rainbow trout
Yellow perch
Lake trout
Brown trout
Walking catfish
Prey and non-ESA species
Surrogate species
ESA Listed Species

Helle B. Andersen

From: PETERSON Jenn L [PETERSON.Jenn@deq.state.or.us]
Sent: Tuesday, October 30, 2007 4:01 PM
To: Helle B. Andersen; rcaldwell@nwaquatic.com
Subject: Diazinon

I mentioned during the lab visit that I may have a contact to get some diazinon. Can you be specific about what you need? Do you need technical grade (I am assuming?), and how much?

I know I can get commercial formulations, but technical grade may be harder. You may have already solved the problem by now as well.

Let me know-

Jennifer L. Peterson, PhD
Environmental Toxicologist
Oregon Department of Environmental Quality, NW Region Portland Harbor Section 2020 SW 4th Ave., Suite 400 Portland, Oregon 97201
Phone: (503) 229-6770
Fax: (503) 229-6899
peterson.jennifer@deq.state.or.us

John Toll

From: Blischke.Eric@epamail.epa.gov
Sent: Wednesday, October 31, 2007 1:37 PM
To: John Toll; Humphrey.Chip@epamail.epa.gov; Shephard.Burt@epamail.epa.gov
Cc: Gene Revelas; Jim.McKenna@portofportland.com; ricka@bes.ci.portland.or.us; rjw@nwnatural.com; Valerie Oster
Subject: Re: NAS audits and visit

John, EPA's visit to the NAS lab during the lamprey ammocoete toxicity testing program did not identify any issues. In general, EPA believes that NAS is doing an excellent job with the tests. We do not have any concerns about the laboratory's ability to successfully complete the study.

Eric

"John Toll"
<johnt@windwardenv.com>
10/31/2007 01:29 PM

To
Eric Blischke/R10/USEPA/US@EPA

cc
"Gene Revelas" <grevelas@integral-corp.com>, "Valerie Oster" <voster@anchorenv.com>, <rjw@nwnatural.com>, <Jim.McKenna@portofportland.com>, <ricka@bes.ci.portland.or.us>

Subject
NAS audits and visit

Hi Eric. I'm writing to check on the outcomes of your two audits of the NAS for the lamprey ammocoete toxicity testing program. To the LWG's knowledge, the audits raised no concerns regarding the testing program. Can you confirm that for us? Also, would you please let us know whether, and if so how your team documented the audits? John

John Toll, Partner
Windward Environmental LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119-3958
(206) 812-5433
(206) 913-3292 (cell)
www.windwardenv.com

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Helle B. Andersen

From: Helle B. Andersen
Sent: Thursday, November 01, 2007 12:18 PM
To: Burt Shephard (shephard.burt@epa.gov)
Cc: John Toll; Lisa Saban; 'Valerie Oster'; 'Gene Revelas'; 'McKenna, James (Jim)'; 'ricka@bes.ci.portland.or.us'; 'Robert Wyatt (rjw@nwnatural.com)'
Subject: Diazinon

Burt,
As you know we are having difficulties buying diazinon for the lamprey ammocoetes toxicity testing at a reasonable price. We have call up several suppliers and for the amount needed (100 g) the cost is around $4-5K. Last we talked about this you suggested that may you or other agency members could help us out finding diazinon at a more reasonable price. In our search for a supplier we ran across an EPA website and we thought that you could maybe request the diazinon from them (http://www.epa.gov/oppbead1/labs/analyticalchem_lab.htm#standards). The laboratory needs 100g reagent or analytical grade (>97% if possible) diazinon.
Thanks a lot for looking into this.
Helle

Helle B. Andersen
Windward Environmental LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119

Direct Line (206) 577-1287
Phone (206) 378-1364
Fax (206) 217-0089
hellea@windwardenv.com

This communication is made under the framework of the LWG Participation Agreement and in the parties' common interests in meeting LWG member obligations under the Administrative Order on Consent and in anticipation of litigation concerning liability for the Portland Harbor Superfund site. This communication is intended and believed by the parties to be part of an ongoing and joint effort to develop and maintain a common legal strategy and contains strategies, work product and legal advice within the "common interest" extension of the attorney-client privilege and the work product doctrine. This communication may include attorney-client communications. With respect to communications by private LWG members to public members, those communications are with the expectation that they will be kept confidential by the public entities. The information is intended to be for the use of the individual or entity named above. If you are not the intended recipient, please be aware that any disclosure, copying, distribution or use of the contents of this information is prohibited. If you have received this electronic transmission in error, please notify us by electronic mail at hellea@windwardenv.com.

John Toll

From: John Toll
Sent: Monday, November 19, 2007 12:08 PM
To: Helle B. Andersen; 'Blischke.Eric@epamail.epa.gov'; Burt Shephard (shephard.burt@epa.gov)
Cc: Lisa Saban; 'Jessica Pisano'; 'Gene Revelas'; 'Valerie Oster'; 'McKenna, James (Jim)'; 'ricka@bes.ci.portland.or.us'; 'Robert Wyatt (rjw@nwnatural.com)'
Subject: RE: Lamprey flow-through test with naphthalene

Eric, Burt et al., As we did with lindane, our next steps will include looking at the relative sensitivity of ammocoetes to naphthalene (i.e., comparing literature LC50s for other species to the test concentrations used in this test), and comparing test concentrations to literature data on naphthalene solubility. We'll let you know what we find. Again as for lindane, any data you might have available on naphthalene species sensitivity distributions would of course be welcome. John

John Toll, Partner
Windward Environmental LLC
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From: Helle B. Andersen
Sent: Monday, November 19, 2007 11:44 AM
To: Blischke.Eric@epamail.epa.gov; Burt Shephard (shephard.burt@epa.gov)
Cc: Lisa Saban; John Toll; Jessica Pisano; Gene Revelas; Valerie Oster; 'McKenna, James (Jim)'; ricka@bes.ci.portland.or.us; 'Robert Wyatt (rjw@nwnatural.com)'
Subject: Lamprey flow-through test with naphthalene

Eric and Burt,
The flow-through test with naphthalene ended yesterday. The test passed the acceptability criterion (<10% mortality in the control) but unfortunately only about 50% died in the highest concentration. Right now the lab is summarizing the data and I'll let you know when we know more (estimated concentrations in exposure chambers etc). NAS would like to proceed with the lamprey testing right after Thanksgiving so we would have to reach a decision on how to proceed preferable by early next week.
Thanks Helle

Helle B. Andersen
Windward Environmental LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119

Direct Line (206) 577-1287
Phone (206) 378-1364
Fax (206) 217-0089
hellea@windwardenv.com

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attorney-client communications. With respect to communications by private LWG members to public members, those communications are with the expectation that they will be kept confidential by the public entities. The information is intended to be for the use of the individual or entity named above. If you are not the intended recipient, please be aware that any disclosure, copying, distribution or use of the contents of this information is prohibited. If you have received this electronic transmission in error, please notify us by electronic mail at hellea@windwardenv.com.

Helle B. Andersen

From: PETERSON Jenn L [PETERSON.Jenn@deq.state.or.us]
Sent: Wednesday, November 21, 2007 1:31 PM
To: Helle B. Andersen
Subject: Diazinon

Importance: High

Helle-

I just spoke with James Whitehead of MANA industries regarding the diazinon. A fresh batch of pure product from Israel should be available sometime in mid-December, but for sure by the end of the year. Because he knows we need it ASAP he is checking to see if they have some warehoused in the US - he should know for sure if this is the case by next week.

I know this is delayed from his previous estimates. I wanted to let you know in case these timeframes are not workable and you would like to explore other options. Right now he has the lab address and as soon as 100 grams is located it will be sent out. He is also supposed to let me know next week if a US source is located.

Jennifer L. Peterson, PhD
Environmental Toxicologist
Oregon Department of Environmental Quality, NW Region
Portland Harbor Section
2020 SW 4th Ave., Suite 400
Portland, Oregon 97201
Phone: (503) 229-6770
Fax: (503) 229-6899
peterson.jennifer@deq.state.or.us

Helle B. Andersen

From: Helle B. Andersen
Sent: Wednesday, November 21, 2007 3:44 PM
To: Burt Shephard (shephard.burt@epa.gov)
Cc: Lisa Saban; John Toll; Mike Johns; 'Gene Revelas'; 'Jessica Pisano'; 'Valerie Oster'; 'McKenna, James (Jim)'; 'ricka@bes.ci.portland.or.us'; 'Robert Wyatt (rjw@nwnatural.com)'
Subject: peliminary lamprey toxicity data with naphthalene
Attachments: Naphthalene draft survival data.pdf

Burt,
Attached please find the preliminary lamprey toxicity data for the range-finding and flow-through tests with naphthalene. As you can see the only partial mortality occurred in the highest concentration. We should talk early next week about the path forward (whether the lab can continue with pentachlorophenol or they should perform another test with naphthalene).
Have a great Thanksgiving.
Helle

Helle B. Andersen
Windward Environmental LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119

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Phone (206) 378-1364
Fax (206) 217-0089
hellea@windwardenv.com

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Helle B. Andersen

From: PETERSON Jenn L [PETERSON.Jenn@deq.state.or.us]
Sent: Monday, December 03, 2007 2:12 PM
To: Helle B. Andersen
Subject: Diazinon

Hi Helle-

I just sent James an e-mail asking if he had more updated information on its arrival. I will forward it to you as soon as he writes me back. If you find that the timeline is becoming un-workable and decide to order some, please let me know so I can get back with him to cancel the shipment.

Jennifer L. Peterson, PhD
Environmental Toxicologist
Oregon Department of Environmental Quality, NW Region
Portland Harbor Section
2020 SW 4th Ave., Suite 400
Portland, Oregon 97201
Phone: (503) 229-6770
Fax: (503) 229-6899
peterson.jennifer@deq.state.or.us

Helle B. Andersen

From: Shephard.Burt@epamail.epa.gov
Sent: Monday, December 03, 2007 2:25 PM
To: Helle B. Andersen
Cc: Blischke.Eric@epamail.epa.gov; Humphrey.Chip@epamail.epa.gov; Goulet.Joe@epamail.epa.gov; rgensemer@parametrix.com
Subject: Re: Naphthalene testing recommendations

Helle,

After talking with several individuals, I'm recommending that you proceed with the toxicity testing on the remaining two chemicals, pentachlorophenol and diazinon, instead of performing a repeat of the naphthalene test. The worst that can come out of the existing naphthalene definitive test witll be an LC50 with either no confidence limits or very wide confidence limits. Sufficient information was obtained to provide an indication of the protectiveness of water column naphthalene TRVs to Pacific lamprey, the primary objective of the study. In my opinion, it is more important to obtain toxicity data for the remaining two chemicals with the remaining ammocoetes than it is to attempt to refine the existing naphthalene results.

Best regards,

Burt Shephard
Risk Evaluation Unit
Office of Environmental Assessment (OEA-095) U.S. Environmental Protection Agency, Region 10
1200 6th Avenue Seattle, WA 98101

Telephone: (206) 553-6359
Fax: (206) 553-0119

e-mail: Shephard.Burt@epa.gov

"If your experiment needs statistics to analyze the results, then you ought to have done a better experiment"
- Ernest Rutherford

Helle B. Andersen

From: PETERSON Jenn L [PETERSON.Jenn@deq.state.or.us]
Sent: Monday, December 10, 2007 11:04 AM
To: Helle B. Andersen
Cc: rcaldwell@nwaquatic.com
Subject: FW: Diazinon Sample

Helle-

Here is the message from James regarding the diazinon. I hope this works for you!

-Jennifer

-----Original Message-----
From: James Whitehead [mailto:jamesw@manainc.com]
Sent: Monday, December 10, 2007 11:05 AM
To: PETERSON Jenn L
Subject: RE: Diazinon Sample

Hello Jenn,

The tech sample is usually a very viscous material and under some conditions crystals may form in the tech.

I am told the samples are ready to ship from Israel. I am pushing the shippers so we can make the deadline.

With best regards,

James Whitehead
Makhteshim Agan of North America
302 Deer Run North
Oxford, MS 38655
662-513-4333 Office
601-594-2743 Mobile

Helle B. Andersen

From: Blischke.Eric@epamail.epa.gov
Sent: Tuesday, December 11, 2007 9:40 AM
To: Helle B. Andersen
Cc: Shephard.Burt@epamail.epa.gov; Goulet.Joe@epamail.epa.gov; John Toll; Lisa Saban
Subject: RE: Lamprey Toxicity Testing Update

Thanks for the update.

Eric

"Helle B. Andersen" <helleb@windwardenv.com>
12/11/2007 09:30 AM

To: Eric Blischke/R10/USEPA/US@EPA
cc: Burt Shephard/R10/USEPA/US@EPA, Joe Goulet/R10/USEPA/US@EPA, "John Toll" <johnt@windwardenv.com>, "Lisa Saban" <lisas@windwardenv.com>
Subject: RE: Lamprey Toxicity Testing Update

Eric,
Last Monday Burt recommended that NAS continued testing with pentachlorophenol and diazinon. The lab is setting up the pentachlorophenol test either today or tomorrow (depending on how comfortable they are with the diluter system and maintaining the concentration). The diazinon has not come in yet. I have been e-mailing Jennifer who arranged for the contact with the supplier. Unfortunately the shipment from Israel was delayed but it sounds like it may arrive sometime here in December. As a back-up we have found another source that can ship it out tomorrow. The price is about $5,400 for 70g.
Depending on request for retesting any of the chemicals I'm expecting the testing to be completed in January.
Helle

-----Original Message-----
From: Blischke.Eric@epamail.epa.gov
[mailto:Blischke.Eric@epamail.epa.gov]
Sent: Tuesday, December 11, 2007 9:05 AM
To: Helle B. Andersen
Cc: Shephard.Burt@epamail.epa.gov; Goulet.Joe@epamail.epa.gov
Subject: Lamprey Toxicity Testing Update

Helle, can you provide me with an update of the lamprey toxicity testing? Did the Diazinon come in? When will the testing be complete?
I believe Burt provided you guidance on the naphthalene testing. Are there any outstanding questions regarding the naphthalene.

Thanks, Eric

Helle B. Andersen

From: PETERSON Jenn L [PETERSON.Jenn@deq.state.or.us]
Sent: Tuesday, December 11, 2007 4:30 PM
To: Helle B. Andersen
Subject: FW: Diazinon Sample

Helle-

Here is an update from James. If you don't think this timeframe work I would go ahead and order it.

-Jennifer

-----Original Message-----
From: James Whitehead [mailto:james.whitehead1@worldnet.att.net]
Sent: Tuesday, December 11, 2007 3:29 PM
To: PETERSON Jenn L
Subject: RE: Diazinon Sample

Hello Jenn,

I have no further update but the sample should be here by late December. The exact timing will depend on how fast EPA and Customs clear the sample into the US.

With best regards,

James Whitehead
Makhteshim Agan of North America
302 Deer Run North
Oxford, MS 38655
662-513-4333 Office
601-594-2743 Mobile

From: PETERSON Jenn L [mailto:PETERSON.Jenn@deq.state.or.us]
Sent: Tuesday, December 11, 2007 7:20 PM
To: James Whitehead
Subject: RE: Diazinon Sample

Hi James,

Could you let me know an estimated arrival date based on what you know now (estimated ship date from Israel)? Thanks - I will pass the info on to the lab.

Jennifer L. Peterson, PhD
Environmental Toxicologist
Oregon Department of Environmental Quality, NW Region
Portland Harbor Section
2020 SW 4th Ave., Suite 400
Portland, Oregon 97201
Phone: (503) 229-6770
Fax: (503) 229-6899
peterson.jennifer@deq.state.or.us

Helle B. Andersen

From: PETERSON Jenn L [PETERSON.Jenn@deq.state.or.us]
Sent: Thursday, January 10, 2008 9:25 AM
To: Helle B. Andersen; rcaldwell@nwaquatic.com
Subject: Diazinon

Hi Helle-

With the craziness of December, I must not have told James we didn't need the diazinon after you decided to order it. Since it is supposed to be delivered today, I don't think I can stop it, but I am sure we can arrange to have it sent back if necessary.

-Jennifer

-----Original Message-----
From: James Whitehead [mailto:jamesw@manainc.com]
Sent: Wednesday, January 09, 2008 3:45 PM
To: PETERSON Jenn L
Subject: FW: FedEx Shipment Notification

Hello Jennifer,

Just a note ot let you know that the Diazinon tech sample finally cleared Customs and EPA and has been shipped to Northwestern Aquatic Sciences for delivery on Thursday.

With best regards,

James Whitehead
Makhteshim Agan of North America
302 Deer Run North
Oxford, MS 38655
662-513-4333 Office
601-594-2743 Mobile

From: TrackingUpdates@fedex.com [mailto:TrackingUpdates@fedex.com]
Sent: Wednesday, January 09, 2008 2:32 PM
To: James Whitehead
Subject: FedEx Shipment Notification

This tracking update has been requested by:

Company Name: Donna Landis / LABSERVICES
Name: Shipped for Makhteshim Agan NA
E-mail: donna@labservices.com

Message: Shipped for Makhteshim-Agan N.A.,Diazinon Tech (100gr)

Shipped for Makhteshim Agan NA of Donna Landis / LABSERVICES sent Dick Caldwell of Northwestern Aquatic Sciences 1 FedEx Standard Overnight package(s).

This shipment is scheduled to be sent on 01/09/2008.

Reference information includes:

Reference: Product 045

Tracking number: 792628166999

To track the latest status of your shipment, click on the tracking number above, or visit us at fedex.com.
To learn more about FedEx Express, please visit our website at fedex.com.
This tracking update has been sent to you by FedEx on the behalf of the Requestor noted above. FedEx does not validate the authenticity of the requestor and does not validate, guarantee or warrant the authenticity of the request, the requestor's message, or the accuracy of this tracking update. For tracking results and fedex.com's terms of use, go to fedex.com.

Thank you for your business.

Helle B. Andersen

From: Shephard.Burt@epamail.epa.gov
Sent: Thursday, January 24, 2008 12:27 PM
To: Helle B. Andersen
Subject: Re: Update on the lamprey toxicity testing

Helle,

Thanks for the update, but the electrons got scrambled somewhere between Windward and EPA, I can't read your tables of results. Do you have them in a Word or Excel file that you can attach to an e-mail? Regarding LC50 calculations, an acceptable presentation of results is LC50 > value, which is occasionally done in the datasets used by EPA to derive ambient water quality criteria. Might be a way to back out an LC50 for the test where your only partial mortality is the 50% level.

Best regards,

Burt Shephard
Risk Evaluation Unit
Office of Environmental Assessment (OEA-095) U.S. Environmental Protection Agency, Region 10
1200 6th Avenue Seattle, WA 98101

Telephone: (206) 553-6359
Fax: (206) 553-0119

e-mail: Shephard.Burt@epa.gov

"If your experiment needs statistics to analyze the results, then you ought to have done a better experiment"
- Ernest Rutherford

John Toll

From: John Toll
Sent: Friday, February 08, 2008 1:45 PM
To: Blischke.Eric@epamail.epa.gov; Jim.McKenna@portofportland.com; rjw@nwnatural.com; ricka@bes.ci.portland.or.us
Cc: Humphrey.Chip@epamail.epa.gov; Shephard.Burt@epamail.epa.gov; Goulet.Joe@epamail.epa.gov; Helle B. Andersen; Lisa Saban; Mike Johns
Subject: RE: Lamprey Toxicity Testing

Thanks Eric; we'll notify NAS. John

-----Original Message-----
From: Blischke.Eric@epamail.epa.gov [mailto:Blischke.Eric@epamail.epa.gov]
Sent: Friday, February 08, 2008 1:39 PM
To: Jim.McKenna@portofportland.com; rjw@nwnatural.com; ricka@bes.ci.portland.or.us
Cc: Humphrey.Chip@epamail.epa.gov; John Toll; Shephard.Burt@epamail.epa.gov; Goulet.Joe@epamail.epa.gov
Subject: Lamprey Toxicity Testing

All, just to confirm a phone conversation I had with John Toll, EPA has determined that the lamprey water toxicity testing is complete. The lab may break down the diluters and associated lab equipment.

We have not yet reached a decision on whether to perform the lamprey ammocoete tissue chemical analysis. As everyone should recall, this issue was tabled last fall in an interest in getting the toxicity testing started. We are reconsidering our position regarding the tissue testing in light of the preliminary toxicity testing results.

If you have any questions about this, please let me know.

Thanks, Eric

Helle B. Andersen

From: Blischke.Eric@epamail.epa.gov
Sent: Monday, March 10, 2008 6:00 PM
To: Helle B. Andersen
Cc: Gene Revelas; John Toll; Lisa Saban; McKenna, James (Jim); ricka@bes.ci.portland.or.us; rjw@nwnatural.com; Valerie Oster; Shephard.Burt@epamail.epa.gov; Humphrey.Chip@epamail.epa.gov
Subject: Re: Analysis of lamprey tissue samples

Helle, sorry to have taken so long to get back to you.

We discussed this at last Wednesday's TCT meeting. As you are aware, the purpose of the water toxicity testing was to determine the relative sensitivity of the lamprey ammocoetes to a range of contaminants based on mode of toxic action. The testing that was performed was generally successful in developing LC50s which may be used to evaluate the range of sensitivity of lamprey ammocoetes based on exposure to water column contaminants. However, this information will not provide us with an estimate of the relative sensitivity as measured through body burden.
Currently, we have lamprey ammocoete tissue data collected from the Portland Harbor site. Although the number of lamprey ammocoete tissue samples collected was limited, a comparison of lamprey tissue body burdens to tissue-residue toxicity reference values (TRVs) may be used to evaluate risks to lamprey ammocoetes. Measuring tissue body burdens from the water toxicity testing will provide us with an estimate of the relative sensitivity of the lamprey ammocoetes based on another line of evidence - tissue-residue TRVs. Generally, there is good TRV information for most of the chemicals tested (i.e., lindane, copper, pentachlorophenol and diazinon). Secondarily, analysis of tissues from the toxicity tests will document contaminant exposure of the ammocoetes during the tests, a concern that has been raised by some on the government team.

Because the relative sensitivity of organisms exposed to chemicals as measured based on water exposures vs. body burden can vary, EPA is requesting chemical analysis of the lamprey ammocoetes for the water toxicity test chemicals. Organisms exposed to lindane should be analyzed to lindane; organisms exposed to copper should be analyzed for copper; etc. If sufficient numbers of ammocoetes are available, EPA requests separate analysis of the dead ammocoetes during each 24 hour observation period, as well as analysis of the remaining live ammocoetes at the end of the 96-hour exposure period. Ammocoetes from multiple replicates within a toxicity test may be pooled if needed to obtain sufficient tissue mass for analysis. This request assumes that the ammocoetes were stored in such a manner that permits this type of tissue analysis. EPA believes that this information will allow us to better evaluate the risks to lamprey ammocoetes as measured by whole body lamprey ammocoete tissue analysis collected from the Portland Harbor site.

Please let me know if you have any questions.

Thanks, Eric

"Helle B. Andersen" <helleb@windwardenv.com> 02/25/2008 10:53

To: Eric Blischke/R10/USEPA/US@EPA
cc: "John Toll"

AM <johnt@windwardenv.com>, "Gene Revelas" <grevelas@integral-corp.com>, "Valerie Oster" <voster@anchorenv.com>, "Lisa Saban" <lisas@windwardenv.com>, "McKenna, James \(Jim\)" <mckenj@portptld.com>, <ricka@bes.ci.portland.or.us>, <rjw@nwnatural.com>
Subject Analysis of lamprey tissue samples

Eric,
Last you spoke with WW regarding the analysis of the lamprey tissue samples you were going to ask your tech group whether they still requested this data. Did you reach any conclusion? To be able to meet the June 1 lockdown analysis of these samples should be initiated immediately.
Thanks Helle

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